Scientific Presentation Abstracts

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METALLIC IMPLANTS AT THE CRICOID IN EQUINE LARYNGOPLASTY LEAD TO LESS LOSS OF ABDUCTION AND MORE BIOMECHANICAL STABILITY IN EX VIVO TESTING. Brandenberger O[1], Rossignol F*[2], Perkins JD*[3], Lechartier A[1], Mespoulhès-Rivière C*[4], Vitte A[2], Rossignol A[2], Boening KJ*[5], Ducharme NG*[6]. [1]Clinique Vétérinaire de Grosbois & Clinique Equine de l' Ecole Nationale de Maisons Alfort, Boissy St Leger, France, [2]Clinique Vétérinaire de Grosbois, Boissy St Leger, France, [3]Department of Veterinary Clinical Sciences, Royal Veterinary College, North Mymms, United Kingdom, [4]Clinique Equine de l' Ecole Nationale de Maisons Alfort, Maisons Alfort, France, [5]August Winkhausstr. 62, Telgte, Germany, [6]College of Veterinary Medicine, Cornell University, Ithaca, NY.

Objective: To compare the loss of abduction and biomechanical stability of 3 double passages through the cricoid with the standard single passage in equine laryngoplasty surgery.

Study design: Experimental ex vivo with equine cadaveric larynges (n = 75).

Methods: Complete larynges were implanted and traction was applied only on the cricoid passage. The single passage with Ethibond® suture (CG) and 2 mm Fibertape (FG) was compared to 3 different double passages with 2 mm Fibertape: standard double loop passage (SDLP), U-shaped double passage (SU) and U-shaped double passage with a metallic button placed ventrally on the cricoid (SB).

Constructs were subjected to cyclic loading, oscillating from 5 to 50N for 3000 cycles, followed by a single cycle to failure. Loss of left to right arytenoid angle quotient (LRQ), mean displacement of the prosthesis during cyclic loading as well as the ultimate load in a single cycle to failure of these 4 constructs were compared with CG.

Results: SB and SU showed significantly less reduction of LRQ after cyclic loading (0.04 ± 0.09, 0.07 ± 0.07, respectively) than CG (0.15 ± 0.08).

SB, SU and SDLP exhibited significantly lower displacement during cyclic loading (1.1 ± 0.6 mm, 1.7 ± 0.7 mm, 2.7 ± 1 mm, respectively) than CG (4.5 ± 1.6 mm).

SB showed the highest load at failure (342 ± 52N) and was the only one significantly higher than CG (277 ± 47N).

Conclusion: The present ex vivo results suggest that the laryngoplasty suture should not be wrapped over the caudal edge of the cricoid during equine laryngoplasty and an application of a metallic button to the ventral aspect of the cricoid is recommended to decrease the loss of abduction, especially when the cricoid has no lateral notch.

A MORPHOLOGICAL STUDY OF THE EQUINE DORSAL AND VENTRAL NASAL CONCHAL BULLAE. Froydenlund TJ, Reardon RJM*, Smith SH, Dixon PM. Royal (Dick) School of Veterinary Studies, Edinburgh, Scotland, United Kingdom.

Introduction: The rostral aspects of the equine dorsal and ventral conchae enclose 2 bullae, namely the dorsal conchal bulla (DCB) and the ventral conchal bulla (VCB), respectively, both of which are subdivided by septae into a variable number of sections. The morphology of the bullae, their cellulae, drainage and histology are poorly described. The recent recognition that these bullae can become infected, causing chronic unilateral nasal discharge, has stimulated interest in these structures. Additional anatomical information would be useful for treating diseases of the bullae and planning surgical approaches.

Methods: Fourteen cadaveric horse heads were transected sagittally midline. The nasal septum and the medial walls of the spiral lamellae of the dorsal and ventral conchae were sharply excised to expose the nasal conchal bullae. The size and shape of the medial wall of the bullae was documented, with particular attention to the number and sites of drainage apertures. The medial walls of the bullae were then removed by careful sharp dissection. The dimensions of each bulla and the number of cellulae and septae were recorded. The drainage of each cellula was identified and coloured wires were used to demonstrate the drainage apertures. Samples were collected for histopathology.

Results: The mean lengths of the DCB and VCB were 77.7 mm and 57.1 mm, respectively; constituting 13.8% and 10.2% of head length, respectively. The mean widths of the DCB and VCB were 28.5 mm and 28.2 mm, respectively; equivalent to 5.1% and 5% of head length, respectively. The median number of drainage apertures from the DCB and VCB were 3 and 1, respectively. The median number of cellulae within the DCB and VCB were 3 and 2, respectively. No communications were identified between these bullae and the adjacent paranasal sinuses. Histology revealed that the outer covering of both bullae consisted of ciliated pseudostratified epithelium supported by a glandular submucosa, whilst the inner lining was mostly composed of a double layer of cuboidal-to-attenuated cells. There were thin plates of bone similar to nasal conchal bone in the walls.

Discussion and conclusion: The morphology of the equine nasal conchal bullae is very variable. The anatomy of the right and left sides of each horse are similar, though not identical. The DCB is generally a more complex structure than the VCB, containing more septae, cellulae and drainage apertures. An appreciation of the site and anatomy of the bullae is important since empyema of the nasal conchal bullae is a cause of unilateral nasal discharge. Transendoscopic lavage or surgical fenestration of the bullae are required for treatment.

CORRELATION BETWEEN THE CONFORMATION OF THE DISTAL FORELIMB AND SUPERFICIAL DIGITAL FLEXOR TENDON LESIONS IN FLAT RACING THOROUGHBREDS. Fugazzola MC[1], Lancioni I[1], Duran Graeff MC[2], Canonici F[3], Petrizzi L[1]. [1]University of Teramo, Teramo, Italy, [2]University of Saskatoon, Saskatoon, Canada, [3]Equine Practice srl, Roma, Italy.

Introduction: Scientific research on equine skeletal conformation and its correlation with athletic soundness has produced contradictory results and its importance remains debatable. The aim of the study was to determine the correlation between front limb conformation and the development of superficial digital flexor tendon (SDFT) lesions in flat racing Thoroughbred horses by means of digital measurements on radiographic images.

Methods: Ninety-three 4-year-old flat racing Thoroughbreds trained in the same training facility were included in the study; 66 horses were orthopedically sound and 27 had a history of a SDFT injury. Four different radiographic images of the distal aspect of both front limbs were taken from each horse. After testing the repeatability of 17 digitally measured parameters, these measurements were taken for all the animals. The possible effect of conformation measurements on lesion development was assessed by analysing the association between each measured variable and the sound/lesion status of the horse performing direct multiple regressions. Differences between the 2 groups for each parameter were analysed using t-statistics.

Results: None of the measured conformational parameters showed a strong association with the development of SDFT lesions. However sound horses showed a greater proximal interphalangeal dorsal joint angle than horses with a SDFT lesion. A smaller distal width of the middle phalanx (MP) was also associated with fewer tendon lesions.

Discussion: The different PIP joint angles might be explained by the fact that the angle of the PIP joint causes variations in the position and direction of the distal insertion of the SDFT on the proximal aspect of the MP. A higher leverage effect and a different torque around the MP might play a role in inducing higher tensile forces on the SDFT, thus explaining the higher incidence of lesions in the group with a smaller angle (greater hyperextension). Nevertheless these explanations remain of limited importance as multiple regression analysis showed no influence of the conformational parameters on lesion development. Large scale studies that analyse risk factors for the development of SDFT lesions include many other factors besides conformation such as advancing age, longer race distance, male gender, type of racing surface and trainer. Whilst race track, age and shoeing were factors that were highly consistent in our study population, there were still numerous other factors apart from conformation that may have had an influence on the development of SDFT lesions.

Conclusion: It appears that conformational traits of the distal aspect of the forelimb of flat racing Thoroughbreds are not a major contributing factor to the development of SDFT injury if analysed independently.

AN ALTERNATIVE SURGICAL APPROACH FOR COMPLETE REMOVAL OF THE MANICA FLEXORIA OF THE DIGITAL FLEXOR TENDON SHEATH. Hennessy SE, Clegg PD*, Milner PI. University of Liverpool, Equine Hospital, Philip Leverhulme, Faculty of Veterinary Science, South Wirral, United Kingdom.

Introduction: Injuries to the manica flexoria (MF) within the digital flexor tendon sheath (DFTS) are an important cause of lameness. MF removal can be accomplished via a closed approach but complete removal can be difficult to achieve. This study describes a technique to allow complete removal of the MF from its origin on the superficial digital flexor tendon (SDFT).

Methods: 15 cadaver hind limbs with no known DFTS pathology were placed in lateral recumbency. Endoscopy of the DFTS was performed through a standard approach. A medial instrument portal was made in the proximal DFTS, under endoscopic guidance, proximal to the origin of the MF between the SDFT and deep digital flexor tendon (DDFT). The dorsomedial border of the SDFT was sectioned using a No.12 scalpel blade and the cut edge of the medial border of the MF grasped with Halsted mosquito forceps. The dorsolateral margin of the MF was then sectioned using a lateral instrument portal as described for the dorsomedial margin. The MF was then removed from the DFTS through the medial portal, with any remaining proximal attachments sectioned using suction biopsy forceps. Limbs were then dissected to assess MF removal. Clinical cases with signs localising to the DFTS with an injury to the MF underwent the procedure as described above. Outcome for clinical cases was determined by telephone with a minimum of 6 months follow-up time.

Results: Complete removal of the MF was achieved in all 15 cadaver hind limb. Iatrogenic damage was minimal. Eleven clinical cases undergoing DFTS endoscopy with MF removal by the described approach were included. All cases involved the hind limb. 7/11 cases were Cob-types with a median age of 13 years and a mean presenting lameness of 2/5. MF tears were on the lateral aspect in 7/11 and on the medial in 4/11 cases. Plantar annular ligament (PAL) desmotomy was undertaken in 1/11 cases. Following surgery, 10/11 (91%) horses were sound with 8/11 (73%) back to previous level of work at the time of follow-up. DFTS effusion was resolved in 10/11 cases.

Conclusion: Complete removal of the MF can be achieved through a minimally invasive approach without the requirement to perform a PAL desmotomy.

ULTRASOUND-GUIDED, TENDON-SPARING, LATERAL NEEDLE APPROACH TO THE NAVICULAR BURSA: A CADAVERIC STUDY IN 58 EQUINE FORELIMBS. Nottrott K, Schramme M*, De Guio C, Khairoun A. Université de Lyon, VetAgro Sup, Campus Vétérinaire de Lyon, GREMERES, Marcy l'Etoile, France.

Introduction: Diagnosis and treatment of navicular disease in the horse often necessitates injection of the navicular bursa (NB). Radiographic and transcuneal ultrasonographic control techniques have been described to assess correct needle placement during bursocentesis. The aim of our study was to describe and demonstrate the efficacy of a lateral needle approach to the NB under ultrasonographic guidance using a microconvex probe placed axially to the lateral ungular cartilage visualizing needle advancement to the NB in the plane of the beam without penetration of the deep digital flexor tendon (DDFT).

Methods: The navicular bursa of 58 cadaveric forelimbs of 29 horses, euthanized for other reasons than lameness and positioned under flexion in a Hickman block, were injected with 1.5ml contrast fluid (Telebrix ®TM) followed by 0.5 ml methylene blue dye whilst slowly retracting the needle to investigate its pathway by dissection. Lateromedial radiographs were taken to locate the contrast fluid in the NB, digital flexor tendon sheath (DFTS), distal interphalangeal joint (DIPJ) or surrounding soft tissues. Time needed for probe placement and injection, as well as number of attempts for each injection were recorded. The depth of the injection site from the skin surface was measured.

Results: In 47/58 (81%) the bursa alone was injected, in 9/58 limbs (15.5%) the NB and the DIPJ, in 2/58 (3.4%) the adjacent soft tissues without intrathecal deposition, in 1/58 (1.7%) the DIPJ alone and in 1/58 (1.7%) the NB and the adjacent soft tissues. There was successful deposition of contrast medium in the NB in 55/58 (94.8%) specimens.No aberrant injection into the DFTS was detected. The average time from probe placement to injection was 147.63 seconds (SD +/− 61 sec), 1.59 (SD +/− 0.8) attempts for correct needle placement were used and the distance from skin surface to injection site was 43.5 mm (SD +/− 7 mm). In none of the limbs did the needle inadvertently penetrate the DDFT.

Discussion and conclusion: The results show the potential of this ultrasound-guided injection technique for diagnostic analgesia of the NB and treatment of navicular disease in live horses without penetrating the DDFT with the needle. Radiographic control may become unnecessary.

CRANIAL OSTECTOMY FOR THE TREATMENT OF IMPINGING DORSAL SPINOUS PROCESSES IN THE STANDING HORSE. A REPORT OF A NOVEL TECHNIQUE AND A RETROSPECTIVE EVALUATION OF 70 CASES. Poore LA, Suthers JM*, Crowe OM*, Hepburn RJ. The B & W Equine Hospital, Breadstone Berkeley, Gloucestershire, United Kingdom.

Introduction: Impingement of the dorsal spinous processes of the vertebrae of the thoracolumbar spine has been reported as the most common cause of back pain in the horse. The objectives of this study were to report a novel technique for treatment of impingement of DSP's in the standing horse and to report the long term outcome in 70 horses that had undergone treatment with this technique.

Methods: A novel technique of cranial ostectomy for the treatment of impinging DSPs in the standing horse is reported. The case records, including amnesis, clinical presentation, diagnostic imaging and surgical reports, of all horses that had undergone standing cranial ostectomy for impingement of DSP's at the B&W Equine Hospital between 2011 and 2014 were reviewed. The post-operative outcome and owner satisfaction were assessed by telephone questionnaire with the horse's carer.

Results: Of the 70 horses that were treated with the described technique, 35 horses (50%) had complete resolution of clinical signs and returned to the work that was intended. Three horses (4%) improved sufficiently to be used for some athletic work. Six horses (8.5%) returned to a lower level or work than was intended due to owners work commitments, injuries or confidence issues. Twenty two horses (31%) had resolution of back pain post-operatively but were unable to return to the work intended due to other orthopaedic, medical or behavioural problems. Cosmetic outcome was described as excellent in 60 horses (86%) and good in 10 horses (14%). There were no intra-operative complications. Ninety seven percent of owners would recommend this procedure for other cases of DSP impingement.

Discussion and conclusion: The presented data shows this technique of cranial ostectomy to be an effective treatment for impingement of DSPs in the horse with excellent cosmetic outcomes. As the technique is performed on standing horses, it results in short surgery times and has none of the potential complications or expenses of general anaesthesia.

EX VIVO BIOMECHANICAL COMPARISON OF FOUR SUTURE MATERIALS FOR LAPAROSCOPIC BLADDER CLOSURE IN A HORSE. Ruzickova P, Burns P, Frasch MG, Beauchamp G, Elce YA*. Université de Montréal, St. Hyacinthe, Canada.

Introduction: Surgery on the equine bladder generally occurs for 2 reasons - rupture and calculi removal. Urinary bladder rupture is most frequently diagnosed in male neonates and usually it presents clinically with signs associated with uroperitoneum. There is a trend of surgical procedures towards minimal invasive techniques in both human and veterinary medicine. Laparoscopic closure of the urinary bladder in equine patients has been reported but remains challenging. New generations of suture materials have been developed that do not require knots. This may reduce the challenges posed by laparoscopic closures of internal organs. The objective of our study was to compare 4 different types of suture material and laparoscopic suturing methods used for laparoscopic closure of the urinary bladder. Our hypothesis was that the strength of the repairs would be similar but the use of the knotless suture would result in decreased placement times.

Methods: Forty-two adult equine cadaver bladders were obtained. A standard incision was created and repaired in 4 groups using 2-0 poliglecaprone and 2-0 knotless, self-locking suture using laparoscopic instruments, and 2-0 and 0 knotless self-locking suture using the laparoscopic Endo StitchTM device in a double layer inverting pattern. Procedures were performed in a laparoscopic trainer and all procedures were timed and recorded on video. The bladders were then inflated with water and bursting strength pressures recorded. A control group of intact bladders was also tested. Statistical analysis using a linear model with unequal variances amongst the groups and a post-hoc Turkey's test was used with significance set at $P < .05$.

Results: Bursting strength did not vary significantly amongst the treatment groups while all treatment groups had significantly decreased bursting strength from the control group. There was a significant difference in the time to place the sutures with the 2 Endo StitchTM groups being significantly faster than those in which the suture was placed using laparoscopic needle holders and forceps. Subjectively the smaller 2-0 suture was easier to place and tore the tissue less than the 0 suture during both placement and rupture.

Conclusion: Self-locking knotless suture may be a viable alternative to the traditional suture material for laparoscopic closure of urinary bladder. Further cyclic testing and in vivo testing has to be performed before recommending its use in clinical cases.

THE DIAGNOSTIC VALUE OF RADIOGRAPHY AND COMPUTED TOMOGRAPHY FOR THE DETECTION OF SUBCHONDRAL CYSTIC LESIONS IN THE LIMBS OF HORSES. Schön S[1], Fürst A*[1], Kircher P[2], Jackson M*[1]. [1]Equine Hospital, Equine Department of Vetsuisse Faculty, University of Zurch, Zurich, Switzerland, [2]Section of Diagnostic Imaging, Department of Small Animals, Vetsuisse Faculty, University of Zurich, Zurch, Switzerland.

Introduction: Subchondral cystic lesions (SCLs) in the equine limb represent an etiologic and diagnostic challenge. Due to the complex anatomy and the summation of opacities radiographs may be insensitive for the detection of small SCLs and their exact localization. Additional fissures, osteoarthritis (OA) and periosteal reaction (PR) may also be underestimated.

Objective: The purpose of this study was to compare the accuracy of radiography and computed tomography (CT) for the diagnosis of SCLs in the equine limb. It was hypothesised that CT would be beneficial in evaluating SCLs compared to radiography, where features such as communication of the SCLs with the joint and fissures are often missed.

Methods: Horses with lameness due to a SCL in the phalanges, the third metacarpal and metatarsal bone and the radial carpal bone and a complete radiographic and CT evaluation were included. Radiographic and CT studies were evaluated according to the following criteria: Localization and size of the SCL, fissure and channel formation, communication of the SCL with the joint, OA and PR. Association between fissures and communication of the SCL with the joint on radiographs and CT were evaluated with a Fisher's exact test and the agreement beyond chance between OA and PR was assessed with a Cohen's Kappa test.

Results: Thirty-four horses with 45 SCLs were included in the study. On radiographs, 78% of SCLs and 16% of concomitant fissures were detected. On CT, a communication of the SCL with the joint was shown in 96% of all the SCLs. CT detected significantly more fissures than radiographs. This was the case in 30% of all SCLs. Channel formation, only visible on CT, was detected in 30% of all SCLs. Radiographs and CT showed a substantial to moderate intermodality agreement for the description of OA and PR.

Discussion: This study showed the beneficial diagnostic quality of CT compared to radiography. Most of the SCLs visible on CT showed a communication with the joint and often a concomitant fissure was visible. The detection of small channels is a new and interesting aspect of SCLs and may underline new aspects of their pathophysiology. Evaluation of OA and PR in both modalities showed similar results.

Conclusion: Should a horse suffer from lameness caused by a SCL diagnosed on radiography, a CT evaluation is recommended to depict the exact SCL features in order to make an optimal treatment plan and improve the outcome.

IMAGING AND SURGICAL ANATOMY OF THE EQUINE SPHENOPALATINE SINUS AND 14 CASES OF SPHENOPALATINE SINUS DISEASE. Tucker R[1], Windley Z[1], Smith L*[1], Witte TH*[1], Fiske-Jackson A*[1], Turner S[2], Perkins JD*[1]. [1]Royal Veterinary College, London, United Kingdom, [2]Chine House Veterinary Hospital, Sileby, United Kingdom.

Introduction: Knowledge of imaging and surgical anatomy and an understanding of the conditions affecting the sphenopalatine sinus are currently lacking. Our objectives were to describe the CT and surgical anatomy of the sphenopalatine sinus (SPS) in normal horses and to describe the diagnosis, treatment and outcome in clinical cases confirmed with disease involving this sinus.

Methods: The SPSs of 10 normal cadaver heads were subjected to digital radiography, CT and sinoscopic examination, prior to anatomical sectioning. SPS anatomy was described and compared between cadaver specimens across the imaging modalities. Medical records (January 2004–January 2014) of horses admitted to a UK equine hospital and diagnosed with disease involving the sphenopalatine sinus were reviewed. Clinical outcome was established by telephone follow up with the referring veterinarian and/or owner.

Results: The anatomy of the SPS was variable and the location of the sphenoidal septum was inconsistent. The SPS was not identifiable on plain radiographs. CT provided accurate anatomical information, although plates of thin bone could appear erroneously perforated. The palatine portion of the SPS was consistently accessible sinoscopically, with the sphenoid portion accessible in 6/10 cadaver heads. Fourteen cases of SPS disease were identified, presenting with signs of nasal discharge, epistaxis, blindness and/or exophthalmos. Final diagnoses included neoplasia (7), progressive ethmoidal haematoma (4), sinus cyst (2) and empyema (1). Seven out of 14 horses were alive 1 year after treatment with a worse outcome associated with CT evidence of bone loss and a diagnosis of neoplasia.

Discussion and conclusion: SPS disease should be considered as a cause of exophthalmos, blindness, unilateral epistaxis and unilateral nasal discharge in the horse. Knowledge of the anatomical variation of the SPS is vital in the interpretation of CT images. A combination of CT and sinoscopy provides the most comprehensive approach for diagnosis and treatment of SPS disease as there are benefits and limitations to both techniques. CT provided valuable diagnostic and surgical information but could not differentiate the nature of soft tissue masses. Standing sinoscopic access to the palatine portion of the SPS allows evaluation, biopsy and mass resection but surgical access to the sphenoid portion of the SPS is limited.

DEVELOPMENT OF A NEW LAPAROSCOPIC FORAMEN EPIPLOICUM MESH CLOSURE (FEMC) TECHNIQUE IN 6 HORSES. Van Bergen T[1], Wiemer P[2], Bosseler L[3], Ugahary F[4], Martens A*[1]. [1]Department of Surgery and Anaesthesiology of Domestic Animals, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium, [2]De Lingehoeve Diergeneeskunde, Lienden, Netherlands, [3]Department of Pathology, Bacteriology and Poultry Diseases, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium, [4]MD Surgeon n.p., Consultant in General Surgery, Tiel, Netherlands.

Background: Epiploic Foramen Entrapment (EFE) is a relatively common life threatening condition in horses that could be prevented by closing the epiploic foramen (EF) in horses at risk of developing EFE.

Objective: To describe the laparoscopic Foramen Epiploicum Mesh Closure (FEMC) technique and report its outcome.

Methods: The EF of 6 horses was closed with the FEMC technique. A diabolo-shaped mesh construct was introduced in the omental vestibule through the EF under laparoscopic visualisation in the standing sedated horse. Clinical and hematologic parameters were recorded during the post-operative period. Four weeks after the intervention repeat laparoscopy was performed in all horses. Three horses were subjected to euthanasia respectively 1, 2 and 3 months after the intervention, and were examined on necropsy and histopathology. The remaining 3 horses were followed clinically during the 6 months post-operative period.

Results: The 6 FEMC procedures were performed successfully in a median surgery time of 22 minutes (range, 18–27 minutes). No blood values were beyond the laboratory reference intervals although the increase of fibrinogen (FIB) and aspartate aminotransferase (AST) was statistically significant. On repeat laparoscopy all 6 EFs were closed and no undesired adhesions were identified. This was confirmed on gross and histopathologic examination of the 3 euthanized horses. The 3 remaining horses were clinically normal during the 6 months post-operative observation period.

Conclusion: The FEMC technique provides a fast, simple, reliable and safe procedure to obliterate the EF in horses at risk for EFE.

Large Animal General Surgery

PLANT THORN SYNOVITIS CAUSED BY PRUNUS SPINOSA (BLACKTHORN) PENETRATION IN 20 HORSES. Ashton NM, Doles J*. Nottingham University Vet School, Nottingham, United Kingdom.

Introduction: Blackthorn (Prunus spinosus), a member of Rosacea family is recognised as causing infections and tissue reactions. In man, blackthorn synovitis is a rare cause of monoarthritis which is difficult to diagnose. There is no published literature on this condition in the horse.

Objective: The aim of this study is to describe the presentation, diagnosis, treatment and outcome of plant thorn synovitis in the horse.

Methods: All cases in this prospective study presented with acute onset synovitis within 24 hours of thorn penetration. All cases were subject to a standardised clinical assessment, surgical treatment and aftercare. Initial assessment included lameness evaluation, synovial fluid analysis and ultrasound examination. Surgical treatment was performed within 24 hours of presentation under general anaesthesia, using a 2 stage procedure:

Stage 1 Perisynovial technique. Ultrasound guided placement of a 20 gauge 35mm needle marker that is used as a guide for electrosurgical dissection onto the perisynovial thorn fragment.

Stage 2 Endoscopic technique. Using standard and novel endoscope and instrument portals to locate and remove thorn fragments and thorn debris from sites within synovial structures, with rongeurs and synovial resector. Lameness evaluation and synovial fluid analysis were repeated at 48 h and 120 h post-operatively. Outcome data was obtained by telephoning clients at 4 weeks and 12 weeks post-operatively.

Results: 20 cases met the study inclusion criteria over a 12 month period. Mean lameness score on presentation was 4/5 (range 1–5). The most commonly affected structures were fetlock joints (7/20) and tendon sheaths (7/20). Mean synovial fluid total protein was 55.6 g/l (range 30–116), and TNCC was 161×10^9 (range 26–285) on presentation and 12×10^9 (range 1–35) at 48 hours post operatively. All synovial fluid cultures were negative. All horses were sound (Grade 0) at 5 days post operatively and all returned to full work.

Discussion: There are a limited number of case series of blackthorn injury in humans, however the consensus is that surgical treatment is required for a successful outcome. The 2 stage surgical procedure described, achieved accurate identification and removal of thorn material in all cases.

Conclusion: In contrast to previous studies on synovial sepsis, these cases had a positive outcome despite high pre and post operative synovial fluid total protein and TNCC. These findings suggest that thorn synovitis cases have a different etiology from synovitis originating from sepsis or contamination.

ARE DISINFECTED NON-STERILE GLOVES SAFE FOR MINOR SURGICAL PROCEDURES IN EQUINE VETERINARY MEDICINE? Brandenberger O[1], Mespoulhès-Rivière C*[2], Rossignol F*[3], Boulouis H-J[4]. [1]Clinique de Grosbois & Clinique Equine de l'Ecole Nationale de Maisons Alfort, Boissy St Leger, France, [2]Clinique Equine de l' Ecole Nationale de Maisons Alfort, Maisons Alfort, France, [3]Clinique Vétérinaire de Grosbois, Boissy St Leger, France, [4]Microbiologie-Immunologie, Ecole Nationale Vétérinaire de Maisons Alfort, Maisons Alfort, France.

Objective: To assess the bacterial counts of disinfected non-sterile gloves and compare them to the counts of non-disinfected non-sterile gloves and self-donned sterile gloves.

Study design: Experimental in vitro study.

Samples: Non-sterile gloves (n = 200), sterile gloves (n = 40).

Methods: Six groups of 40 gloves were sampled and cultured using a swab-rinse technique. The groups were clean gloves disinfected with either 70% ethanol or alcoholic chlorhexidin by the same person (E-self, C-self), clean gloves disinfected with either 70% ethanol or alcoholic chlorhexidin by an assistant (E-ass, C-ass) and groups of self-donned sterile gloves (SG) and non-disinfected non-sterile gloves (CG) as controls.

Results: The mean bacterial growth on disinfected gloves was as follows: C-ass: 1+/−3.8 CFU/ml; E-ass: 4+/−7.8 CFU/ml; C-self: 4+/−7.1 CFU/ml; E-self: 9+/−18 CFU/ml. The mean bacterial growth on non-disinfected non-sterile gloves was 45+/−57.3 CFU/ml and on sterile gloves was 1.3+/−4 CFU/ml.

The mean counts for all disinfected gloves were significantly lower than for CG. C-ass and self-donned sterile gloves had equivalent counts.

Conclusion: Bacterial counts on non-sterile gloves were significantly reduced by disinfection with either alcohol or alcoholic chlorhexidin. Alcoholic chlorhexidin applied on non-sterile gloves by an assistant reduces the bacterial count to the level of self-donned sterile gloves.

IN VITRO EFFECTS OF POLY(ADP-RIBOSE) POLYMERASE INHIBITORS IN AN EQUINE MODEL OF INFLAMMATION. Cacciolatti C[1], Meyer-Ficca ML[2], Southwood LL[3], Meyer RG[2], Bertolotti L[1], Zarucco L[1]. [1]Dipartimento di Scienze Veterinarie, Sezione Clinica Chirurgica Veterinaria, Università degli Studi di Torino, Grugliasco (TO), Italy, [2]Department of Animal Biology and Mari Lowe Center for Comparative Oncology, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA, [3]Department of Clinical Studies-New Bolton Center, School of Veterinary Medicine, University of Pennsylvania, Kennett Square, PA.

Introduction: Endotoxemia and ischemia/reperfusion (I/R) injury following strangulating gastrointestinal tract diseases are leading causes of morbidity and mortality in horses. Poly(ADP-ribose) polymerase (PARP) may play a role when activated in response to DNA injury induced by these types of lesions, and synthetizes PAR polymers using NAD+ as donor of ADP-ribose units. Hyperactivation of this process leads to rapid depletion of the intracellular NAD+ and ATP stores culminating in energy crisis-induced cell necrosis. Cell death and increased inflammatory response is also due to PAR-dependent apoptosis-inducing factor translocation to the nucleus and release of the pro-inflammatory mediator high mobility group box 1. Because of these functions, PARP pharmacologic inhibition may be protective and therefore beneficial if used in conjunction with the current therapy for I/R injury and endotoxemia. The aim of the present study was to utilize an equine in-vitro model in order to determine the TNF-α and NO production after lipopolysaccharide (LPS)/interferon-γ (IFN-γ) stimulation of mononuclear equine cells, and evaluate the protective effect of PARP inhibition on TNF-α and NO production.

Methods: All procedures were IACUC approved. Following a pilot study (2 horses) to determine the TNFα and NO production after LPS/IFN-γ stimulation of mononuclear cells, peripheral venous blood was collected from 6 healthy horses; white blood cells were separated and mononuclear cells were cultured. Various concentrations of IFN-γ and LPS (none, low and high stimulation) were added to cultured cells to mimic endotoxemia, and PARP inhibitors (ABT888, AZD2281, PJ34) were added at 1 μM final concentration to wells before stimulation to determine their protective effects. Triplicates were performed for each combination of stimulation and inhibition. After 24 h of incubation a NO assay and TNF-α ELISA were performed. ANOVA for repeated measures was used for statistical analysis ($P < 0.05$).

Results: Results of the pilot study revealed no increase in NO production. Therefore, only TNF-α concentration was measured in samples from the 6 horses. There was no difference in TNF-α production between control (untreated) and treatment with ABT888 or AZD228. When data from experiments using PJ34 under high stimulation condition were analyzed separately, a significant difference between control group and PJ34 inhibited samples was detected ($P = 0.0457$).

Discussion and conclusion: According to our findings, inhibition of PARP with PJ34 decreases TFN-α production in LPS/IFN-γ stimulated equine mononuclear cells, suggesting that this inhibitor may become a promising novel therapy helping prevent inflammation and thereby reducing endotoxin-induced organ damage in horses.

A COMPARISON BETWEEN A STAPHYLECTOMY AND A "TIE-FORWARD" PROCEDURE FOR THE TREATMENT OF INTERMITTENT DORSAL DISPLACEMENT OF THE SOFT PALATE IN SWEDISH STANDARDBRED TROTTING HORSES. Carmalt JL*[1], Johansson B[2], Cicolo de Silva S[3], Waldner C[1]. [1]Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Canada, [2]Hallands Djursjukhus, Slöinge, Sweden, [3]Faculdade de Medicina Veterinária e Zootecnia, Universidade de São Paulo, São Paulo, Brazil.

Objective: To compare the performance of horses with intermittent dorsal displaceent of the soft palate (IDDSP) treated with surgical intervention against control horses. To determine whether there was a difference in post-operative performance between horses treated with a staphylectomy compared to a tie-forward procedure.

Study Design: A retrospective case-controlled study using 39 Standardbred racehorses diagnosed with IDDSP by over-ground video-endoscopy and 62 age and sex-matched control horses. Racing data for all horses were retrieved from online racing records (n = 1980).

Methods: Generalizing estimating equations controlling for horse were used to compare pre- and post-surgery racing speed (m/s) of IDDSP horses, comparing their performance to control horses. The effect of surgical procedure type on whether horses returned to racing, post-surgical speed, career race starts and earnings were evaluated.

Results: Horses with IDDSP raced faster than control horses (0.08 m/s, $P = .02$). Racing records were available for 36 horses. 23/25 horses that raced before surgery, and 6/11 horses that had not raced before surgery, raced afterwards. Horses that raced before surgery were significantly more likely to race after surgery ($P = .035$) than those that had not. The odds of racing post surgery (18/18 staphylectomy and 11/13 tie-forward horses) was not significantly different ($P = .27$) between surgical techniques. Career level variables did not differ significantly between surgical techniques or between IDDSP and control horses.

Conclusion: The choice of surgical technique did not influence whether a horse returned to racing, their subsequent career earnings or career longevity. Reported superiority of newer techniques may be biased by comparisons to historical reports.

CLEANING OF SURGICAL MATERIAL WITH A GAUZE EFFECTIVELY REDUCES CONTAMINATION DURING PELVIC FLEXURE ENTEROTOMY IN HORSES. Giusto GG, Tramuta CT, Grego EG, Comino FC, Caramello VC, Robino PR, Nebbia PN, Gandini MG. University of Turin, Grugliasco, Italy.

Introduction: Pelvic flexure enterotomy is one of the most common procedures performed in abdominal surgery of the horse. A survey on the method for pelvic flexure enterotomy closure employed by ECVS and ACVS Diplomates, revealed that 58.3% of surgeons adopt measures to reduce contamination during closure of enterotomies. The most popular measure employed was to start the second layer with a new suture strand, and a change of surgical gloves and/or instruments. Our hypothesis is that cleaning the surgical material used for the first layer closure, with a soaked gauze, will significantly reduce its bacterial contamination, avoiding the time and money wasted changing it for the second layer. The aim of the present study is to compare the bacterial contamination of the surgical material, either cleaned or not with a wet swab in an ex-vivo pelvic flexure enterotomy model in horses.

Methods: Pelvic flexure samples were harvested from 24 slaughtered horses at a local abattoir, then randomly assigned to 2 groups (F and C) of 12 specimens each. A 8-cm long incision was made on the antimesenteric side, and the luminal content emptied. In group F the enterotomy site was closed with a full thickness simple continuous pattern while in group C with a Cushing pattern. Each group was divided into 2 sub-groups; N and G. In sub-group N suture material was collected soon after the completion of the suture line. A sterile swab was passed on the surgical gloves and on the surgical instruments. In subgroup G a sterile gauze soaked with sterile saline was passed on the suture material, surgical gloves and instrument before collection.Then sterile swabs were collected as per group N. A new set of sterile instruments and gloves were used to perform the surgical procedure for each specimen.The samples were submitted for culture and optical density measurement. Normality of data was determined with the Shapiro-Wilk test. Data was not normally distributed, thus a nonparametric test (Kruskal-Wallis with Dunn post-test) was used for comparison. Significance was set for $P < 0.05$.

Results: The optical density of the subgroup CG was significantly less than subgroup CN ($P = .019$). Optical density of the subgroup FG was significantly less than subgroup FN ($P = .02$). The difference between sub-groups FN and CN, and between sub-groups FG and CG was not significant($P = 1.0$).

Discussion: Cleaning the suture material, instruments and gloves with a wet gauze significantly reduces the contamination after completion of the first layer of pelvic flexure enterotomy closure in horses. An inverting suture pattern in the first layer does not reduce the contamination of the suture material, instruments and surgical gloves compared to a full thickness pattern.

LIGATION OF THE IPSILATERAL COMMON CAROTID ARTERY AND TOPICAL MEDICATION FOR PREVENTION OF HEMORRHAGE FROM GUTTURAL POUCH MYCOSIS IN HORSES. Cousty M*[1], De Beauregard T*[2], Picandet V[1], Tessier C*[3]. [1]Clinique Equine de Livet, St Michel de Livet, France, [2]Clinique Equine de Meslay, Meslay du Maine, France, [3]Oniris, Nantes, France.

Introduction: There are no published results on ligation of the ipsilateral common carotid artery (CCA) in combination with topical antimycotic treatment for prevention of hemorrhage from guttural pouch mycosis in horses. The objective was to evaluate the effect of ligation of the ipsilateral CCA for prevention of hemorrhage from guttural pouch mycosis, in a population of horses whose owners could not afford transcatheter methods.

Methods: Horses were included in the study only if balloon catheter occlusion or transarterial coil embolization was refused by the owner for financial reasons. Ipsilateral ligation of the CCA was performed. Topical medication was performed under endoscopic guidance with amphotericin B, amphotericin B and enilconazole, amphotericin B and ketoconazole, enilconazole, nystatine and amphotericin B, nystatine and enilconazole, nystatine and ketoconazole. Treatment was administered by instillation over the fungal plaques under endoscopic guidance, by intralesional injection directly in the plaques using a transendoscopic needle or by detachment of diphteric membrane and lavage. Frequency and number of treatments were recorded. The time until resolution of the mycotic lesions was recorded.

Results: Twenty-four horses were included in the study. Recurrence of epistaxis occurred in 5 horses (20.8%) which caused the death of 4 horses (16.6%). Two others horses died for unrelated cause (colic, pleuropneumonia). The mean number of treatments +/− SD was 6.3 +/− 4.0 (range: 2–14) for all topical treatments. This was significantly higher for intralesional injection (8.0+/−4.2) compared with instillation (3.6 +/− 1.7) and debridement and lavage (3.0 +/− 2.3) ($P = .06$). The mean time +/− SD until resolution of the mycotic lesions was 77.4 +/− 4.3 days (range: 46–153). This was significantly lower for debridement and lavage (5.1 +/− 4.7 days) compared with instillation (69.0 +/− 25.0 days) and intralesional injection (83.0 +/− 0.6 days) ($P < .001$).

Discussion and conclusion: The recurrence of epistaxis after ligation of the CCA and topical treatment using antimycotic drugs is 20.8% and the mortality rate is 16.6%. This is lower than the reported recurrence rate without any form of arterial occlusion (48% of mortality), but higher than all other transcatheter occlusion techniques. Ligation of the ipsilateral CCA and topical medication carry a better prognosis to avoid recurrence of epistaxis compared to medical treatment alone but is inferior to transcatheter occlusion techniques.

RISK FACTORS FOR SURGICAL SITE INFECTIONS AFTER ENUCLEATION OF THE EYE IN HORSES. Ensink JM*, Huppes T, Hermans H*. Dept of Equine Sciences, Faculty of Veterinary Medicine, Utrecht, Netherlands.

Introduction: Enucleation is a procedure often performed to remove painful, non-visual eyes. Enucleation may lead to a deep indentation of the skin over the orbit. Placing an implant in the orbit will improve cosmetic appearance. However, using an implant may increase the risk of surgical site infection (SSI) and SSI will almost always lead to loss of the implant. This study aims to collect data on the risk factors for SSI.

Methods: Records of horses undergoing enucleation in our clinic over a 7 ½ year period were reviewed. Indications for enucleation were grouped as follows: Group 1 (clean) included ERU, too small or too large globes, and intraocular tumours. Group 2 (non-clean) included corneal perforation and rupture and infected ulcers. Group 3 (tumour and retrobulbar) included squamous cell carcinoma and retrobulbar processes (not infection). Implants were spherical silicone implants from Jardon eye prosthetics.

Results: 116 cases of enucleation were evaluated. For 11 horses it was a standing procedure, 105 were operated under general anesthesia (GA). An implant was used in 56 horses. The number of SSIs was 10. Three infections were noted within 10 days after surgery, 3 between 10 days and 1 month, 2 between 1 and 6 months and 2 at 3–4 years after surgery. Of 5 cases of SSI a sample for culture was taken, resulting in growth of: S. equi zooepidemicus (3), S. aureus (1), several anaerobes (1). In the group with clean eyes a significantly higher percentage of horses received an implant (66%) than in both other groups (29%) (Chi square $P < .01$). Percentage of SSI over all indications was 5% in enucleations without an implant and12% in enucleations with an implant. Ordinal regression testing was performed using SPSS 22 with the variables: indication for enucleation, implant/no implant, general anesthesia/standing, conjunctival sac opened or not. This showed that the following factors had significant influence on the percentage of SSIs: an implant increases the risk ($P < .02$), clean eyes have a smaller risk ($P < .05$), standing procedures have a larger risk ($P = .053$).

Discussion and conclusion: The risk of SSI after enucleation is low in clean eyes (6%) and when no implant is used (5%). The use of an implant for a group 2 or 3 eye (non-clean, tumour, retrobulbar process) will increase the risk of SSI to 25% (3/12).

The number of standing enucleations is so small that no firm conclusion can be drawn. The effect of opening the conjunctival sac on the percentage of SSIs is limited. This study shows that even when the conjunctival sac is opened an implant can be used: in 11 of these cases there was only 1 SSI (9%).

PREDICTION OF SHORT-TERM OUTCOME USING DORSAL COLON BIOPSY IN CASES OF LARGE COLON VOLVULUS. Gonzalez LM*[1], Fogle CA*[1], Baker WT*[2], Hughes FE*[3], Blikslager AT*[1]. [1]North Carolina State University, Raleigh, NC, [2]Hagyard Equine Medical Institute, Lexington, KY, [3]Peterson and Smith Equine Hospital, Ocala, FL.

Introduction: Large colon volvulus (LCV) is a severe form of intestinal strangulation that is associated with a poor outcome for survival. Histomorphometric evaluation of pelvic flexure biopsies have been used to predict short-term outcome. However, the optimal biopsy site for accurate prediction of prognosis or determination of tissue viability with or without colonic resection has been debated. The primary aim of this study was to determine if a dorsal colon biopsy near the site of colonic resection accurately predicts short-term outcome in cases of LCV. The objectives were to evaluate the predictive value of dorsal colon biopsy: (1) for short-term outcome, (2) for impact of colonic resection and, (3) compared to pelvic flexure biopsy.

Methods: Horses were selected for inclusion in the study if LCV $\geq$ 360 degrees was diagnosed and if a biopsy at the site of dorsal colon resection was obtained. All mucosal biopsies were placed in 10% neutral buffered formalin. Tissues were stained using H&E and independently evaluated. A receiver operator curve was used to determine the optimal cutoff value for short-term survival for variables without published reference ranges. Logistic regression determined if variables were associated with an increased likelihood of death.

Results: Thirty-three horses met the inclusion criterion. 32/33 horses had paired pelvic flexure biopsies obtained. Based on the receiver operator curve, a cutoff measurement for I:C of 0.9 in dorsal colon biopsies predicted death with a sensitivity and specificity of 63% (95% CI; 38–84%) and 71% (95% CI; 42–92%), respectively ($P = .038$). Mucosal hemorrhage score in dorsal colon biopsies was determined to have a cutoff value of 3 for prediction of death with a sensitivity and specificity of 74% (95% CI; 49–91%) and 86% (57–98%), respectively ($P = .002$). Based on univariate regression, LCV cases with dorsal colon and pelvic flexure biopsy hemorrhage scores of $\geq$3 were 16.8 ($P = .002$) and 9.3 times ($P = .008$) more likely to die, respectively. There was a trend toward statistical significance of I:C ratio measurements in both dorsal colon and pelvic flexure biopsies for prediction of death. Mann Whitney Rank Sum test determined the median value measured for I:C ratio of dorsal colon and pelvic flexure were statistically different ($P = .021$). Large colon resection was not predictive of outcome. No combination of variables improved the prediction of death in a forward stepwise regression.

Discussion and conclusion: Histomorphometric evaluation of dorsal colon biopsy is accurate to predict short-term outcome. Although I:C ratio measurements between paired dorsal colon and pelvic flexure biopsies were significantly different neither biopsy was found to more accurately predict death.

BPV1 L1 VLP VACCINATION SHOWS HIGH POTENTIAL TO PROTECT HORSES FROM EQUINE SARCOIDS. Hainisch EK[1], Abel H[1], Harnacker J[1], Wetzig M[1], Shafti-Keramat S[2], Kirnbauer R[2], Brandt S[1]. [1]Research Group Oncology, Equine Clinic, Veterinary University, Vienna, Austria, [2]Laboratory of Viral Oncology (LVO), Division of Immunology, Allergy and Infective Diseases (DIAID), Department of Dermatology, Medical University, Vienna, Austria.

Introduction: Papillomavirus (PV) Virus Like Particles (VLPs) consisting of the major capsid protein L1 have been shown to produce high titres of type-specific antibodies and to protect against experimental PV infection and tumour formation in animal models. In humans, Human Papillomavirus (HPV) L1 VLP–based bivalent and quadrivalent vaccines significantly reduce the prevalence of chronic HPV infections and the incidence of HPV-related neoplasia. We have previously shown BPV1 L1 VLP vaccination in horses to be safe and to produce high and long-lasting antibody titres (Phase I). We have also shown that in-vitro BPV1 and 2 are closely related serotypes with antibodies raised against either to cross-protect against the other. To establish a virus challenge model we intra-dermally inoculated horses with cow wart derived BPV1 virion. This reliably resulted in the growth of skin tumours that were histologically indistinguishable from equine sarcoids but spontaneously regressed several weeks later.

Methods: In the herein described Phase II study we used this equine sarcoid model to study the protective properties of the BPV1 L1 VLP vaccination in a total of 3 animal experiments. In 2 animal experiments using 21 horses each, 14 horses were vaccinated with BPV1 L1 VLP (day 0 and 28) and inoculated intra-dermally together with 7 unvaccinated controls with cow wart derived BPV1 and BPV2 virion respectively (10 wheals per horse, day 42). Additionally, 7 horses that had been vaccinated in the frame of the Phase I study 5 years previously (day 1, day 28, and 6 months), and 3 unvaccinated controls were challenged with BPV1 accordingly.

Results: All control horses developed 10/10 possible pseudo-sarcoids. 13/14 vaccinated horses challenged with BPV1 were completely protected. One horse was partially protected. In the BPV2 challenge 3/14 vaccinated horses were completely protected. Tumour sizes and time of tumour persistence were significantly reduced

(P = .003 and P = .005 respectively) when compared to unvaccinated controls. All horses vaccinated 5 years earlier were completely protected.

Conclusion: BPV1 L1 VLP showed comprehensive and long lasting protection against experimental infection with BPV1 and BPV2 virion. BPV1 L1 VLP therefore appears to be exceptionally suited for a commercially available preventative vaccination against equine sarcoid.

A RETROSPECTIVE EVALUATION OF THE TREATMENT OF 618 EQUINE SARCOIDS. Haspeslagh M, Van Aert C, Vlaminck L*, Martens A*. Department of Surgery and Anaesthesiology of Domestic Animals, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium.

Introduction: The goal of this study was to determine the outcome after treatment of equine sarcoids and to evaluate which parameters have an influence on this outcome.

Methods: A retrospective study was performed on all horses treated for equine sarcoid at an equine referral clinic between 2008 and 2013. Data were gathered from the clinic's archives on variables concerning horse, tumour, treatment and outcome and owners were contacted by phone for long-term follow-up. A multinomial logistic regression was used to find out which variables significantly influenced the outcome after treatment.

Results: Information was gathered for 618 equine sarcoids in 232 horses. Most tumours were of the verrucous type, located in the inguinal region and multiple. The overall success rate was 74.9%. Surgical excision with 12 mm margins was the most frequently used treatment and also had the highest success rate (86.8%). Compared to surgical excision, sarcoids treated with excision followed by chemotherapy, debulking followed by chemotherapy, cryosurgery and topical acyclovir application had a significantly higher chance of recurrence after treatment. Tumours that were located on the chest, were of the verrucous type and/or were located on a horse that received concurrent immunostimulating treatment for another sarcoid, had the best chance of a successful outcome after treatment. As a topical treatment, imiquimod was significantly more successful compared to acyclovir.

Conclusion: The results of this study show that when a systematic approach is followed in selecting sarcoid treatment, a relatively high overall success rate can be achieved. Even though surgical excision has often been reported to have a high chance of recurrence, this treatment shows the best results here. This is due to very meticulous surgical technique, combined with a careful selection of cases. The latter however, introduced a bias in the results of treatment. Horses that received concurrent immunostimulating treatment had a better chance of a successful outcome regardless of the primary treatment. This indicates that the immune system plays an important role in the development and healing of equine sarcoids.

THE EFFECT OF SEASON AND MIDLINE CLOSURE ON SURGICAL SITE INFECTION FOLLOWING LAPAROTOMY AND REPORTING OF BACTERIAL ISOLATES IN 287 HORSES. Isgren CM, Salem SE, Archer DC*, Worsman FCF, Townsend NB*. Philip Leverhulme Equine Hospital, University of Liverpool, Neston, United Kingdom.

Introduction: 1) To investigate pre, intra and postoperative risk factors for surgical site infection (SSI) including the effect of season and 2) to identify the bacterial isolates and antimicrobial sensitivities.

Study design: Retrospective study.

Methods: Study inclusion criteria were horses that underwent exploratory laparotomy at the Philip Leverhulme Equine Hospital over a 36-month period and survived to hospital discharge. SSI was defined as discharge from the laparotomy incision of >24 hrs duration or any duration of purulent discharge. Variables of interest were tested for association with SSI using a Chi-squared test for categorical variables and a univariable logistic regression model for continuous variables. Variables with $P < 0.25$ were considered for inclusion into a multivariable model. $P < 0.05$ was considered statistically significant.

Results: Of the 287 horses that fulfilled the study inclusion criteria, 73 horses (25.4%) developed SSI during hospitalisation. Increased weight (kg) (OR 1.002, 95% CI 1.0002–1.005, P = 0.03), elevated PCV (≥48%) upon arrival at the hospital (OR 3.03, 95% CI 1.32–6.94, P = 0.009), performing small intestinal resection (OR 2.27, 95% CI 1.15–4.46, P = 0.017) and postoperative colic (OR 2.86, 95% CI 1.41–5.79, P = 0.003) were significantly associated with increased likelihood of SSI in the multivariable model. The lowest risk of SSI was in the spring with winter (OR 3.84, 95% CI 1.38–10.70, P = 0.01) and summer (OR 5.63, 95% CI 2.07–15.3, P = 0.001) months having increased risk. Three-layer closure of the midline was protective (OR 0.31, 95% CI 0.16–0.58, P < 0.001) and there was no effect of surgery being performed outside normal working hours (P = 0.60) Of the 73 horses that developed a SSI, bacteria were cultured in 59 cases. A total of 120 bacterial isolates were identified, with 69/120 (57%) being Gram negative and 51/120 (43%) being Gram positive. The 3 most commonly isolated bacteria were Escherichia Coli (59.5%), Enterococcus spp (42.4%) and Staphylococcus spp (25.4%). Penicillin resistant isolates were predominant (96/104; 92%) with 95/96 having received penicillin. Only 18% (21/119) of isolates were gentamicin resistant with 10/21 having received gentamicin. Seventeen isolates (17/104; 16.3%) were resistant to both penicillin and gentamicin including 2 methicillin-resistant Staphylococcus aureus (MRSA) species.

Discussion and conclusion: Three-layer closure of the laparotomy incision was protective for SSI. A seasonal effect was apparent with the winter and summer months associated with greater risk of SSI. Knowledge of risk factors for SSI and bacterial isolates obtained are an important part of clinical audit and can be used to assist informed decision-making regarding antimicrobial use.

LONG TERM FOLLOW-UP OF ESOPHAGEAL SURGERY OUTCOMES IN 27 HORSES. Koenig JB*[1], Silveira A[1], Cribb NC*[1], Piat P*[2], Laverty S*[2], Sorge U[3]. [1]Ontario Veterinary College, University of Guelph, Guelph, Canada, [2]Faculty of Veterinary Medicine, University of Montreal, Saint Hyacinthe, Canada, [3]College of Veterinary Medicine, University of Minnesota, Saint Paul, MN.

Introduction: Recent information evaluating the long-term outcome of esophageal surgery in the horse is limited. The objectives of this retrospective study are to investigate the clinical findings, complications and long-term outcome following different equine esophageal surgery approaches and techniques.

Methods: Medical records for horses undergoing esophageal surgery from 1994 to 2012 were reviewed. Signalment, clinical diagnosis and treatment, location of esophageal lesion, type of esophageal surgery, placement and duration of a feeding tube, complications after surgery, duration of hospitalization, and discharge from hospital were recorded. Long-term follow–up information of at least1 year after discharge on surviving horses was obtained by telephone survey.

Results: A total of 27 horses were identified that underwent esophageal surgery. Overall, 12 esophagostomies with placement of a feeding tube, 8 esophagotomies with primary closure (after unsuccessful lavage under general anesthesia was attempted in 4 cases), 3 esophagomyotomies and 2 esophagoplasties were performed. Additionally, in all 5 horses with rupture ventral drainage was established and in 3 of these horses, the rupture was sutured. Overall, 48% of horses had postoperative complications (13/27) with an average of 3.6 complications per horse (1 to 7). Suturing a ruptured esophagus resulted in significantly more complications (P = .008). Horses with a sutured esophagus were 22 times more likely to form a fistula (P = .012). Overall, 17/27 horses were discharged from the hospital (63%), and 10 horses (37%) were euthanized. Long-term, 42% of horses survived and were free of complications after esophageal surgery.

A MODIFIED SURGICAL TECHNIQUE FOR PENILE AMPUTATION AND PREPUTIAL ABLATION IN THE HORSE. Wylie CE, Payne RJ*. Rossdales Equine Hospital, Newmarket, United Kingdom.

Objective: The aim of this study was to describe a modified surgical technique for treatment of severe penile pathology, and the long-term outcome.

Methods: The surgery consisted of sub-ischial urethrostomy and penile amputation with preputial ablation, with the horse in dorsal recumbency. The urethrostomy was sited at least 10cm ventral to the caudal limit of the ischiatic arch. The urethra was identified via a vertical skin incision midline overlying a urethral catheter, and opened at a single point with a scalpel blade. The incision was continued longitudinally for a distance of 10cm with mayo scissors having over-sewn the bulbospongiosus muscle and corpus spongiosum tissue in a continuous, crushing layer. The distal urethra was completely transected, and was then spatulated, approximating the skin edges to the urethral mucosa using single simple interrupted sutures around all margins at 3mm intervals. The penis was then elevated vertically under moderate traction and conjoined elliptical skin incisions were made around the penis and prepuce encompassing the tissue for removal. A plane of dissection was established between the body wall and the prepuce at the cranial end of this incision and, when complete, the penis root was clamped with large right-angled forceps and transected with a scalpel blade. A simple continuous suture through the tunica albuginea was used to crush and close the corpus cavernosum. A redundant section of the penis root and caudal body was left in situ, rather than being retroflexed as described elsewhere. The surgical site was flushed prior to anchoring a multi-lumen drain at the caudal incision end by a percutaneous retaining suture. The subcutaneous fatty tissues were then closed in 2 layers along the incision length, with the exception of the most cranial 6cm which was left open to drain and heal by secondary intention; the multi-lumen drain exited through this point. A subcutaneous simple continuous suture layer was placed prior to closing the skin with staples. Follow-up was obtained using a structured owner telephone questionnaire or review of the electronic patient records.

Results: Cases included: 11 squamous cell carcinomas (73.3%), 2 melanomas, 1 chronic preputial discharge with no associated neoplasia, and 1 paraphimosis following routine sedation. Length of survival ranged from 0.9–74.6 months (median 25.1 months). From the 13 horses with follow-up, 9 survived >18 months (69.2%). Four euthanasias were due to presenting or post-operative complications, while 2 were unrelated to the procedure.

Discussion and conclusion: This procedure presents a simplified, viable option for treatment of extensive mixed penile lesions; reducing surgical complexity in comparison to previously described techniques.

LONG-TERM OUTCOME OF LAPAROSCOPIC CLOSURE OF THE NEPHROSPLENIC SPACE. Roecken M[1], Wuensch V[2], Barske K[2]. [1]Department of Equine Surgery, University of Giessen, Giessen, Germany, [2]Veterinary Clinic Starnberg, Starnberg, Germany.

Introduction: To prevent recurrence of left dorsal displacement of the large colon (LDDLC) of up to 21%, laparoscopic techniques have been published. The aim of the study was to evaluate long term outcome after laparoscopic closure of the nephrosplenic space (NSS) in horses with LDDLC. Long term evaluation (≤3 years) was achieved by questionnaire and reviewing the horses' medical records.

Methods: The laparoscopic surgery was performed in the standing sedated horse by apposition of the perirenal fascia to the dorso-medial aspect of the spleen by a continuous suture pattern in a cranial to caudal direction.

Results: Between 2010 and 2013 laparoscopic closure of the NSS was achieved in 33 horses. None of these horses developed any perioperative complications. Long term outcome was determined by questionnaire in 27/33 cases so far.

In the year before closure of the NSS, 11% of the patients had only1 colic episode, 40% had 2 to 3, 30% had 4 to 10 and 18.5% had even more than 10. As cause, a LDDLC was diagnosed in all cases. 59% of the presented horses were operated at least once (44%) or even 2 times (15%) before laparoscopic closure of the NSS.

Postoperatively 55% of the horses had no further colic symptoms during the observation period (≤3 years). 18.5% of the cases had 1 colic, 11% had 2 to 3, 3 horses (11%) had 4 to 6 and 1 horse even more. In 23% of these cases with assumed abdominal discomfort, colic symptoms were only verified by the owners and solved without medication or veterinary intervention. The remaining 22% of the horses were either treated conservatively (89%) or underwent colic surgery (11%). As cause for recurrence of colic, LDDLC was diagnosed in only 2 cases, which was treated conservatively in 1 case and surgically in the second case. In this case, insufficient closure of the nephrosplenic space was diagnosed. Further remarks of the owners were that since closure of the NSS 33% of the horses were better to ride, 26% had an increased performance and 15% became looser in the back.

Conclusion: In conclusion it can be stated, that the laparoscopic method is a suitable surgical technique to prevent recurrence of LDDLC and to reduce the number of colic episodes as long as surgical closure of the nephrosplenic space is complete.

EFFECTS OF SELECTIVE AND NONSELECTIVE NON STEROIDAL ANTI-INFLAMMATORY DRUGS ON THE CONTRACTILITY AND MUSCULAR INFLAMMATORY REACTION IN UNINJURED AND ISCHAEMIA AND REPERFUSION DAMAGED EQUINE JEJUNUM. Roetting AK*[1], Franz S[1], Wogatzki A[1], Zimmermann R[1], Greve A[1], Hopster K[1], Tappenbeck K[2], Huber K[2], Rohn K[3], Brehm R[4]. [1]Equine Clinic, University of Veterinary Medicine Hannover, Foundation, Hannover, Germany, [2]Department of Physiology, University of Veterinary Medicine Hannover, Foundation, Hannover, Germany, [3]Institute for Biometry,University of Veterinary Medicine Hannover, Foundation, Hannover, Germany, [4]Institute of Anatomy,University of Veterinary Medicine Hannover, Foundation, Hannover, Germany.

Introduction: Most colic patients receive an NSAID. Nonselective NSAIDs can have negative effects on mucosal healing, but COX2 selective NSAIDs may have negative effects on motility. The objective of this series of studies was to compare the effects of selective and non-selective NSAIDs on the contractility and the muscular inflammation of uninjured and ischaemia and reperfusion damaged equine jejunum.

Methods: 12 horses randomly received either flunixin or firocoxib intravenously 30 minutes before induction of general anaesthesia. Subsequently experimental jejunal ischaemia and reperfusion was induced in each horse. In 12 different horses experimental jejunal ischaemia and reperfusion were induced twice in adjacent segments. During the second ischaemia these horses received either flunixin or firocoxib intravenously. Biopsy samples were taken before and after each ischaemia and after each reperfusion in both groups of horses. Contractility and histopathological evaluation focusing on neutrophils and eosinophils and on immunohistochemical identification of COX-1 and COX-2 was performed.

Results: When comparing the effects of flunixin and firocoxib on jejunal contractility both in vivo and in vitro, flunixin improved contractility for many parameters evaluated, and for the remaining parameters there was no difference between both NSAIDs. Ischaemia and reperfusion induced a neutrophilic inflammation more pronounced in the longitudinal muscle layers, and this muscular inflammation included adjacent uninjured apparently healthy jejunum. Neutrophilic infiltration was accompanied with an upregulation of COX-2 in the longitudinal muscle. COX-inhibitors had little or no measurable effects on neutrophilic muscular infiltration in our model. We found no association between the presence of neutrophilic infiltration and changes of in vitro contractility.

Conclusion: Any possible connection between neutrophilic muscular jejunal inflammation and the onset of post-operative ileus should be further evaluated. Based on our findings the use of the nonselective NSAID flunixin may be preferable in horses at risk for developing POI. However, the in vitro results of these studies may not translate directly to a clinical and in vivo situation, and the negative effects of nonselective NSAIDs on jejunal mucosal healing should be considered when treating colic patient. Clinical studies are needed before a definite recommendation for the type of NSAID best used in post-operative colic patients can be made.

THE ANTIBACTERIAL EFFECT OF VACUUM-ASSISTED CLOSURE (VAC) USING 3 DIFFERENT FOAMS IN AN EQUINE PERFUSED EX VIVO WOUND MODEL. Van Hecke L, Haspeslagh M, Martens A. Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium.

Introduction: The goal of this study was to compare the antibacterial effect of vacuum-assisted closure (VAC) using 3 different foams to a standard antibacterial dressing in an equine perfused ex vivo wound model.

Methods: An abdominal musculocutaneous flap was collected from 6 equine cadavers. In the laboratory a 18G catheter was inserted into the superficial epigastric artery and connected to a sterile saline solution (0.9%) infusion. Afterwards, 4 circular wounds of 5 cm diameter were created on the flap by removing skin, the cutaneous trunci muscle and the outer layer of the rectus sheath. Next, The wounds were infected with 2 common wound pathogens in horses, namely Staphylococcus aureus and Pseudomonas aeruginosa. After an incubation period, the wounds were randomly assigned to 1 of the following 4 treatment groups: (1) VAC using a silver impregnated polyurethane foam (V.A.C. GranuFoam silver) (VAC-AgPU) as primary wound dressing, (2) VAC using a normal polyurethane foam (V.A.C. GranuFoam) (VAC-PU) as primary wound dressing, (3) VAC using a polyvinyl alcohol foam (V.A.C. WhiteFoam) (VAC-PVA) as primary wound dressing or (4) control treatment (C) using a non-adherent antimicrobial dressing with polyhexamethylene biguanide (Telfa AMD) without VAC. A 8 mm punch biopsy was taken of each wound before application of the treatments (T0) and then every 6 hours during the 24 hour treatment protocol (T6, T12, T18, T24) to calculate the bacterial load (CFU/g tissue).

Results: For P. aeruginosa, the bacterial load in the VAC-PVA treated wounds was significantly lower compared to the other treatments (C, VAC-PU and VAC-AgPU) from time point T6 to T24. The bacterial load in the VAC-AgPU treated wounds was slightly lower than the bacterial load in the C and VAC-PU treated wounds from time point T6 to T24 but only significantly so at T12. For S. aureus, the bacterial load in the VAC-PVA treated wounds was significantly lower compared to the other wounds (C, VAC-PU and VAC-AgPU) from time point T6 onwards.

Conclusion: Based on this study, the authors recommend to use a PVA foam as primary dressing when performing VAC therapy for treating contaminated wounds healing by second intention in horses.

Large Animal Orthopedic Surgery

OSTEOCHONDROSIS PREVALENCE AND IMPACT IN DUTCH WARMBLOOD HORSES ESTIMATED FROM A 5-YEAR EQUINE IMAGING PRACTICE DATABASE (2008–2013). Van Grevenhof EM[1], Nielen M[2], Van Vilsteren AAM[1], Blok MC[2], Versteeg JJ[2], Geerts AJJ[3], Back W*[4]. [1]Wageningen University, Wageningen, Netherlands, [2]Utrecht University, Utrecht, Netherlands, [3]EDigit Mobile Equine Imaging, Roosendaal, Netherlands, [4]Ghent University, Merelbeke, Belgium.

Introduction: Osteochondrosis (OC) is a highly prevalent, multifactorial disease in warmblood horse populations with lesions developing at a very young age. Generally, surgery is advised for individual horses clinically suffering from OC dissecans (OCD) to have the fragments removed. Breeding policies by studbooks aim at reduction of OC in the population, while at the same time horse breeders might wish to improve their management of young horses. Therefore, the aims of this study were 1) to retrospectively evaluate the radiological database of the country's largest practice on mobile equine imaging to estimate OC prevalence, 2) to study the variation in individual farm management of young horses in relation to the mean OC status of all the included farms ('OC benchmarking').

Methods: The evaluated equine practice database provided OC diagnosed as positive/negative based on radiological examinations for 8 joints per horse: stifles, hocks, and fetlocks. A horse was considered free of OC when all joints were negative. Only warmblood horses that were radiographed between 12–60 months of age (born 2008–2012) were retrospectively selected for this study (n = 828). Farms with at least 5 horses scored for OC were asked to participate in the management study. Mare and foal management information was collected per farm via a detailed, web-based questionnaire (2013). Questions included aspects of housing, feeding, handling and

pasture use. A preliminary analysis was carried out by comparing high (>25% OC) and low (<25% OC) prevalence farms.

Results: The total group of included horses showed an OC prevalence of 21% (n = 171). In total 45 farms responded to the questionnaire; 167 (27%) of their 626 horses showed OC in 1 or more joints. The joints most affected in the 167 horses were hocks (n = 86), followed by hind fetlocks (n = 38), fore fetlocks (n = 35), and stifles (n = 34) with 22 horses showing OC in at least 2 affected joints. OC surgery was advised for 89 (53%) of OC positive horses, mostly for the hock joints. At farm level only 3/45 (7%) farms had no OC positive horses observed and 23/45 (51%) were defined as high prevalence farms; the farm with the highest OC prevalence showed 80% of the radiographed horses being OC positive (4/5). Low OC farms more often pastured male and female weaned foals separately (P < .05).

Discussion and conclusion: The prevalence of OC in Dutch warmblood horses between 1-4 years old was estimated to be around a quarter of the population, based on these practice data. OC surgery was advised for half of the OC diagnosed horses, indicating the high economic and welfare impact. Preliminary analysis suggests that weaned foal management might be important for OC development, which is in accordance with earlier findings.

POST-TRAUMATIC FETLOCK OSTEOARTHRITIS IN STANDARDBRED RACEHORSES: THE CULPRIT OF LONG-TERM PROGRESSION TO DEGENERATIVE JOINT DISEASE? Bertuglia A[1], Pagliara E[1], Ricci A[1], Brkljaca Bottegaro N[2]. [1]Department Veterinary Science, Turin, Italy, [2]Faculty of Veterinary Medicine Clinics, Zagreb, Croatia.

Introduction: Osteoarthritis (OA) begins many years before structural changes are detectable, since DJD spans over a lifetime in man. In racehorses progression from post-traumatic OA stage to DJD seems much shorter. The purpose of this study was to assess changes in inflammatory and structural biomarkers in serum (S) and synovial fluid (SF) in a cohort of STBRs diagnosed with post-traumatic fetlock OA over the racing career of the animals. We hypothesised that biomarkers assay could demonstrate the progression of degenerative status in the joints after post-traumatic OA, better than clinical and radiographic assessment.

Methods: Thirty-seven STBRs between 18–24 months of age, diagnosed with fetlock joint OA as a cause of lameness, were included in the study. Horses were observed over a period of 5-years of racing activity. Six sound, age-matched STBRs were used as healthy controls. Blood sampling, SF sampling from affected joints, lameness and radiologic examinations were performed at the first lameness episode and repeated yearly. Samples were processed for IL-1ß, IL-6, TNF-α, COMP and CTX-II using ELISA kits. A semi-quantitative radiographic-based score was employed to define the severity of OA. A mixed linear model analysis was employed for multiple comparisons between C and OA groups over the timeframe of the study.

Results: Twenty-five horses fulfilled the study requirements. Significant differences between C and OA were detected for all the biomarkers in SF at T4 and T5. In S those differences were not recorded for IL-6. Concentrations of inflammatory cytokines in OA decreased at T2, followed by an increase with time in SF and S, and attaining a significant difference to baseline at T4 (IL1β, TNF-α) and T5 (IL1β, IL-6, TNF-α). Structural biomarkers showed an increasing trend during consecutive assessments with a significant difference to T1 in S, and SF at T3, T4 and T5. A significant progression over time was evident for radiographic score in the OA group, but not for clinical assessment. In a multivariate analysis only TNF-α values in SF significantly and independently contributed in explaining radiological changes at T4 and T5.

Discussion and conclusion: Both inflammatory and structural biomarkers were increased in the S and SF of OA-affected STBRs, demonstrating that long-term increased concentration of biomarkers is a disease-effect. Biomarkers could predict structural progression of traumatic OA with a better accuracy than clinical and radiological assessment. TNF-α in the SF was correlated with radiological changes, raising the suggestion that cartilage degradation is up regulated by inflammatory stimuli. In conclusion, this study underlines that early post-traumatic fetlock OA and the DJD status are closely interdependent processes.

SURGICAL TREATMENT OF SAGITTAL FRACTURES OF THE FIRST PHALANX WITH TWO PROXIMAL SCREWS JUST DISTAL TO THE ARTICULAR SURFACE. Bladon BM*, Nieuwenhuis G. Donnington Grove Veterinary Surgery, Newbury, United Kingdom.

Introduction: Sagittal fractures of the first phalanx are a frequently encountered fracture of the performance horse. Surgical treatment, to place lag screws across the fracture plane, is usually recommended. It has been suggested that the depth of bone, in a dorsal to palmar/plantar plane, is sufficient that it might be more appropriate to place 2 screws in the proximal aspect of the phalanx, in a transverse plane.

Methods: A prospective study was conducted, recording the details of horses treated surgically for a sagittal fracture of the first phalanx. The age breed and sex of the horse was recorded, along with discipline, fracture type and whether the horse was treated with 1 or 2 proximal screws. The 2 proximal screw technique was adopted at 1 point in time; horses prior to this date were treated with 1 screw and subsequently with 2. The post operative performance of racehorses was recorded, including the number of days from injury to racing. Horses were excluded from the study if the fracture was comminuted, or if the horse underwent surgery under general anaesthesia. The proportion of horses returning to racing was compared by Fisher's Exact Test, and the number of days from injury to return to racing was compared by student's t test.

Results: Twenty nine horses were identified. Seven were treated with a single proximal screw, while 22 had 2 screws in the same transverse plane of proximal P1. Seven horses had less than 6 months follow up, and there were 5 non racehorses (1 in the last 6 months). Of the remaining 18 horses, 7 were treated with a single proximal screw, and 11 were treated with 2 proximal screws. Of those treated with a single screw 4 (57%) raced again, while 8 (73%) of horses with 2 proximal screws raced again, P = .67. The median time to race again was 381 days for horses treated with 1 screw, and 336 days for those with 2 screws, P = .046.

Discussion and conclusion: Though the sample size is small, and therefore the statistical comparisons are not robust, there is some suggestion that horses return to racing quicker following surgery with 2 proximal screws, compatible with the hypothesis that 2 proximal screws results in greater post operative fracture stability. Subjectively, the authors are of the opinion that horses treated with 2 proximal screws show less post operative lameness and heal with less dorsal new bone formation. The technique of placing 2 screws in the proximal transverse plane of the first phalanx is straightforward. Precise anatomical location was achieved by intra-operative radiography using needle markers. The population was not unduly skewed by the use of standing surgery. There were no sagittal fractures of the proximal phalanx which required general anaesthesia during the study period.

INCIDENCE OF POSTOPERATIVE SEPTIC ARTHRITIS AFTER ELECTIVE FEMOROPATELLAR JOINT ARTHROSCOPY IN THE HORSE. Brunsting J[1], Oosterlinck M*[1], Martens A*[1], Wilderjans H*[2]. [1]Faculty of Veterinary Medicine, Ghent University, Department of Large Animal Surgery and Anaesthesiology, Merelbeke, Belgium, [2]Equine hospital de Bosdreef, Moerbeke-Waas, Belgium.

Introduction: Arthroscopy of the femoropatellar (FP) joint is a commonly performed procedure to treat osteochondrosis of the femoral trochlear ridges. Although septic arthritis is an uncommon complication after arthroscopy, there is a clinical impression that this occurs more commonly after arthroscopy of the FP joint compared to other joints.

Methods: In a retrospective case study, the incidence of postoperative septic arthritis after elective arthroscopy in various joints was evaluated. Horses that had primary septic arthritis or penetrating joint injury were excluded as well as horses with diagnostic arthroscopy with 1 portal. Age, sex and breed of the horse, antimicrobial administration, surgeon, anaesthetic time, size of the lesion, postoperative complications and long-term evaluation were retrieved from the medical records.

Results: A total of 1741 joints, including 359 (20.6%) FP joints, were explored in 1079 horses. Thirteen joints (0.75%) in 12 horses developed septic arthritis: 1 metacarpophalangeal joint (0.14%), 4 tibiotarsal joints (0.74%), 8 FP joints (2.23%) and 0% of the other joints. There was a significantly higher risk of developing septic arthritis after performing a FP joint arthroscopy compared to the other examined joints (P = .001) with an odds ratio of 6.3. All infected FP joints were accompanied by a lateral portal infection. The horses with infected FP joints were younger than those without infection (median age 21 vs. 35 months respectively) but this difference was not significant. The size of the defect in the lateral trochlear ridge was significantly larger in the infected FP joints compared to the non-infected FP joints (median 39 and 30 mm respectively, P = .032). The anaesthesia time of horses with infected joints (median 95.5 min. range 74–150 min.) was significantly longer compared with non-infected joints (median 85 min. range 57-191 min., P = .032). There was no significant effect of sex or breed of the horse. Five of 7 horses with infected FP joints survived and 3 are performing on international jumping level.

Discussion and conclusion: This study shows that FP joint arthroscopy carries a significantly higher risk of postoperative infection. This may be associated with various factors, including preoperative clipping, peroperative contamination, peroperative tissue trauma due to instrument traffic (instruments going repeatedly in and out of the joint), subcutaneous fluid accumulation, prolonged anaesthetic time and postoperative contamination. Although the present study does not allow drawing final conclusions on this issue, prevention should be focused on the per- and postoperative trauma and contamination, especially of the lateral portal.

CONDITIONED UMBILICAL-CORD DERIVED EQUINE STEM CELLS FOR TENDON HEALING. Griffon D*[1], Cho J[1], Wagner J[1], Wei J[2], Chavaryamath C[1], Wagoner-Johnson A[2]. [1]Western University of Health Sciences, Pomona, CA, [2]*University of Illinois, Dept of Mechanical Science and Engineering, Champaign, IL.

Introduction: Mesenchymal stem cells (MSCs) have gained tremendous interest because they offer new strategies to manage orthopedic diseases that challenge traditional therapeutic approaches, such as spinal cord injury, tendon diseases, chronic inflammation, bone defects and cartilage damage. Our long term goal is to develop a cell population with enhanced stemness for allogenic regenerative therapy. The objective of this study was to determine the influence of conditioning foetal adnexa-derived stem cells on chitosan under hypoxia.

Methods: Equine umbilical cord-derived stem cells (UCM-MSCs, n = 6) were cultured under 1- standard conditions or 2- conditioned on chitosan under hypoxia. Groups were compared for proliferation, stemness (gene expression), and differentiation. Fluorescence labeled cells from each group were injected in a bilateral rat patellar ligament defect. Tensile properties (n = 6 rats/treatment, 28 days) and histology (n = 4, day 7 and n = 6, day 28) of treated ligaments were normalized to contralateral, untreated defects.

Results: UCM-MSCs formed spheroids on chitosan but yielded 69% less DNA than under standard conditions. Expression of SOX2, OCT4, NANOG was 4 to 30 times greater in conditioned than standard cells. UCM-MSCs differentiated into osteogenic and chondrogenic lineages but only conditioned cells underwent neurogenic differentiation. Ligaments treated with conditioned cells had greater stiffness (X2) and modulus of elasticity (176.6 vs 34%), with less hysteresis (22.3 vs 34.2%) than the standard group. Fluorescent cells were identified in both groups.

Conclusion: Conditioning cells on chitosan under hypoxia appears to affect the proliferation of UCM-MSCs, which may reflect poor cell attachment to chitosan film combined with decreased proliferation due to hypoxia. However, chitosan and hypoxia improved the stemness of UCM-MSCs, their ability to differentiate and their contribution to the healing of tissues. These properties are highly relevant to clinical applications and outweigh the negative impact on cell proliferation.

DIFFUSION OF MEPIVACAINE TO ADJACENT SYNOVIAL STRUCTURES AFTER INTRASYNOVIAL ANALGESIA OF THE DIGITAL FLEXOR TENDON SHEATH IN THE HORSE. Jordana M*[1], Martens A*[1], Duchateau L[2], Haspeslagh M[1], Vanderperren K[3], Oosterlinck M*[1], Pille F*[1]. [1]Department of Surgery and Anaesthesiology of Domestic Animals, Faculty of Veterinary Medicine, Ghent University, Merelbeke 9820, Belgium, [2]Department of Comparative Physiology and Biometrics, Faculty of Veterinary Medicine, Ghent University, Merelbeke 9820, Belgium, [3]Department of Veterinary Medical Imaging and Small Animal Orthopaedics, Faculty of Veterinary Medicine, Ghent University, Merelbeke 9820, Belgium.

Introduction: Controversy exists about the specificity of diagnostic analgesia of the digital flexor tendon sheath (DFTS) in horses. Recent studies have shown that backflow of local anaesthetic solution to the subcutaneous tissues affecting the palmar digital nerves can desensitize additional structures in the digit. Other authors have suggested that diffusion of local anaesthetic solution could be responsible for this non-specificity. Therefore, the present study was performed to evaluate the degree of diffusion of mepivacaine hydrochloride from the equine DFTS to adjacent synovial structures.

Methods: Eight horses were included in the study. Under general anaesthesia, the DFTS of 1 front and 1 hind limb of each horse were injected simultaneously with mepivacaine hydrochloride (1 ml/50 kg bwt). Synovial fluid samples of the injected DFTS, the adjacent metacarpo/metatarsophalangeal (MCP) joint, proximal interphalangeal (PIP) joint, distal interphalangeal (DIP) joint, navicular bursa (NB) and the contralateral MCP joint were collected 15 minutes after injection (T15) for 1 of the injected limbs and 60 minutes post-injection (T60) for the other limb. Venous blood samples were obtained at T0, T15 and T60 to check for systemic distribution of mepivacaine. After a washout period of 2 weeks, the procedure was repeated using the same limbs but the time of sampling was now reversed between the front and the hind limbs. Concentration of mepivacaine in the different samples was measured with a commercial ELISA kit.

Results: Mepivacaine concentrations in the DFTS samples, both at T15 (5076.6 mg/L) and T60 (3503.3 mg/L), exceeded by far those estimated sufficient to produce synovial analgesia (100 mg/Lor 300 mg/L). Mepivacaine was found in all the samples of the synovial structures adjacent to the injected DFTS, but concentrations were low, with a maximum value of only 3.2 mg/l. Except for the NB samples, the mepivacaine concentrations in the adjacent synovial structures were significantly higher at T60 compared to T15 ($P < .03$). Significantly higher mepivacaine concentrations were found in the ipsilateral MCP joints compared to the contralateral MCP joints at T60 ($P < .001$). Blood samples showed significantly higher mepivacaine concentrations at T15 (0.03 mg/L) and T60 (0.04 mg/L) compared to T0 (0.005 mg/L) ($P < .001$).

Discussion and conclusion: Mepivacaine injected into the DFTS of horses diffuses towards adjacent synovial structures but without achieving clinically relevant concentrations. The presence of mepivacaine in synovial structures other than the DFTS is rather the result of local diffusion than of systemic distribution.

TARSOCRURAL ARTHROSCOPY FOR OSTEOCHONDROSIS DISSECANS: LONG-TERM FOLLOW-UP OF 54 CASES. James OA, Payne RJ, Bathe AP*, Greet TRC, Wylie CW. Rossdales Equine Hospital, Newmarket, United Kingdom.

Introduction: There is limited information on tarsocrural arthroscopy (TA) for OCD in Great Britain (GB) and routine examination of the plantar pouch has not been described; therefore, the objective of this study was to evaluate the outcomes of such cases within our Hospital.

Methods: A retrospective case series review was performed and combined with a questionnaire survey to obtain follow-up data. The electronic patient records of all equine clients between January 2005 and December 2013 were reviewed. All the case notes were searched electronically for a combination of [hock OR tarsocrural] AND [OCD OR osteochondritis OR osteochondrosis OR osteochondral] and were reviewed by 1 of the authors. Inclusion criteria were that the patient had TA for the diagnosis and or treatment of OCD at our Hospital. A structured follow-up questionnaire was designed to gather information on the intended use of the animal following tarsocrural arthroscopy, and whether the animal had achieved its intended goals. Complications were graded using a modified human Clavien classification scale.

Results: Of the 99 cases; 42 were Warmbloods which were more highly represented in the OCD population than in the general population seen at this referral hospital.There was a questionnaire response rate of 54.5%, with a median time from surgery to follow-up of 58 months (SD 31.8 months, range 9–115 months). In total, 64.8% of animals had reached the desired goals and the surgery was deemed a success, 27.8% of owners believed their horse had not achieved the goals expected, and 7.4% did not know - either due to being unbroken, or had been sold on. Of the 15 horses that had not achieved the goals, 46.7% were considered to be due to persistent hock OCD related lameness. Twenty-eight animals (51.9%) underwent plantar pouch examination. In this subset, 70% of animals were believed to have achieved pre-surgery goals when pathology was absent from the plantar pouch, compared with 50% of horses, which had pathology present.

Discussion and conclusion: This is the first study to describe the long-term follow-up of a population of horses undergoing TA for OCD and the higher prevalence of Warmbloods with OCD undergoing TA in GB compared to other breeds. Current literature indicates a poorer prognosis when treating OCD in the tarsocrural joint if cartilage degeneration is present. In conclusion, whilst data are limited, there are indications that animals with plantar pouch pathology are less likely to perform to their owners expectations than those horses with no pathology present within the plantar pouch.

DESIGN AND POSITION TESTING OF A 10-HOLE LOCKING COMPRESSION TARSAL ARTHRODESIS PLATE PROTOTYPE ON 20 WARMBLOOD CADAVERIC LIMBS. Klaus CSK*, Lischer CJL*. Equine Clinic Free University of Berlin, Berlin, Germany.

Introduction: A 10-hole locking compression tarsal arthrodesis prototype plate was tested for design and position on 20 cadaveric warmblood horses.

Methods: After an approximately 10cm longitudinal skin incision, the plate was positioned dorsomedially on proximal MTIII and the distal tarsal bones under fluroscopc guidance and fixed in position by a 4.5 mm cortical screw inserted in an elogated combi-hole at the vertical shrank of the plate. All other 9 locking screws were inserted: 2 horizontal locking head screws were inserted in the distal tarsal bones; 4 transarticular locking head screws crossing the DIT or the TMT joint; 3 locking head screws to fix the plate on MTIII; Time for implantation was recorded. After implantation was completed all screws were removed and CT examination of the cadaveric limbs was performed. The CT images were interpreted and the position of the screw holes were measured and graded as (1: optimal, 2: acceptable, 3: inacceptable) for the following criteria: horizontal locking head screws within distal tarsal bones: closest distance to the corresponding joint spaces; transarticular locking head screws: point of crossing the joint space and maximum distance to the ipsilateral cortex; locking head screws within MT III: maximum distance to ipsilateral cortex

Results: The time needed to position the plate and insertion of all screws was 25–50 minutes. All horizontal screws were positioned in an optimal or acceptable position. All transarticular screws were in an optimal or acceptable distance to the ipsilateral cortex.

In 16 of the 20 limbs transarticular screws were crossing the joint space in a grade 3 position. 1 screw in 4/16 limbs, 2 screws in 11/16 limbs and 3 screws in 1 limb were affected. Skin closure was not performed, but would have been possible in all cases without complications.

Discussion and conclusion: The prototype plate could be positioned well fitting onto warmblood horses hindlimb without any bending of the implant or contouring of

the bone surface. All horizontal screws were inserted in a safe position without entering any joint space. The transarticular screws revealed a safe distance to the ipsilateral cortex to avoid the risk of stress raising at this cortex. The crossing point of the joint surface was garded as 3 in 16/20 limbs but all screws were still purchased in a solid piece of bone and no chip fractures were observed. The design of this prototype fits warmblooded horses of an average size without contouring of the implant or the bone surface.

Further mechanical testing as well as clinical experience will be needed before this implant can be recommended as a treatment option.

EQUINE ALLOGENEIC UMBILICAL CORD BLOOD MESENCHYMAL STROMAL CELLS REDUCE ACUTE SYNOVIAL FLUID NUCLEATED CELL COUNT IN AN EQUINE SYNOVITIS MODEL. Williams LB, Koenig JB*, Black B*, Gibson TWG*, Sharif S, Koch T. Ontario Veterinary College, University of Guelph, Guelph, Canada.

Introduction: Improved clinical outcomes have been reported following intra-articular injection of mesenchymal stromal cells (MSC) in the horse, dog, and human. These observations have led to use of intra-articular MSC injection in equine practice with little understanding of the mechanisms by which perceived improvement occurs. Our objectives were to evaluate the effect of intra-articular injection of allogeneic umbilical cord blood- derived MSC in a model of lipopolysaccharide (LPS) induced synovitis. We hypothesized that intra-articular injection of allogeneic CB-MSC would decrease the inflammatory response associated with LPS injection.

Methods: Two feasibility studies evaluated intra-articular injection of LPS or allogeneic CB-MSC alone into the tibiotarsal joint in 3 horses. Following these studies, acute middle carpal joint synovitis was induced bilaterally using LPS in 6 horses. Allogeneic CB-MSC were injected into 1 middle carpal joint of the 6 horses. Lameness, routine synovial fluid analysis, and synovial fluid biomarkers were evaluated.

Results: LPS injection alone resulted in transient lameness and marked signs of inflammation. In undisturbed joints, injection of 30-million CB-MSC resulted in mild synovitis that resolved without treatment. Mild lameness in the CB-MSC-treated limb was observed in 2 horses and severe lameness in the third horse 24h post-injection. Lameness did not correlate with the severity of synovitis induced by CB-MSC injection.

Simultaneous injection of LPS and CB-MSC resulted in significant reduction in SF total nucleated, neutrophil, and mononuclear cell numbers compared to LPS-only treated joints. No differences were detected in other parameters associated with synovial fluid analysis or biomarkers. Lameness in CB-MSC treated limbs was observed at 8 hours, which resolved by 24 hours.

Conclusion: Allogeneic CB-MSC significantly reduced synovial fluid cell populations and stimulated a mild prolonged inflammatory response in an acute synovitis model. Further evaluation of dose, timing of treatment, and additional effects of treatment are needed to evaluate CB-MSC as a safe and efficacious therapeutic option in equine sports medicine.

EVALUATION OF CYTOKINE AND GROWTH FACTOR LEVELS IN SERUM AND AUTOLOGOUS CONDITIONED SERUM OF SOUND HORSES AND HORSES SUFFERING FROM NATURAL OSTEOARTHRITIS. Lasarzik J[1], Bondzio A[2], Ehrle A[1], Einspanier R[2], Lischer C*[1]. [1]Equine Clinic: Surgery and Radiology, Free University of Berlin, Berlin, Germany, [2]Institute of Veterinary Biochemistry, Free University of Berlin, Berlin, Germany.

Introduction: Autologous conditioned serum (ACS) is a common treatment agent in the therapy of human and equine osteoarthritis. We hypothesized that ACS produced by a commercialy available ACS kit would result in a higher increase in Interleukin-1 beta (IL-1β), Interleukin-1 receptor antagonist (IL-1ra) and Insulin growth factor-1 (IGF-1) levels compared to levels received by incubation of whole blood in normal serum glass tubes (IS). Further we suggested that a longer incubation time than 24 hrs would cause a more pronounced increase in the IS and ACS cytokine and growth factor concentrations.

Methods: In 7 sound horses and 6 horses suffering from osteoarthritis, concentrations of IL-1β, IL-1ra and IGF-1 were measured in normal serum (S), IS and ACS utilizing ELISA kits.

Results: No significant difference was found between the IL-1ra and IGF-1 levels in IS and ACS after the same incubation times. Further the IGF-1 levels in IS and ACS did not show a significant increase compared to the IGF-1 levels in S. There was no significant difference in IL-1ra, IL-1β and IGF-1 concentrations of IS and ACS samples between 24 hours and 36 hours of incubation detectable.

Discussion and conclusion: In contrast to our first hypothesis, incubation of whole blood in commercially available serum glass tubes had similar effects on the IL-1ra, IL-1β and IGF-1 concentrations as the incubation in commercially available ACS kits. Contrary to our second hypothesis we found that longer incubation times than 24 hrs do not induce a more pronounced increase in cytokine and growth factor levels. The results of the present study question the necessity of commercially available ACS kits for the conditioning of autologous serum and lead to the inquiry if intra-articular treatment of OA joints with normal or incubated serum would induce the same therapeutical effects as ACS treatment which need to be investigated in future in vivo studies.

IS SYSTEMIC LIDOCAINE ABLE TO REDUCE KETAMINE REQUIREMENTS TO INDUCE ANESTHESIA IN CALVES? Lauper JL[1], Marolf VM[2], Steiner AS*[1], Meylan MM[1], Spadavecchia CS[2]. [1]University of Berne, Vetsuisse-Faculty/ Farm animal clinic, Berne, Switzerland, [2]University of Berne, Vetsuisse-Faculty/ Division of Veterinary Anaesthesia and Pain Management, Berne, Switzerland.

Introduction: Only a few drugs are approved for bovine anesthesia and analgesia. After premedication with an alpha-2 agonist, typically xylazine, ketamine is commonly used to induce anesthesia in calves. If quiet induction and smooth intubation are not obtained, either xylazine or ketamine or both can be readministered, but severe cardiorespiratory side effects might follow. Lidocaine (L), mainly known as a local anesthetic, can be administered systemically as a continuous rate infusion during and after abdominal surgery in humans (Koppert et al., 2004), horses (Doherty & Seddighi, 2010) and calves (Vesal et. al., 2011) to provide analgesia and decrease the requirement for inhalation anesthetics. The objective of the present study was to investigate whether a single intravenous bolus of L in calves premedicated with xylazine can reduce the amount of ketamine needed to perform oro-tracheal intubation while improving the induction quality but without impairing the cardiovascular function.

Methods: Forty-one calves, referred for elective umbilical surgery were included in the study.

Calves were assigned randomly to 1 of the 2 groups (L or S). All calves were premedicated with xylazine (0.07 mg/kg IM) and butorphanol (0.1 mg/kg IM). Ten minutes after premedication, the treatment (L or saline [S]) was injected slowly over 1 minute. Two minutes after the injection of treatment, anesthesia was induced with ketamine (2.5 mg/kg IV). If depth of anesthesia was unsatisfactory for intubation, ketamine was readministered at a dosage of 1 mg kg-1 IV until the calves could be successful intubated. The amount of ketamine required for induction, physiological parameters, sedation and intubation quality scores were statistically evaluated.

Results: The required amount of ketamine for induction of general anesthesia was not different for the 2 groups ($P = .483$). After treatment, calves in the L group showed stronger sedation ($P = .0157$) than in the S group. Demographic data, physiological parameters and quality of intubation did not differ significantly between groups.

Discussion and conclusion: The study failed to demonstrate a reduction of ketamine requirements for induction of anesthesia by administering a bolus of L in the premedication. Despite stronger sedation in the L group, the sedative effects of a L bolus seems to be very short in calves. Intravenous L has no adverse effects on cardiopulmonary parameters and can be safely added to general anesthesia in calves.

INTRAVENOUS REGIONAL LIMB PERFUSION WITH LIDOCAINE AND MEPIVACAINE IN STANDING SEDATED HORSES. Mendez-Angulo JL*[1], Granados MM[1], Modesto R[2], Serrano-Rodriguez JM[1], Funes FJ[1], Quiros S[1], Gomez-Villamandos RJ[1], Zaldivar-Lopez S[1], Trumble TN*[2]. [1]University of Cordoba, Cordoba, Spain, [2]University of Minnesota, St. Paul, MN.

Introduction: The objectives of this study were to evaluate limb withdrawal response to nociceptive stimulation and systemic clinical effects, and to determine maximal drug concentration achieved in plasma and synovial fluid following IVRLP with lidocaine or mepivacaine in standing sedated horses.

Methods: A controlled, randomized, cross-over study was performed. Six healthy horses were sedated with xylazine CRI, and IVRLP was performed in the cephalic vein with lidocaine, mepivacaine, or saline. Additionally, a low 4-point nerve block was performed as positive control. All horses received all protocols (3 weeks washout). Electrical and mechanical stimuli were used to test nociceptive threshold of the distal limb (baseline and every 10 minutes for 1 hour). For lidocaine and mepivacaine trials, blood samples were collected before IVRLP and every 10 minutes for 1 hour, at 2 and 24 hours. Synovial fluid was collected (radiocarpal joint) before IVRLP, and 25 min, and 1, 2, and 24 hours later. Drug concentrations were measured using high performance liquid chromatography. Data was compared with 2-way repeated measures ANOVA, and significance set at $P < .05$.

Results: Nociceptive thresholds in lidocaine and mepivacaine protocols from 10 to 30 minutes were similar to those observed in nerve block group, and significantly increased compared to saline. Maximal lidocaine and mepivacaine concentrations in plasma were 265.9 ± 49.7 and 147.7 ± 40.6 ng/mL, respectively; and synovial fluid 305.3 ± 55.1 and 370.3 ± 68.8 ng/mL, respectively.

Discussion and conclusion: Lidocaine or mepivacaine IVRLP provides antinociception to the distal limb in standing sedated horses, with plasma concentration staying low during the procedure.

EFFECTS OF PRE-ACTIVATED ADIPOSE MESENCHYMAL STEM CELLS ON EXPERIMENTAL EQUINE FETLOCK OSTEOARTHRITIS MODEL. Monteiro S*[1], Maninchedda U[2], Roussignol G[3], Remandet B[3], Segard E[2], Hilairet S[3], Jorgensen C[4], Lepage OM*[2]. [1]Departamento de Medicina Veterinária, Escola de Ciências e Tecnologia, Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Instituto de Investigação e Formação Avançada, Universidade de Évora, Évora, Portugal, [2]University of Lyon; VetAgro Sup, Veterinary Campus of Lyon, GREMERES-ICE Lyon Equine Research Center, Marcy l Etoile, France, [3]Sanofi-aventis Recherche, Montpellier, France, [4]CHU Lapeyronie University Hospital, Montpellier, France.

Introduction: Mesenchymal stem cells (MSCs) have reparative effects due to paracrine actions and need to be activated by inflammatory mediators. Therefore, pre-activation of MSCs could lead to a more efficient therapeutic activity than unstimulated MSCs. Our objective was to study the effects of interferon-γ (INF-γ) pre-activated or "primed" allogeneic MSC in experimental osteoarthritis models, *in vitro* and *in vivo,* in horses.

Methods: Equine adipose derived mesenchymal stem cells (ASC) were characterized and activated with IFN-γ. ASC were tested on equine cartilage explants subjected to interleukin-1 (IL-1) and oncostatine-M (n = 8). The experimental *in vivo* model of OA was induced by arthroscopy, using an adapted "groove" technique in 1 distal metacarpal condyle. Group A (n = 6) did not receive any treatment; Group B (n = 6) received intra-articular injection of 15 million INF-γ activated ASC in a vehicle (3 mL) and Group C (n = 4) received the vehicle alone (3 ml), 7 days post-surgery. After 15 days stall-rest horses respected a standardized exercise protocol. They were clinically evaluated before surgery (d0), in the middle (d45) and in the end of the study (d75), using an inertial sensor device for objective lameness examinations, synovial fluid analysis and radiography. All articular surfaces were evaluated macroscopically and histologically.

Results: In the experimental study *in vitro*, IL-1 and oncostatine-M treatment induced a significant ($P < .001$) increase in glycosaminoglycans (GAG) release to the culture medium. Cartilage explants treated with ASC showed less GAG degradation and IFN-γ pre-activation enhanced the protective effect ($P = .019$). *In vivo*, there was no significant difference in mean head movement asymmetry and radiographic scores between groups throughout the study ($P > .05$). Estimated proportions of lame horses at the end of the study was 83%, 33% and 50% and mean radiographic score was 11.8, 7.7 and 9 in group A, B and C, respectively. There was no significant difference in synovial fluid TP and PGE2 mean values, nor in macroscopic and histologic mean scores between groups ($P > .05$).

Discussion and conclusion: IFN-γ primed allogeneic ASC treatment had benefic effects observed *in vitro* by significant reduced GAG production but these effects were less evident clinically. Perhaps there was not enough inflammation by the time of the treatment (d7) or maybe the number of stem cells was not adequate. This could be explained by insufficient number of cells for this type of joint or accelerated clearance of the cells from the joint environment. Using INF-γ primed allogeneic ASC treatment has protective effect *in vitro* and should be further explored clinically before it can be recommended in acute osteoarthritis in horses.

REHABILITATIVE LEGWEAR FOR FLEXOR APPARATUS INJURIES IN THE HORSE. Pugliese BR[1], Schad GA[1], Pflaster DS[2], Size KJ[3], Kirker-Head CA*[1]. [1]The Cummings School of Veterinary Medicine at Tufts University, North Grafton, MN, [2]Pflaster Consulting, Burlington, VA, [3]Manta Product Development, Cambridge, MA.

Introduction: Horses with flexor apparatus (FA) overstrain injuries may benefit from legwear that mechanically limits metacarpophalangeal joint (MCPJ) extension and hence peak FA stress/strain. This could enhance the local mechanical environment for healing, prevent re-injury of already traumatized tissues, and speed return to function. We hypothesize that: 1) horses can wear our rehabilitative legwear during exercise without adverse effect; 2) legwear effectively limits MCPJ extension; and 3) legwear redirects weight-bearing forces (load - N) from the FA to the dorsal aspect of the cannon and pastern bones.

Methods: Six healthy adult horses (3 Thoroughbreds, 2 Warmbloods, and 1 Quarter Horse; weight 519-635 kg, age 5–11 years) of good conformation were acclimated to bilateral application of prototype legwear and a treadmill exercise regimen. Evaluation of: i) legwear wearability (the interaction between body and wearable object), ii. slow motion video (to measure MCPJ height above ground surface, reflecting MCPJ extension), and iii. telemetric force data (reflecting redirection of FA load to the cannon and pastern bones) were completed. The exercise protocol (walk, trot, canter) was completed under 3 bilateral forelimb treatment conditions: naked limb (control), inactive legwear (unlimited MCPJ extension - control), and active legwear (limited MCPJ extension - treatment).

Results: Horses wearing activated legwear during exercise consistently maintained greater MCPJ height above the ground during peak load, when compared to the naked limb. This ranged from 15.2 ± 4.3 (SD) cm in the naked limb vs 16.3 ± 4.4 cm in the treated limb at the walk, to 8.8 ± 4.4 cm in the naked limb vs 10.8 ± 4.9 cm in the treated (lead) limb at the canter. This effectively reduced the MCPJ torque experienced by the FA by 2.7% (walk), 2.5% (trot) and 2.8% (canter) of naked limb values. Legwear integrity was uncompromised throughout the study but initial padding deficiencies caused occasional local hair coat disruption in all horses and mild skin abrasion in 1 horse.

Discussion: Results confirm that activated legwear consistently and effectively reduced MCPJ extension and hence FA load during ambulation when compared with the naked limb. This may benefit recovery from FA overstrain injuries by providing an enhanced mechanical environment for healing and protection from re-injury. Legwear design requires modification to address subtle padding-associated wearability deficiencies.

DECELLULARIZATION TO PRODUCE BIOLOGICAL SYNOVIAL EXTRACELLULAR MATRIX SCAFFOLDS. Reisbig NA, Bertone AL*, Hussein HA, Pinnell E. The Ohio State University, Columbus, OH.

Introduction: Cartilage debilitation, as seen in osteoarthritis, is estimated to cost industrialized countries 1–2.5% of total gross domestic production. Present treatments focus on symptom relief and there are no therapies that can reverse the loss of chondrocyte function. Regenerative cells and anabolic agents, in combination with scaffolds for targeted delivery, is a treatment that could promote cartilage repair. The objective of this study was to find a method to produce decellularized synovium (synECM) that could serve as a living scaffold when seeded with viable cells. Four methods that are rapid, relatively inexpensive, and have been successfully applied in similar tissue types were compared with regards to morphology and efficiency of decellularization.

Methods: Villous synovium was harvested from the equine stifle. Fresh-thawed synovium was randomly assigned to control (no processing) or 1 of 4 decellularization methods in triplicate: 1) 0.1% peracetic acid solution (1X); 2), same as method 1 but repeated (2X); 3) 1% Triton X/DNAse, and; 4) same as method 3 with 2M sodium chloride solution replacing the Triton X. Control and decellularized tissue from each method was cut with a biopsy punch and tested for morphology (histologic, scanning electron microscopy) and efficiency of decellularization (cell content, DNA content, DNA fragmentation and histology). Numerical data was analyzed with repeated measures ANOVA for method and Tukey's post-hoc test with significance set at $P < .05$.

Results: All decellularization methods resulted in non-viable synovium and loss of cells. The PAA procedure (1X) had no significant loss of villous matrix integrity but had significantly greater retention of cells, cellular DNA (P = 6.5–18), and DNA size (>200 bp) than all other methods. The 2X PAA procedure also had no significant loss of matrix integrity, but had fewer cells than 1X, significantly (P = 4.9–7) lower retention of cellular DNA compared to the control and 1X, and similar low DNA retention (101ng/mg) and small DNA size (<200 bp) as methods 3 and 4. TritonX/DNAase and 2MNaCl/DNAase damaged villous structure leaving little to no discernable synovium, no cells identifiable, low (140–143 ng/mg) and small (<200 bp) residual DNA content.

Discussion and conclusion: The 0.1% PAA, performed twice, was considered to have the best scaffold potential due to the low cellularity, low DNA content and retained villous architecture. Other advantages of the PAA are elimination of an extra cycle for sterility (PAA is used to sterilize ECM) and potentially less toxicity for cell seeding.

PREVALENCE AND ANTIMICROBIAL SUSCEPTIBILITY PROFILE OF BACTERIAL ISOLATES FROM HORSES WITH SYNOVIAL SEPSIS (95 CASES). Robinson CS, Timofte D, Singer ER*, Rimmington L, Rubio Martinez L*. Philip Leverhulme Equine Hospital, University of Liverpool, Neston, United Kingdom.

Introduction: Culture of bacteria from the synovial fluid of horses with septic synovitis takes at least 24 hours. Therefore empirical antimicrobial therapy is instigated whilst awaiting results. Our objective was to describe the prevalence and antimicrobial susceptibility patterns of bacterial organisms cultured from horses with synovial sepsis at a UK referral hospital between 2004 and 2013. We hypothesise that the bacteria cultured and their antimicrobial susceptibility will differ from previous reports due to differences in study time period and horse population.

Methods: All horses diagnosed with synovial sepsis with positive bacterial culture at 1 UK referral hospital from 2004 to 2013 were included. Bacteria were cultured, Gram positive and negative bacterial identification performed and antimicrobial susceptibility tested.

Results: Ninety five horses and a total of 114 bacterial isolates were included in the study. Synovial contamination was caused by a wound in 85.3% of cases. The synovial structures most frequently affected were the DFTS (25%) and the MC/TPJ (17%). Gram-positive bacteria were isolated in 74.6% of cases: 22% were haemolytic Staphylococcus spp. and of these 11% were identified as Staphylococcus aureus. Methicillin resistant Staphylococcus aureus was identified in 2 cases. Gram-negative

bacteria were isolated from 25% of cases, of which the majority were non-haemolytic Escherichia coli or other coliforms (9.6%). One Gram-negative organism (Citrobacter freundii) was detected to be an extended-spectrum β-lactamase producer. All Gram-negative species were resistant to penicillin G, as were all Gram-positive species except Streptococcus spp. Eighty eight percent of haemolytic- Staphylococcus spp., 86.4% of non- haemolytic Staphylococcus spp. and 50% of Streptococcus spp. were sensitive to gentamicin. The efficacy of gentamicin decreased considerably if the infecting agents were Proteus spp., Enterobacter spp., Pseudomonas spp. or Acinetobacter spp. which are more likely to be multidrug-resistant.

Conclusion: Penicillin G and gentamicin combination is a suitable choice for first line treatment whilst awaiting culture results when bacterial contamination of a synovial structure has occurred. The large number of Gram-positive isolates that were resistant to penicillin and the partial Gram-negative susceptibility to gentamicin shows that knowledge of the infective agents and their susceptibility pattern can increase the likelihood of therapeutic success whilst decreasing the selective pressure exerted by the common combinations used to broaden their antibacterial spectrum.

MAGNETIC RESONANCE IMAGING OF MENISCAL, CRUCIATE LIGAMENT AND CARTILAGE PATHOLOGY - 76 CLINICAL CASES. Waselau M*, Bracher B, Kasparek AC. Equine Hospital Aschheim, Equine Diagnostic Center Munich, Aschheim, Germany.

Introduction: Recently, routine magnetic resonance imaging (MRI) of equine stifles was established. In the current study, this MRI-technique was used to (1) evaluate/report incidence/location of meniscal, cruciate ligament and cartilage lesions, (2) describe interrelations of this pathology, (3) compare MRI-findings to ultrasonography/arthroscopy retrospectively and (4) report post-MRI treatment. We hypothised, that stifle MRI's (1) delineate menisco-, cruciate desmo- and chondropathies thoroughly, (2) confirm their co-existence, (3) reveal soft-tissue pathology, that remained underdiagnosed on ultrasonography/arthroscopy and (4) can influence/change treatment.

Methods: Medical records of 76 stifles positive after intraarticular anesthesia without abnormalities on radiography/ultrasonography were reviewed for breed/age/gender, MRI-anesthesia time and findings. With horses under general anesthesia, stifles were extented in a rotating MRI-gantry. Different sequences in several planes were acquired within 62 min (40–94). Retrospectively, ultrasonographic/arthroscopic findings were compared to MRI-scans. Arthroscopy was performed if lesions were accessible based on MRI-scans.

Results: MRI-examinations were successfully accomplished in all horses and soft-tissues were completely imaged. Incidence of menisco-, cruciate desmo- and chondropathies were high with characteristic locations. Frequently, soft-tissue pathology was co-existent. Retrospectively, ultrasonography frequently failed to identify/follow lesions. Thirty-three stifles (43%) underwent arthroscopic revision with remaining stifles being treated conservatively. Arthroscopically, all superficial chondropathies were confirmed. However, extent of meniscal tears/degenerations and cruciate desmopathies was unreliably diagnosed and/or incompletely followed. Conversely, frequency/location of meniscal damages/tears and/or cruciate desmopathies were more globally portrayed on MRI-images

Discussion and Conclusion: MRI-examinations revealed that soft-tissue pathology of stifles is common/co-existent and is frequently underdiagnosed on traditional diagnostics. MRI-examinations delineate menisco-, cruciate desmo- and chondropathies more globally as compared to conventional diagnostics. Based on MRI-evaluations, almost half of scanned stifles were treated conservatively. Therefore, MRI-results influenced/changed therapy. However, combining MRI-scanning with subsequent arthroscopy appears useful for better understanding of stifle pathology, treatment and prognosis.

Large Animal Poster Presentation

DOES STANDING LAPAROSCOPIC PERITONEAL FLAP HERNIOPLASTY MODIFY TESTICULAR HISTOLOGICAL CHARACTERISTICS? Gracia LA[1], Ezquerra LJ*[2], Ortega C[2], Martin M[2], Roquet I*[2], Tapio H[3], Duran ME[2]. [1]Hyvinkää Hevossairaala, Hyvinkää, Finland, [2]Veterinary Teaching Hospital, University of Extremadura, Caceres, Spain, [3]Veterinary Teaching Hospital, University of Helsinki, Helsinki, Finland.

Introduction: Laparoscopic hernioplasty techniques in horses have been developed in recent years to avoid the recurrence of inguinal hernias and to spare the testicles for breeding purposes. Reproductive-related complications due to different hernioplasty techniques have been described in other species. Objectives: 1) to assess the histological characteristics of the testicles 1 year after being subjected to standing laparoscopic peritoneal flap hernioplasty (SLPFH); and 2) compare the daily sperm output (DSO) before and 1 year after the hernioplasty.

Methods: Five intact stallions underwent SLPFH as described by Wilderjans et al 2012. Four healthy stallions were castrated and used as a control group. The DSO was evaluated before and 1 year after surgery. The stallions were castrated 1 year after the hernioplasty and the histological features were assessed following McLachland et al. The samples were evaluated using a quantitative modified Johnsen score. The values are expressed as mean (±SD). Normal distribution of the variables was assessed using the Shapiro-Wilk test. The variables were compared using an unpaired 2-sample test (normal distribution) or using a Mann-Whitney U test (non normal distribution). The level of significance was set at $P < 0.05$.

Results: The DSO did not show significant differences between T0 and T12 (3584 ± 1194 vs. $3518 \pm 1544 \times 106$ spermatozoa). All the testicle tissue samples from the hernioplasty group showed moderate vascular congestion and interstitial edema. The pampiniform plexus showed vascular congestion and interstitial edema, which was more evident in the hernioplasty group. The epididymus showed edema and congestion in 8/10 samples from the hernioplasty group, in contrast to 2/7 of the control group. The mean ± SD tubular diameter of the horses in the control group and hernioplasty group was 230 ± 34 and 186 ± 10 μm respectively ($P = 0.002$). Spermatogenesis did no cease in any of the samples except in 1 (one testicle) from the hernioplasty group. The percentage of seminiferous tubules with full spermatogenesis was $24.85 \pm 14.31\%$ in the samples of the control group and $14.1 \pm 9.68\%$ in the samples of the hernioplasty group. However, this difference was not significant. The modified Johnsen score was 7.22 ± 0.17 in the samples of the control group and 7.13 ± 0.19 in the samples of the hernioplasty group. The difference was not significant.

Discussion and conclusion: SLPFH produced mild histological changes in the testicular parenchyma, epididymis and pampiniform plexus after 1 year follow-up. Further studies with longer follow-ups are required to determine if these changes may progress producing clinical signs and decreasing sperm production.

LONG-TERM ATHLETIC OUTCOME AFTER DISTAL INTERPHALANGEAL JOINT ARTHROSCOPY FOR REMOVAL OF PROXIMAL P3 FRAGMENTS OR DIAGNOSTIC REASONS? 44 CASES. Kramer J, Gudehus T*. Pferdeklinik Leichlingen, Am Further Weihe, Leichlingen, Germany.

Introduction: Coffin joint arthroscopy for extensor process fragment removal carries a favorable short term prognosis in limited number of reported cases. Few reports signal a rather guarded prognosis long term. Little is known regarding timely removal of fragments when diagnosed in young horses.

Methods: Cases included presented with or without lameness with extensor process fragments unilateral in 39 and bilateral in 5 cases. 6 Horses without specific findings on radiography were included after undergoing diagnostic/ therapeutic arthroscopy without overt fragments visible on plain radiography.

Results: None of the horses presenting lame free for fragment removal became lame in the study period of up to 3 years post-operatively. Lame free cases were significantly younger than lame horses presenting for fragment removal. 20% of the cases presenting for fragment removal and lameness failed to return to soundness or remain sound in the study period. 4 out of 6 cases with diagnostic arthroscopy were able to return to soundness.

Discussion and conclusion: Our data compares favorably to the limited information available regarding long term prognosis for removal of coffin joint fragments, in cases with existing lameness. Our data allows comparison of lame and non lame cases prior to removal. Having evaluated the influence of age and lameness at the time of presentation, we strongly recommend removal of extensor process fragments at the time of diagnosis to prevent lameness and improve long term athletic perspective.

CHEMOKINE INVOLVEMENT IN INTESTINAL INJURY SECONDARY TO ISCHEMIA/REPERFUSION. Marañón G[1], Manley W[1], Perrin R[2], Rancan L[3]. [1]HORSEPITAL SL, Madrid, Spain, [2]Clinique Equine Desbrosse, Saint Lambert Des Bois, France, [3]3D. Biochemistry and Molecular Biology III. UCM, Madrid, Spain.

Introduction: During surgery, the intestine experiences ischemia-reperfusion (I/R) induced damage that has been identified as a significant cause of morbidity and mortality. One of the key processes of this injury is the recruitment of circulatory leukocytes. However, the mechanisms by which I/R induces leukocyte accumulation and subsequent tissue damage in intestinal surgery remains unknown. The aim of this study was to assess the role of monocyte chemotactic protein 1 (MCP-1) and macrophage inflammatory protein 2 (MIP-2) in leukocyte chemotaxis related to intestinal injury secondary to I/R.

Methods: Four adult horses destined for euthanasia for reasons unrelated to the cardio-vascular system or gastrointestinal tract were used. After routine anesthesia, horses underwent ischemia by clamping the mesenteric artery. Plasma samples and intestinal tissue biopsies were collected at 2 different time-points: before ischemia, and 5 hours after ischemia. Plasma levels of intercellular adhesion molecule 1 (ICAM-1) and intestinal expression of monocyte chemotactic protein 1 (MCP-1), macrophage inflammatory protein 2 (MIP-2), myeloperoxidase (MPO) and intestinal oedema were measured. A non-parametric test was used to assess statistical

significance. Informed consent from horse owners was provided, and the institution granted approval for the study.

Results: I/R caused substantial damage observed as intestinal oedema ($P < .05$). I/R also increased MPO levels ($P < .05$), which suggests an activation and infiltration of neutrophils into the intestinal tissue. MCP-1, MIP-2 and ICAM-1 levels were also significantly increased compared to preischemia levels ($P < .05$).

Conclusion: The present study demonstrates that activated neutrophils, as well as MCP-1, MIP-2 and ICAM-1 are involved in inflammatory response induced by ischemia-reperfusion-induced intestinal injury.

THE USE OF CISPLATIN ELECTROCHEMOTHERAPY TO TREAT CUTANEOUS TUMOURS IN HORSES. Relave F*, Hartmann M. Clinique Equine de Conques, Saint Aubin de Branne, France.

Introduction: Cutaneous tumours are relatively common in horses. Treatment with excision alone is often unsuccessful and adjunctive use of cisplatin is generally recommended, either intratumourally, or using slow-release biodegradable beads. Recently, the use of cisplatin-electrochemotherapy (c-ECT) has been described for sarcoid treatment.

The aim of this study is to report the result of c-ECT for cutaneous tumours, including carcinoma and melanoma, and specifically for periorbital tumour.

Methods: C-ECT was performed under general anaesthesia either alone, or immediately after tumour removal or debulking. Cisplatin was injected intra-tumourally, and electroporation applied to the tumour within 15 minutes. C-ECT sessions were performed at 2–3 weeks interval. Number of sessions and dose of cisplatin used, as well as cosmetic result were recorded.

Results: wenty-three horses were included, with a total of 44 tumours, including 16 localised in the periorbital region. Ninety-three percent of tumours on 87% of horses were completely resolved. The mean number of c-ECT for all tumours was 1.82 ± 0.99, and 2.25 ± 0.97 for periorbital tumours, with a mean dose of cisplatin injected of 21.74 ± 12.94 mL and 15.57 ± 6.25 mL respectively. Cosmetic result was excellent for 70.4% of tumours, and 81.2% of periorbital ones. Unsuccessful result was present in 3 upper eyelid tumours that were previously surgically excised, despite 6 c-ECT sessions. One horse was further treated by total eyelid excision and exenteration, the 2 other horses did not receive more treatment at owner complaint.

Discussion and conclusion: C-ECT is a useful treatment for cutaneous tumours in horses with success rates of 93%, and 81.2% for periorbital tumours, with a mainly excellent cosmetic result (70% for all tumours, 81.2% for periiorbital tumours). There was a lower number of c-ECT sessions, but a higher dose of cisplatin per c-ECT sessions than previously required. All 3 eyelids tumours that were unresponsive to treatment had a previous surgical removal, either immediately or several months prior to the treatment. Thus, we do not recommend excision of periorbital tumour prior to c-ECT treatment. No tumours with more than 5 c-ECT sessions had successful outcome.

MAGNETIC RESONANCE DOCUMENTATION OF AN AXIAL HUMERAL HEAD CYST TREATED BY ARTHROSCOPIC ENUCLEATION IN A QUARTERHORSE COLT. Waselau M*, Bracher B, Kasparek AC. Equine Hospital Aschheim, Equine Diagnostic Center Munich, Aschheim, Germany.

Introduction: Shoulder bone cysts can affect the humeral head or scapula and can cause intermittent lameness. Currently, these cysts are mainly localized/diagnosed and treated by arthrocentesis, (contrast) radiography, ultrasonography, scintigraphy and/or arthroscopy. However, discrete or fairly axially located cysts may remain undetected on traditional diagnostics causing therapy failures. Therefore MRI may be required as a more detailed imaging technique. The purpose of this case report was to (1) describe MRI-examination of equine shoulders, (2) report MRI-findings and (3) describe subsequent therapy. We hypothised, that (1) shoulder MRI can be safely performed, (2) all relevant soft-tissue/bone structures can be delineated, (3) shoulder pathology, undetected on radiographs are clearly portrayed on MRI and (4) MRI-scans can assist in pre-OP planning/therapy.

Case description: A 12-month old Quarterhorse colt (388kg) was evaluated for left front lameness. The lameness was confirmed to the shoulder by intraarticular anesthesia but radiographs revealed no abnormalities. Therefore, an MRI-scan was performed in lateral recumbency revealing a caudomedially located humeral head cyst. Based on MRI-findings, the cyst was arthroscopically enucleated and flushed via a caudolateral approach. Subsequently, the patient was placed on chondroprotectives. Six month post-OP, the colt was lame-free but a slight carpal valgus was noticed. This deformitiy was successfully treated by hoof trimming.

Discussion and conclusion: To our knowledge, this is the first case report that describes MRI-examination of an equine shoulder joint and reports on MRI-findings with subsequent therapy. Our report demonstrates that MRI of equine shoulder joints can be safely performed, all relevant soft-tissue and bone structures can be accurately portrayed, radiologically undetected shoulder pathology can be clearly delineated and MRI-scans allowed targeted surgical therapy. In conclusion, shoulder joint lameness positive to intraarticular anesthesia but negative to traditional imaging techniques should be considered for MRI-examination. MRI-scan may provide a more global view on shoulder pathology which is important for appropriate treatment and prognosis.

CHITOSAN-COLLAGEN-HYDROXYAPATITE COMPOSITE IN OVINE BONE TISSUE: EVALUATION OF BIOLOGICAL INTERACTION. Zoppa ALV, Nóbrega FS, Almeida LES, Marcondes GM. Department of Surgery - School of Veterinary Medicine and Animal Science, University of São Paulo, São Paulo, Brazil.

Introduction: Fractures involving extensive bone tissue loss can be challenging for the large animal surgeon. Chitosan is a hydrophilic biopolymer obtained from the deacetylation of chitin obtained from the shells of mollusks, crustaceans and insects. The aim of this study was to evaluate biocompatibility and biological behaviour of a new chitosan-collagen-hydroxyapatite composite following implantation in an ovine 3rd/4th metacarpal bone defect. Our hypothesis was that this biomaterial shows good biocompatibility and osteoconductive properties after implantation in bone.

Methods: This project was approved by the Animal Ethics Committee. Six nonpregnant ewes underwent bilateral unicortical osteotomy in the proximal third of the 3rd/4th metacarpal bone diaphysis using a 5mm trephine. One operated limb was then randomly selected for implantation of chitosan-collagen-hydroxyapatite composite while the contralateral limb served as untreated control. On day 60, bone biopsy specimens were collected from the treated limb and control limb with a 3.5 mm trephine. The calcified material was processed and submitted to descriptive and morphometric analysis under light microscopy. Statistical analysis was performed by Friedman and Wilcoxon tests.

Results: All animals remained sound and did not show any abnormal findings on physical examination throughout the study period. Treated and control limbs showed similar thermographic behavior, with return to preoperative physiological status within 60 days. Temperature readings varied significantly over time both in treated and control limbs (Friedman test; $P = .003$ and $P = .006$ respectively). Histomorphometric analysis under light microscopy revealed significantly higher percentages of newly formed bony tissue in control compared to treated defects 60 days after osteotomy. Light and electron microscopy findings demonstrated formation of bony tissue adjacent to the implanted biomaterial with no signs of inflammatory cell infiltration or foreign body reaction.

Discussion and conclusion: The composite histologically showed osteoconductive behavior and good biocompatibility when implanted in ovine bone. The smaller amounts of newly formed bone in treated defects at 60 days postoperatively may be due to incomplete degradation of the biomaterial within this time period. The fact that new bone was growing into the structure of the implanted material and was found directly adjacent to this biomaterial clearly indicates osteoconductivity. Results of this trial suggest that the composite has potential applicability as a scaffold for antibiotic, platelet rich plasma and stem cell therapy administration. Clinical investigations and biomechanical evaluations are warranted.

PERCUTANEOUS ULTRASOUND-GUIDED ARTERIAL ANGIOGRAPHY FOR TRANSARTERIAL COIL PLACEMENT IN ANESTHETIZED AND STANDING HORSE. Maninchedda U, Lepage OM*, Gangl M*, Benredouane K. Vetagro-sup, Marcy L'Etoile, France.

Objective: To describe ultrasound-guided percutaneous introduction of a transarterial angiographic catheter into the common carotid artery (CCA), to investigate the feasibility of using angiography of the carotid arteries in the guttural pouch region, and to assess transarterial coil (TAC) placement into the internal carotid artery (ICA).

Study Design: Experimental study.

Methods: Healthy Standardbred horses ($n = 6$), aged 5–8 years were used in this study. Ultrasound-guided percutaneous CCA catheterization and angiography was performed in all 6 horses under general anesthesia; the catheterization sites were ultrasonographically evaluated postoperatively. Ten weeks later, using the same horses sedated and standing, the same procedure was combined with placement of a TAC in the ICA.

Results: Agitated-contrast ultrasonography confirmed successful catheterization of the CCA. Needle puncture and introducer-set penetration of the CCA were the main technical difficulties. Radiography and fluoroscopy confirmed successful angiography and TAC placement. Mild hematoma formation was recorded in 4 out of 12 procedures.

Conclusion: Angiography and TCA placement in the ICA can be safely performed using a percutaneous approach to the CCA under ultrasound guidance, in standing or anaesthetized horses. This approach can be used for TAC embolization procedures; however, technical difficulties and hematoma formation can impair the procedure.

DECISION MAKING IN CRYPTORCHID CASTRATION; A RETROSPECTIVE STUDY OF 324 CASTRATED HORSES. Huppes T, Ensink JM*. Utrecht University, Dept. of Equine Sciences, Faculty of Veterinary Science, Utrecht, Netherlands.

Introduction: Careful consideration of preoperative examination and choice of surgical technique are necessary for successful cryptorchid castration. We formulated a standardized policy regarding preoperative examination and surgical approach. The objective of this study is to validate this policy and to document complication and failure rate of different castration techniques. This provides information for evidence-based decisions about appropriate castration technique for different types of cryptorchidism.

Methods: Case records were reviewed for all cryptorchids that underwent castration at our clinic (2004-2014). Information retrieved included results of preoperative ultrasound, results of endocrine tests, surgical findings/procedures and complications. Three different approaches were used for castration; laparoscopic, conventional and combined laparoscopic/conventional. For all approaches failure rate per testicular location was determined. To validate the standardized policy horses were split into 2 periods: old policy (n = 165) and new policy (n = 159). During the old policy the owners' preferences determined the castration technique. During the new policy ultrasound (US) was performed to locate the testis and was used to select surgical approach. For abdominal testes: laparoscopic intra-abdominal spermatic cord ligation without orchidectomy (standing). For inguinal testes: conventional orchidectomy (general anaesthesia). For a stallion with 1 abdominal and 1 normal/inguinal testis: combined laparoscopic/conventional. The number of horses that needed a second surgery for successful castration was determined. The use of US to locate the retained testes preoperatively was validated.

Results: 324 horses were included. Failure rates: laparoscopic castration 0/168 (0%); abdominal 5/41 (12.2%); inguinal and scrotal testes 12/98 (12.4%). Conventional castration: abdominal 3/12 (25%); inguinal testes 0/91 (0%). Combined laparoscopic/conventional castration: abdominal 0/34 (0%); inguinal testes 0/2 (0%). During the old policy 20/131 (15.3%) and during the new policy 4/146 (2.74%) of horses required a second surgery. In 161/171 (94.2%) retained testes, US based preoperative advice on the surgical approach was correct.

Discussion and conclusion: For abdominally retained testes, a laparoscopic approach, and for inguinally retained or normally descended testes a conventional approach is the technique of choice. Using a standardized approach regarding preoperative examination and surgical technique of choice, as formulated in the new policy guideline, resulted in a significant reduction of second surgeries necessary for successful cryptorchid castration. Preoperative US is a reliable tool to determine the appropriate surgical approach.

TOWARDS THE DEVELOPMENT OF MORE EFFECTIVE EQUINE OSTEOARTHRITIS TREATMENTS: POTENTIAL BENEFIT OF STIMULATING MSCS IMMUNOMODULATORY ABILITY. Barrachina, L[1], Remacha M[1], Ranera B[1], Romero A[2], Vazquez F[2], Albareda J[3], Prades M*[4], Zaragoza P[1], Martín Burriel I[1], Rodellar C[1]. [1]Laboratorio de Genética Bioquímica (LAGENBIO). Facultad de Veterinaria. Universidad de Zaragoza. 50013 Zaragoza. Spain, Zaragoza, Spain, [2]Hospital Veterinario. Universidad de Zaragoza. 50013 Zaragoza. Spain, Zaragoza, Spain, [3]Área de Traumatología y Ortopedia. Facultad de Medicina. Universidad de Zaragoza. Spain, Zaragoza, Spain, [4]Departament de Medicina i Cirurgia Animal. Universitat Autonoma de Barcelona, Barcelona, Spain.

Introduction: Mesenchymal stem cells (MSCs) based therapies are being investigated for the treatment of equine joint diseases because of their plasticity and their ability to modulate inflammatory environments. MSCs immune-regulatory properties have been induced in other species through priming with pro-inflammatory cytokines (PIC), such as TNFα and IFNγ. Joint inflammation leads to the release of these cytokines in the synovial fluid. Hypothetically in vitro PIC stimulation of equine MSCs may enhance immunomodulation and improve their therapeutic efficacy.

Methods: Bone marrow derived MSCs (BM-MSCs) from 3 horses were subjected to 3 inflammatory stimuli during 72 hours: a) 20% inflammatory synovial fluid (I-SF), b) 50ng/ml of TNFα and IFNγ (PIC-50), and c) 20ng/ml of TNFα and IFNγ (PIC-20). Immune-regulatory gene expression profile, as well as tri-lineage differentiation and proliferation potentials were assessed after every stimulus. To explore the decrease in BM-MSC plasticity after PIC induction, the expression of the pluripotency-related genes (Oct-4, NANOG and SOX2) was studied.

Results: I-SF exposed BM-MSCs plasticity and proliferation remained unaltered, while these properties clearly diminished under PIC-20 and PIC-50 conditions. Due to the low viability observed after both PIC stimuli the expression of 2 pro-apoptotic genes (BAX and CASP 8) and 2 anti-apoptotic ones (BCL-2 and HSP-27) were analyzed and a significant down-regulation of both anti-apoptotic genes was seen. PIC priming induced significant changes in the genic immune-regulatory profile of BM-MSCs, like the up-regulation of immunomodulation-implied molecules such as IL-6, IDO, COX2, iNOS and VCAM. However, the pro-inflammatory genes TNFα and IFNγ. were also significantly overexpressed and the anti-inflammatory gene IL-10 and the proliferation-implied genes COX1 and Cyclin D2 were significantly down-regulated. MHC-II was overexpressed, but other co-stimulatory molecules like CD40L were down-regulated. Equine BM-MSCs expressed the acute phase proteins haptoglobin and serum amyloid A in basal conditions. Haptoglobin expression was significantly modified under both PIC conditions

Conclusion: Results obtained suggest that equine BM-MSCs properties are significantly modified by inflammatory stimuli. Finding a balance between the enhancement of immune-regulatory potential without a detriment in viability and plasticity of equine BM-MSCs is critical to develop efficient treatments for equine joint diseases. Further studies are being accomplished testing lower PIC concentrations and time of exposure.

TECHNIQUES FOR PELVIC FLEXURE ENTEROTOMY CLOSURE IN HORSES. A SURVEY OF ECVS AND ACVS DIPLOMATES. Comino FC, Giusto GG, Caramello VC, Gandini MG. University of Turin, Grugliasco, Italy.

Introduction: Pelvic flexure enterotomy is commonly performed in horses. Although it is a relatively straightforward surgery several complication may arise, some of which can be fatal. Published techniques to close pelvic flexure enterotomies describe 2 layer handsewn patterns. We hypothesized that boarded veterinary surgeons would have received a standardized education, especially on procedures where little variation of techniques has been published. The aim of this study is to evaluate if there is a uniformity of technique currently used by ECVS and ACVS Diplomates for pelvic flexure enterotomy closure.

Methods: A web-based survey was conducted among 172 ECVS and 322 ACVS diplomates.The survey had 9 questions, aimed to determine the surgical technique used and the measures taken by the surgeon to minimize the contamination of the surgical site.

Results: Responses were obtained from 130 surgeons. A total of 23 different techniques (in terms of suture patterns and knots used) were reported. Monofilament suture material was used by 63.8% of surgeons, and multifilament by 30.8%. Preferred size was USP 2-0 followed by USP 0 and 3-0. A 2 layer suture pattern was chosen by 100% of participants: 60.8% chose a full thickness pattern oversewn by an inverting pattern. 21.5% chose a 2 layer inverting suture pattern. The surgeon's knot was the first choice to secure the suture line, followed by the square knot. While the 81.5% of surgeons considered negligible the contamination caused by the suture material, 58.3% of surgeons employed methods to minimize contamination due to suture material, when performing the second layer closure.

Discussion: The most common suture pattern used was a simple continuous full thickness pattern oversewn with a Cushing suture pattern. A large number of surgeons use a 2 layer inverting suture pattern, that has been described only once in horses and associated with postoperative bleeding. The surgeon's knot was the most commonly used, with the square knot representing the second choice. None of the knots most commonly employed (surgeon's or square) are considered the ideal knot to secure a continuous suture with monofilament suture material. Although contamination from the suture material in the second layer was considered negligible from the majority of surgeons, more than half of the participants employed measures to reduce this contamination. From the results of this survey, it appears that many surgeons are concerned about contamination given by suture materials and suture techniques.Further, information gained from this survey may assist surgeons in training, and may help in promoting a large clinical trial to assess complications.

MESH REPAIR OF A LARGE VENTRAL HERNIA WITH INTERPOSITION OF OMENTUM IN A CALF. Gandini MG, Caramello VC, Giusto GG, Comino FC, Casalone MC, Bellino CB. University of Turin, Grugliasco, Italy.

Introduction: Ventral and incisional hernias are common surgical problems in large animals. Ventral hernias may occur from midline or paramedian incision, trauma or for abomasal fistulization. Synthetic materials are used for the repair of abdominal wall defects, but some types carry a high risk of adhesions if placed intraperitoneally. In this work we report the effectiveness of placing the omentum as a protective layer in mesh hernia repair in a calf.

Case description: A 1 month-old Piedmontese,female calf, weighting 60 kg was referred for evaluation and repair of a ventral hernia. A defect extending from 3 cm caudal to the umbilicus down to the pubis was diagnosed and surgical repair was elected. A 20 cm Y-shaped midline incision starting caudal to the umbilicus was performed in the skin to preserve the integrity of the mammary glands. The defect extended caudally to the pelvis, without enough abdominal wall tissue to safely anchor sutures under tension. For these reasons a tension free mesh implantation was considered. The omentum was reached and brought caudally to cover the viscera down to the pelvis. It was secured to the edges of the defect with nylon sutures. A 17 × 10 cm polypropylene mesh was cut in the shape of the defect and then prepared applying a number of sutures with USP 1 nylon around its perimeter. The mesh was then delivered into the abdomen and placed in correspondence of the defect, intraperitoneally and in contact with the omentum. The sutures were then passed through the margins of the hernia from inside to outside with removable needles. Care was taken to apply the mesh without tension and wrinkles. The nylon sutures

were then tied. Skin in excess was trimmed, and the remaining sutured to cover the mesh. Recovery from sedation was uneventful and no postoperative complications or signs of pain were detected. Follow-up was obtained 4 months after discharge. No complications were noted and normal increase in weigh was reported.

Discussion and conclusion: Typically, large ventral hernias have depletion of muscular and fascial tissues. Polypropylene mesh is one of the most commonly used prosthetic materials for large ventral hernia repair in large animals. Placed intraperitoneally adhesion of abdominal contents to the mesh, irritation of intestine and subsequent rupture of a bowel, may occur. This can be avoided by extraperitoneal implantation of the mesh whenever possible. The interposition of omentum between the mesh and underlying intestine has been proposed as a protective measure. To the best of our knowledge, this is the first successful report of a ventral hernia repair with the interposition of the omentum between the viscera and the mesh in large animals.

ASSOCIATIONS BETWEEN RESPONSES TO HOOF EXTENSION TEST AND LESIONS IDENTIFIED BY MAGNETIC RESONANCE IMAGING (MRI). Brogniez L[1], Perrin R*[1], Labed S[2], Lang F[2], Clegg P*[3], Vandeweerd JM*[2]. [1]Clinique Desbrosse, St Lambert des Bois, France, [2]University of Namur, Namur, Belgium, [3]University of Liverpool, Liverpool, United Kingdom.

Introduction: A number of clinical tests have been described to assess foot pain. The hoof extension test can be performed by placing the foot at the extremity of a wooden plank ("plank test") and gradually lifting the other extremity to reach a 30° angle with the floor. Our objective was to assess, in show jumpers and dressage horses with palmar foot pain and no abnormality at radiography or ultrasonography of the foot, the correlation between responses to the "plank test" and lesions of relevant anatomical structures in the foot identified by using low-field MRI.

Methods: The medical records of all horses undergoing standing MRI for foot pain between January 2010 and July 2013 were reviewed. 143 scans of adequate quality were eligible. We included the scans of lame feet where the lameness, identified on a straight line or a circle, was totally improved after a palmar digital nerve block. A total of 84 scans were retained. MR images were acquired using a standing 0.27T MR unit. The "plank test" and selected anatomical structures assessed by MRI were scored.

Results: A low but significant correlation was identified between MRI changes of the facies flexoria ($r = 0.24$, $P = .03$) and of the trabecullar bone ($r = 0.22$, $P = .04$) of the distal sesamoid bone. No other correlation was statistically significant between scores at the test and at MRI. The plank test had a sensitivity of 75% to indicate a lesion (MRI score > 1) of the facies flexoria or the trabecullar of the distal sesamoid bone (considered together). The specificity was 46%.

Discussion and conclusion: In show jumpers and dressage horses with a front limb lameness abolished by palmar digital nerve block and no significant finding at radiography and ultrasonography of the foot, the "plank test" could be indicative of distal sesamoid disease as assessed by MRI. A positive "plank test" could therefore strengthen the decision to refer the horse for MRI investigation of the foot. Due to the high prevalence of synovial abnormalities and low prevalence of DDFT changes in the current study, we cannot speculate on the performance of the test to indicate changes of those anatomical structures.

MINIMALLY-INVASIVE PLATE OSTEOSYNTHESIS OF A SALTER-HARRIS TYPE 2 FRACTURE OF THE PROXIMAL PHALANX IN A FILLY. Van Spijk J[1], Fürst AE*[1], Del Chicca F[2], Ringer S[3], Jackson MA*[1]. [1]Equine Department, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland, [2]Diagnostic Imaging Department, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland, [3]Department of Anesthesia, Vetsuisse Faculty, Univerity of Zurich, Zurich, Switzerland.

Introduction: Epiphyseal fractures account for approximately 20 to 30% of all fractures in foals. Frequently affected bones include the femur, ulna and humerus, whereas the proximal phalanx (P1) is less commonly affected. The present report describes internal fixation using 2 PIP-LCPs for the treatment of a Salter-Harris type 2 fracture of the proximal physis of P1 in a large foal.

Case description: A 7-month-old warmblood filly was referred to our hospital because of acute lameness in the right hind limb. The area of the proximal phalanx (P1) was diffusely swollen and hot but there was no visible wound and no crepitus or instability of the foot. Four standard radiographic projections of the right hind fetlock were taken. A well defined radiolucent line was visible in the physeal region of P1, which was markedly wider than the same physis of the contralateral limb. A diagnosis of closed Salter-Harris type 2 fracture and mild misalignment in the proximal phalanx of the right hind limb was made. On the following day, the filly was placed in left lateral recumbency and the right hind leg was surgically prepared. The fracture was reduced using bone reduction forceps under the guidance of an Arcadis Orbic 3D C-arm and 2×4.5-mm narrow locking compression plates designed for equine pastern arthrodesis (PIP-LCPs, Synthes GmbH, Oberdorf, Switzerland) were used to stabilize the fracture. The filly recovered well and 2 months later radiographs showed complete healing of the fracture. One month later the plates were removed under general anesthesia. The filly made a full recovery and was sound at 3 years of age when the final examination took place.

Discussion: Since epiphyseal fractures of P1 are rare, there is limited published data to allow surgeons to select appropriate repair. Because the total longitudinal growth of P1 has been estimated to be only about 1.2 cm in the horse, surgical treatment of P1 fracture is also an option in larger foals before cessation of growth from the physis. This case report describes internal fixation using PIP-LCPs for the treatment of a Salter-Harris type 2 fracture of the proximal physis of P1 in a large foal. Fracture healing was rapid and without complications, and the use of a cast could be avoided.

EX VIVO ASSESSMENT OF AN ULTRASOUND GUIDED INJECTION TECHNIQUE FOR A DISTENDED NAVICULAR BURSA. Perrin R*[1], Diguet AC[2], Bailly C[1], Cantet P[1], Brogniez L[1], Clegg P*[3], Nisolle JF[4], Vandeweerd JM*[2]. [1]Clinique Desbrosse, St Lambert des Bois, France, [2]University of Namur, Namur, Belgium, [3]University of Liverpool, Liverpool, United Kingdom, [4]CHU Mont Godinne Dinant, Yvoire, Belgium.

Introduction: Ultrasonography is commonly used to evaluate the deep digital flexor tendon and the navicular bursa. Distention of the navicular bursa is frequent in performance horses. The objective of this study was to describe and assess an ultrasound-guided technique to inject a distended navicular bursa.

Methods: Twenty distal limbs of horses of various breeds and sizes were used. To obtain synovial distension, the navicular bursa was injected with 2 ml of contrast medium using a lateral approach and radiography was performed to confirm that the contrast medium was distending the bursa. The navicular bursa was injected with 1 ml methylene blue solution. Dissection was performed afterwards to assess whether the navicular bursa had been successfully injected.

Results: The success rate of this ultrasound-guided technique was 13 /19 (68%). In 3 of the 13 feet, a small amount of methylene blue was found in the distal interphalangeal joint too. Six injections were not successful (2 injections in the distal interphalangeal joint, 3 in peripheral tissues, 1 in the digital sheath).

Discussion and conclusion: This ultrasound-guided technique was reliably performed with a success rate of 68%, by a clinician not trained to the technique. It has the advantage not to rely upon external landmarks. This technique is feasible only if the bursa is distended, and if ultrasound images are of adequate quality.

TYPE III FRACTURES IN THE DISTAL PHALANX OF HORSES: OUTCOME AFTER SURGICAL AND CONSERVATIVE THERAPY. Jackson MA*[1], Heer C[1], Del Chicca F[2], Fürst AE*[1]. [1]Equine Departement, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland, [2]Section of Diagnostic Imaging, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland.

Introduction: Type III pedal bone fractures occur frequently in horses. The aim of this retrospective study is to compare conservative and surgical treatment of pedal bone fractures type III, with regard to prognosis in the context of the patient's age, the surgical technique, the recovery time and the formation of osteoarthritis in the distal interphalangeal joint.

Methods: All medical records of horses presented with a pedal bone fracture type III were reviewed. For each horse severity of the lameness at initial examination, radiological examination, treatment, complications, outcome and convalescence time was recorded. Follow-up information was obtained by clinical and radiological examination.

Results: Between January 1992 and January 2014, 34 horses with a pedal bone fracture type III were treated. 15 conservatively (Group A) and 19 surgically (Group B). Eleven of the 15 horses of Group A (73.3%) could return to their intended use. Conservatively treated horses older than 3 years with a good outcome had an average convalescence time of 8.06 months. Overall, 12 horses showed OA of the DIPJ within 4 months of the occurrence of the fracture. In group B, 12 of 19 horses could return to their previous use (63.1%). When considering only fractures treated under C-Arm, CAS or CT control, 11 of 13 horses were completely sound (84.6%). Overall, surgically treated horses, older than 3 years and with a good outcome, had an average convalescence time of 6.6 months with the shortest time being 3.5 months and the shortest time to bony union on radiography being 4 months. A total of 9 horses developed OA of the DIPJ.

Discussion: As described in the literature, all horses in this study up to and including 3 years of age were successfully treated either conservatively or surgically. Conservatively treated horses older than 3 years had an average convalescence time of 8.06 months. Surgically treated horses in the same age group had an average recovery time of 6.6 months. Our study shows that if only the type III cases operated under CAS, C-arm or CT are examined, 84.6% have a good long-term outcome. In many horses OA of the DIPJ was visible in the first 4 months after fracture. However, the formation of osteoarthritis after a type III

coffin bone fracture seems not to be clinically significant, since many of the affected never show any lameness.

Conclusion: This study shows that conservative treatment of pedal bone fracture type III is appropriate for horses younger than 3 years. On the other hand, when modern imaging systems are available, surgical therapy is superior and to be recommended for horses older than 3 years. This study shows that neither of the 2 treatment options prevents the formation of osteoarthritis.

LAPAROSCOPIC CLOSURE OF THE NEPHROSPLENIC SPACE USING AN ABSORBABLE BARBED SUTURE. De Fourmestraux C, Geffroy O*, Robert M, Tessier C*. ONIRIS, National College of Veterinary Medicine, Food Science and Engineering, Nantes-Atlantique, Equine Surgery, Nantes, France.

Introduction: Entrapment of the ascending colon within the nephrosplenic space (NS) accounts for 2.5 to 6% of horses admitted for surgical treatment of colic. The reported recurrence rate ranges from 3.2 to 21%. Laparoscopic nephrosplenic space closure (NSC) is recommended for horses predisposed to LDDLC. V-loc^{TM}180, absorbable polyglyconate wound closure device avoids the need for knot tying and prevents suture reversing through the tissue. We hypothesized this suture could be efficient for laparoscopic NSC, allowing homogeneous tension repartition and alleviating the need for knot tying.

Methods: Four adult horses were euthanized for reason unrelated to gastrointestinal disease. Cadavers were suspended and laparoscopic NSC was performed.

Laparoscopic portals are made as described previously by Röcken et al. using a 25 mm diameter and 15 cm long custom canula in the dorsal flank portal. A 45 cm long needle holder is used to start the closure at the cranial most aspect of the space. The needle is passed through the loop at the end of the suture after the first bite to allow fixation of the starting point. NSC is accomplished using a simple continuous pattern. At the most caudal aspect of the NS, suture is continued in a reverse manner to prevent loosening and the suture tail is cut.

We performed laparoscopic NSC with V-loc^{TM}180 on 2 clinical cases which had previously presented LDDLC. Horses were sedated and restrained in stocks and a transrectal examination was performed to evaluate NS. The left paralumbar fossa was aseptically prepared, portals were infiltrated with local anaesthetic and surgery was performed. Horses were given 2 weeks of stall rest and 4 weeks of hand walking. Six weeks post-operatively, NSC was evaluated by transrectal palpation, ultrasonography of the left flank and under laparoscopic visualisation. Owner satisfaction was assessed at the same time and by phone call 6 months postoperatively.

Results: The suture was completed in all cadavers and both clinical cases. Follow-up examination confirmed healing and ablation of the NS in the first clinical case. This horse returned to his previous level of exercise and did not show recurrence of LDDLC. At 6 months follow-up, owner satisfaction was excellent. The second clinical case is in his first week post-operative at the time of writing but did not show any recurrence of LDDLC until now.

Discussion and conclusion: We found that V-Loc^{TM}180 offers secure and effective NSC without compromising strength and security. We conclude that V-Loc^{TM}180 can be used safely to close the NS and might reduce manipulation of the suture and operative time. Long-term usage of V-Loc^{TM}180 and larger number of cases are needed to statistically assess the potential advantages.

HORSE MORSELIZED BONE AS A SCAFFOLD FOR ALLOGENIC MESENCHYMAL STROMAL CELLS: A POTENTIAL DEVICE FOR BONE DEFECT TREATMENT. IN VITRO PRELIMINARY STUDY. Dante S, Pepe M, Bazzucchi C, Pascucci L. Department of Veterinary Medicine University of Perugia, Perugia, Italy.

Introduction: Tissue engineering procedures employing mesenchymal stromal cells (MSCs) are a new approach to enhance regeneration of critical size bone defects. MSCs, in fact, produce trophic factors, cytokines, and signaling molecules able to create the optimal environmental conditions for tissue regeneration.(1) The aim of this study was to set up a procedure for sampling, banking and morselizing cortical (CO) and cancellous (CA) bone from healthy donor horses and to combine it with allogenic adipose-derived MSCs in order to obtain a construct potentially useful for orthopedic applications.

Methods: Bone samples were harvested from 4 horses euthanized on clinical grounds. The gluteal area was prepared for aseptic technique. Ileum neck was exposed and samples of CO-CA bone were isolated, packed in sterile plastic bags and preserved at −80°C. Thawed bone segments were ground with a bone mill. Morselized fragments were treated with Triton X-100 and SDS. Horse adipose tissue-derived MSCs at passage 3 (2), were seeded on morselized bone. An electron microscopic analysis was performed to evaluate the morphological features and the dimensions of bone fragments, the degree of MSC colonization and the extent of residual contamination by native cellular debris. Samples were fixed and prepared for examination with a Philips XL30 Scanning Electron Microscope (SEM).

Results: Sampling and storage procedures appeared to be adequately standardized; none of the samples were positive in microbiological assays. SEM observation revealed a relatively uniform size of bone fragments. Bone freezing and detergent treatment removed a great part of the native cellular component. Bone samples were colonized by a satisfactory number of MSCs that showed a typical fibroblastoid morphology. SEM analysis revealed a better efficiency in cortical bone cellularization.

Discussion and conclusion: Understanding how MSCs interact with natural 3D matrices is critical for the rational development of biomimetic scaffolds. Cell shape and function, in fact, are highly responsive to the structural properties of a matrix; the dimensionality of the scaffold is also able to influence cell adhesion.(3) This study demonstrated that MSCs are able to adhere to morselized allograft and to survive on it thus creating a living compound potentially useful for bone defect treatment. The different efficiency of cellularization of CO versus CA could suggest the use of a mixture of both components in order to maintain osteoinductivity and osteoconductivity, associated to the regenerative properties of MSCs.

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FRACTURE OF THE MEDIAL INTERCONDYLAR EMINENCE OF THE TIBIA IN HORSES (16 CASES). Rubio-Martinez LM*[1], Redding WR*[2], Bladon B*[3], Wilderjans H*[4], Payne RJ*[5], Geffroy O*[6], Parker R*[7], Tessier C*[6]. [1]University of Liverpool, Neston, United Kingdom, [2]North Carolina State University, Raleigh, NC, [3]Donnington Grove Veterinary Group, Newbury, United Kingdom, [4]Dierenkliniek De Bosdreef, Moerbeke-Waas, Belgium, [5]Rossdales Equine Hospital and Diagnostic Centre, Newmarket, United Kingdom, [6]Oniris-Nantes, Nantes, France, [7]Liphook Equine Hospital, Hampshire, United Kingdom.

Introduction: Fractures of the medial intercondylar eminence of the tibia (MICET) are relatively uncommon in horses and scarcely reported in the literature. This study reports the clinical and diagnostic findings, surgical treatment and outcome in a series of horses presented with MICET fracture.

Methods: Horses presented to 8 equine hospitals and diagnosed with fracture of the MICET that underwent surgical treatment were included in the study. Clinical and diagnostic findings, surgical treatment, post-operative management and outcome were retrieved. Follow-up information was obtained from owners.

Results: Sixteen cases were identified between 2004 and 2014. Duration of lameness was 3 days – 3 months (median: 4 weeks). History of trauma associated with an acute onset of lameness was reported in 10 cases. All cases underwent arthroscopic examination of the affected medial femorotibial joint and arthroscopic removal of the fractured MICET. The cranial cruciate ligament was intact in 5 cases and was involved in 11 cases; the damage to the cranial cruciate ligament was estimated to be $\leq$25% (n = 3), 25–50% (n = 4) or $\geq$50% (n = 4) of its cross-sectional area. Damage to the cranial ligament of the medial meniscus was found in 8 cases (5 cases with mild or superficial fibrillation, and 3 cases with moderate to severe damage). Abnormalities of the medial meniscus were observed in 4 cases. Severe disruption of the medial collateral ligament of the medial femorotibial joint was found in 1 case. Mild to moderate articular cartilage damage was identified in 7 cases. Horses with shorter history of lameness (<5 weeks) seemed to have milder concurrent lesions than horses with more chronic lameness. Total convalescence time was 6–12 months. Follow-up (7 months – 9 years; median 17 months) information was available for 12 cases. Nine cases were sound and had returned to their previous or expected use: general purpose (n = 3), dressage (n = 2), show-jumping (n = 1), flat racing (n = 1), eventing (n = 1), Western performance (n = 1). One case remained lame and 2 cases had been euthanized because of persistent lameness; these 3 cases had the most severe changes to the articular soft tissue structures of the medial femorotibial joint.

Discussion and conclusion: Fractures of the MICET are commonly associated with a traumatic event. Prompt diagnosis and arthroscopic removal of the MICET fracture is recommended as it seems to be associated with milder lesions to the associated articular structures and a more favourable prognosis.

CARPAL ARTHRODESIS USING A MINIMALLY INVASIVE APPROACH: THREE CASES. Rossignol F*[1], Bartke S[2], Brandenberger O[1], Van Bergen T[3], Vitte A[1]. [1]Clinique Equine de Grosbois, Boissy St Léger, France, [2]Tierklinik Lüsche, Bakum, Germany, [3]Department of Surgery and Anaesthesiology of Domestic Animals, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium.

Objective: To report a minimally invasive approach for pan and partial carpal joint arthrodesis using locking compression plates (LCP).

Study design: Case series; 3 cases (2 partial and 1 pan carpal arthrodesis)

Methods: All cases underwent general anaesthesia between 2011 and 2014; the procedures were performed in lateral (partial) or dorsal (pan) recumbency. Two to 3 LCP plates were contoured to the dorso-lateral, dorso-medial and sagittal aspect of

the carpal joint using a minimally invasive tunnelisation technic. Cartilage was debrided in all joints using an arthroscopic approach (middle carpal joint) and a drilling technique (carpometacarpal joint). A bone graft, which was sampled either from the ileum or sternum, was injected into the middle carpal joint. All cases recovered in a full limb cast by rope assistant recovery.

Results: All cases recovered well. They were able to be used for leisure and pasture activity (case 1) and breeding (case 2). Case 3 is still on recovery at the time of writing, but showed excellent weight bearing on the operated leg. Case 1 had its plates removed 10 months postop due do inflammatory reactions at the dorsal carpus. All cases demonstrated progressive joint fusion at x-ray re-examination.

Dsicussion: Minimally invasive percutaneous plate osteosynthesis can be used in carpal joint arthrodesis with the advantage to reduce the infection risk, to reduce the surgical time, and to facilitate skin closure. In case 1 and 3, the fluoroscope was also helpful to shorten the surgery time. For pancarpal arthrodesis, the cartilage of the middle carpal joint and antebrachio-carpal joint was debrided by an arthroscopic approach, which led to better view and supports easier complete debridement.

Conclusion: LCP plate fixation using a minimally invasive approach seems to be a suitable technique for pan- and partial carpal joint arthrodesis with some advantages compared to the standard technique.

A NOVEL SURGICAL TECHNIQUE FOR REPAIR OF COMBINED LATERAL AND LONG DIGITAL EXTENSOR TENDON LACERATION IN THE EQUINE HIND LIMB. Russell JW, Russell TM*. Bendigo Equine Hospital, Shepparton, Australia.

Introduction: Distal limb lacerations in the horse are common. Wounds in this region are commonly caused by wire or fence trauma and extensor tendons are often transected due to their superficial location. Functional healing relies on the cut distal extensor tendon forming adhesions to the third metatarsus and surrounding soft tissue. For this reason, we have found, counter-intuitively, that small wounds with minimal tissue trauma may take a long time to form a strong bond between the tendon and surrounding tissue, and this bond may be easily disrupted after cast removal, by catching the toe on the ground during ambulation. This is a particular problem in foals and weanlings, where longer cast duration may cause catastrophic laxity in the flexor tendons and suspensory ligament, as well as predisposing to rub sores.

To address this problem we hypothesized that encouraging stronger wound healing by removing the paratenon and periosteum in the wound, we could reduce the time spent in a cast and reduce the risk of tendon laxity complications in young horses.

Methods: The paratenon of the distal portion of the lacerated digital extensor tendon was surgically removed and a strip of periosteum on the dorsal surface of the third metatarsal bone was surgically removed. The debrided tendon surface was then sutured to the periosteum and surrounding soft tissues as 1 layer. The limb was then placed in a cast for a maximum of 4 weeks. Client owned horses ($n = 10$) with complete laceration of LoDET and LaDET. (3 foals, 3 yearlings, 4 adults.) having received this procedure were followed up at 6 months post surgery.

Results: 90% (9 of 10) of the horses that underwent this procedure returned to functional soundness.

Conclusion: By stripping the paratenon and adjacent periosteum, wound strength is sufficient after 4 weeks of immobilization to allow cast removal. This is an important consideration in young animals as prolonged cast application can result in prohibitive flexor tendon laxity. Wound strength is also sufficient after 4 weeks in adults if early cast removal is indicated (i.e. if cast sores are developing).

INTERVERTEBRAL DISC DEGENERATION OCCURS NATURALLY AT THE LUMBAR-SACRAL DISC IN THE SHEEP. Nisolle JF[1], Vandermeersch L[2], Dabrowski C[2], Kirschvink N[2], Neveu F[3], Meirlaen P[3], Muylkens B[2], Clegg P*[4], Vandeweerd JM*[2]. [1]CHU Mont Godinne Dinant, Yvoire, Belgium, [2]University of Namur, Namur, Belgium, [3]University of Liège, Liège, Belgium, [4]University of Liverpool, Liverpool, United Kingdom.

Introduction: Sheep are commonly used as animal models to study intervertebral disc degeneration (IVDD). Ovine models are induced mechanically or chemically. A naturally occurring disease would be extremely interesting since it could better mimic the progress of the disease in man. Computed tomography (CT) and Magnetic Resonance Imaging (MRI) are used to diagnose and assess the progress of IVDD. In the current study, our hypothesis was that IVDD occurs naturally at the lumbar-sacral disc in the sheep. Our objective was (1) to document and score lesions identified at the lumbar-sacral disc by CT and MRI; (2) to compare degenerative scores to those of other discs; (3) to correlate scores with age.

Methods: 19 sheep, from 6 months to 10 years, were used. Sheep were CT scanned with an Emotion 6 Philips Ingenuity and structural abnormalities (osteophytes, intradiscal calcifications, endplate integrity and sclerosis) were scored. Sheep were also scanned with a 1.5 T MRI (Magneton Symphony SIEMENS) with 2 body-coils and lesions were scored by T2 mapping and T2W sequence (T2 signal intensity, disc extension beyond the interspace, nucleus shape and annular tears). T2 times were also recorded. Regions of Interest (ROIs) were placed around the nucleus pulposus. Field of view included 5 discs starting from the lumbar-sacral disc (named L6-S1 (lumbar-sacral), L5-L6, L5-L4, L4-L3, L3-L2). Categories of age were 1 year, 2 to 4 years, 5 to 7, 8 to 10.

Results: Scores at T2 mapping correlated significantly with scores at T2W ($r = 0.794$, $P = 0.0$) and with T2 times ($r = -0.881$; $P = 0.0$). Scores at CT correlated significantly with those at T2W ($r = 0.310$, $P = 0.002$). Categories of age had a significant effect on scores at T2 mapping, T2W and on T2 times both at the L6-S1 level ($P = 0.012$, 0.004, 0.008) and other levels ($P = 0.029$, 0.014, 0.019). Higher scores (indicating disease) appeared to be more frequent in the oldest sheep. Scores at T2 mapping ($P = 0.005$), T2W ($P = 0.001$) and CT ($P = 0.045$) as well as T2 time ($P = 0.006$) were significantly different in L6-S1 than in other levels, indicating more lesions at that disc. Scores at T2 mapping and T2W was always higher than other levels, except in 2 sheep (3 years and 6 years) where partial fusion of the last vertebra and sacrum (impeding movement) was observed and L5-L6 had higher scores than L6-S1.

Discussion and conclusion: This study indicated that the sheep could be used as a model of naturally occurring IVDD. The L6-S1 disc was more often affected. Since it is the level where dorsoventral movement is the highest, the hypothesis of a biomechanical etiology of the disease can be suggested.

UNREPORTED COMPLICATION FOLLOWING FIXATION OF PROPAGATING CONDYLAR FRACTURES IN THREE THOROUGHBRED RACEHORSES. White JM, Bladon BM*. Donnington Grove Veterinary Surgery, Newbury, United Kingdom.

Introduction: Condylar fractures are the most common fracture site of the third metacarpal and metatarsal bones in the TB racehorse. These fractures may occur in either the lateral or medial condyles and are commonly treated with surgical intervention. Surgery includes the use of cortical screws placed in lag fashion with or without a DCP or LCP for fractures propagating proximally. Notwithstanding the significant immediate catastrophic fracture risks following general anaesthesia usually in propagating medial condylar fractures, more delayed complications include post operative infection and the development of osteoarthritis (OA) in the fetlock joint. We report the unexpected complication of rapid onset, career ending OA of the proximal interphalangeal (PIP) joint following propagating condylar fracture repair in 3 cases.

Case description: Three horses were identified which sustained a propagating condylar fracture, had no prior PIP joint pain or pathology at the time of fracture but suffered career ending PIP joint OA on the operated limb. All horses were male entire thoroughbreds. One 2 year old had a medial condylar fracture of the LH treated with a 14 hole LCP. One 2 year old had a medial condylar fracture of the LH and one 3 year old had a lateral condylar fracture propagating into the metacarpal diaphysis of the RF; both were treated with cortex screws placed in lag fashion, in the standing sedated horse. All horses had cast or cast bandage immobilization (6–41 days) and similar post operative regimens with 2–3 months box rest and 1–2 months controlled walking exercise.

Results: All metacarpal/metatarsal condylar fractures healed on serial post operative radiographs. Lameness attributable to the PIP joint confirmed with diagnostic anaesthesia and radiography developed between 5.5 and 8.5 months post surgery and was the primary reason for retirement. All horses received intra-articular medication with corticosteroids and hyaluronan and 1 horse also received tiludronate. One of the horses raced post operatively (placed in 3 of 4 races) but did not have a long career. The other 2 horses did not race after surgery due to recurrent PIP joint lameness, 1 was retired to stud.

Discussion and conclusion: PIP joint OA can be a complication following propagating condylar fracture repair in the racehorse. The exact reason for this is uncertain but it is suggested that it is the result of trauma sustained at the time of fracture. The differing techniques used in the 3 horses suggest that it is unlikely to be a complication of the surgical procedure. It is possible that the PIP joint OA was associated with the post operative cast immobilzation, but the duration of casting was variable between horses and in 1 horse it was not prolonged at 6 days.

SHORT- AND LONG-TERM OUTCOME OF CONSERVATIVE AND SURGICAL MANAGEMENT OF FRACTURES OF THE ULNA IN 20 HORSES. Ladefoged S, Wallin J, Toth T*, Andersen PH. Equine Clinic, Department of Clinical Sciences, Swedish University of Agricultural Sciences, Uppsala, Sweden.

Introduction: While generally agreed that open reduction and internal fixation is the treatment of choice for most fractures of the ulna, conservative therapy may also be a treatment option. The primary reason for selecting conservative therapy is often financial constraints precluding surgical management. However, other motives for the choice of methods may also be present, and the clients perception of the outcome

is therefore of interest.The aim of the present study was to compare survival and long-term outcome between groups of horses treated for an ulnar fracture, either surgically or by conservative management.

Methods: Medical records of horses treated at one hospital, between January 2002 and December 2012, diagnosed with an ulnar fracture were reviewed and case details and radiographs retrieved. Information regarding short- (within 1 year) and long-term (>1 year) outcome and owner satisfaction with treatment was obtained via telephone interviews, using a standardized questionnaire. Differences between groups were investigated using a chi-square- or Fischer's exact test. A p-value <0.05 was considered significant.

Results: Twenty cases were included. Fracture types included 11 type 4, 7 type 5, 1 type 2 and 1 type 1b. Eleven horses were treated surgically by open reduction and internal fixation (Group 1). Nine horses were managed conservatively with stall confinement with or without support from a harness (Group 2). Seven horses from group 1 (64%) survived >1 year. Five horses (45%) returned to their previous athletic level. Six horses (67%) from group 2 survived >1 year, of which 4 (43%) returned to previous athletic level. No difference in outcome or return to previous athletic level could be detected. Interestingly, there was no difference in the total treatment cost for horses that stayed at the hospital ($P = .22$). Owners of horses in group 1 expressed more satisfaction with the treatment than owners of horses in group 2. Several of the latter owners would not choose conservative treatment again.

Discussion and conclusion: Due to limitations of case series', caution should be used when applying these results to other horse populations. In this series, horses treated surgically had shorter hospitalization time and returned to work sooner than horses treated conservatively. Veterinarians recommending therapy for cases of ulnar fractures should be aware that many cases may be treated surgically with a good outcome. Prolonged hospitalization and stall confinement of horses treated conservatively was a major welfare concern of the owners interviewed in this study. Conservative treatment had the same total cost as surgical treatment.

ENTRAPMENT OF A SWAN-GANZ CATHETER AS A COMPLICATION OF RIGHT HEART CATHETERISATION IN A HORSE. Dias DPM, Pereira RN, Canola PA, Coelho CMM, Flôres FN, Lopes MCS, Valadão CAA. Faculdade de Ciências Agrárias e Veterinárias, Unesp, Jaboticabal, SP, Brazil.

Introduction: Pulmonary artery pressure (PAP) measurement in horses might provide valuable information regarding haemodynamics. The PAP is achieved by means of right heart catheterisation. The procedure is safely performed with occasional complications as knotting and entrapment.

Case description: A 10-year-old mare was subjected to right heart catheterisation to evaluate hemodynamics experimentally. A Swan-Ganz continuous cardiac output catheter was inserted through a sheath placed in the right jugular vein. The proposed measurements were performed, and resistance was felt whilst the catheter was being withdrawn. Echocardiography was performed in order to assess the cause of catheter resistance, and a bend at the tip of the entrapped catheter was visualised within the right ventricle. The horse was sedated using xylazine (1.0 mg/kg, IV) and the Swan-Ganz was withdrawn without difficulty.

Discussion and conclusion: Entrapment of a Swan Ganz catheter in humans is rare and considered life-threatening due to the risk of cardiac rupture, especially when device is forced to be removed. For the present case, the catheter had a metallic cover on its tip for continuous cardiac output measurement. This catheter tip is stiffer than conventional Swan-Ganz tip, possibly leading to entrapment since the catheter bend was exactly at the stiff segment. Bradycardia and cardiac muscle relaxation were induced by xylazine, and probably enabled removal. Knotted intravascular catheters may need to be surgically removed in humans. Thus for horses, sedation using alpha-2 agonists could be recommended before the attempt to withdraw an entrapped Swan-Ganz by traction in order to avoid cardiac ruptures and surgical procedures.

SURGICAL TREATMENT OF IATROGENIC VENTRAL LARYNGEAL STENOSIS USING A MUCOSAL FLAP TECHNIQUE IN TWO HORSES. Kane-Smyth J, O'Leary JM, Barnett TP, Dixon PM*. The University of Edinburgh, Roslin, United Kingdom.

Objective: To describe a novel surgical technique used to correct post-operative ventral laryngeal stenosis (cicatrix) and document the outcome of this treatment in 2 Thoroughbred racehorses.

Study design: Retrospective case series.

Methods: Two horses presented with iatrogenic ventral laryngeal stenosis with resultant exercise intolerance and abnormal exercise-related noise. Under general anaesthesia, a midline sagittal incision was made in the skin over the ventral aspect of the larynx and between the sternohyoideus muscles overlying the cricothyroid notch. At the level of the dorsal limit of the cicatrix, the full thickness of the cricothyroid ligament and the attached laryngeal cicatrix were sagittally sectioned on the left side. The laryngeal mucosa, cicatrix and underlying cricothyroid membrane immediately rostral and caudal to the cicatrix were then sectioned in a medial direction as far as the right side of the cricothyroid notch. Following resection of most of the attached cicatrix tissue, the resultant mucosal flap (attached to the right side of the larynx) was reflected ventrally and sutured to the attachment of the cricothyroid ligament on the right side of the cricothyroid notch, creating an intact mucosal layer on the right side of the ventral larynx.

Results: Both horses had good intra-laryngeal wound healing with minimal redevelopment of ventral stenosis present at 5 and 9 months, respectively. Both successfully returned to racing with complete absence of abnormal respiratory noise.

Conclusion: The unique laryngeal anatomy of horses, with a cartilage-free ventral laryngeal area (cricothyroid notch), allows this novel surgical technique to be used to successfully treat ventral laryngeal stenosis.

SMALL ANIMAL

Small Animal Soft Tissue Resident's Forum

REMOVAL OF OESOPHAGEAL FOREIGN BODIES IN DOGS THROUGH A GASTROTOMY: 6 CASES (2007–2013). Aertsens A, Poncet CM*. CHV Frégis, Arcueil, France.

Objective: The purpose of this study was to describe the feasibility of gastric removal of oesophageal foreign bodies located in the caudal oesophagus in dogs.

Methods: This retrospective study was conducted between January 2007 and December 2013 on dogs with foreign body in the caudal oesophagus diagnosed by radiography ($n = 95$). They were included in the study if they had a foreign body removed by gastrotomy after unsuccessful endoscopic management. Data collected included history, clinical signs, surgical technique, and outcome.

Results: A conventional midline coeliotomy was performed in 6 dogs. Two stay sutures were placed on the stomach to ensure adequate retraction before an incision in the middle of the ventral body, midway between the branches of the gastric and gastroepiploic vessels. The length of the incision was wide enough to allow one hand to be introduced through it. To avoid gastric content spillage and improve visualisation of the cardia, the gastric opening was anchored to the most cranial part of the midline coeliotomy using sutures through the abdominal muscular layers. The gastrotomy allowed palpation and direct visualization of parts of the foreign body. Removal was attempted by forceps grasping and gently pulling with sweeping motion. If unsuccessful, the foreign body was pushed into the stomach. Attempts were not forced, and the firmly lodged foreign bodies were cut in small pieces with bone rongeurs and bone cutters through a midline gastrotomy. In all cases, surgery was successful and the whole foreign body was extracted. The distal part of the oesophagus, which can be seen through the gastrotomy, was inspected for potential lesion. The stomach was closed in 2 continuous pattern layers, the abdomen was copiously flushed with warm saline, and the abdomen was closed in a conventional manner. Animals were kept in the hospital for a few days to the clinician's discretion. Five dogs recovered well without any postoperative complications. One dog died during the immediate post-operative period.

Discussion and conclusion: The present study showed lower rates of perioperative morbidity and mortality than traditional techniques. This procedure is technically easily performed, and is associated with low rate of complications. One dog died without relation associated to the surgical technique. Gastrotomy to remove foreign bodies located in the caudal oesophagus appears to be an effective, easy and safe procedure with low rate of short and long-term complications.

CHEMICAL ANALYSIS OF THIN PLASTIC FILMS USED FOR SURGICAL ATTENUATION OF PORTOSYSTEMIC SHUNTS IN DOGS AND CATS. Bowen EJ[1], Scurr DJ[2], Piggott M[2], Chanoit G*[1]. [1]Langford Veterinary Services, University of Bristol, Bristol, United Kingdom, [2]School of Pharmacy, University of Nottingham, Nottingham, United Kingdom.

Introduction: Thin plastic films are commonly used for attenuation of portosystemic shunts in dogs and cats (technique referred to as cellophane banding). There is a lack of consistency in the type of films used in this technique and recent evidence suggests these films may not all be cellophane. Furthermore, the mechanism by which the inflammatory response associated with these films occurs is not completely understood. It has been suggested that compounds, such as dicetyl phosphate, remain on the films following manufacturing. These compounds are known irritants when placed in body cavities and may be key in the establishment of the inflammatory reaction.

Objective: The aims of our study were to 1) determine the chemical composition of a large number of thin plastic films used for portosystemic shunt attenuation at the surface, subsurface and in the bulk of the film, and 2) identify the presence, concentration and location of irritant compounds within the films.

Methods: Fourier Transform Infrared Spectroscopy (FTIR), X-ray Photoelectron Spectroscopy (XPS) and Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS) were performed to analyse the surface, subsurface and bulk of the samples. Two samples of each film were sterilised using steam and ethylene oxide and were analysed using FTIR. The sample thickness was measured using Scanning Electron Microscopy. Samples thickness was compared using a 1-way ANOVA.

Results: Thirteen samples were collected. No difference in chemical composition was observed between sterile and non-sterile samples. XPS confirmed low phosphorous concentration (surrogate marker of dicetyl phosphate) between 0.01–0.19%. There were significant differences between film thicknesses ($P < .001$). The FTIR and ToF-SIMS identified 6 cellophane samples, 4 of which had an initial unknown layer before becoming cellophane. Five samples were identified as polypropylene and did not contain an initial layer. One sample had an initial nitrogen containing layer and then became polypropylene. One sample could not be identified but contained several different layers.

Conclusion: This study confirmed that films used to attenuate portosystemic shunts were commonly not cellophane. Our study showed that suspected irritant compounds were not present in significant concentrations in the films studied, and that certain variability existed in the chemical composition of these films (surface vs. bulk). Folding films before use may lead to significant variation in the amount of plastic material covering the shunt depending on the type of film used. Considering the rate of elution as an additional factor, the present findings lead to a legitimate question about the reproducibility of shunt occlusion when using these films.

USE OF A THORAX-ABDOMEN PRESSURE GRADIENT TO IMPROVE THE DIAGNOSIS OF DYNAMIC SLIDING HIATAL HERNIA IN 20 DOGS WITH BAOS. Broux O[1], Clercx C[2], Busoni V[3], Claeys S*[1], Hamaide A*[1], Billen F[2]. [1]Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Division of Small Animal Surgery, University of Liège, Liège, Belgium, [2]Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Division of Small Animal Internal Medicine, University of Liège, Liège, Belgium, [3]Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Division of Diagnostic Imaging, University of Liège, Liège, Belgium.

Introduction: Brachycephalic dogs are predisposed to hiatal hernia, especially dynamic sliding hiatal hernia (SHH). We hypothesized that artificially increasing the pressure gradient between the abdominal and thoracic cavities during diagnostic procedures could improve the detection of SHH in dogs with BAOS.

Objective: The purpose of the study was to 1) compare the ability of 3 standard diagnostic imaging methods (radiography, ultrasonography and endoscopy) to detect SHH. 2) assess whether increasing the thorax-abdomen pressure gradient improves SHH detection. 3) determine whether a correlation exists between the digestive clinical signs and the GEJ abnormalities seen endoscopically.

Methods: The respiratory and digestive clinical signs of 20 dogs suffering from BAOS were evaluated and a respiratory and a digestive clinical score were assessed in each dog. Based on physical examination, thoracic radiographs and laryngoscopy, a respiratory lesion score was recorded in each dog. The GEJ was assessed using standard abdominal ultrasound (US-STD, 18 dogs), thoracic radiographs (RX-STD, 20 dogs) and digestive endoscopy (ENDO-STD, 20 dogs). In order to investigate the effect of an increased intraabdominal pressure on the GEJ, procedures were repeated using manual application of a pressure on the cranial abdomen (RX-MAP and ENDO-MAP) and body angulation at 30° "upside-down" (ENDO−30°). In order to investigate the effect of a decreased intrathoracic pressure on the GEJ, temporary complete obstruction of the endotracheal tube was performed during endoscopy (ENDO-OB). A GEJ lesion score was calculated for each ENDO manipulation in each dog. Presence of SHH was assessed during US, RX, ENDO with and without manipulations.

Results: All dogs presented with respiratory signs and 65% had digestive symptoms. Using standard procedures SHH was detected in 2 dogs. Manipulations during endoscopy allowed detecting SHH in 3 (ENDO−30°), 4 (ENDO-OB) and 5 (ENDO-MAP) dogs. The severity of GEJ lesion scores were increased during the 3 manipulations compared to STD. Digestive clinical score was significantly correlated with the GEJ lesion score during OB manipulation only ($P = 0.02$).

Discussion and conclusion: Increasing the thorax-abdomen pressure gradient worsens GEJ lesions and improves SHH detection. ENDO-OB is the sole manipulation revealing the correlation between digestive clinical signs and GEJ lesions. The present study shows that SHH is underdiagnosed in dogs with BAOS using standard procedures and that OB is useful to reveal SHH during endoscopy.

EVALUATION OF INTRAOPERATIVE FLUORESCENCE IMAGING USING A NOVEL LIPID NANOPARTICLE IN CANCER-BEARING DOGS: A PROSPECTIVE PROOF-OF-CONCEPT STUDY IN 9 CASES. Cabon Q[1], Sayag S[2], Texier-Nogues I[3], Navarro FP[3], Boisgard R[4], Virieux-Watrelot D[5], Ponce F[2], Carozzo C*[1]. [1]Surgery and Anaesthesia Unit, VetAgro Sup Campus Vétérinaire de Lyon, Marcy l'Etoile, France, [2]Clinical Oncology Department, Small Animal Internal Medicine Unit, VetAgro Sup Campus Vétérinaire de Lyon, Marcy l'Etoile, France, [3]Univ. Grenoble Alpes, CEA, LETI, MINATEC Campus, Technologies for Healthcare and biology division, Grenoble, France, [4]CEA I2BM SHFJ INSERM U1023, Orsay, France, [5]Pathology Unit, VetAgro Sup Campus Vétérinaire de Lyon, Marcy l'Etoile, France.

Introduction: Curative treatment for soft-tissue sarcomas (STS) is characterized by complete excision but intraoperative definition of tumor margins can be difficult. To assist the surgeon, in vivo near-infrared fluorescence imaging has emerged in human medicine. The objective of this proof-of-concept clinical study was to evaluate prospectively the use of intraoperative fluorescence imaging and nanoparticle in surgical excision of subcutaneous tumors in dogs.

Methods: Dogs presented with a STS or other subcutaneous tumours were prospectively enrolled. Clinical staging, including whole-body CT, was performed. The lipid nanoparticles (LipImageTM 815) used in this study have been the subject of a previous pharmacological and toxicological study. All dogs received an intravenous injection of LipImage® 815 (2.8 nmol/kg) 48 h before surgery. Wide or radical resection was decided after CT examination. The operative plan was not modified by fluorescence imaging. Real-time fluorescence imaging was performed using Fluobeam® (Fluoptics, France) device before skin incision and after tumor excision. In cases of radical resection, the lymph node (LN) was imaged. The tumour and LN were sent for histological examination. Surgical margins were classified as clean or dirty (metastasis for LN). Tumour fluorescence, as well as persistent fluorescence for dirty margins or infiltrated LN, were recorded.

Results: Nine dogs were included. Mean age and body weight were 10.4 years and 25 kg. Tumours were located on the head (2), joint (2) or a limb (5). Appendicular amputation was performed in 3 dogs and wide resection in 6 dogs. Histopathology revealed a malignant peripheral nerve sheath tumor (4), synoviosarcoma (2), undifferentiated soft tissue sarcoma (1), malignant melanoma (1) and osteoblastic osteosarcoma (1). Margins were considered clean in 5/6 dogs after wide surgical resection and dirty in case n°1. Metastasis was confirmed in 2/3 LN. Fluorescence was observed in all 9 tumors. In case n°1 (infiltrated margins), persistent fluorescence was observed in the deep plane after tumor excision. In cases no. 4 & 5 (metastatic LN), fluorescence was observed in excised LN.

Discussion and conclusion: All 9 primary tumours showed intense fluorescence, suggesting that LipImage® 815 is a useful contrast agent for intraoperative fluorescence imaging. A correlation was observed between the persistence of the tumour and fluorescence of deep margin or LN in the 3 cases with infiltrated margins or metastatic LN. These results demonstrate this methodology is very promising and may assist the surgeon in distinguishing infiltrated tissues intraoperatively. Future studies are needed to evaluate complete resection rates when surgery is guided by intraoperative fluorescence imaging.

GLANS URETHROTOMY AS A TREATMENT OF OS PENIS URETHRAL CALCULI OBSTRUCTION IN THREE MALE DOGS. Pisani G*[1], Cinti F[1], Carusi U[1], Buracco P*[2]. [1]Veterinary Clinic Luni Mare, Ortonovo (SP), Italy, [2]Department of Veterinary Science, University of Torino, Grugliasco (TO), Italy.

Introduction: Urolithiasis is a common cause of lower urinary tract obstruction in male dogs. The most commonly reported site of obstruction is immediately proximal to the os penis but occasionally it occurs at the level of the ischiatic arch. Diagnostic imaging techniques such as radiography, pneumocystography, ultrasonography, uroendoscopy and double-contrast cystography, are recommended to confirm both the presence and complete removal of calculi. Treatment of urolith(s) entrapped in the penile urethra includes different approaches. In a few cases retrograde urethral hydropropulsion followed by cystotomy is possible. If, however, the position, size or shape of the urolith(s) make removal not feasible, other surgical approaches may be necessary, such as urethrotomy or uretrostomy. Based on the location of the urethral obstruction, a prescrotal or perineal urethrotomy can be performed, whilst a perineal or scrotal urethrostomy is indicated in selected cases. The urethrotomy incision is left to heal by first or second intention, as the regenerative properties of urethral epithelium are good. Healing occurs rapidly and it is characterized by complete re-epithelialization in approximately 7 days. Major complications may be haemorrhage, urethral stenosis, infection and recurrence of the obstruction.

Objective: The author's purpose is to describe a glans urethral surgical approach to relieve severe urethral obstruction caused by urolith(s) at the level of the os penis when its/their mobilization becomes unfeasible. As far as the authors know, this technique has not been previously reported in the veterinary literature.

Case description: Three male dogs were referred for stranguria and hematuria caused by urolith(s) entrapped in the os penis urethra. After that all the conservative procedures addressed to move them along the urethra up to the bladder were unsuccessful, an alternative glans urethrotomy was used to reach the urethra.

Results: Os penis urethral obstruction was successfully removed in all the dogs. Short-term follow-up showed both a low complication rate and a rapid healing. Long-term follow-up showed a complete healing and no complications were reported, with full owners' satisfaction.

Conclusion: The surgical approach to urethra here reported is easy and fast to perform, characterized by a low complication rate. Authors propose this technique as an alternative procedure to relieve urethral obstruction caused by urolith(s) entrapped in the os penis urethra.

USE OF PRE- AND INTRAOPERATIVE ULTRASONOGRAPHY FOR THE SURGICAL TREATMENT OF ABSCESSES AND DRAINING TRACTS IN DOGS. Ferrand FX[1], Abadie C[1], Sonet J[2], Carozzo C*[1]. [1]Small Animal Surgery Department, VetAgro Sup, Campus Vétérinaire de Lyon, Marcy L' Etoile, France, [2]Diagnostic Imaging Department, VetAgro Sup, Campus Vétérinaire de Lyon, Marcy L' Etoile, France.

Introduction: The purpose of the study was to evaluate the use of preoperative and intraoperative ultrasonography for the diagnosis and surgical treatment of chronic abscesses and draining tracts suspected to be secondary to a migrating foreign body.

Methods: Medical records of dogs diagnosed with chronic abscess or draining tract and that had a preoperative and/or an intraoperative ultrasonographic exam were reviewed. Dogs were then assigned into 1 of 4 groups: group A included dogs where preoperative ultrasonography was used alone, group B included dogs where preoperative ultrasonography and CT or MRI were used, group C included dogs where preoperative and intraoperative ultrasonography were used, and group D included dogs where CT or MRI were used in combination with intraoperative ultrasonography. Results of each diagnostic imaging method were collected and compared with surgical findings. Outcome was considered successful when there was no clinical sign of relapse at long-term follow-up, with a minimum follow-up of 6 months.

Results: Twenty-seven dogs were included in the study. Hunting dogs and shepherd dogs were overrepresented. Eight dogs were included in group A, 5 dogs in group B, 11 dogs in group C and 3 dogs in group D. The percentage agreement between preoperative ultrasonography and surgery was 87.5% in group A and 0% in group B. The percentage agreement in group B between CT or MRI and surgery was 20%, and 80% between ultrasonography and CT or MRI. Results in group C and group D showed a full agreement between intraoperative ultrasonography and surgery, with a percentage agreement of 82% between preoperative ultrasonography and surgery in group C and 100% between CT or MRI and surgery in group D. A successful outcome was obtained in 100% of cases in group A, 100% in group B, 75% in group C and 100% in group D.

Discussion and conclusion: The agreement rate between preoperative ultrasonography in groups A and C was comparable with other studies. Results of intraoperative ultrasonography seemed comparable or even better than those found with the use of CT scan in previous studies. Intraoperative ultrasonography appears to be particularly accurate to identify a foreign body and to guide the surgeon during the intervention, limiting soft tissue damage, the time of surgery and the time of recovery.

LAPAROSCOPIC-ASSISTED COLOPEXY AND CYSTPEXY IN TREATMENT OF PERINEAL HERNIA IN DOGS. Gibert S, Ragetly G*, Poncet C*. Centre Hospitalier Vétérinaire Frégis, Arcueil, France.

Introduction: Colopexy, cystopexy, and deferensopexy at coeliotomy followed by perineal reconstruction, have been recommended for the treatment of bilateral and complicated perineal hernia (PH). Advantages of laparoscopy in reducing morbidity have been demonstrated. However previous clinical studies suggest a high rate of infections of the colopexy site when performed under laparoscopy. Our aim was to evaluate the complications and long-term outcome of dogs with complicated PH treated by laparoscopic-assisted colopexy and cystopexy.

Methods: Medical records of dogs with complicated PH admitted from 2009 to 2014 were retrospectively reviewed. Inclusion criteria were: bilateral or complicated PH (recurrence, unilateral with major rectal dilatation, or with a concurrent surgical prostatic disease, or with a retroflexed bladder), abdominal surgery consisting on a laparoscopic-assisted colopexy and a cystopexy as the sole or the first treatment step. Pre- and postoperative data including signalment, operative complications, and long-term outcome were recorded.

Results: Sixteen dogs were included (mean age 9.8 ± 3.0 years and mean weight 19.7 ± 15.8 kg). Eleven hernia were bilateral, 3 had bladder retroflexion, 10 had major rectal dilatation, and 8 had prostatic disease observed. Eleven dogs had pelvic diaphragm reconstruction after 10 ± 5 days. A short-term complication (colopexy wound infection) was recorded in 1 case. Death of unknown origin occurred in 1 dog 4 days after laparoscopy. Mean time follow-up was 27 ± 11months and 14 dogs had >10 months follow-up. Quality of life was reported as excellent in 79% of the dogs, satisfactory in 7% and non-satisfactory in 14%. No case of dribbling, urinary or fecal incontinence was noted. Persistent tenesmus was reported in 5/15 dogs. Long-term recurrence was observed in 3/14 cases, 2 in dogs treated for IBD.

Discussion and conclusion: In contrast to a previous report, laparoscopic-assisted treatment of perineal hernia was associated with a low post-operative morbidity in our study. The low infection rate may be due to the improved experience in laparoscopy as well as surgical wounds distant from the penis compared to open surgery. Furthermore, dribling and urinary incontinence were not reported in this series. Cystopexy may allow a more physiologic positioning of the bladder, which may be further improved by the laparoscopy technique. The rate of post-operative tenesmus observed may be caused by underlying disease (IBD) or induced by the colopexy itself. This persistent tenesmus may predispose patients to recurrence. In conclusion, laparoscopic-assisted colopexy and cystopexy were shown to be a safe technique for the treatment of perineal hernia in dogs.

THE NASOPHARYNGEAL SPACE IN BRACHYCEPHALIC DOGS: A COMPUTED TOMOGRAPHIC COMPARISON OF PUGS AND FRENCH BULLDOGS. Heidenreich DC, Dupré G*. University of Veterinary Medicine, Small Animal Clinic for Surgery and Ophthalmology, Vienna, Austria.

Objective: To compare the nasopharyngeal space of Pugs and French Bulldogs with CT imaging and to assess the anatomic location of greatest airway obstruction.

Study design: Prospective CT study.

Animals: 30 Pugs and 30 French Bulldogs with brachycephalic upper airway syndrome

Methods: The thickness and length of the soft palate and cross-sectional area of the airway passage dorsally to the soft and hard palate were measured and computed to each individual's skull index before statistical comparison between breeds. The presence of nasopharyngeal turbinates and their effect on airway space was assessed.

Results: Pugs have significantly smaller cross-sectional airway areas dorsally to the soft and hard palate despite a significantly thicker and longer soft palate in French Bulldogs. They also are more commonly affected with nasopharyngeal turbinates but the smallest airway space is located dorsally to the soft palate.

Conclusion: Assessment of nasopharyngeal space with CT imaging showed less airway space despite smaller soft palate dimensions in Pugs compared to French Bulldogs.

MECHANICAL COMPARISON OF MONOFILAMENT NYLON LEADER AND ORTHOPAEDIC WIRE FOR MEDIAN STERNOTOMY CLOSURE. McCready DJ[1], Bell J*[1], Ness MG*[1], Tarlton J[2]. [1]Croft Veterinary Hospital, Cramlington, United Kingdom, [2]Bristol University, Bristol, United Kingdom.

Objectives: The objective of this study was to mechanically compare monofilament nylon leader (MNL) and orthopedic stainless steel wire (SSW) for median sternotomy closure in the dog. Our hypothesis was that MNL secured with crimp clamps would be mechanically comparable to SSW for median sternotomy closure in the dog.

Methods: Sternums were harvested from 14 dogs euthanatized for reasons unrelated to this tudy. Each specimen consisted of all sternebrae and 3-6cm of costal cartilage and intercostal muscles. A median sternotomy was performed leaving the manubrium intact. Specimens were matched for bodyweight and randomly assigned to 1 of 2 closure methods: 1) SSW 20G used peristernally in a single twist figure of 8 pattern centred on the sternal synchondrosis. 2) MNL 80lb placed peristernally in a figure of 8 pattern centred on the sternal synchondrosis. A Securos crimp clamp was used. A custom made clamp was used to secure each construct. The clamps were loaded into a servohydraulic materials testing machine. Each construct underwent constant axial displacement at 100mm/min until failure. Load at yield (N), maximum load (N), modulus (MPa) and displacement were recorded. Mode of failure was determined by visual and radiographic examinations. Descriptive statistics were reported as mean+/−SD. Data were compared using a 2-sample unpaired Student's t-test. A $P<0.05$ was considered significant.

Results: Two constructs were eliminated from further analysis due to technical error. Load at yield of SSW (1252.2+/−341.6N) and MNL (1328+/−212.7N) constructs was not significantly different. Maximum load at failure for SSW (1368.6+/−289.3N) and MNL (1497+/−240.4N) constructs was not significantly different. The modulus of SSW (1844.3+/−426.5 MPa) and MNL (1636.7+/−499.5MPa) constructs was not significantly different. The displacement ranged between 0.6+/−0.24 mm and 7.21+/−1.75 mm (at 100 and 1000N rspectively) for the SSW constructs and between 0.43+/−0.12 mm and 7.58+/−1.76 mm (at 100 and 1000N respectively) for the MNL constructs. No significant difference in the mean displacement between the 2 closure methods was evident. All SSW failed by fracture of the sternocostal junction or costal cartilages. Four of the MNL constructs failed by pulling of the suture material throught the crimp.

Discussion: No significant differences in the load at yield, maximum load, modulus and displacement between SSW and MNL constructs during single cycle load to failure testing were demonstrated; findings which support our hypothesis that MNL secured with crimp clamps is mechanically comparable to SSW for median sternotomy closure in the dog.

TRANSDIAPHRAGMATIC APPROACH TO ATTENUATE CONGENITAL EXTRA-HEPATIC PORTOSYSTEMIC SHUNTS, INSERTING IN THE THORACIC PART OF THE AZYGOS VEIN. Or M[1], Devriendt N[1], Vandermeulen E[2], De Ridder M[1], Kitshoff A[1], De Rooster H*[1]. [1]Department of Small Animal Medicine and Clinical Biology, Ghent University, Merelbeke, Belgium, [2]Department of Medical Imaging of Domestic Animals and Orthopedics of Small Animals, Ghent University, Merelbeke, Belgium.

Objective: To describe the surgical technique and to document the feasibility of a transdiaphragmatic approach to attenuate congenital extra-hepatic portosystemic shunts, inserting in the thoracic part of the azygos vein.

Study design: Cadaveric study and prospective case series.

Animals: Canine cadavers (n = 5) and dogs with congenital porto-azygos shunts that inserted in the thoracic part of the azygos vein (n = 6).

Methods: A transdiaphragmatic approach for attenuation of intra-thoracic portosystemic shunts was fine-tuned in cadavers and subsequently applied in clinical cases. In the cadavers, the azygos vein was filled by retrograde injection of aqueous latex. Landmarks were established for creating a safe corridor for a transdiaphragmatic approach to the shunt insertion site. The clinical cases were suspected to have a porto-azygos rather than a porto-caval communication based on the results of the transsplenic portal scintigraphy. The intra-thoracic insertion of the porto-azygos shunt was confirmed at the time of surgery in all dogs. All shunts were attenuated close to their insertion site.

Results: The position of the intra-thoracic part of the aorta was identified by digital palpation through the diaphragm. A small cut was made in the left diaphragm 0.5–1 cm ventral to the level of the aorta; the incision was lengthened bluntly over 3–5 cm. Stay sutures were placed to open up the incision, and a small retractor was used to lift the esophagus away from the aorta. The vagus nerve, the phrenic nerve and the sympathetic trunk were not in the surgical site and were not at risk of iatrogenic damage. A moistened abdominal sponge covered the parietal aspect of the liver and the remaining abdominal content during intra-thoracic dissection of the shunt. Exposure of the shunt insertion site to the azygos vein was excellent in all clinical cases. No technical issues were encountered to place an ameroid constrictor (n = 2) or a cellophane band (n = 4). There were no intra- or postoperative complications.

Discussion and conclusion: Surgical recommendation for congenital portosystemic shunt attenuation is approaching the shunt as close to its insertion site as possible. If a thoracic insertion of a porto-azygos shunt has been identified, a transdiaphragmatic approach exposes the most ideal site for shunt attenuation. This approach represents a relatively easy and fast surgical procedure, without unnecessary abdominal organ manipulation, while the risk of missing additional contributing branches is eliminated.

Small Animal Orthopedics Resident's Forum

EFFECT OF TIBIAL PLATEAU LEVELING OSTEOTOMY ON STABILITY OF THE FELINE CRANIAL CRUCIATE-DEFICIENT STIFLE JOINT: AN IN-VITRO EXPERIMENTAL STUDY. Bilmont A[1], Retournard M[2], Asimus E[1], Autefage A*[1]. [1]Unité de Chirurgie, Ecole Nationale Vétérinaire de Toulouse, Toulouse, France, [2]Centre Hospitalier Vétérinaire Frégis, Arcueil, France.

Introduction: The effect of Tibial Plateau Levelling Osteotomy (TPLO) on the cranial cruciate ligament (CrCL)-deficient stifle joint has been validated by ex-vivo studies in the dog but not in the cat. Our objective was to evaluate the effect of TPLO on Cranial Tibial Subluxation (CTS) and the Tibial Rotation Angle (TRA) in a model of the feline CrCL-deficient stifle joint.

Methods: Hind limbs from10 adult cats were freed of soft tissues, preserving the stifle and talocrural joint capsules. Quadriceps and gastrocnemius muscles were simulated using cables, turnbuckles and a spring. An axial load of 30% body weight was applied. The stifle and hock joint angles were adjusted to 120°. CTS and TRA were radiographically measured with the cranial cruciate ligament intact, after CrCL transection, and after TPLO with a post operative Tibial Plateau Angle (TPA) of +5°, 0° and −5°.

Results: CrCL section resulted in a CTS of 8.8 ± 1.6 mm and a TRA of 14.8 ± 3.8°. After TPLO at +5°, CTS (7.9 ± 1.0mm) and TRA (11.4 ± 5.2°) values were not significantly different from those obtained after CrCL section. CTS and TRA with TPLO at 0° and −5° were not significantly different either.

Discussion and conclusion: In this model, TPLO with a postoperative TPA of 5° failed to eliminate cranial tibial subluxation although some reduction in CTS effect was noted when the TPA was decreased to 0° and −5°.

ARTHROSCOPIC ASSISTED FEMORAL TUNNEL DRILLING FOR THE INTRAARTICULAR ANATOMIC CRANIAL CRUCIATE LIGAMENT RECONSTRUCTION IN DOGS. Bolia A[1], Böttcher P*[1], Winkels P*[2]. [1]University of Leipzig, Small Animal Clinic, Leipzig, Germany, [2]Tierärztliche Klinik Ahlen, Ahlen, Germany.

Introduction: Intra-articular CCL repair in dogs is not commonly performed and until now it has not met with enduring success. Accurate tunnel placement has been shown to be crucial during ACL reconstruction in humans. Aims of the present study were to describe the radiographic location of the center of the femoral footprint of the CCL in dogs such as to develop and test an aiming device for anatomic femoral tunnel drilling.

Methods: A. Radiographic study: CT and 3D reconstruction of the femora from 49 dogs (BW ≥ 20 kg) was performed, followed by manual segmentation of the CCL footprint on the 3D models and calculation of its center. Finally, virtual digital radiographs were produced and the location of the calculated center of the CCL was expressed using 3 different methods (4 × 4 box grid method and percentage position for the medio-lateral (ML) projection; o'clock position for the disto-proximal (DP) projection. B. Aiming device: Hindlimbs (n = 12) of 6 cadaveric dogs (BW ≥ 20 kg) were used. One hindlimb from each cadaver was randomly chosen and the caudo-cranial position of the CrCL center was calculated, on standard ML stifle radiographs, and transferred onto to an adjustable aiming device. During stifle arthroscopy, after visualization of the femoral footprint of the CrCl, the aiming device was inserted and a guide pin was placed from extra to intra-articular. The position of the resulting bone tunnel was evaluated on stifle radiographs and also compared with the anatomic center of each contralateral hindlimb, in 3D space.

Results: **A. Radiographic study:** In the ML radiographs the center of the CrCL femoral footprint was consistently located in the second rectangle from the top of the most caudal column of the 4 × 4 grid. The mean percentage caudo-cranial and proximo-distal location was 20.2% and 33.8%, respectively. In the DP radiograph, the o'clock position of the CCL center was between 2 and 3 o'clock in 97.6% of the cases. B. Aiming device: According to the post operative radiographs, the location of all 6 tunnel intra-articular openings, was consistent with the results of the radiographic study. According to the 3D measurements, arthroscopic femoral drilling resulted in a median deviation of 0.6 mm of the drill tunnels around the CCL center.

Discussion and conclusion: The radiographic location of the center of the femoral footprint was consistently predicted in the stifle radiographs of these 6 dogs over 20 kg. This data was used to plan and verify the placement of the femoral tunnel opening during intra-articular CCL repair. Precise anatomic placement of the tunnels was achieved using an adjustable aiming device. The proposed technique may reduce femoral tunnel misplacement when performing intraarticular CCL repair in dogs.

CORRELATION BETWEEN DISTRACTION INDEX, NORBERG ANGLE AND LINEAR FEMORAL OVERLAP OF THE CANINE HIP JOINT. De Ridder M[1], Weekers F[2], Coopman F[3], Verelst E[3], Broeckx B[4], Duchateau L[1], Verhoeven G*[1]. [1]Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium, [2]Algemene Dierenkliniek Randstad, Borsbeek, Belgium, [3]Faculty of Applied Bio-engeneering, University College, Ghent, Belgium, [4]Faculty of Pharmaceutical Sciences, Ghent University, Ghent, Belgium.

Introduction: The combat against canine hip dysplasia (CHD) has been executed by official screening committees for over 4 decades. The Orthopedic Foundation for Animals, the Federation Cynologique Internationale (FCI) and the British Veterinary Association/Kennel Club (BVA/KC) concentrate on the phenotypical interpretation of hip extended (HE) radiographs to subjectively categorize hip joints. The FCI and BVA/KC quantify hip conformation through measurement of the Norberg angle (NA) in order to express hip joint laxity. Despite these efforts, CHD remains prevalent in dog populations. The most commonly applied technique used in the radiographic diagnosis of CHD is the HE radiograph. Another radiographic method used to identify laxity is the PennHIP distraction index (DI). The PennHIP method quantifies the breed specific laxity of the hip joint, in order to express the chance for which the dog will develop CHD throughout its lifetime. Besides a HE view, compression and distraction radiographs are necessary to measure the DI. Certification is mandatory for veterinarians who want to participate in PennHIP screening, which is not accepted as an official screening method in Europe and Asia. The linear femoral overlap (LFO) and surface femoral overlap, which quantifies the relative coverage of the acetabulum and the femoral head on HE radiographs, have recently been compared and a high correlation was found. The aim of this study is to investigate the correlation between the LFO, NA and DI. Our null hypothesis is that LFO and DI are highly correlated, so that LFO is an alternative measurement for detection of hip joint laxity on HE radiographs.

Methods: 53 standard hip extended radiographs (106 hips) were selected from the database for official FCI screening. Radiographs were categorized into 3 groups: 20 dogs with DI<0.3, 20 dogs with DI between 0.3 and 0.7 and 13 dogs with DI >0.7. After randomization, 6 experienced observers digitally measured the NA and LFO for each hip joint independently, unaware of the DI. The procedure was repeated 4 weeks later. The Spearman correlation test was used to determine correlation coefficients.

Results: The correlation coefficient between NA and DI was 0.55 ($P < .0001$), between LFO and DI 0.67 ($P < .0001$) and between NA and LFO 0.92 ($P < .0001$). Combining the NA and LFO did not significantly improve the detection of hip joint laxity.

Conclusion: Although the LFO generates a higher correlation with DI than the NA, LFO cannot be considered as a valuable alternative tool to detect hip joint laxity. Combining NA and LFO does not improve the correlation with the DI. DI represents a unique quantification of hip joint laxity, which cannot be detected on hip extended radiographs with LFO, NA or both.

BIOMECHANICAL COMPARISON OF LOCKING COMPRESSION PLATE AND LIMITED CONTACT DYNAMIC COMPRESSION PLATE COMBINED WITH AN INTRAMEDULLARY ROD IN A CANINE DIAPHYSEAL FEMORAL FRACTURE MODEL. Matres Lorenzo L[1], Diop A[2], Maurel N[2], Boucton MC[2], Bernard F*[1], Bernardé A*[1]. [1]Centre Hospitalier Vétérinaire St Martin, St Martin Bellevue, France, [2]Equipe Biomécanique et Remodelage Osseux (EPBRO), Paris, France.

Introduction: This *in vitro* prospective biomechanical study compared a plate-rod system (LC-DCP-R) with a Locking Compression Plate (LCP). Structural properties, 3-dimensional (3D) inter-fragmentary motion (IFM), and plate linear strain were investigated.

Methods: Ten pairs of cadaveric canine femurs were obtained from 25–35 kg dogs. A mid-diaphyseal 20 mm gap was created in each femur. Each pair of femora was stabilized with either a LCP or a LC-DCP-R constructs (C). LCP C used a 10-hole 3.5 mm LCP plate with 8 (4+4) 3.5 mm self-tapping locking screws per specimen. LC-DCP-R C used a 10-holes 3.5 mm LC-DCP with 6 monocortical and 2 bicortical 3.5 mm self-tapping cortical screws combined with an intra-medullary rod. Static physiological loading conditions were simulated and, using an Instron testing machine, each specimen was successively submitted to a non-desturctive test (NDT) up to 60% body weight (BW) and a continuous destructive test (CDT) at 5mm/min until failure. Stiffness and limit of failure (LF) were obtained. IFM was obtained using an optopelectronic device. Plate strains were recorded using a strain gauge during CDT. Statistical significance was set as $p<.05$ for data analysis.

Results: The stiffness of LC-DCP-R C was 1.5 times and 1.6 times greater than the LCP C in NDT and CDT stiffness respectively. The LF was significantly greater for LC-DCP-R C (384+/−62 N corresponding to 117%+/−19% BW) than for LCP C (274+/−29 N corresponding to 84% +/− 14% BW). The axial motion was approximately 3 times higher for the LCP C than for the LC-DCP-R C (0.37+/−0.13 mm vs 0.11+/−0.13 mm at 30% BW; and 1.11+/−0.56 mm vs 0.41+/−0.33 mm at 60% BW). These differences were significant at 30% BW and at 60% BW, exceeding 2mm at 60% BW for several LCP specimens. Transverse motion were almost twice higher for LCP than for LC-DCP-R C (0.43+/−0.14 mm vs 0.20+/−0.12 at 30% BW and 1.18+/−0.56 mm vs 0.72+/−0.38 mm at 60% BW). These differences were significant at 30% and at 60% BW. The amplitude of rotation around the cranio-caudal axis was significantly higher for LCP than LC-DCP-R C. The maximun mean strain at mid-plate surface was 1.6 times higher for LCP than for LC-DCP-R C, at 30% BW (379+/−175 vs 244+/−80 μdef, respectively). The elastic strain of the Stainless Steel used for plate manufacture was reached at a mean load of 290+/−44 N (89% of mean BW) for LC-DCP-R, whereas it was reached at a mean load of 241+/−48 N (74% of mean BW) for LCP C. This difference was not statistically significant.

Discussion and conclusion: LC-DCP-R C demonstrated higher stiffness and resistance to failure, lower IFM, and lower plate strain and stress compared to LCP C.

EVALUATION AND COMPARISON OF ARTHROSCOPIC CENTRAL AND CAUDAL MEDIAL MENISCAL RELEASE IN 20 CANINE CADAVERIC STIFLES. Mindner JM, Scharvogel SV*. Tierklinik Haar, Haar, Germany.

Introduction: Medial meniscal release (MMR) was advocated by Slocum as a means of preventing damage of the caudal meniscal pole in surgery of cranial cruciate ligament (CrCL)-deficient stifles. Central and caudal MMR has been described in the veterinary literature. Arthroscopy offers better visualisation of intra-articular structures and arthroscopic techinique has a higher sensitivity of detecting a meniscopathy, when probing the menisci, compared to arthrotomy. Our objective was to compare the feasibility and effectiveness of arthroscopically performed central and caudal MMR.

Methods: Twenty canine cadaveric stifles from 10 dogs were used. Orthogonal radiographic views were obtained from each stifle joint to assess presence or absence of orthopaedic disease. Standard arthroscopy was performed by a single, experienced surgeon. Stifle joints were randomly divided into 2 groups – one for central and one for caudal MMR. After thorough inspection of the joint, the integrity of the medial meniscus was confirmed and MMR was performed caudally or centrally arthroscopically, depending on the group to which the stifle had been assigned. Each meniscus was probed to determine a complete release. A complete disarticulation of each stifle joint was performed. The medial meniscus was probed once again and completeness of the release was assessed visually after dissecting the meniscus free.

Results: The radiographs showed mild osteoarthritis in 5/20 stifle joints. Arthroscopy revealed mild synovitis in 9/20 joints, a partial CrCL rupture and a bucket handle tear of the medial meniscus in 1 joint. Central MMR was complete in 4/10 stifles, the incomplete releases (6/10) showed an intact bridge on the abaxial meniscus. In the caudal MMR group a complete release was achieved in 9/10 cases. Visualization of the location and the release was better when performing the caudal release, compared to the central release.

Discussion and conclusion: Caudal MMR was 2.25 times more likely to be complete than central MMR. A possible reason might be inferior visualization of the area where central MMR is performed. Also, the position of the stifle distractor used for arthroscopy partly impeded correct placement of the scalpel blade. One limitation of our study is the lack of a CrCL-diseased control group, where the amount of joint distraction might be different due to stifle joint arthropathy. Further studies are needed to evaluate the viability and outcome of arthroscopically performed central and caudal MMR in a clinical setting. Caudal MMR seems a promising technique in regard to its feasibility and effectiveness compared to central MMR. Larger case numbers need to be assessed in order to prove significance.

OUTCOMES FOLLOWING METAL ENDOPROSTHESIS LIMB SPARING SURGERY IN DOGS WITH DISTAL RADIAL OSTEOSARCOMA: A VETERINARY SOCIETY OF SURGICAL ONCOLOGY RETROSPECTIVE STUDY. Mitchell KE[1], Kung M[2], Dry S[3], Boston SE*[4], Straw RC*[2], Ehrhart NP*[5], Ryan SD*[1]. [1]University of Melbourne Veterinary Teaching Hospital, Werribee, Australia, [2]Australian Animal Cancer Foundation, Brisbane Veterinary Specialist Centre, Albany Creek, Australia, [3]Southpaws Specialty Surgery for Animals, Moorabbin, Australia, [4]College of Veterinary Medicine, University of Florida, Gainesville, FL, [5]College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO.

Introduction: Use of first generation stainless steel endoprosthesis (GEN1) in limb sparing surgery for distal radial osteosarcoma (OSA) has previously been associated with high complication rates. To date, the second generation endoprosthesis (GEN2), which is lighter weight, available in 2 sizes, with hydroxyapatite coating and locking screws has not been investigated. The aims of our study were to compare the surgical and oncological outcomes between the 2 generations of endoprosthesis (EN).

Methods: Medical records of participating institutions were reviewed for dogs with distal radial OSA treated with EN and chemotherapy. Patient data was sourced from medical records and radiographs. Outcomes were compared between EN generation using Independent t-tests, Mann-Whitney tests or Chi-Square tests. Time until complication, metastasis-free interval (MFI) and survival time (ST) were examined using Kaplan-Meier product limit method and Mantel-Cox analyses.

Results: Records from 45 dogs were examined, 28 receiving GEN1 and 17 receiving GEN2. Overall complication rate was 95.5% (infection 77.8%; implant related complication 35.6%; local recurrence 24.4%). Amputation was performed secondary to complication in 9 cases. Between EN generations, there were no significant differences in rate of complication or time until complication (infection, implant-related, local recurrence or amputation). Post-operative limb function and severity of complication did not differ significantly between the 2 groups. Preservation of the ulna was not significantly associated with implant-related complication or local recurrence rates. The use of locking screws was not significantly associated with implant-related complication rate. Overall metastasis rate was 66.7% and median MFI was 188 days. Survival time ranged from 34 days to 6.1 years (median ST = 247 days). The 1-, 2-, and 3-year survival rates were 33.3%, 15.5%, and 4.4% respectively. Between EN groups, there was no significant difference in metastasis rate, MFI or ST.

Discussion and conclusion: Results show that there is no significant difference in outcomes between GEN1 and GEN2 for limb sparing surgery. The overall complication rate remains unacceptably high for both generations. Oncological outcomes of either generation EN remain similar to amputation and other limb sparing techniques when used in conjunction with curative intent chemotherapy. Further refinement of the EN is indicated to reduce complication rates.

L-LACTATE IN NORMAL AND DISEASED CANINE JOINT FLUID. Proot JL, Sheahan DE*. Calder Vets Ltd., Dewsbury, United Kingdom.

Introduction: The value of lactate concentration (LAC) in synovial fluid (SF) has been investigated in humans but only one limited canine veterinary study has investigated SF LAC in normal joints and joints affected by osteoarthritis and found no difference between the 2 groups.

Objective: The purpose of this study was to determine normal canine SF LAC using a hand-held lactate meter and to compare this with SF LAC of joints affected by inflammatory and non-inflammatory joint disease and secondly to investigate if a correlation exists between SF LAC and SF nucleated cell count (NCC) and SF total protein concentration (TPC).

Methods: Sixty SF samples were taken and divided into 4 different groups based on the results of orthopaedic investigations and laboratory analysis: normal(1), osteoarthritis(2), non-septic inflammatory arthritis(3), septic arthritis(4). Lactate was measured using a hand-held lactate meter (Lactate-Scout, Senslab, Leipzig,

Germany) and the rest of the SF was sent for full cytological analysis and culture and sensitivity testing to a commercial laboratory.

The Kruskal-Wallis test was used to compare SF LAC between the 4 groups and Mann-Whitney tests were used for comparison of the normal group with the 3 other groups. To allow for multiple testing between the groups, the p-values from the Mann-Whitney tests were given a Bonferronni adjustment. A Spearman's rank correlation was used to examine correlations between the variables.

Results: Statistical analysis revealed an overall significant difference between the 4 groups ($P = 0.002$). There was no difference between the normal group and groups 2&3 but a statistical difference was found between the normal group and group 4 ($P = 0.004$). No significant association between SF LAC and SF NCC or SF TP could be found (correlation coefficient of 0.25 and 0.29 respectively).

Discussion: We used a hand-held lactate meter because it has been validated for canine veterinary patients and it is cost effective and easy to use. In this study, SF LAC appears to be a good marker for septic arthritis but because of the possible overlap of lactate values between group 3&4 it has been suggested that low level synovial fluid lactate values point to exclusion rather then a high value to the diagnosis of septic arthritis. The synovial fluid hyperlactatemia in septic joints is likely the result of increased glucose utilisation and conversion to lactic acid under anaerobic conditions in the inflamed synovium and it is likely that bacteria exert an additional influence. We could not find a significant correlation between SF LAC and SF NCC or SF TPC, which suggests that leucocyte breakdown products are not a contributing factor in lactate production.

COMPARISON OF CONVENTIONAL AND HIGH DEFINITION VIDEO TELESCOPE ASSISTED VENTRAL SLOT DECOMPRESSION FOR CERVICAL INTERVERTEBRAL DISC HERNIATION IN 51 DOGS. Rossetti D, Ragetly G*, Poncet C*. Centre Hospitalier Vétérinaire Frégis, Arcueil, France.

Introduction: Ventral slot surgery is the treatment of choice for cervical intervertebral disc disease (IVDD) in dogs. It is a very demanding technique and serious complications can occur. In human neurosurgery, the benefit of using a magnification system to limit perioperative complications is well recognized. Little is known about the use of magnification in veterinary neurosurgery. The objective of this prospective study was to compare the use of a Video Telescope Operating Monitor (VITOM) with the conventional approach to assist surgeon for ventral slot surgical procedures in dogs.

Methods: Patients undergoing a single space cervical ventral slot decompression for cervical IVDD between June 2013 and September 2014 were enrolled in this study and assigned to a conventional approach or a VITOM assisted approach. Signalment, pre-operative neurological status, site and amount of spinal compression based on CT myelography, operative time, surgical complications, size of the ventral slot, spinal decompression based on CT myelography, hospitalization time and post-operative outcome were compared between the 2 groups.

Results: A total of 51 patients were included, 30 in the VITOM group and 21 in the standard

conventional group. French bulldog was the most common breed. C3-C4 was the most frequent intervertebral herniated disc space treated. The dogs from the VITOM group were more severely affected pre-operatively ($P = 0.04$). No statistical difference was noted in surgical time (62.14 ± 14.2 min, $P = 0.6$). In the VITOM group, the ventral slot width was smaller ($P = 0.007$) than in the conventional group. The VITOM group had a greater improvement in post operative spinal canal diameter ($P = 0.01$) and spinal canal height ($P = 0.002$) compared to the conventional group. The VITOM group had a greater improvement of their neurological status in the first 24 hours after surgery ($P < 0.01$) and a shorter post-operative hospitalisation time ($P = 0.006$).

Discussion and conclusion: The VITOM technique was associated with a smaller ventral slot, a better spinal decompression, a greater clinical improvement and a reduced hospitalisation stay compared with the conventional group for the treatment of cervical IVDD. The VITOM allowed better visualisation of the spinal cord anatomy, better soft tissue handling and effective sinusal bleeding control. Compared with other reported magnifications systems, the VITOM installation and use were time efficient and the learning curve was not considered steep by the surgeons. These results support the idea that the VITOM-assisted approach may offer advantages compared to the conventional ventral slot surgery.

Small Animal Orthopaedics

BONE HEMOPHILIC PSEUDOTUMOR IN A GERMAN SHEPHERD DOG: FIRST DESCRIPTION OF A RARE AND CHALLENGING COMPLICATION OF HEMOPHILIA A. Decambron A, Manassero M, Reyes-Gomes E, Fayolle P, Fournet A, Bouvard J, Pey P, Perrot S, Medaille C, De Fornel P, Thibaud JL, Viateau V. Ecole Nationale Vétérinaire d'Alfort, Paris, France.

Introduction: Bone hemophilic pseudotumor (BHPT) is a rare complication of hemophilia in people, defined as a progressively expanding encapsulated hematoma that leads to the destruction of bone. The aims of this case report are to describe for the first time a BHPT in a dog and to make recommendations for its management.

Case description: A 7-month male German Shepherd dog was referred for a forelimb painless weight-bearing lameness associated with major swelling. Radiographs taken 2 weeks earlier by the referring veterinarian had shown an ulnar diaphyseal cystic-like osteolytic lesion with cortical thinning. The owner reported rapid expansion since the lesion had been punctured by the referring veterinarian, 4 days before presentation. Blood tests results were whithin normal limits, except for coagulation tests. Hemophilia was confirmed with factor VIII deficiency. Scintigraphy, CT and MRI examinations revealed: an isolated active lesion on the ulna mid-diaphysis, encapsulating areas compatible with bleeding, cysts and oedema, suggestive of a BHPT. Large ulnar resection with subsequent bone replacement with PMMA was performed. Adjunctive treatment to limit peri-operative blood losses included administration of fresh plasma, desmopressin and tranexamic acid.

Results: The dog recovered well and was weight-bearing 3 days after surgery. Histopathology revealed non-specific intra-osseous hemorrhage consistent with BHPT. A week after surgery, recurrence of bleeding appeared within soft tissues, confirmed by ultrasound and CT. Factor VIII replacement allowed the bleeding to stop within 24h. The replacement was continued for 5 days on demand, to maintain factor VIII around 150% according to the recommendations in people. The dog was discharged 24h after. At 1-month follow-up, the dog was in good general condition with slight weight-bearing lameness which was related to the proximal ulnar osteotomy.

Discussion and conclusion: To the best of our knowledge, this is the first time a BHPT has been diagnosed in a dog. The diagnosis of BHPT is non-specific and must be based on the natural history and clinical course of a patient with hemophilia with exclusion of unicameral or, aneurysmal bone cysts and neoplastic processes. MRI is the most sensitive and accurate method for diagnosing HPT in people. Given the rarity of HPT, there is no consensus about management strategies in people. However, excision is recommended when possible to prevent recurrence. BHPT should be part of the differential diagnostic of expanding and osteolytic lesions in young dogs. Surgeons must be aware of these because fine-needle aspiration and biopsy are absolutely contra-indicated in these situations. Factor VIII administration is recommended for successful and safe treatment.

COMPARISON OF OPEN REDUCTION VERSUS MINIMALLY INVASIVE SURGICAL APPROACHES ON SCREW POSITION IN CANINE SACROILIAC LAG-SCREW FIXATION. Déjardin LM*[1], Marturello DM[1], Guiot LP*[2], Guillou RP*[2], DeCamp CE*[1]. [1]Michigan State University, College of Veterinary Medicine, East Lansing, IL, [2]Ohio State University, College of Veterinary Medicine, Columbus, OH.

Methods: Canine cadaver SILs were stabilized using an ilio-sacral screw applied via either ORIF or MIO techniques ($n = 10$/group). Sacral screw angles in the dorsal and transverse planes as well as pilot screw hole length to sacral width ratio were measured on CT scan multi planar reconstructions then statistically compared ($p < 0.05$).

Discussion and conclusion: This study demonstrates that compared to open approaches, minimally invasive techniques provides more accurate and consistent screw placement within the sacral body. Importantly, with proper surgical techniques, iatrogenic neurological damage can be avoided with both open and minimally invasive surgical approaches. The pilot hole to sacral width ratio, which relates to safe screw fixation, also demonstrates that screw penetration of at least 60% of the sacral width can be achieved regardless of surgical approach. These findings suggest that MIO of SIL is a valid alternative to ORIF.

VALIDATION OF A CONFORMATION SCORE TO PREDICT CRANIAL CRUCIATE LIGAMENT DEFICIENCY IN LABRADORS. Griffon D*[1], Boudrieau R*[2], Tanaka R*[1], Cunningham D[1], Gordon-Evans W*[3], Bruecker K*[4]. [1]Western University of Health Sciecnes, Pomona, CA, [2]Tufts University, North Grafton, MA, [3]Wisconsin Veterinary Referral Center, Milwaukee, WI, [4]Veterinary Medical and Surgical Group, Ventura, CA.

Introduction: Cranial cruciate ligament deficiency (CCLD) is the leading cause of lameness affecting the stifles of large breed dogs. Our long term goal is to identify dogs that are predisposed to this disease and, ultimately, prevent CCLD. We previously developed a CCLD conformation score to differentiate limbs of Labradors with or without CCLD.

Objective: The objective of this project is to evaluate the ability of this scoring system to predict the known status of a limb in large population of Lbradors.

Methods: Limbs of client owned Labradors were classified as 1- normal (sound Labradors over 6 years of age), 2- diseased (CCLD confirmed at surgery), or 3- predisposed (sound contralateral limb in dogs with unilateral CCLD). Radiographs of the pelvic limbs were obtained to calculate a CCLD conformation score using the equation previously published. Scores obtained on right and left limbs were

compared within dogs with a paired t tests. Scores between groups of limbs were compared with a t-test.

Results: Radiographs were obtained on 164 Labradors, including 194 normal limbs, 80 CCLD limbs and 54 predisposed limbs. The mean, standard deviation and 95% confidence intervals for the scores of CCLD limbs (2.59 ± 3.16, [3.88, 1.30]), predisposed (2.04 ± 3.04, [3.49, 0.59]), and normal limbs (-4.35 ± 3.55, [−3.00, −6.59] were determined based on 158 limbs. Scores differed between CCLD limbs and normal Limbs, predisposed limbs and normal limbs, and total diseased limbs (CCLD and predisposed) and normal limbs. No difference was found between right and left limbs within dogs. The sensitivity and specificity of the CCLD conformation score were equal to 72 and 76%, respectively.

Conclusion: The predictive value of the conformation score supports its potential role to detect Labradors at risk for CCLD. Score on 1 limb may be used to predict the risk of CCLD in a dog. These results warrant further evaluation of this score in a longitudinal study of young sound Labradors consequently monitored for CCLD.

THE USE OF BONE WELDING® TECHNOLOGY IN SPINAL SURGERY: AN EXPERIMENTAL STUDY IN SHEEP. Heidenreich DC[1], Langhoff JD[2], Müller A[2], Mayer J[2], Von Rechenberg B*[1]. [1]Musculoskeletal Research Unit (MSRU), Vetsuisse Faculty, University Zurich; University of Veterinary Medicine, Small Animal Clinic for Surgery and Ophthalmology, Vienna, Zürich, Switzerland, [2]SpineWelding AG; Zimmer GmbH, Winterthur, Schlieren, Switzerland.

Introduction: The innovative BoneWelding® Technology is a unique insertion method for bonding resorbable thermoplastic polymer implants such as pins directly to bone. The implantation method employs ultrasonic energy to mold the polymer into the pores of the host bone and forms a strong and uniform bond between implant and bone. The BoneWelding® implantation method gives enhanced stability, reduces operation time and has a potential to avoid migration of the implant. Poly-L/DL-lactide 70/30 consists of 70% L-lactide and 30% D/L-lactide and shows good biocompatibility. Resorbable implants are attractive for spinal surgery, as their degradation renders implant removal. The hypothesis of this study is that BoneWelding® technology is suitable for spinal surgery and even advantageous for ease of application compared to polymer screws.

Methods: 3 implant concepts, a resorbable plating system (1), 2 converging polymer pins (2) and suture anchors (3) were implanted with the aid of ultrasonic energy to the cervical spine. Bioresorbable polylactide implants (PLDLLA 70/30) were inserted ventrally into the third and fourth vertebral body of 6 sheep. Polymer screws were used as controls. Observation period was 2 months and samples were evaluated macroscopically and histologically for polymer molding behavior and host tissue response.

Results: Qualitative and quantitative histomorphometrical evaluation showed excellent anchorage of the implants, new mineralized bone at the implant-bone interface without inflammatory cell reaction.

Discussion and conclusion: This study demonstrated that BoneWelding® technology can successfully be used in spinal surgery for variable concepts. Ultrasound insertion provided stable fixation and was well tolerated by the adjacent vertebral bone, even when pins were positioned in close vicinity to each other. In conclusion, the BoneWelding® technology for spinal surgery offers an attractive alternative to more conventional methods of fixing implants to the vertebral bodies. It is easy to apply, safe for the vertebral structures and biocompatible for the adjacent bone.

A BIOMECHANICAL COMPARISON OF KIRSCHNER-WIRE FIXATION ON FRACTURE STABILITY IN SALTER-HARRIS TYPE I FRACTURES OF THE PROXIMAL HUMERAL PHYSIS IN A CADAVERIC MODEL. Ma J[1], Johnson KA*[1], Walsh WR[2]. [1]University of Sydney, Sydney, Australia, [2]SORL, University of New South Wales, Sydney, Australia.

Introduction: The physis is the weakest component of immature long bones, and physeal fractures constitute about 30% of fractures in growing dogs. Salter Harris type I and II fractures require accurate reduction and adequate stabilization to allow continued longitudinal bone growth, in conjunction with facture healing. Fractures of the proximal humeral physis typically have a Salter Harris type I or II configuration. Conventional internal fixation of these fractures involve the insertion of 2 parallel Kirschner wire, although other methods described include tension band wiring, Rush pinning, and lag screws. However these recommendations are all based on anecdotal evidence. The objective of our study was to biomechanically assess the optimal number (between 1 and 3) of implanted Kirschner wires in a Salter Harris 1 proximal humeral fracture model.

Methods: Salter-Harris I fractures of the proximal physis of the humerus were created in entire cadaveric bones harvested from 6 to 8 month old pigs ($n = 12$) that were obtained from an abattoir. The fractures were reduced and stabilised initially with 3×3.0 mm diameter Kirschner wires inserted normograde from the greater tubercle. Peri-fragmental retro-reflective markers were attached (4 on the epiphysis and 4 on the proximal diaphysis) for motion analysis tracking. Specimens were attached to a servo-hydraulic material testing machine for cyclic loading. A constant axial compression of 20N and a sinusoidal torque of ± 2 Nm at 0.5 Hz for 250 cycles were the loading parameters used. The tests were repeated on the same bones with 2 pins, and then 1 pin, and the results were statistically analysed.

Results: There was a significant difference between the 3 constructs (3, 2 and 1 pin construct fixation), for gross angular displacement ($P < .001$). Three-pin fixation had no effect on toggle compared to 2-pin fixation ($P = .052$) but both 3-pin and 2-pin fixation significantly reduced rotational toggle compared to 1-pin fixation. Construct stiffness was not different between any of the pin groups ($P > .33$).

Discussion and conclusion: In this model, fixation with 1 pin significantly reduced the stability of the fracture site compared to repair with 2 pins and 3 pins. Whether there was increased stabilisation of these fractures with 3 pins compared to fixation with 2 pins was not conclusive in this model.

A CANINE-SPECIFIC ANTI-NERVE GROWTH FACTOR ANTIBODY (NV-01) REDUCES PAIN ASSOCIATED WITH DEGENERATIVE JOINT DISEASE IN DOGS. Knazovicky D, Freire M*, Case B, Jiamachello K, Innes JF, Gearing DP, Lascelles BDX*. Comparative Pain Research Laboratory, Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC.

Introduction: Degenerative joint disease (DJD) is the most common cause of chronic pain in dogs. Non-steroidal anti-inflammatory drugs (NSAIDs) are the only approved class of drugs for DJD pain in dogs. Neutralizing antibodies against Nerve Growth Factor (NGF) are analgesic in rodent models and in humans with DJD. The aim of this pilot study was to evaluate the efficacy of a novel caninised anti-NGF antibody (NV-01) for the treatment of DJD pain in dogs.

Methods: In a placebo-controlled, masked, clinical study, 26 dogs were randomized to receive NV-01 (200 mcg/kg IV) or placebo. In addition to objective accelerometry measures, owners completed validated clinical metrology instruments (Client-Specific Outcome Measures [CSOM], Liverpool Osteoarthritis in Dogs [LOAD] and Canine Brief Pain Inventory [CBPI]) on days 0, 14 and 28. LOAD, CSOM and CBPI subscales (pain severity [PS] and pain interference [PI]) were evaluated within and between groups non-parametrically. Recognized success/failure criteria were applied and success compared between groups using Fisher's exact test.

Results: There were no differences between the groups for age, sex, bodyweight or body condition score. CBPI PS and PI scores did not change in the placebo group, but significantly improved in the NV-01 group (PS: Day 0–14, $P = .006$ and Day 0–28, $P = .02$; PI: Day 0–14, $P = .006$ and Day 0–28, $P = .032$). There were no differences between the groups for CBPI scores. LOAD scores showed similar improvement from Day 0–14 ($P = .002$) and Day 0–28 ($P = .002$) in the NV-01 group. CSOM scores showed a similar pattern of improvement, with a significant difference between the groups at day 14 and day 28 ($P = .009$ and $P = .03$, respectively) and significantly more successes at day 28 ($P = .047$). Objectively measured activity significantly increased in the anti-NGF Ab group ($P = .045$), not in the placebo group ($P = .811$). No side effects were noted.

Discussion and conclusion: These pilot data demonstrate a positive analgesic effect of an anti-NGF antibody in client-owned dogs suffering from chronic DJD pain. The magnitude of the effect was similar to that reported with an NSAID.

Funding source: Nexvet Biopharma Pty Ltd

DOGS WITH CHRONIC, OSTEOARTHRITIS-ASSOCIATED PAIN SHOW WIDESPREAD SOMATOSENSORY SENSITIVITY. Knazovicky D[1], Case B[1], Thomson A[1], Harden LB[2], Lascelles BDX*[3]. [1]Comparative Pain Research Laboratory Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, [2]Center for Comparative Medicine and Translational Research, Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, [3]Center for Pain Research and Innovation, UNC School of Dentistry, Chapel Hill, NC.

Introduction: Chronic pain is a major symptom of osteoarthritis (OA). Our inability to provide analgesic control of such chronic pain has led us to explore mechanisms underlying pain. Quantitative sensory testing (QST) is a promising method assessing the somatosensory system and pathologic changes within that system, called central sensitization (CS). We hypothesized that mechanical and thermal QST would differ between normal dogs and dogs with chronic pain resulting from OA, indicating the presence of CS.

Methods: Mechanical and thermal sensory thresholds obtained in animals with chronic OA-associated pain ($n = 15$) on 2 occasions 7 days apart, were compared with those of age-,sex- and weight- matched normal dogs ($n = 15$). Testing was performed at 3 sites: OA-affected joint (peri-articular sensitivity), cranial tibial muscle (muscle sensitivity) and dorsal metatarsal region (remote sensitivity).

Results: There were no significant differences in thresholds between right and left hind limbs in either group for any modality. QST data were repeatable over time in

control dogs, but in OA dogs, thresholds were significantly lower on Day 7 compared to Day 0. Matched subject comparison (un-paired t-test) of OA and control dogs revealed lower thresholds for OA dogs on all testing sites and both testing days, with more significant differences on the second visit when compared to control dogs.

Discussion and conclusion: Our data indicate that widespread variation in somatosensory processing is present in spontaneous canine OA associated pain. OA dogs might be more sensitive to stress induced analgesia, as we observe differences in thresholds in OA dogs on different visits, but this requires further investigation. Further work should focus on identifying subgroups of dogs with OA pain that have developed CS and on identifying novel treatments of CS.

Funding: Boehringer Ingelheim Animal Health GmbH, Morris Animal Foundation, Comparative Pain Research Laboratory

LONG-TERM FOLLOW-UP OF FELINE PATELLAR FRACTURE CASES. Longley MJ, Langley-Hobbs SJ*. University of Bristol, Bristol, United Kingdom.

Introduction: A report of 52 cases of patellar fracture in 34 cats was published in 2009 (1). All cases had occurred after no or minimal trauma. At that time, 10/34 cats had been noted on follow up to have developed spontaneous fractures in other bones, the commonest sites being pelvis (ischium, acetabulum, ilium), proximal tibia, and lateral humeral condyle. The purpose of this investigation was to obtain follow-up on those original cases and to investigate the incidence of spontaneous fractures and the long-term outcome of cats following patellar fracture.

Methods: All veterinarians were contacted by telephone or email to obtain follow up specifically relating to the incidence of further fractures or other problems in the cohort of cats with historical patellar fracture.

Results: Of the original 34 cases, further follow-up was obtained in 11 cases. Of these, 3 cats were recorded in the original report as having spontaneous fractures in other bones in addition to the fractured patellae. Of these 3 cases, 1 went on to develop additional fractures on further follow-up. Of the remaining 8 cases with no additional fractures originally reported, 7 cats had developed further fractures. One cat, recorded as having persistent deciduous teeth, developed a chronic mandibular abscess. Four cats were euthanased: 1 case due to hip luxation, 1 due to hind-limb weakness and bilateral sciatic neuropathy and 2 due to unrelated causes. The long-term mobility of cats affected by patellar fracture appears to be acceptable though most animals have some degree of intermittent or permanent lameness, with variable degrees of stiffness.

Discussion: Fifty percent of cats (17/34) with patellar fractures went on to fracture other bones. This high number of subsequent fractures is strong evidence of an underlying bone problem in these cats, predisposing to further fatigue fractures. Most of the fractures of other bones were avulsion fractures. Bone is weakest under tension and therefore it is purported that the underlying pathology leading to a weakening of the bone may predispose to this type of fracture. As not all cats were followed up, it is possible that the proportion of cats which go on to develop spontaneous fractures may be higher. It is also possible that the occurrence of additional fractures increased the likelihood of follow-up being obtained. A number of cats (5/34) in the original case series had retained deciduous teeth, which is a very rare problem in cats. Four of the 5 cats with persistent deciduous teeth went on to develop other fractures. Only 1 cat that was originally recorded as having retained teeth was not recorded as developing other fractures, however, this case was subsequently lost to follow-up.

SYSTEMATIC REVIEW OF THE LITERATURE OF THE CANINE MENISCUS: INCIDENCE, RISK FACTORS, DIAGNOSIS AND MANAGEMENT. McCready DJ, Ness MG*. Croft Veterinary Hospital, Cramlington, United Kingdom.

Objectives: To systematically evaluate the evidence reporting the incidence, risk factors, diagnosis and management of meniscal injury in dogs with cranial cruciate ligament (CCL) failure.

Methods: The Cochrane methodology for systematic reviews was used. Five research questions were defined. An electronic database search of PubMed and CAB abstracts was performed during November 2013. Bibliographies of all relevant identified studies were examined for additional manuscripts. Title and abstracts were reviewed for relevance to the defined inclusion criteria. Data were extracted for study participants, study design, intervention, outcome measures and results. Studies were evaluated using an validated instrument for assessing methodological quality. A level of evidence was then assigned to each study.

Results: One hundred and 6 studies were identified. There were no class I or class II studies, 30 class III and 76 class IV studies. Thirty studies were prospective case series, 43 were retrospective case series, 16 were animal research studies and 17 were cadaveric studies. The overall quality of methodology was rated as excellent, good, fair and poor in 0, 4, 67 and 35 studies respectively. The median Quality Index score of the studies reviewed was 14 (range 6-19) out of a possible score of 26.

Discussion: The majority of available evidence were either non-randomised prospective case series, retrospective case series, cadaver or animal research studies which are class III or class IV studies and represent low quality evidence for clinical decision-making. In conclusion, despite numerous publications fulfilling the inclusion criteria, no one study or combination of studies provided high quality evidence to establish the true incidence or risk factors of meniscal injury with CCL failure in the dog, or to support one diagnostic or surgical intervention over another for meniscal injuries at the time of stifle stabilisation for CCL failure. There is currently inadequate evidence to formulate valid clinical protocols or 'standards of care' with regard diagnosing or treating meniscal injury in the CCL-deficient stifle.

EX-VIVO TORSIONAL PROPERTIES OF THE TARGON VET NAIL SYSTEM IN CANINE FEMURS: COMPARISON WITH THE 2.4MM LC-DCP PLATE. Macedo AS[1], Moens NMM*[2], Runciman RJ[2], Gibson TWG*[2], Minto BW[1]. [1]Sao Paulo State University, UNESP, Jaboticabal, Brazil, [2]University of Guelph, Ontario Veterinary College, Guelph, Canada.

Introduction: The Targon® Vet System (TVS) is a new nail system designed for use in the large bones of small dogs and cats: Unlike traditional interlocking nails, the TVS consists of a smaller intramedullary rod locked in place by specifically designed bolts external to the rod. Our objective was to evaluate the torsional properties of TVS in small dog femora and to compare it to the 2.4mm LC-DCP® plate.

Methods: 36 femurs from small dog cadavers were allocated to 3 groups ($n = 12$). Points below the lesser trochanter and above the fabellae were marked and an osteotomy was performed in the middle. Group 1: the bone was fixed with the 2.5 mm TVS with the bolts applied at those locations, leaving a 2 mm gap osteotomy gap. Group 2: The TVS system was also used but the proximal bolt was placed in a location equidistant between the proximal mark and the osteotomy. Group 3: A 7-hole 2.4mm plate was applied to the lateral aspect of the bone. All constructs were tested non-destructively at a rate of 1 deg/sec between a torque of $+/-$ 0.57 Nm for 10 cycles. Cyclic loading was followed by an acute torsion to failure. The last of the 10 cycles was used to measure the deformation under non-destructive load. Stiffness and torque to failure were measured from the final torque-deformation curve.

Results were compared using ANOVA and Tukey post-hoc tests, with "dog" as a random effect and bolt distance, and bone diameter as co-variables. Significance was set at $P < 0.05$.

Results: Torque at yield was $0.81+/-0.18$ and $0.81+/-0.09$ Nm for groups 1 and 2 and $1.74+/-0.46$ Nm for group 3. The stiffness was $0.05+/-0.01$; $0.05+/-0.007$ and $0.14+/-0.015$ Nm/deg for groups 1,2 and 3. Displacement under cyclic loading was $16.6+/-2.5$; $15.6+/-2.1$ and $7.8+/-1.06$ deg respectively. There was no significant difference for any of the parameters between groups 1 and 2. All parameters examined were however significantly different between group 3 and groups 1 and 2. There was no interaction detected between bolt distance and bone diameter for any of the parameters in any of the groups.

Discussion and conclusion: The results show that the TVS system has 1/2 the torsional strength and 1/3 of the stiffness of a 2.4 mm plate in this model. The lack of interaction between bolt distance and stiffness was unexpected and suggest that the stiffness of the system is more a function of the bolt gripping mechanism on the rod rather than the properties of the rod itself. This is also supported by the large displacement observed under cyclic loading and the marks left by the bolts on the rod suggesting slippage of 1 of the 2 bolts. Fracture of the bone was not observed. Whether the system has adequate biomechanical properties to result in bone healing must be tested and confirmed clinically.

3D FSE CUBE AND VIPR-ATR 3T MAGNETIC RESONANCE IMAGING PREDICTS CANINE CRANIAL CRUCIATE LIGAMENT STRUCTURAL PROPERTIES. Muir P*, Racette M, Al saleh H, Waller III KR, Bleedorn JA, McCabe RP, Vanderby Jr R, Brounts SH*, Block WF. University of Wisconsin-Madison, Madison, WI.

Introduction: Magnetic resonance imaging (MRI) may enable assessment of cranial cruciate ligament (CCL) mechanics.

Objective: Our objective was to determine whether MRI measurement of normal CCL volume in an ex-vivo canine model predicts structural properties.

Methods: Ten stifles from 8 normal dogs underwent 3.0 Tesla 3D MRI. CCL volume and normalized median grayscale value were determined using 3D Fast Spin Echo (FSE) Cube and Vastly under-sampled Isotropic PRojection (VIPR) -alternative repetition time (aTR) sequences. Stifles were mechanically tested. CCL structural properties, determined after joint laxity testing, included displacement at yield, yield load, load to failure, and stiffness.

Results: Yield load and load to failure ($R^2 = 0.56$, $P < .01$) were correlated with CCL volume determined by VIPR-aTR. Yield load was correlated with CCL volume determined by 3D FSE Cube ($R^2 = 0.32$, $P < .05$). Structural properties were not related to median grayscale values. Joint laxity and CCL stiffness were not related to MRI parameters, but displacement at yield load was related to CCL volume for both sequences ($R^2 > 0.57$, $P < .005$).

Conclusion: 3D MRI offers a predictive method for estimating canine CCL structural properties. 3D MRI may be useful for monitoring CCL properties in clinical trials.

SURFACE ELECTROMYOGRAPHY, KINETIC AND KINEMATIC GAIT ANALYSIS OF THE HIND LIMB IN HEALTHY TROTTING LABRADOR RETRIEVERS. Ragetly CA*[1], Griffon DJ*[2], Hsu MKI[3], Scotti S[1], Hsiao-Wecksler ET[3]. [1]Clinique vétérinaire EVOLIA, L'Isle Adam, France, [2]Western University, Pomona, CA, [3]University of Illinois, Urbana, IL.

Introduction: Electromyography (EMG) measures electrical signal transmission along muscle fibers and it is used to identify which muscles are active during particular movements. The use of surface EMG to study the activity patterns of hind limb muscles has only been reported sparsely in dogs, exclusively in walking animals, and EMG was never combined with net joint moment or power data. Surface EMG may become an asset to non-invasive biomechanical and neuromuscular research by revealing specific muscular activity during locomotion.

Objective: To 1) characterize EMG activity of major hind limb muscle groups with surface electrodes in healthy Labrador Retrievers during treadmill ambulation, and 2) correlate EMG data with kinetics and kinematics. We hypothesized that activity of the quadriceps muscles, extensor muscles of the stifle joint, would correlate positively with stifle extensor moment. We hypothesized that the activity of the hamstring and gastrocnemius muscles, flexor muscles of the stifle joint, would correlate positively with stifle flexor moment.

Methods: Five clinically normal Labrador Retrievers were recruited. Ground reaction forces, stifle joint angle, net stifle muscle moment and power, and surface EMG activity of the quadriceps, hamstring and gastrocnemius muscle groups were recorded.

Results: The quadriceps was activated for half of the gait cycle, during 69% of the stance phase and 37% of the swing phase. Quadriceps activity was observed when the stifle was extending, but also during flexion of the joint in the weight bearing phase. Muscular activity of the hamstring and gastrocnemius muscles occurred mainly during flexion of the stifle, from the end of swing to mid-stance and early swing. Kinetic, kinematic and EMG data associated well. The use of surface EMG highlighted the co-contraction patterns of the muscles around the stifle joint.

Discussion and conclusion: The gait mechanics of healthy Labrador Retrievers were characterized with kinetics, kinematics and EMG analysis at a trot on a treadmill which may help in the identification of dogs affected by orthopedic or neurological disorders.

EFFECT OF TIBIAL TUBEROSITY ADVANCEMENT ON CRANIAL TIBIAL SUBLUXATION IN THE FELINE CRANIAL CRUCIATE-DEFICIENT STIFLE JOINT: AN IN-VITRO EXPERIMENTAL STUDY. Retournard M[1], Bilmont A[2], Asimus E[2], Autefage A*[2]. [1]Centre Hospitalier Vétérinaire Frégis, Arcueil, France, [2]Ecole Nationale Vétérinaire de Toulouse, Toulouse, France.

Introduction: The effect of Tibial Tuberosity Advancement (TTA) on the cranial cruciate ligament (CrCL)-deficient stifle joint has been validated by ex-vivo studies in the dog but not in the cat. Our objective was to evaluate the effect of TTA on Cranial Tibial Subluxation (CTS) and Tibial Rotation Angle (TRA) in a feline model of CrCL-deficient stifle joint.

Methods: Hind limbs of 10 adult cats were freed of soft tissues except the stifle and talocrural joint capsules. Quadriceps and gastrocnemius muscles were simulated using cables, turnbuckles and a spring. An axial load of 30% body weight was applied. The stifle and hock joint angles were adjusted to 120°. Patellar tendon angle (PTA), CTS and TRA were measured radiographically with the cranial cruciate ligament intact, after CrCL transection, after TTA and after additional advancement of 1 and 2 mm.

Results: CrCL section resulted in a CTS of 8.1 ± 1.5 mm and a TRA of $18.4 \pm .7°$. After TTA, PTA was significantly decreased from $99.1 \pm 1.7°$ to $89.1 \pm 0.7°$; CTS and TRA did not change significantly (7.8 ± 1.0 mm and $15.9 \pm 5.7°$ respectively). Additional advancement of the tibial tuberosity by 2 mm significantly reduced the PTA to $82.9 \pm 0.9°$. A significant decrease of CTS (6.9 ± 1.3 mm) and TRA ($14.7 \pm 3.6°$) was also observed.

Discussion and conclusion: TTA failed to eliminate cranial tibial subluxation in this model. Over advancement of the tibial tuberosity by additional increments of 1 and 2 mm, failed to neutralize cranial tibial subluxation.

TRANSPLANTATION OF AN ARTIFICIAL TISSUE ENGINEERED BONE SUBSTITUTE IN A CRITICAL SIZED FEMORAL DEFECT AFTER IRRADIATION. Rottensteiner UR[1], Bertram UB[1], Lingens LFL[1], Köhn KK[1], Bührer GB[1], Fischer LF[1], Fey TF[3], Greil PG[3], Distel LD[2], Horch REH[1], Arkudas AA[1]. [1]University of Erlangen - Nuremberg, Department of Plastic and Hand Surgery, Erlangen, Germany, [2]University of Erlangen - Nuremberg, Department of Radiation Oncology, Erlangen, Germany, [3]University of Erlangen - Nuremberg, Department of Materials Science and Engineering, Erlangen, Germany.

Introduction: Transplantation of a tissue engineered bone substitute in a critical sized femoral defect (CSFD) was evaluated; X-ray irradiation of the recipient femur served as a reproducible model for decreased vascularization and bone healing.

Methods: One hundred five male adult Lewis rats were used. Custom made titanium cages were filled with a hydroxyapatite (HA) scaffold (Actifuse®) alone or in combination with bone marrow derived mesenchymal stem cells (bmMSC) and bone morphogenetic protein 2 (BMP-2) and placed subcutaneously in 46 healthy donor rats 6 weeks before CSFD surgery. In 23 syngenic recipient rats, the left femur was irradiated 4 weeks prior to CSFD surgery, 23 served as unirradiated controls. At CSFD surgery, a defect of 10 mm length was created in the femoral diaphysis of recipients. The titanium cages were transferred from the donor to the femoral defect in the recipient. Empty titanium cages served as controls in 6 unirradiated and 7 irradiated rats. Rats were sacrificed after 10 days or 12 weeks. Evaluation of bone formation, vascularization, cell survival and immune reaction was done by histology/immunohistochemistry and micro-CT. Gene expression was assessed using RT-PCR and compared to healthy bone tissue.

Results: All empty, unirradiated defects and 2 irradiated, empty defects showed bone ingrowth originating from the femur stumps; none of the defects achieved complete healing. HA scaffold alone failed to induce bone formation and even reduced bone ingrowth from the stumps. The combination of HA scaffold, BMP-2 and bmMSC induced a marked bone formation in both unirradiated and irradiated defects, with significantly more bone generation in unirradiated controls after 12 weeks. Firm connective tissue with occasional bone trabeculae bridging the gap between femur and construct had formed after 12 weeks. No foreign body reaction was observed. Vascularization was significantly decreased 10 days after CSFD in the irradiated group, but did not differ after 12 weeks. Cell survival was higher in the periphery than in the center and lower in irradiated constructs after 10 days, but not after 12 weeks. RT PCR revealed a decrease of osteocalcin and alkaline phosphatase and an increase of osteopontin, Hif1α and TNFα expression in HA/BMP-2/bmMSC constructs after 12 weeks, compared to healthy bone.

Conclusion: The combination of HA scaffold, bmMSC and BMP-2 showed promising results in healing of bone defects in damaged bone, with no apparent adverse effects. The combination of tissue engineering methods and the titanium cage allows for surgical implantation of the newly formed tissue with immediate stability. Further work should focus on improving bony bridging, cell survival and vascularization in the center of the construct.

COEFFICIENT OF VARIATION OF GROUND REACTION FORCE MEASUREMENT IN CATS- PRELIMINARY RESULTS. Schnabl E*, Bockstahler B. Small Animal Surgery, University of Veterinary Medicine Vienna, Vienna, Austria.

Introduction: Biomechanical motion analysis in dogs and horses has been a fundamental aspect of orthopedic research for many decades, however very little is known about feline biomechanics. It was therefore the aim of the study to determine the coefficient of variation (CV) among 3 ground reaction force (GRF) measurements in client owned cats.

Methods: Fifteen client-owned European Shorthair cats with no orthopaedic or neurologic abnormalities were included. Cats were measured walking across a pressure sensitive walkway 3 times during a period of 2–17 weeks. Parameters evaluated were peak vertical force (PFz), vertical impulse (IFz), step length (SL, m) and symmetry index (SI%) of the front- and hind limbs. Coefficient of variation and 95% Confidence Interval (CI) of the PFz and IFz of each limb were determined for all 3 measurements.

Results: The body mass of cats ranged between 4 and 6.6 kg (mean 5.5 ± 1.2 kg SD), and age between 2.6 and 14.9 years (mean 7.2 ± 4.2 years SD). Gait velocity of cats was between 0.39 - 0.83 m/s (mean 0.64 ± 0.09 SD).

Mean values of CV for all 4 legs (LF, RF, LH, RH) of PFz were 3.60 ± 1.37 SD, 3.48 ± 1.51 SD, 3.34 ± 2.25 SD and 3.83 ± 3.29 SD respectively. Mean values of CV for IFz were (LF, RF, LH, RH) 10.30 ± 6.13 SD, 11.76 ± 4.61 SD, 11.45 ± 5.66 SD and 12.35 ± 5.75 SD respectively.

Mean symmetry index (SI) of PFz was $1.29 \pm 0.57\%$ for the front- and $2.86 \pm 1.35\%$ for the hind limbs. Mean symmetry index of the vertical impulse (IFz) was $2.24 \pm 0.73\%$ and $3.20 \pm 1.45\%$ for the front- and hind limbs respectively.

Discussion: We were able to perform all measurements 3 times, without extensive acclimatisation of the cats. Peak vertical force is the most stable parameter of the evaluated GRFs. Our mean PFz was slightly higher than reported previously in cats, which may be related to the variation in gait velocities. Similar to many other quadrupeds, such as dogs, cats exert greater forces on their forelimbs. The reported SI of PFz and IFz are comparable to those of dogs.

Conclusion: The results of this study suggest that gait analysis in cats using pressure sensitive walkways is a promising approach to lameness evaluation in cats. PFz is the most reliable value. This should be considered if PFz and IFz are used in the evaluation of treatment effects.

TIME-DEPENDENT DECREASED MECHANICAL PROPERTIES OF THE CONTRA-LATERAL CRANIAL CRUCIATE LIGAMENT (CRCL) AFTER LIGAMENT REPLACEMENT SURGERY. A SHEEP STUDY. Viateau V[1], Manassero M[1], Mitton D[2], Mignonney V[3], Guerard S[4]. [1]Ecole Nationale Vétérinaire d'Alfort, Maisons Alfort, France, [2]IFFTSAR, Lyon, France, [3]Laboratoire de biomatériaux et polymeres de spécialité, Villetaneuse, France, [4]Institut de Mécanique et d'Ingénierie, Bordeaux, France.

Methods: Fifteen two-year-old, female Pré-Alpes sheep free of degenerative joint disease underwent excision of the left CrCL and subsequent intra-articular joint stabilization with a LARS AC 44^{TM} artificial ligament. Animals were sacrificed 3 (n = 7) or 12 (n = 8) months post operatively. In animals explanted 12 months post operatively, Bone Mineral Density (BMD) was assessed in both limbs, using dual-photon absorptiometry; 10 healthy, unoperated sheep were used for control. Explanted operated and contralateral unoperated joints were submitted to mechanical tests including a kinematic analysis and a tension loading test. Recorded data on controlateral unoperated joints included: (i) internal tibial rotation (ITR) during flexion/extension; (ii) Anterior Tibial Translation (ATT); (iii) Marklof stifness, (iv) Load to failure in tension; (v) Mode of failure; (vii) BMD. Quantitative data were expressed as mean ± standard deviation. Statistical analysis were performed using Graphpad prism^{TM} software.

Discussion and conclusion: Our results show time-dependant decreased structural mechanical properties combined with an increase in BMD (suggestive of increased loading) in the contralateral limb after CrCL replacement in sheep. Further studies are needed to explain these modifications and to evaluate their potential impact on coCrCL rupture in dogs.

EVALUATION OF FEMORAL AND TIBIAL CONFORMATION IN ENGLISH STAFFORDSHIRE BULL TERRIERS WITH AND WITHOUT CONGENITAL MEDIAL PATELLAR LUXATION USING COMPUTED TOMOGRAPHY. Newman M, Voss K*. Faculty of Veterinary Science, University of Sydney, Sydney, Australia.

Introduction: Changes in hind limb conformation suggested to be associated with congenital medial patellar luxation (MPL) in dogs include coxa vara and valga, diminished angle of anteversion, external torsion of the femur, femoral varus, tibial valgus, and internal tibial torsion. Few studies have compared hind limb conformation between dogs of a certain breed affected or unaffected by MPL, and many previous studies have been using conventional radiographs to determine limb conformation, which are subject to positional errors. The aim of this study was to compare hind limb conformation of English Staffordshire Bull Terriers (ESBT) with and without MPL using computed tomography.

Methods: Computed tomography was performed in ESBT over 1 year of age. The control group consisted of ESBT without MPL undergoing anaesthesia for other reasons. Dogs with cranial cruciate ligament rupture were excluded from the study. Following previously described measurements were obtained: Inclination angle, femoral condyle trochanteric angle, proximal, distal and overall anteversion angle (AA), femoral varus angle (FVA), tibial valgus angle (TVA), and tibial torsion angle (TTA). Student's T-test was conducted to compare normal limbs to limbs with MPL, all limbs of dogs with MPL to limbs of the control group, and MPL-affected limbs (normal limbs of unilaterally affected dogs excluded) to the control group. P-values of <0.05 were considered significant.

Results: Five ESBT with grade II or III MPL, and 6 without MPL were included in the study. Two dogs with MPL were only affected unilaterally. Limbs of ESBT with MPL had significantly diminished proximal, distal, and overall AA, and increased FVA compared to limbs of normal ESBT. Omitting the limbs of unilaterally affected dogs, limbs with MPL also had diminished proximal, distal, and overall AA, in addition to decreased TVA. Differences of FVA between groups were not statistically significant when only comparing affected versus unaffected limbs.

Discussion and conclusion: As previously reported in other breeds, ESBT with MPL had higher FVA and increased external torsion of the femur compared to ESBT without MPL. Affected ESBT also had diminished AA, which is in contrast to a previous study where no differences in AA were found between dogs with and without MPL, using MRI. External torsion of the femur in normal ESBT was higher than previously reported for other breeds, which may be the cause of the bow-legged stance of ESBT. In conclusion, ESBT with MPL have skeletal changes at the level of the hip joint, femur and tibia.

KINEMATICS OF A NOVEL CERVICAL FUSION SYSTEM. Zindl CZ[1], Fitzpatrick NF[2], Litsky ASL[3], Allen MJA[4]. [1]The Ohio State University - Department of Veterinary Clinical Sciences, Columbus, OH, [2]Fitzpatrick Referrals, Eashing, United Kingdom, [3]The Ohio State University - The Orthopaedic BioMaterials Laboratory, Columbus, OH, [4]University of Cambridge - Department of Veterinary Medicine, Cambridge, United Kingdom.

Introduction: In dogs with disc-associated cervical spondylomyelopathy (DACSM), distraction of the intervertebral space and fusion is recognized as the preferred surgical treatment technique. In humans, pedicle screw fixation is used for reconstruction of the cervical spine and has been reported to be an effective and reliable approach for anterior cervical fusion, resulting in good mechanical stability when tested in-vitro. The goal of this study was to determine the effects of a combination of a new pedicle screw-rod system with anchored intervertebral traction screw (FITS) on motion in the lower cervical spine. We hypothesized that the new spinal fixation system would effectively eliminate motion at the instrumented C5-C6 articulation.

Methods: Six cadaveric cervico-thoracic spines (C2-T3) were harvested and prepared for mechanical testing. Specimens were mounted on a 4-point bending jig and using axial loads were tested in extension (0-100N), flexion (0-60N) and lateral bending (0-40N). Angular displacements were recorded from optical trackers rigidly secured to C5, C6 and C7. Data were collected from intact spines and after stabilization with the new implant system. Under each loading condition (flexion, extension and lateral bending), angular displacement at C5-C6 and C6-C7 were compared between the constructs (intact vs. instrumented) using a paired Student's t-test at a significance level of $P < .05$.

Results: The results of this study indicate that application of the new spinal fixation system at C5-C6 effectively eliminates motion at this level, irrespective of loading direction. Instrumentation of C5-C6 was also associated with a concomitant modest increase in motion at C6-C7 when tested in extension and flexion, but not in lateral bending.

Discussion and conclusion: The application of the new spinal fixation system results in reproducible and statistically significant increase in cervical stability, as compared with the intact spine. The deployment of an anchored intervertebral spacer permits distraction, thereby restoring the neuroforamen and preventing collapse of the intervertebral space. Although there was evidence of a modest increase in motion at the adjacent level ("domino effect"), this effect was relatively small.The combination of a pedicle screw-rod system and anchored interbody spacer provides an effective solution for surgical stabilization of the canine cervical spine.

RETRIEVAL ANALYSIS OF CANINE CERVICAL TOTAL DISC REPLACEMENT IMPLANTS. Zindl CZ[1], Adamo FPA[2], Da Costa RCC[1], Allen MJA[3]. [1]The Ohio State University - Department of Veterinary Clinical Sciences, Columbus, OH, [2]East Bay Veterinary Specialists, Walnut Creek, CA, [3]University of Cambridge, Department of Veterinary Medicine, Cambridge, United Kingdom.

Introduction: Surgical treatment of disc-associated cervical spondylomyelopathy (DACSM) with decompression and vertebral distraction-fusion is one of several surgical treatment options for this disease, but concerns remain about adjacent level disc pathology. Total disc replacement (TDR) seeks to mimic normal spinal motion. The purpose of this study was to evaluate the histological response to a series of TDR implants used in clinical cases of DACSM.

Methods: Six titanium alloy cervical TDR prostheses were retrieved from 4 dogs. After euthanasia, the cervical spine was explanted, functional spinal units (FSU) fixed in formalin, dehydrated in alcohol under vacuum and embedded in photocurable acrylic resin. Thick sections were prepared in the sagittal plane using a diamond band saw and ground to 150-200μm. Faxitron microradiographs were taken, sections were stained with Stevenel's blue and van Gieson picrofuchsin and evaluated by light microscopy.

Results: Tissues from 2 Doberman Pinschers and 2 mixed breed dogs (3 neutered males, 1 spayed female, 33.7 ± 7.3 kg) were available. At time of surgery, dogs were 8 years (n = 2) or 12 years (n = 2). Implants were retrieved 3 months (n = 2) or 3 years (n = 2) after surgery. Dogs were treated with a 1st-generation TDR with no surface modification (2 dogs) or with a 2nd-generation TDR with an acid etched fixation surface (2 dogs). The articulation was metal-on-metal (3 FSUs) or metal-on-polyethylen (3 FSUs). There was minimal evidence of osseointegration and it was most likely to be seen ventrally and at the caudal endplate. All retrievals showed evidence of lucency around the implant and spaces were filled with fibrous tissue. Osteophytes were evident dorsally and ventrally. Gross and microscopic evaluation of articular surfaces in 1 case revealed an eccentric wear scar on both articular surfaces, with evidence of metallosis but no sign of inflammation within the periprosthetic tissue.

Discussion and conclusion: Microscopic findings show that all TDR implants were not robustly osseo-integrated. When present, bone apposition was greater at the cranial endplate, and at C3, reflecting the fact that more cranial cervical motion units may be less mobile compared to caudal cervical motion units. However, fibrous tissue was present to some extent in all cases, suggesting that post-operative micro- or macro-motion may not be the only factor. Impingement between the articular surfaces and eccentric wear scars indicate that forces exerted during spinal motion were sufficient to overcome the constraint provided design of the articulation. Osteophytes may reflect an attempt to stabilize the level. In conclusion, although clinical results with these implants were good, they were functioning more as mobile distraction devices than as total disc replacements.

Small Animal Soft Tissue

RIGHT HEPATIC DIVISIONAL LOBECTOMY IN DOGS WITH A LARGE HEPATOCELLULAR CARCINOMA COMPRESSING/INVOLVING THE CAUDAL VENA CAVA. Asano K, Seki M, Ishigaki K, Iida G, Kutara K, Teshima K, Yoshida O, Edamura K, Sakai M. Department of Veterinary Medicine, College of Bioresource Sciences, Nihon University, Fujisawa, Japan.

Canine hepatocellular carcinoma (HCC) primarily originates from 1 hepatic lobe and gradually progresses to form a large mass. In dogs with a massive HCC, surgery is the treatment of choice, and the prognosis after successful complete resection is excellent. However, the surgical removal of a right hepatic divisional mass compressing and/or involving the caudal vena cava (CVC) has the potential risk of intraoperative bleeding associated with poor prognosis. We have developed and improved the surgical methodology ("right hepatic divisional lobectomy") for en bloc resection of right hepatic divisional lobes. This pilot clinical study aimed to describe the surgical technique and outcome of right hepatic divisional lobectomy in dogs with a large mass originating from the right hepatic division. Seven dogs with a large hepatic mass were included in this study. In all patients, computed tomography (CT) was performed preoperatively: CT showed that the mass originated from right hepatic divisional lobes, and compressed the surrounding tissues including the major vessels (CVC and main portal vein) and/or to involve the CVC. All patients underwent right hepatic divisional lobectomy for en bloc resection of an enlarged hepatic mass. In 1 patient, en bloc resection including the CVC was accomplished. In the others, the mass resection with the isolation from the CVC was needed. All patients received a postoperative blood transfusion (range: 200–400 mL), although no heavy hemorrhage due to the laceration of the CVC or main hepatic veins was observed. The surgery time was 170.4 ± 38.0 minutes (range: 120–222 minutes). All patients were histopathologically diagnosed as a HCC. Complete resection of HCC was feasible in almost patients. One patient died during the postoperative hospitalization, and the total mortality rate was 14.3%. Our study demonstrated that Pringle maneuver was effective for the ligation and transection of the right branch of portal vein, and right hepatic arteries and ducts at the liver hilus for reducing the hemorrhage. En bloc resection of the mass including the CVC was safely successful for the measurement of cranial caval and femoral venous pressures. Then, reduction of hemorrhage by the isolation of the venous systems could be avoided. Our pilot clinical study described the surgical technique and outcome of the right hepatic divisional lobectomy procedure in dogs with a large HCC compressing/involving the CVC. This technique was suggested to be useful for improving the quality of life and survival time in canine HCC.

OPEN PATCH GRAFTING OF THE RIGHT VENTRICULAR OUTFLOW TRACT USING POLYTETRAFLUOROETHYLENE UNDER CARDIOPULMONARY BYPASS IN THE DOG. Bristow PC, Sargent JS, Luis Fuentes V, Bypass Team RVC, Brockman DJ*. Royal Veterinary College, Hatfield, United Kingdom.

Introduction: Pulmonic stenosis is the most common congenital heart defect in dogs. Severity of stenosis is determined by the trans-stenotic pressure gradient (PG) and can be valvular (most common), supravavular or subvalvular/infundibular. Balloon valvuloplasty (BV) has become the first-line treatment for valvular PS. Surgical intervention is reserved for dogs in which BV is technically impossible or where previous BV attempts have failed. For these patients a right ventricular outflow tract (RVOT) patching technique is most likely to be beneficial. Another indication for this surgery is "Double Chambered Right Ventricle" (DCRV). There are few reports, mostly with very small case numbers and few with long term follow up, for patching of the RVOT. The purpose of this study was to retrospectively report the short and long term outcome of ePTFE patch grafting of the RVOT for the treatment of PS or DCRV.

Methods: Data were collected from the hospital records for all dogs that had undergone RVOT patch grafting with an ePTFE patch under CPB. Echocardiographic images were reviewed and PG and VTI ratios re-measured. Survival data was determined by owner and referring veterinarian contact. Differences in PG and VTI ratio pre-operatively, 48 hours post-operatively and at last follow up were analysed using a paired t-test.

Results: 12 dogs met the inclusion criteria (9 PS and 3 DCRV). Eleven dogs underwent full CPB and 1 partial. Mean body weight was 21.5kg (+/−11.8). Mean total anaesthetic time was 411 minutes, surgical time 272.6 minutes and total CPB time 84.98 minutes. Two intra-operative complications occurred, 1 of which was fatal. Three complications (all fatal) occurred in the first 24 hours post-operatively with a further 3 (all resolved with supportive care) occurring within a week post-operatively. Eight animals survived to discharge. Mean time to last echocardiographic exam was 924 days. Mean PGpre (143 mmHg) was significantly greater than PG48 (32) and PGfinal (26), $P<0.0001$, with a mean percentage PG reduction of 78.35% at long term. Four dogs are still alive (790–2980 days post-operatively). Median survival time for the remainder was 2044 days with cause of death unrelated to cardiac disease in 3, and due to heart failure as a result of tricuspid dysplasia in 1.

Conclusion: ePTFE patch grafting of the RVOT for treatment of severe PS or DCRV in dogs, is a feasible and effective method to reduce the severity of the trans-stenotic PG. The peri-operative mortality rate can be high, but if dogs survive the peri-operative period then a significant, sustained reduction in pressure gradient is achieved with an excellent long term outcome.

OUTCOME OF BIOPROSTHETIC VALVE REPLACEMENT IN NINE DOGS WITH TRICUSPID VALVE DYSPLASIA. Bristow PC, Luis Fuentes V, Bypass Team RVC, Brockman DJ*. Royal Veterinary College, Hatfield, United Kingdom.

Introduction: Tricuspid valve dysplasia (TVD) is an uncommon congenital malformation in small animals, with a spectrum of valvular lesions possible which result in progressive right atrial and ventricular volume overload. Twelve dogs that underwent tricuspid valve replacement under cardiopulmonary bypass (CPB) to treat TVD have been reported. Ten of the dogs survived surgery with 2 dogs euthanised at 10 and 13 months post-operatively because inflammatory pannus caused failure of the bioprosthesis. The authors concluded that replacement of the tricuspid valve was an acceptable therapy for dogs with TVD. The purpose of the study reported here is to describe the short term and long term outcome in a further cohort of dogs.

Methods: Dogs were considered candidates for TV replacement if they had severe TV regurgitation associated with clinical signs of cardiac compromise. The protocols for anaesthesia and CPB used have been reported previously (Orton at al 2001).

Results: 9 dogs of a variety of breeds were presented. Median age was 13 months (range 7–61 months), median weight 26.5 kg (range 9.7–59 kg). Six animals had an episode of CHF prior to surgery and 3 had atrial fibrillation. A variety of clinical signs were present and 8/9 dogs were receiving at least 1 cardiac medication. Median cross clamp time was 65 minutes (range 45-90), and bypass time 98.5 minutes (range 65–120). Eight bovine pericardial valves and 1 porcine aortic valve were used. One intra-operative complication occurred; a tear in the aorta at the cardioplegia cannula site which was repaired. Complications during hospitalisation occurred in 6 dogs, 4 of which were fatal; 1 due to presumed thromboembolic disease, 2 because of delayed sepsis (5 and 7 days after surgery), 1 because of systemic inflammatory disease after bypass (SIRAB), and 1 dog died of fatal intrathoracic haemorrhage 14 days after surgery. The 4 remaining dogs survived a median of 533 days; 2 died due to fibrosis of the valve, 1 due to osteosarcoma and the remaining due to sudden collapse (cause unknown).

Discussion: The short term mortality rate among the dogs in this study is higher than the previous report. The reason for this difference is unknown; our surgical, bypass and anticoagulant technique was based on the protocol previously reported. Based on our results, bioprosthetic valve replacement using this protocol cannot be recommended for dogs with TVR. Until better techniques for controlling the canine coagulation system have been devised, or until less thrombogenic valve materials are developed, canine valve replacement is unlikely to give consistent acceptable results.

THORACIC BITE WOUNDS IN DOGS AND CATS: A RETROSPECTIVE STUDY ABOUT 65 CASES. Cabon Q[1], Deroy C[1], Cachon T*[1], Fau D[1], Viguier E*[1], Goy-Thollot I[2], Carozzo C*[1]. [1]VetAgro Sup, Campus Vétérinaire de Lyon, Service de Chirurgie, Marcy l'Etoile, France, [2]VetAgro Sup, Campus Vétérinaire de Lyon, SIAMU, Marcy l'Etoile, France.

Introduction: Bite wounds represent 10% of traumatic injuries in pets and the thorax is involved in 30%. Initial skin damage may not reflect the degree of deeper lesions. In the thoracic area, bite wounds can be a potentially life-threatening condition. Management of thoracic bite wounds is controversial. The objective of the current study is to report a retrospective series of thoracic bite wounds in dogs and cats and the associated clinical findings, management and outcome.

Methods: A retrospective study (2000–2013) of thoracic bite wounds was conducted. Dogs euthanized at presentation were excluded. Lesions were described by their depth: no wound, superficial, deep or perforating. Thoracic X-rays reports were reviewed. Management was classified as non-surgical, wound exploration or explorative thoracotomy. An owner interview was carried out for long-term follow up. Quantitative data were compared with the Mann-Whitney U test and qualitative data with a Fisher exact test. Values of $P<0.05$ were considered significant.

Results: 65 cases were collected in 62 patients (54 dogs and 8 cats, 6,5 years, 6 Kg). Poodles were over-represented. 22% of patients with a normal respiratory pattern had thoracic X-ray lesions. Respiratory distress was not correlated with mortality nor with surgical intervention. Most of patients had superficial (28) or deep (13) wounds, while 8 had a penetrating wound. Three dogs were presented without a wound. 77% of dogs and 100% of cats had X-ray lesions. 28% of patients underwent exploratory thoracotomy and 17.2% had surgical wound exploration. Thoracic wall discontinuity was the most frequent lesion observed at surgery (46.4%). Thoracotomy was associated with increased hospitalization length bus was not correlated to a higher mortality rate. In our study, mortality rate was 15.4%. No variables were correlated with a higher mortality rate. Long-term outcome was excellent.

Discussion and conclusion: Breathing pattern is suggestive of internal trauma but not reliable as accurate indicator for internal lesions. Every animal suffering from thoracic bite wounds, whatever their respiratory pattern, should have thoracic X-rays. Two of 3 patients in our study without a wound suffered from more than 4 X-Rays lesions. This underlines the potential discrepancy between skin and internal damages and force to consider every thoracic bite wound as a potentially life-threatening condition. Penetrating injury and more than 3 X-ray lesions are indications for thoracotomy. In their absence, wound exploration, extended to thoracotomy if thoracic body wall disruption or air leaking is observed, are recommended in each patient after thoracic bite wounds.

EVALUATION OF A RECOVERY PIGLET MODEL FOR PULMONARY ARTERY GRAFTING. Chanoit G*[1], Bouquiaux AL[2], Upex A[2], Murison PJ[1], Ghorbel M[2], Britchford K[2], Caputo M[2]. [1]School of Veterinary Sciences University of Bristol, Bristol, United Kingdom, [2]Bristol Heart Institute, University of Bristol, Bristol, United Kingdom.

Background and objective: Pulmonic stenosis (PS) is a common congenital heart defect in dogs, which shares pathogenic similarities with pulmonary atresia in infants. A small subset of dogs with PS are treated surgically. The ideal surgical procedure should result in the total replacement of the region of the abnormal pulmonic valve with a biocompatible tissue that will gradually be replaced by native tissue. In infants, the additional challenge is that the new valve needs to grow during the development of the child to avoid the additional cost and morbidity of re-interventions. Such a graft is not yet available and an in vivo model is crucial to test potential biocompatible replacements. In this experimental study, we evaluated a novel recovery piglet model for left pulmonary artery grafting with a view to enable testing of a new generation of tissue-engineered artery grafts.

Methods: Standardised anaesthetic and surgical protocols were used in accordance with Home Office Guidance. Ten 5-week-old piglets (~10 kg) underwent general anaesthesia, insertion of central jugular line and arterial femoral line for monitoring purposes. A left thoracotomy was performed with dissection and clamping of the left pulmonary artery and implantation of an interpolated graft. The graft was made of a multilayer porcine small intestinal submucosa (P-SIS) matrix. All pigs were given systemic heparin (100 UI/kg) before the grafting procedure. A chest drain was placed. Piglets were continuously monitored during a 48-hour recovery period, including records of heart rate, blood pressure, respiratory rate, oxygen saturation and rectal temperature. They were included in the study for 1-6 months.

Results: All piglets survived the surgical procedure. One out of 10 piglets died during the first 2 hours of recovery due to suspected aspiration pneumonia. One piglet showed severe serosanguineous pleural effusion and hypoxia needing multiple chest drain suctions. Four piglets presented a wound infection in the first week after surgery, leading to an additional course of antibiotics. No further deaths or undesired events occurred up to 6 months following surgery. Evaluation of the grafts at the time of termination showed patency and integration of the graft within neighboring structures.

Conclusion: This study validated a piglet model for left pulmonary artery grafting. This model is associated with low mortality and morbidity. Postoperative recovery was rapid with no major complications seen after 24hours post-extubation. Obtaining a successful model for pulmonary artery grafting allows the evaluation of the growth of a paediatric tissue-engineered vascular graft. Further work is needed to assess the quality of the multilayer P-SIS matrix as a vascular graft.

LONG-TERM FOLLOW-UP OF 4 CASES OF TRACHEAL COLLAPSE WITH A NOVEL TRACHEAL STENT. Dhupa S*[1], Clark D[2], Solomon J[3]. [1]California Veterinary Specialists, Carlsbad, CA, [2]University of Pennsylvania, Philadelphia, PA, [3]Infiniti Medical, Menlo Park, CA.

Introduction: Tracheal collapse is a common cause of respiratory distress in dogs. Intraluminal stenting has become an attractive therapy for tracheal collapse, but tracheal diameter is not always uniform making the choice of an appropriately sized stent difficult. This may negatively impact outcomes. A novel, variable diameter stent has been developed specifically for canine anatomy to treat cases with non-uniform tracheal diameters. The purpose of this study was to assess performance, complications, long-term quality of life (QOL) and client satisfaction associated with this stent.

Methods: This was a single centre, retrospective study. Dogs with signs suggestive of tracheal collapse were evaluated with fluoroscopy. Dogs were considered candidates for stent placement if they demonstrated either grade 3 or 4 collapse and were no longer responding satisfactorily to medical management. Tracheal dimensions were determined while intubated and under positive pressure ventilation. Dogs with a 10% or greater difference between the cervical and thoracic tracheal diameters received the novel stent. Stents were chosen to be 10-20% percent oversized throughout their length with respect to tracheal diameter. QOL was subjectively graded on a visual line scale of 0-10 before and after stent placement. Paired t-tests were used to determine changes following stenting. A 2-sided p-value <0.05 was considered significant. Medical record review and client interviews were performed to assess complications and client satisfaction. A questionnaire was used to evaluate several performance related attributes of the stents during placement.

Results: Of the 8 dogs evaluated for stent placement during the 7-month study period, 5 met criteria for the use of the novel stent. Patients were followed for a mean of 19 months (range 17–21). One patient was lost to follow-up. No complications occurred during stent placement and the stent was highly rated with respect to ease and accuracy of placement. None of the stents fractured or migrated and granulation tissue did not develop in any case. All patients were alive at follow up. Improvement in QOL was statistically significant ($P = .03$). Clients were extremely satisfied with the outcome and all stated that they would repeat the procedure for another pet.

Discussion and conclusion: Tracheal collapse is a chronic and progressive disease with no known cure. Treatment strategies therefore focus on improving the quality and/or length of life. This study supports the use of this stent in specific circumstances to provide a durable improvement in QOL. Methods that improve the fit between stent and individual patients may improve outcomes associated with tracheal stenting.

THE OMENTUM: A NEGLECTED SURGEON'S FRIEND? Doom M[1], Cornillie P[1], Simoens P[1], De Rooster H*[2]. [1]Department of Morphology, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium, [2]Department of Medicine and Clinical Biology of Small Animals, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium.

Introduction: Despite increasing evidence of its special features, the omentum has not really found its common application in veterinary surgery. Extra-abdominal transposition in particular seems less integrated, although chronic axillary and inguinal wounds are well known indications for omental flaps. The currently applied lengthening technique in dogs is based on an anatomical study performed in a single cadaver only. The aim of the present study was to expand the current knowledge on the vasculature of the canine omentum, and to refine the existing pedicle flap technique.

Methods: In 10 canine cadavers, intravascular latex injection and subsequent dissections were performed. Through a left intercostal approach, the aorta was injected with an aqueous latex solution, filling the abdominal arteries. The abdomen was opened in the ventral midline to dissect and map the injected arteries. In 10 additional canine cadavers, a novel omental lengthening technique was studied, based on the gained vascular insights. First, the omentum was transposed cranially and caudally to evaluate its operating range. Next, an incision was made through both omental walls, from the right free omental border, parallel to the gastroepiploic arterial arch, transecting 3 to 4 omental arterial branches. The incision was lengthened caudally, thereby creating an omental pedicle supplied by the splenic artery. The operating range of the pedicle was compared to that of the intact omentum. The superficial and deep walls of the pedicle were unfolded, and the increase in pedicle width was recorded.

Results: The branching pattern of the omental vasculature showed little variation amongst the cadavers. A great number of richly anastomosing fine vessels formed a system of communicating arcades that render the typical net-like framework of the omentum. Both the superficial and the deep wall were predominantly supplied each by a left and right marginal omental branch that anastomose near the caudal omental border into a superficial and a deep omental arch (SA, DA), respectively. Both arches were connected through an arterial anastomosis that ran across the caudal omental border. All other anastomoses between the arteries of the superficial and the deep wall were weak and inconsistent. By transposing the intact omentum, the right axilla could be reached in 3 dogs, both axillae in 1 dog and both groins in all cadavers. In all cases, the pedicled omentum reached to and beyond those main regions of interest. The width of the pedicle tip doubled by unfolding the superficial and deep walls of the pedicle.

Conclusion: The novel pedicle flap supplied by the splenic artery seems to better respect the vascular supply of the omental pedicle.

C-REACTIVE PROTEIN, GLUCOSE AND IRON CONCENTRATIONS ARE SIGNIFICANTLY ALTERED IN FEMALE DOGS UNDERGOING OPEN OVARIOHYSTERECTOMY OR OVARIECTOMY. Moldal ER[1], Peeters ME[2], Nødtvedt A[1], Kjelgaard-Hansen M[3], Kirpensteijn J[2]. [1]Department of Companion Animal Clinical Sciences, Faculty of Veterinary Medicine and Biosciences, Norwegian University of Life Sciences, Oslo, Norway, [2]Department of Clinical Sciences of Companion Animals (DCSCA), Faculty of Veterinary Medicine, University of Utrecht, Utrecht, Netherlands, [3]Department of Veterinary Clinical and Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark.

Objective: To investigate the surgical stress response, measured by C-reactive protein (CRP), glucose and iron serum concentrations, to surgical neutering in female

dogs, and to compare the response to ovariohysterectomy (OHE) with the response to ovariectomy (OVE).

Methods: A randomized clinical trial was performed on 42 female dogs, which were divided into 2 groups, 1 of which underwent OHE, the other OVE. Blood samples were collected immediately before surgery (T0), and at 1 (T1), 6 (T6), and 24 (T24) hours after surgery, and serum frozen and stored at -80 degrees C for later analysis. Upon thawing, the serum samples were subjected to measurement of CRP, glucose, and iron concentration.

Results: Blood samples from 6 dogs were discarded and 17 dogs in the OHE group and 19 dogs in the OVE group were included in the statistical analysis. There was a significant increase in glucose concentration at all time points compared with T0, and an increase of CRP at T6 and T24. Iron concentration was significantly decreased at T6 and T24. Differences between the 2 groups could not be detected for any of the 3 variables.

Discussion and conclusion: The study showed that both OHE and OVE induce a significant surgical stress response in female dogs, measured by CRP, glucose and iron. A difference between the surgical techniques could not be detected for any of the variables.

EVALUATION OF THE USE OF THE HARMONIC SCALPEL AND SHARP INCISIONAL TECHNIQUE FOR RESECTION OF SOFT PALATES IN BRACHYCEPHALIC DOGS. Murgia D*[1], Rasotto R[1], Bussadori R[2], Berlato D[1]. [1]Animal Health Trust, Newmarket, United Kingdom, [2]Clinica Veterinaria Gransasso, Milano, Italy.

Introduction: Traditionally, soft palate resection has been performed using sharp incision with a scalpel blade or scissors. In addition, electrosurgical techniques, the use of the carbon dioxide (CO2) laser or the use of harmonic technology offer an alternative method which, could minimize or avoid haemorrhage and swelling, thereby reducing the risk of post-operative upper airway obstruction and respiratory distress.

Objective: The purposes of this prospective study were to describe the use of the harmonic scalpel (Harmonic Focus®, Ethicon, Johnson & Johnson) for resection of elongated soft palate and to compare the difference in surgical time, intra-operative haemorrhage, and histological damage between harmonic scalpel soft palate resection (HSSPR) and traditional sharp incisional soft palate resection with scissors (SISPR).

Methods: Twenty-seven brachycephalic dogs with elongated soft palate were randomly allocated into 2 groups depending on the surgical technique used for staphylectomy. Group HSSPR included dogs had the palate resected by the use of the harmonic scalpel, while Group SISPR included dogs had palate resection using conventional sharp incision with fine Metzenbaum scissors and closure with monofilament absorbable suture in a simple continuous pattern. All dogs received identical anaesthetic drugs to eliminate any variables associated with the anaesthetic protocol. Surgery time, intra-operative haemorrhage and depth of the thermal injury between HSSPR and SISPR were compared with the appropriate non-parametric test for independent samples. Categorical analysis was performed to evaluate the difference in tissue damage and local oedema between the 2 groups.

Results: The distribution of surgery times between HSSPR and SISPR was statistically different (Mann-Whitney U test; $P < .001$) with HSSPR surgical time significantly shorter. There was a significant difference in the intra-operative bleeding between the 2 techniques (Mann-Whitney U test; $P < .001$) with non-existent haemorrhage in the HSSPR. HSSPR was associated with significantly deeper thermal injury and more tissue damage involving the connective tissue (Pearson Chi-square; $P = .001$), muscle (Pearson Chi-square; $P = .038$), salivary gland (Pearson Chi-square; $P < .001$), but surprisingly with less oedema (Pearson Chi-square; $P < .001$).

Discussion and conclusion: This study compared 2 surgical techniques for soft palate resection and showed that resection with harmonic scalpel appears to have some advantages over the incisional and suturing technique in terms of less surgical time and intra-operative haemorrhage. HSSPR was associated with significantly more tissue damage which, however resulted in no post-operative complication.

SUCCESSFUL TRANS-ENDOSCOPIC ESOPHAGEAL MASS ABLATION IN DOGS WITH SPIROCERCA LUPI ASSOCIATED ESOPHAGEAL SARCOMA. Shipov A*, Kelmer G*, Milgram J*, Aroch I, Lavy E, Segev G. The Hebrew University of Jerusalem, Koret School of Vet. Med. Small Animals, Rehovot, Israel.

Introduction: Spirocerca lupi (S. lupi) is a nematode of canidae, most commonly found in tropical and subtropical areas. The adult worm matures in the caudal oesophageal wall, where it promotes formation of a granulomatous nodule which can transform to various types of sarcoma. Resection and anastomosis or partial oesophagectomy are the palliative treatment options, however these procedures are invasive, cost prohibitive, associated with high morbidity and mortality and prolonged hospitalization.

Objective: To evaluate the feasibility, and document complications and outcome of transendoscopic mass ablation.

Methods: Transendoscopic mass removal was performed using either laser or electocauterization. The procedure was considered successful when > 90% of the visible mass was resected. Long term follow up was performed by telephonic interview.

Results: Fifteen dogs were included in the study. The median tumor size, was 5 cm. The procedure was successful in 12/15 of the cases. The median procedure time was 95min. Recovery was uneventful in all dogs. Complications occurred in 4 dogs, 1 of which was euthanized. Median hospitalization time was <1 day. Long term follow up was available in 8 dogs. Median survival time was 202 days (range, 51-691). Four dogs (50%) lived more than 6 months and 3 dogs survived for more that 1 year. Owner satisfaction score was 8/10 and 7/8 clients indicated that they would repeat such a procedure in the future.

Conclusion: Trans-endoscopic esophageal mass ablation is an effective palliative treatment, associated with lower mortality and comparable survival time when compared to open chest surgery.

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THE FIRST CLINICAL APPLICATION OF TISSUE ENGINEERED HEART VALVE REPLACEMENT IN TWO DOGS WITH SEVERE PULMONIC STENOSIS. Takano H[1], Mizuno T[1], Mizuno M[1], Harada K[1], Furukoshi M[1], Takahashi A[1], Nakayama Y[2], Uechi M[1]. [1]JASMINE Veterinary Cardiovascular Medical Centre, Yokohama, Japan, [2]National Cerebral and Cardiovascular Research Center, Osaka, Japan.

Introduction: Pulmonic stenosis is one of the most common congenital heart diseases in dogs. Since severe stenosis may cause sudden death, balloon valvuloplasty or surgical corrections are performed. However, depending on the type and severity of pulmonic stenosis, these existing techniques have several problems including inadequate effect, restenosis and severe pulmonary regurgitation (PR). To resolve these problems, we have developed tissue engineered heart valve using "in-body" tissue architecture technology (Biovalve). This report is the first application of valve replacement using the Biovalve for clinical canine cases.

Case description: Case 1: A 9-month-old male Pomeranian presented with a grade 5 left basilar cardiac murmur. Severe pulmonic valvular stenosis was identified using echocardiography. Pulmonary valve replacement using the Biovalve was performed under cardiopulmonary bypass. Two weeks after surgery, pulmonic flow velocity was reduced from 5.7 to 2.8 m/sec. Case 2: A 1-year-old female White Shepherd Dog presented with ascites and suspected congenital heart disease. Echocardiography identified severe subvalvular and valvular pulmonic stenosis and left-to-right shunting patent ductus arteriossus (PDA). Since no structural abnormality was found in the tricuspid valve, tricuspid regurgitation (TR) secondary to severe right sided pressure overload was suspected to have caused the congestive right heart failure. Pulmonary valve replacement using the Biovalve was performed after ligation of the PDA. One month later, pulmonic flow velocity was reduced from 7.6 to 4.5 m/sec. Although subvalvular stenosis remained to some extent, TR was improved and ascites resolved.

Discusssion and conclusion: In conclusion, pulmonary valve replacement was successfully performed using the Biovalve. Although mild PR was observed after the replacement in both dogs, no significant postoperative complication was observed and short-term outcomes were considered to be satisfactory.

GLUCOSE TRANSPORTER-1 (GLUT-1) EXPRESSION IN CANINE SOFT TISSUE SARCOMAS. Yap FW[1], Abbondati E[2], Helm JR[1], Parkin T[3], Pratschke KM*[1]. [1]Small Animal Hospital, University of Glasgow, Glasgow, United Kingdom, [2]The Royal (Dick) School of Veterinary Studies, University of Edinburgh, Edinburgh, United Kingdom, [3]College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, United Kingdom.

Introduction: Glut-1 expression has been shown to have prognostic value in certain tumours in human medicine. The objective of this study was to examine the association between Glut-1 expression and long term outcome of soft tissue sarcoma (STS) in dogs.

Methods: Tissue samples from previous surgeries were collected from a cohort cases of canine STS. Each tissue sample was processed for H&E, CD31-antibody and Glut-1 antibody stains. The samples were randomised and evaluated by a single pathologist blinded to the previous histopathology reports and patient clinical outcome. Each case was graded according to standard criteria (H&E), assigned an intratumoural microvessel density (IMD) score (micro-vessel count on CD31 samples) and a Glut-1

score (percentage of neoplastic cells stained: <1% = 0, 1–50% = 1 and >50% = 2). Follow-up variables, including local recurrence (LR), survival times (ST) and disease-free interval (DFI) were collected. Logistic regression tests were used to assess the relationship between each stain (H&E, CD31 and GLUT-1) and whether the grade/score of the stains were associated with LR and patient survival.

Results: Thirty six cases were included. The median follow-up time was 522 days (range 115–1957 days). Ten cases had local recurrence (28%); 6 cases developed regional/distant metastasis (17%) at follow-up. Twelve dogs died during the study period with a median ST of 228 days. Nine of these dogs (75%) died or were euthanased because of tumour related reasons. There were 14 grade 1, 18 grade 2 and 4 grade 3 tumours. The mean IMD score for grade 1 tumours was 52, for grade 2 tumours was 74 and for grade 3 tumours was 99. Twenty 5 of the Glut-1 samples scored 1 and 4 samples were scored 2. No sample was scored 0 and 7 samples had inadequate staining. Using logistic regression tests, tumour grade was significantly associated with LR (P = .017, OR = 6.3), and LR (P = .006, OR = 17.3) and metastasis (P = .01, OR = 32.1) were significantly associated with death. Glut-1 and IMD scores were not associated with either local recurrence (P = .30 and P = .43 respectively) or death (P = .30 and P = .29 respectively).

Conclusion: In this study, a high number of the patients developed LR and the mortality rate as a result of a STS was higher than previously reported. STS grade was significantly associated with LR. LR and regional/distant metastasis were significantly associated with death. Despite the previously reported prognostic value of Glut-1 in several neoplastic conditions in people, Glut-1 expression was not associated with local recurrence or death in canine STS although there was a trend for improved survival with a lower Glut-1 score.

Small Animal Poster Presentation

OUTCOME OF PERCUTANEOUS TRANSVENOUS COIL EMBOLIZATION FOR TREATMENT OF SINGLE EXTRAHEPATIC PORTOSYSTEMIC SHUNT IN DOGS. Asano K, Ishigaki K, Seki M, Teshima K, Kutara K, Ishikawa C, Yoshida O, Edamura K, Sakai M. Department of Veterinary Medicine, College of Bioresource Sciences, Nihon University, Fujisawa, Japan.

We hypothesized that PTCE would be an alternative treatment for canine extrahepatic PSS. The purpose of this study was to describe the procedure and outcome of PTCE in dogs with single extrahepatic PSS. The medical records of dogs with an extrahepatic PSS treated by PTCE between 2004 and 2013 were reviewed. The patients were definitively diagnosed by using computed tomography (CT). A balloon multipurpose catheter was percutaneously inserted via the jugular vein into the shunt vessel, and transvenous portography and portal pressure measurement were performed during the balloon inflation. For attenuation of the shunt vessel, 1 or more embolization coils were implanted via the catheter. Twenty dogs were included in this study. The age and body weight were 3.4 ± 2.5 years old and 4.56 ± 1.96 kg, respectively. CT angiography revealed that 10 patients had a left gastric–phrenic shunt, 7 had a left gastric–azygos shunt, 1 had a right gastric–caval shunt, 1 had a left gastric–caval shunt, and 1 had a splenic–caval shunt. The portal pressures before and during the balloon occlusion were 4.6 ± 2.0 and 9.8 ± 3.7 mmHg, respectively. Portal pressure during balloon occlusion was 2.5 times higher than that before balloon occlusion. The numbers and diameter of implanted coils were up to 5 coils and less than 12 mm, respectively. Before the PTCE, the fasting and postprandial SBAs were 89.5 ± 71.4 and 206.5 ± 121.6 μmol/L, respectively, and markedly decreased after the PTCE (fasting, 7.8 ± 10.6 μmol/L; postprandial, 20.9 ± 26.6 μmol/L). The mean irradiation and operation times were 8.09 and 44.1 minutes, respectively. The mortality rate was 0%, with no intraoperative complications. AC placement was performed after the PTCE in 2 cases. In the residual 18 cases, no clinical signs were observed that could not be managed with medical and dietary interventions. In conclusion, our study suggests that PTCE is an alternative to conventional surgical procedures for single extrahepatic PSS in dogs, although the case selection based on the CT findings are required.

REDUCTION OF SURGICAL COMPLICATIONS IN DOGS AND CATS BY THE USE OF A SURGICAL SAFETY CHECKLIST. Bergström AB*, Dimopoulou MD, Eldh ME. University Animal Hospital, Uppsala, Sweden.

Introduction: Although surgery is performed in order to treat, palliate or prevent disease, postoperative complications cause morbidity and mortality in both human and companion animal surgery. In a major study coordinated by the World Health Organization (WHO), the use of a checklist reduced postoperative morbidity and mortality in a global human population. No corresponding evidence is available in the setting of small animal surgery.

The objective in this study was to examine whether the use of a surgical checklist (SC) could reduce the incidence of complications following small animal surgery.

Methods: Dogs and cats undergoing orthopaedic and soft tissue surgical procedures at a University Animal Hospital were prospectively enrolled in the study. In the pre-intervention period data was collected from 300 consecutive cases with no surgical checklist (NSC group). After this baseline registration the SC was introduced and data was collected from 220 consecutive cases (SC group). The checklist was adapted from the WHO surgical checklist and consisted of 3 different time points; before induction of anaesthesia (sign in), before surgical incision (time out) and before recovery (sign out). In-hospital outcome data were prospectively recorded, and complications within 6 weeks were recorded by reviewing patient records and by telephone interviews with owners. The severity of each recorded complication was graded as minor, moderate or severe.

Statistical analysis: Fischer's exact test and Kendall's tau b test were used to evaluate the results statistically. P-values <0,05 were considered significant.

Results: In total 520 animals were included in the study. Complications occurred in 52 (17.3%) patients in the NSC group, and in 15 (6.8%) in the SC group. The difference was significant (P = 0.0003). Mortality was 1.3% in the NSC group and 0.5% in SC group (P = 0.4). The severity of complications decreased with a SC (P = 0.0005). Also a significant difference in complication rate between the NCS and SC groups regarding infection (P = 0.005) and wound healing (P = 0.037) was found.

Discussion: The occurrence of complications was significantly decreased after introduction of a surgical checklist. Also the severity of complications decreased when a checklist was used. The mortality was low in both groups and it may be that larger groups are required to show if mortality decreases with the use of a checklist.

Conclusion: All animal hospitals should consider using a surgical checklist.

URETHRAL INTUSSUSCEPTION FOLLOWING TRAUMATIC CATHETERIZATION IN A MALE CAT. Broux O[1], Vangrinsven E[2], Etienne AL[3], Billen F[2], Hamaide A*[1]. [1]Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Division of Small Animal Surgery, University of Liège, Liège, Belgium, [2]Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Division of Small Animal Internal Medicine, University of Liège, Liège, Belgium, [3]Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Division of Diagnostic Imaging, University of Liège, Liège, Belgium.

Introduction: In cats, differential diagnoses for urethral obstruction include urolithiasis, idiopathic diseases (plug +/− spasm), neoplasia, urethral stricture, anatomic malformations and foreign bodies. Urethral injuries may result from pelvic fractures, vehicular trauma, urethral calculi, gunshot trauma, bite wounds or urethral catheterization.

Case description: A 8-year-old 4.2-kg castrated male European shorthair cat was referred for lower urinary tract obstruction. The cat had presented multiple episodes of signs of feline lower urinary tract diseases within the past 2 years. Before referral, the cat was presented to the primary care veterinarian for anuria. Urinalysis revealed struvite crystalluria and the presence of Escherichia coli urinary tract infection. The cat was catheterized and referred for further investigation. During physical examination, a urethral mass was identified per rectal palpation and confirmed on retrograde cysto-urethrography caudal to a focal and ampullar dilation of the pelvic urethra. Surgical approach via a perineal urethrostomy was planned in order to relieve the obstruction and resect the suspected mass. Once the localization of the suspected urethral mass was identified, intussusception of the urethra with a complete avulsion of the penile part of the urethra and partial rupture of the urethra at the site of intussusception could be visualized. After removal of the caudal part of the urethra and penis, the perineal urethrostomy was performed. Following recovery from anesthesia, the cat had normal urination. Three weeks after surgery, the owners reported normal urination with no sign of stranguria, hematuria or dysuria.

Discussion and conclusion: This is the first report of urethral intussusception following traumatic catheterization in a cat. Urethral intussusception can create a mass effect on abdominal ultrasonography and retrograde cysto-urethrography. This should be taken into account in the differential diagnoses of a urethral mass.

ARTHROSCOPIC-GUIDED CARPAL FRACTURE TREATMENT IN 4 DOGS. Cabon Q, Ferrand FX, Viguier E*, Fau D, Carozzo C*, Cachon T*. VetAgro Sup, Campus Vétérinaire de Lyon, Service de Chirurgie, Marcy l'Etoile, France.

Introduction: Traumatic injuries are the most common cause of carpal lesions and consist of fractures, luxations and ligament tears. Some carpal bone fractures may be best treated by surgical reduction and stabilization. Although carpal arthroscopy has been described in humans and horses, it has only been described in dogs 10 years ago, in a paper reporting 9 canine cadavers and 5 clinical cases. Video-assisted orthopedic treatment has been described in the canine shoulder, elbow and sacro-iliac joint. To our knowledge, video-assisted fracture management of carpal bone fractures has not been previously reported in dogs. The goal of this paper is to describe the arthroscopic evaluation and the video-assisted surgical treatment of 4 cases of carpal bone fracture.

Case description: Four dogs (a 6-year-old female Labrador Retriever, weighing 27 Kg; a 1,5-year-old neutered female Leonberger, weighing 42 Kg; a 6-month-old

male Leonberg, weighing 57 Kg; a 6-month-old male Dachshund, weighing 7 Kg) were presented with a thoracic limb lameness. Orthopedic examination, carpal X-rays and computed tomography in 2 cases allowed a diagnosis of articular fracture in the carpus. The distal radial epiphysis was affected in 2 dogs, the accessory carpal bone in 1 dog and the radial carpal bone in 1 patient.

Results: Carpal arthroscopy was performed in these 4 dogs with a 2,7 mm 30° oblique arthroscope, via a dorsomedial or dorsolateral camera portal. Arthroscopy allowed evaluation of all the articular structures. The fracture site was visualized in all 4 dogs, as well as cartilaginous lesions or ligament tears. In 2 cases, a bony fragment was removed under arthroscopic visualization. In 2 other cases, fracture reduction was performed assisted with arthroscopy, with pins or screws. No any intra-operative complication was noticed. Postoperative X-rays revealed good implant position and correct fracture reduction in the 2 latter dogs. Postoperative immobilization with splinted bandage was maintained for 2 to 4 weeks. Functional outcome was deemed good in all 4 dogs. Video-assisted implant removal was performed in 2 patients because of mild pain upon implant palpation or implant loosening.

Discussion and conclusion: Arthroscopic-guided fracture management is very feasible in the canine carpus. It allows precise fracture reduction with a minimally invasive approach, and evaluation of potential concomitant lesions. It is not associated with any intra-operative complication in our cases. This technique seems to be easier in larger dogs. Minimally invasive fracture stabilization may be associated with faster bone healing compared to traditional open approaches and can be considered to articular fracture of other joints.

ACCESSORY LIVER LOBE IN A CAT. Carrillo JD[1], Martinez M[1], Soler M[2], Buendia AJ[3], Gomez S[3], Agut A[2]. [1]Veterinary Teaching Hospital. Universtiy of Murcia, Murcia, Spain, [2]Department of Animal Medicine and Surgery. University of Murcia, Murcia, Spain, [3]Department of Anatomy and Pathology. University of Murcia, Murcia, Spain.

Introduction: Accessory liver lobe (ALL) is an uncommon anatomical anomaly associated with an autosomal recessive gene, which has been reported in people, pigs, dogs, camels, fowl and rats. To the author's knowledge, this is the first description of ALL in a cat.

Case description: A 5 year old male cat was referred for assessment of an increase of biochemical liver profile without clinical signs. Abdominal ultrasound (US) revealed a mass in the cranial abdomen with a similar appearance to the liver and slightly hypoechoic compared to this. The mass was attached to 1 hepatic lobe by a vascular pedicle confirmed by colour Doppler. Computed tomography (CT) was performed to characterize the hepatic mass and for surgical planning. CT findings were compatible with benign neoplasia and focal nodular hyperplasia in an accessory liver lobe. At laparotomy, a pedunculated mass was located on the right side of the abdomen, associated with the right medial liver lobe. Resection of the pedunculated mass was performed and the mass was sumitted for histopathological analysis. Histopathological findings were consistent with normal liver tissue. The cat recovered uneventfully with normal liver function 15 days after the surgery.

Discussion: ALL is an extremely rare congenital abnormality. The aetiology could be explained as an error in the formation of the endodermal caudal foregut in the third gestational week. The most commonly reported liver lobe affected is the right medial lobe, as in this case. There are 2 types: an accessory lobe joined to normal hepatic tissue, and a lobe that is completely separate, also called a true ectopic lobe. In this case, the cat had an accessory pedunculated lobe joined to normal hepatic tissue. ALL is difficult to diagnosed before surgery. Most cases of ALL are asymptomatic. In this case, the cat only presented due to an increase in biochemical liver profile. In patients with a pedunculated ALL, the most serious complication is torsion of the pedicle. The presumptive diagnosis is based on CT, magnetic resonance imaging (MRI) and US findings of the mass. However, to reach a definitive diagnosis, histopathological examination is necessary to demonstrate normal tissue liver parenchyma. Surgical treatment is only needed if the patient is diagnosed with a pedunculated ALL or has clinical signs or complications. In this case, resection of the ALL was performed due to the abnormalities in the biochemical liver profile and presence of a pedunculated mass .

Conclusion: When a mass is present in the cranial abdomen close to the liver with an ultrasonographic or CT appearance similar to normal liver, ALL should be included as a differential diagnosis.

TOTAL PROSTATECTOMY FOR PROSTATIC CARCINOMA IN TWO DOGS. Collivignarelli F[1], Buracco P*[2]. [1]Clinica Veterinaria Roma Sud, Rome, Italy, [2]Department of Veterinary Science, School of Veterinary Medicine, Università degli Studi di Torino, Turin, Italy.

Introduction: Total prostatectomy for prostatic tumors may be followed by many complications, including urinary incontinence, necrosis of the bladder neck, and urethra stricture.

Methods: Two dogs affected by prostatic carcinoma had total prostatectomy without urinary incontinence as a long-term complication. In 1 dog the tumor was an incidental finding during an ultrasound abdominal examination performed as prevention for splenic hemangiosarcoma,in the other dog the presenting sign was haematuria. Both dogs had no urinary incontinence before surgery. After full tumor staging consisting of blood work, cardiologic examination, ultrasound guide FNAB of the prostate and cytology, and total body TC,a total prostatectomy was performed through a caudal ventral midline celiotomy and bilateral pubic osteotomy to increase exposure. A urinary catheter was aseptically placed in the urethra during all the procedure. The bladder was retracted cranially, and the deferent ducts ligated and transected. The neurovascular supply to the bladder was preserved as much as possible. The urinary catheter was withdrawn up to the bladder neck to allow transection cranial to the prostate. The urethra was then transected caudal to the prostate.Stay sutures were placed to prevent rotation of the remaining urethra, and the catheter was advanced across the defectinto the bladder. The urethra was anastomosed with simpleinterrupted sutures using a 4-0 monofilament absorbable suture material. A Foley urinary catheter was maintained postoperatively for 7 days..

Results: There were no major intraoperative complications and surgical time was 120 and 140 minutes, respectively. Post-operative complications included prepubic herniation in 1 dog that was repaired with a polypropylene mesh. No urinary incontinence was seen both in the short and long-term follow-up. Histopatology reported prostatic carcinoma with clean excision margins. In 1 dog a MR of the spine was performed after 8 months because of a suspicion of aspinal disease. At the moment the 2 dogs are alive and disease free after 1120 and 912 days, respectively, being also clinicallycontinent

Conclusion: Total prostatectomy is a potential choice in case of prostatic carcinoma in selected patients, i.e.when the tumor is well confined (T1, T2and N0). Urinary incontinence may not be a concern in these cases.

TISSUE EXPANSION TO FACILITATE PRIMARY CLOSURE AFTER SURGICAL EXCISION OF A LIMB SARCOMA. De Lorenzi M, Vezzoni L. Clinica Veterinaria Vezzoni, Cremona, Italy.

Introduction: Soft tissue sarcomas (STS) represent 15% of all cutaneous and subcutaneous tumours in dogs. The most common treatment is wide surgical excision, but this can be difficult for tumours on the distal extremities. In this case a novel device (soft tissue expander (STE): Oxtex Ltd, 25mm diameter, 14 day expansion profile) was trialled. This device is made of a hydrogel coated with silicone. The hydrogel absorbs water from surrounding tissue and once placed subcutaneously will expand unaided.

Case description: A dog presented with a 1.5 cm STS and surgical excision was deemed most suitable . Two STEs that expand to 20 mm over 14 days were implanted subcutaneously to expand skin adjacent to the surgical site. The STE's expanded as expected to 20mm. The STEs were removed and the tumour excised with margins. The expanded skin was undermined, elevated, converted to an advancement flap and used to perform primary closure.

Results: The skin produced was of macroscopically good quality and appeared to have a good blood supply. Sufficient skin was produced to close the defect via primary closure. The incision healed well and sutures were removed 14 days post reconstruction surgery. A section of the expanded skin and STS were sent to a pathologist for evaluation. There were no neoplastic cells in the lateral margins indicating complete removal. The expanded skin had increased fibrous connective tissue. The pathologist thought this was in response to the underlying STE.

Discussion: Due to the limited amount of skin, primary closure was not possible without the use of a skin graft or flap. The use of STE at the lateral surgical margin provided the additional skin for primary closure. The skin adapted to the fast expansion of 14 days by stretching and laying down fibrous connective tissue to support it. An increase in mitotic rate is usual when skin is stretched over a longer period of time, and is able to increase celluar turnover. There was no clinical significance of the rapid expansion as the skin was viable and had a good blood supply. The advantage of skin expansion comapred to grafts and rotational flaps are: no need to sacrifice a donor site; the expanded skin already has an established blood supply; expanded skin has the advantage of being of the same texture and colour, giving a superior cosmetic result; and grafts are technically challenging and require increased surgical time and experience. The STE was simple to implant, well tolerated, cosmetically pleasing and no complications were encountered.

EARLY ORTHOPAEDIC SYMPTOMS IN A DOG WITH SYSTEMIC ASPERGILLOSIS. Del Magno S, Gruarin M, Foglia A, Agnoli C, Dondi F, Pisoni L. Department of Veterinary Medical Sciences, University of Bologna, Ozzano dell'Emilia, Italy.

Introduction Systemic aspergillosis is a rare disease in dogs. The unusual orthopaedic presentation in this case report could be helpful in a timely diagnosis of the pathology.

Case description: A female, 1.5 year old, mixed-breed dog, was presented for lameness in the left hindlimb. A periosteal proliferation was present on radiographs

on the left ileal wing and gluteal enthesitis was suspected. After therapy with NSAID the clinical condition worsened with generalized enlargement of the lymph nodes, azotemia and pyelonephritis. Fungal hyphae were detected in the urine and in the lymph nodes. MRI of the pelvis reveals a severe lesion involving muscle and the bone of the left ileal wing, resulting in osteolysis. Surgical biopsy demonstrated a mycotic myositis and osteomyelitis. Culture from urine and lymph nodes were indicative of infection by Aspergillus spp, group Aspergillus terreus. The antymycogram showed sensibility to itraconazole, voriconazole and amphotericin B. Itraconazole (10 mg/kg 24q) was started and the clinical situation improved. After 1 month the dog had evidence of discospondylitis of L1-L2 and a worsening of the dilatation of the renal pelvis and of the ureters. The dosage of the itraconazole was elevated to 7 mg/kg 12q. After 16 months the dog was euthanized because of severe osteomyelitis of the left femur. Necropsy confirmed the mycotic osteomyelitis of the left ileal wing and of the femur, discospondylitits and pyelonephritis.

Discussion: Systemic mycosis usually are promoted by immunosuppression and the route of entrance for Aspergillus are believed to be either pulmonary or gastroenteric. In the case reported the dog did not have any demonstrated predisposing factor to immunosuppression. A primary local infection of the iliac wing is not probable because no surgery or wound was detected. Systemic infection by Aspergillus has major incidence in young female German Shepherd dogs and the dog of the present case was may have been related to this breed. MRI was performed because in humans it is considered one of the best advanced diagnostic imaging techniques at detecting the soft tissue involvement in mycotic osteomyelitis. The surgical curettage of mycotic osteomyelitis was not performed because of the generalised nature of the infection, and only a biopsy was performed surgically in the iliac region. The sensibility shown in vitro by the fungus to itraconazole, was not sufficient in vivo, even at high dosage, to eliminate the infection. Other drugs like voriconzole were not used because of the relatively high cost, while amphotericin B was considered risky in such an azotemic patient. Nevertheless the survival of the dog was of 16 months from diagnosis and can be considered satisfactory in comparison to the outcome reported in literature.

USE OF NASAL STENTS FOR A MUZZLE SALVAGE PROCEDURE FOLLOWING A FACIAL DEVASTATING GUNSHOT INJURY IN A DOG. Deneuche A*, Di Virgilio F, Centre Hospitalier Vétérinaire, Marcq en Baroeul, France.

There are few reports in the veterinary literature of muzzle salvage procedures after gunshot injuries in dogs. The purpose of this clinical report is to describe the use of nasal stents for the reconstruction of a complex gunshot injury of the rostral aspect of the muzzle of a dog.

A dog was admitted for a devastating facial gunshot injury. The CT scan revealed a degree of comminution precluding a conventional bone reconstruction. Nasal stents were used to support the nose shape and the nostril patency. Two Redon drains CH18 were used as nasal stents and inserted in the nasal cavities in the nasal ventral meatus. The stents were connected by a cerclage wire bridge. To gain more rigidity, the stents were filled with pin wires, removed after 8 days. The soft tissues were apposed with sutures. The fragments of incisive bone were apposed closest to their anatomical position and the mucoperiosteum and the gingival strips were apposed. Finally the remnants of lips were sutured together to cover the lateral aspect of the buccal cavity and the remnants of nostrils were joined around the nasal stents, letting 2 tubes hanging a short way out of the dog's nose. An oesophagostomy feeding tube was set in place. Four days later a debridement of necrotic tissues was necessary. A labial advancement flap was used to bridge the loss of labial substance 1 week after the trauma. The dog removed accidentally the nasal stents 24 days after the first surgery. It was decided not to replace them. The nasal aperture fused in a few days into 1 single nasal opening after necrosis of the nasal septum. The esophageal feeding tube was removed. The dog recovered a normal life. Functional and aesthetic result was accepted as satisfactory by the owner. The challenge was to allow our patient to return quickly to normal functions and to optimize the aesthetic result. The muzzle amputation was an alternative we did not consider and we choose a reconstructive management. The CT scan showed that the nasomaxillary buttress was severely disturbed in our patient. Considering the degree of comminution of the fracture and the severity of the soft tissue lesions, the nasal stents were an excellent option to support the maxillofacial skeleton and to permit the reconstruction of the muzzle. The dog removed the nasal stents prematurely. We recommend to let them in place for nostril reconstruction a much longer time, especially in case of nasal septum necrosis which predispose to collapse of the nasal cavities.

PULMONARY LOBECTOMY USING THE LIGASURE® DEVICE IN A MINIATURE DOG: A FIRST REPORT. Domínguez JM, Morgaz JM, Fernández-Sarmiento A, Navarrete RG, Muñoz P, Gómez- Villamandos R, Funes FJ, Quirós S, Granados MM. Animal Medicine and Surgery Department, University of Cordoba, Cordoba, Spain.

Introduction: Pulmonary lobectomy is partial or complete excision of a lung lobe for lung disease or injury.

Case description: This case report describes the use of an computer assisted electrothermal bipolar tissue sealing system (LigaSureTM) for pulmonary lobectomy in a 6 years old, female Pinscher, weighing 2 kg, with lung laceration caused by a bite wound. Pulmonary lobectomy was performed with a 5mm LigasureTM forceps. Sealing capacity of this system on bronchi, vessels and lung tissue were evaluated in this patient.

Results and discussion: Pulmonary lobectomy performed with LigasureTM has only been previously described in human pediatric medicine. Thermosealing induced with LigasureTM demonstrated effectiveness for this surgical technique in infants and children. Therefore it was decided to use this technique as the patient to be treated had a similar size to a newborn infant. In this dog, LigaSureTM exhibited an effective and safe sealing capacity on bronchi, vessels and lung tissue for pulmonary lobectomy. Minimal tissue charring, sticking and thermal spread to the tissues surrounding the sealing line were detected. Surgical time and postoperative recovery time were similar to surgical stapling, although this vessel sealing system produced a natural seal containing only the patient's own collagen without foreign material.

Conclusion: To the authoŕs knowledge, this is the first reported case of use the LigasureTM system for pulmonary lobectomy as a safe, simple, rapid, and effective procedure in a miniature dog breed. More cases would be required to confirm the efficacy of this technique and to validate it as an alternative to the use of surgical staples.

EVALUATION OF IDIOPATHIC NON-EROSIVE IMMUNE-MEDIATED POLYARTHRITIS TREATMENT WITH ADIPOSE-DERIVED STEM CELLS IN A DOG. Domínguez JM[1], Fernández-Sarmiento JA[1], Muñoz JR[2], Martínez AJ[3], Granados MM[1], Morgaz J[1], Navarrete R[1], Carrillo JM[4], Cugat R[5]. [1]Animal Medicine and Surgery Department, University of Cordoba, Cordoba, Spain, [2]Maimonides Institute for Biomedical Research, Cordoba, Spain, [3]Anatomy and Comparative Anatomy Pathological Department, University of Cordoba, Cordoba, Spain, [4]Animal Medicine and Surgery Department, University of CEU-Cardenal Herrera, Valencia, Spain, [5]Orthopedic Surgery and Traumatology Service, Quirón Hospital, Barcelona, Spain.

Case description: A 7 year old, male, Bobtail breed crossing dog was evaluated for progressive lameness. The animal was presented with lethargy, muscle atrophy and weight loss. On palpation there was limb stiffness and arthralgia in both elbows and hips. Joints were effused and warm. Body temperature, hematology and blood biochemistry showed no abnormalities. Leishmania and ehrlichia tests results were negative. Synovial fluid of affected joints was cloudy, viscosity was low and cellularity (particularly neutrophils) were increased in number. Culture of synovial fluid was negative for bacterial growth. No signs of erosive arthropathy or neoplasia were observed on radiographs. Idiopathic nonerosive immune-mediated polyarthritis (INEIMP) was diagnosed. Treatment proposed for INEIMP was the intra-articular injection of adipose-derived stem cells (ADSC) into the clinically affected joints. The body weight, joint mobility (goniometry), muscle atrophy (thigh muscle circumference), visual analog scale (VAS), veterinary assessment of lameness using video recording, force plate analysis of the peak vertical reaction force (PVF) and vertical impulse (VI) were evaluated and a standardized questionnaire to evaluate functional capacity of the dog was answered by the owner. The patient was valuated before treatment, (pre-treatment examination status, PTE) and at 1, 3, 6, 9, 12 months after treatment.

Results: Patient body weight at baseline was 41 kg. Body weight was conserved at 1, 3, 6, 9, 12 months after treatment (mean 41.75 ± 2.51 kg). Regarding the PTE, the patient showed an improvement in functional capacity assessment at 1 month post-injection. This improvement was noticeably maintained at 3, 6 and 9 months after treatment. At PTE elbow and hip joint manipulation was painful. At 3, 6 and 9 months the patient was not painful on passive joint mobilisation, and joint range of motion improved with mean values returning close to normal. Before ADSC injection the dog showed moderate muscle atrophy. Muscle atrophy was improved at 6 months post treatment. VAS assigned by the owner at PTE was 51, improving to 29 at 1 month, 20 at 3 months and 18 at 9 months, however VAS value was 27 at 12 months. Lameness assessment showed a lower degree of lameness at 1 month and was the dog was not limping from month 3 to month 9. Ground reaction forces, PVF and VI, improved at 1, 3, 6 and 9 months compared to baseline.

Discussion and conclusion: Corticosteroids are the conventional treatment for INEIMP. To date mesenchymal stem cell (MSC) therapy in dogs have been used for osteoarthritis treatment. MSC showed immunomodulatory and immunosuppressive properties. This case, with a diagnosis of INEIMP had improved functional capacity, pain relief, joint mobility, degree of muscle atrophy, degree of lameness and force plate derived measures of analysis of the affected joints 1 month after ADSC injection. These improvements were more noticeable at 3 months and remained during 9 months. To the author's knowledge this is the first report describing the use of ADSC for INEIMP treatment in dogs. This dog's clinical signs improved following intra-articular therapy using ADSC and this treatment may been the effective for the treatment of INEIMP in this dog.

LOCKING COMPRESSION PLATE FOR STABILIZATION OF DISTAL RADIUS AND ULNA FRACTURES IN TOY BREED DOGS: 20 CASES. Gibert S[1], Ragetly G*[1], Boudrieau RJ*[2]. [1]Centre Hospitalier Vétérinaire Frégis, Arcueil, France, [2]Tufts University Cummings School of Veterinary Medicine, North Grafton, MA.

Introduction: Distal radial fractures in toy breed dogs are a challenge to repair due to the small bone dimensions, limited implants, poor interosseous vascularity and reduced peri-osseous soft tissue coverage that may predispose to healing complications. Proposed advantages of locking plates include the fixed angle construct when placed peri-articularly and the preservation of the cortical blood supply. Additionally, the Combi® holes of the LCP®(DePuy Synthes®; Oberdorf, CH) allow it to be used as a conventional compression plate, a pure internal fixator, or a hybrid of the two. The purpose of this study was to evaluate the effectiveness of the LCP® (straight and notched end T-plate) for the treatment of distal radial/ulnar fractures in toy breed dogs.

Methods: The medical records of adult toy breed dogs with fractures of the distal radius/ulna from 2010 to 2014 were reviewed. The inclusion criteria included: fracture of the distal 1/3 of the radius/ulna and repair with open reduction and internal fixation utilizing an LCP® plate (straight or notched end T-plate).

Results: Twenty fractures (20 dogs) satisfied the inclusion criteria; 8 straight and 12 notched end T-plates, either 2.0 (n = 13) or 2.4 (n = 7) mm, were used. Hybrid fixation was performed in all dogs in 1 or all fragments. Mean time to radiographic union was 7 ± 2,3 weeks (range: 4–12 weeks). One complication was observed: infection that resolved with antibiotics and implant removal. In all cases available for long-term follow-up (>6 months;15/20), the reported limb function as evaluated by the referring veterinarian (in-hospital) or owner (telephone) was excellent.

Discussion and conclusion: Peri-articular fractures and with short periarticular fragments are a consensus indication for locking plate fixation which provides excellent angular stability due to its single beam construct property. Hybrid fixation can, however, compromise the vascular supply. The importance of preservation of vascularity at the bone/plate interface may be overstated due to the variable surface contour of the bones, especially in small animals. Hybrid techniques may not have adverse effects on bone healing, and compression fixation remains indicated in 2-piece fractures. The major advantage of locking plate fixation in these fractures is probably due to the fixed angle stability of the small distal fragment achieved with locking screws. Limitations of this study include its retrospective nature with variable fracture patterns and repairs, and inconsistent timing of radiographic and clinical follow-up. The LCP®, used as a hybrid construct for the treatment of distal radial/ulnar fractures was shown to yield excellent clinical results with both uncomplicated healing and excellent functional outcomes in this series of toy breed dogs.

PSYCHOMOTOR SKILLS REQUESTED TO PERFORM SINGLE PORT LAPAROSCOPIC SPAY IN DOGS: IS MISTELS TRAINING ADEQUATE? Gradner G*, Fischbacher A, Dupré G*. University of Veterinary Medicine; Clinic for Small Animal Surgery and Ophthalmology, Vienna, Austria.

Introduction: To improve surgical outcome we want to create reliable systems to train basic and surgical skills for laparoscopic surgeries. The purpose of our study is 1) to describe psychomotor skills needed to perform a single port laparoscopic spay using the operating laparoscope on dogs and 2) to compare them to those trained in MISTELS. The hypothesis was that the MISTELS training system does not enable training of all psychomotor skills needed to perform a 1-hole laparoscopic spay using an operating laparoscope.

Methods: Thomas' taxonomy was used to define minimum psychomotor requirements for 1-hole laparoscopic spays. Under the roof of this taxonomy the procedure "single port laparoscopic spay" was broken down into 9 tasks. Foundational verbs corresponding to the surgical steps were identified. For example: Level = Perception; Foundational verb = feel, see, identify; Detailed surgical description = See, feel and identify the thickness of the skin. The assigned verbs were used to define the psychomotor skills by relating them to the organs needed. The same principle was applied to the MISTELS training with its 5 training goals.

Results: The following 5 psychomotor skills are missing in the MISTELS program: Hand-Eye-Coordination (insertion of working instruments through the channel and place a transabdominal suture through the abdominal wall); Hand-Eye-Perception-Coordination (needed for the insertion of the trocar and skin incision); Finger-Ear-Coordination (to react to Ligasure sounds accordingly); Independent-Finger-Movement (complex movement with Ligasure); Extra-Abdominal-Hand-Intra-Abdominal-Hand-Coordination (fixation of the ovary with a transabdominal suture).

Discussion: While "Hand-Eye-Coordination" is trained every day in a surgeońs life the "Hand-Eye-Perception-Coordination" required to insert a trocar is missing. Familiarity with the Ligasure device before going into 1-hole-laparoscopic spays would cover the skills "Independent-Finger-Movement" and "Finger-Ear-Coordination". "Extra-Abdominal-Hand-Intra-Abdominal-Hand-Coordination" for fixing the ovary to the abdominal wall could be implemented in training systems. While MISTELS was developed to train basic laparoscopic skills modification of box training for specific surgical procedures is desireable. The need of cheap and easy accessible training possibilities offers further development of existing box systems.

A SURGICAL SELF-LOCKING LOOP TESTED FOR COLON ANASTOMOSIS. Höglund OV[1], Maxon O[1], Grönberg A[2]. [1]Department of Clinical Sciences, SLU, Uppsala, Sweden, [2]Carponovum AB, Halmstad, Sweden.

Introduction: Colorectal cancer is common in people. After removal of the pathologic part of the colon, leakage at the site of anastomosis is a frequently reported complication. A new suture-free method for anastomosis of the colon has been developed, CARP (Compression Anastomotic Ring-locking Procedure). The use of staplers, the traditional method to seal the lumen of colon, may interfere with the CARP method. A new technology, based on the principle of a self-locking loop, was therefore developed for temporary sealing of the lumen in conjunction with the CARP method. The aim of this in vitro and in vivo study was to test the self-locking loop with the CARP implant for closure of the colon.

Methods: A flexible band with a case containing a locking mechanism was constructed. Studs were added to 1 side of the flexible band in order to enhance the tissue grip at closure of the loop around tissue. Fresh intestines (lukewarm) from a pig were used in this cadaver test. The colon was transected approximately 15 cm from the anus. The CARP implant (anvil) was inserted into the lumen. The self-locking loop was placed around the transected colon and the loop was tightened around the CARP implant inside the lumen. The closure was visually inspected and the locked loop was removed for inspection of the compressed colonic tissue. The procedure was repeated ten times. The test was repeated in vivo in 4 pigs of approximately 50 kg, where the self-locking loop was used for closure of the lumen in conjunction with both CARP and circular stapler anastomosis.

Results: The self-locking implant could close the colonic lumen around the anvil in both the in vitro (n = 10) and in vivo (n = 8) model. Subjectively, the device achieved a tight closure of the colon and no damage to the intestines was seen on visual inspection at removal of the self-locking implant.

Discussion and conclusion: Subjectively, the technology was perceived as potentially timesaving and easy to use. The self-locking loop may be an alternative to staplers or purse-string closure for temporary closure of the colon lumen in conjunction with the CARP method. Further development, such as designing a tool for tightening the loop in a laparoscopic procedure, should be addressed.

A RETROSPECTIVE STUDY OF COLORECTAL INFLAMMATORY POLYPS IN MINIATURE DACHSHUNDS: 34 CASES (2002–2014). Horikirizono H, Asano K, Ishigaki K, Iida G, Teshima K, Yoshida O, Seki M, Edamura K, Watari T. Department of Veterinary Medicine, College of Bioresource Sciences, Nihon University, Fujisawa, Japan.

In Japan, colorectal inflammatory polyps (CRIPs) are benign non-neoplastic lesions that are usually multifocal and frequently observed in Miniature Dachshunds. However, there is little information on CRIPs in Miniature Dachshunds. The objectives of this retrospective study were to describe the clinical features and therapeutic outcomes of Miniature Dachshunds with CRIPs, and to evaluate the effects of a novel surgical technique ("mucosa-submucosal pull-through technique") and postoperative medical management for the treatment of CRIPs. The medical records of 34 Miniature Dachshunds with a suspicion of having CRIPs were reviewed. A definitive diagnosis of CRIPs was made by colonoscopy, endoscopic ultrasound, and histopathology of endoscopic biopsy samples. All patients underwent the mucosa-submucosal pull-through technique for the removal of CRIPs, followed by postoperative dietary and medical management. The median age was 8.8 year-old, and no gender predilection was observed. The typical clinical signs included hematochezia (100%), tenesmus (74%), and diarrhea (71%). High C-reactive protein (44%), leucocytosis (32%), and hypoalbuminemia (29%) were observed. Colonoscopy revealed that the lesions were located in the rectum (47%), and invaded into the descending colon (50%) and into the transverse colon (3%). Endoscopic ultrasound showed that the lesions were within the mucosal layers in all patients. The mucosa-submucosal pull-through technique was feasible in all patients. Short-term postoperative complications were anastomotic strictures, hematochezia, and tenesmus, but were resolved in < 2 months after the operation in all patients. The histopathologic diagnosis of surgical samples included inflammatory polyps (74%), adenocarcinoma (24%), and inflammation (3%). For postoperative medical treatment, lactulose (100%), non-steroidal anti-inflammatory drugs (88%), mesalazine (88%), and metronidazole (79%) were prescribed. The mortality rate was 0%, and the recurrence rate was 15%. In Miniature Dachshunds, severe inflammation has the potential risk of the carcinogenesis in the colon and rectum. The mucosa-submucosal pull-through technique was effective for the removal of CRIPs without serious postoperative complications such as fecal incontinence, compared with the conventional full-thickness pull-through technique. Our study demonstrated that colonoscopy and endoscopic ultrasound would be useful for surgical planning. In

conclusion, the mucosa-submucosal pull-through technique and postoperative medical management demonstrated to be good prognosis in Miniature Dachshunds with CRIPs even in case of adenocarcinoma formation.

INTRALARYNGEAL THYROARYTENOID LATERALISATION USING THE FAST-FIX 360" SYSTEM: A CANINE CADAVERIC STUDY. Kitshoff AM[1], Van Goethem B*[1], Vandekerckhove P*[2], De Rooster H*[1]. [1]Department of Small Animal Medicine and Clinical Biology, Faculty of Veterinary medicine, Ghent University, Ghent, Belgium, [2]DAC Malpertuus, Heusden, Belgium.

Introduction: Laryngeal paralysis is a condition, mainly reported in large breed dogs, in which the nerves and/or muscles controlling the movement of the arytenoid cartilages cease to function normally, resulting in a reduced rima glottidis surface area. The most commonly performed surgical techniques rely on unilateral abduction of the arytenoid with nonabsorbable sutures, placed between the muscular process of the arytenoid cartilage and either the cricoid or thyroid cartilage. Such procedures require a lateral surgical approach to the larynx. The aim of the study was to investigate a novel minimally invasive intralaryngeal thyroarytenoid lateralisation technique, using the Fast-Fix 360^{TM} meniscal repair system.

Methods: The Fast-Fix 360^{TM} meniscal repair system consists of a delivery needle and 2 × 5 mm polyether ether ketone toggle anchors connected with a 2/0 polyethylene suture component. Normal larynges (n = 30) were harvested from large breed canine cadavers; sharp dissection of the external muscles of larynx and pharynx was done to expose the lateral surface of the thyroid cartilage. In phase 1 (n = 10), a 1.2 mm Kirschner wire was used bilaterally to calculate the insertion angle, leading to optimal thyroid penetration. In phase 2 (n = 10), the Fast Fix delivery needle was inserted intralaryngeally according to the calculated optimal angle and the area of thyroid penetration was assessed bilaterally. In phase 3 (n = 10), the Fast-Fix was applied unilaterally. The first toggle anchor was fired on the lateral aspect of the thyroid cartilage and the second toggle inside the laryngeal cavity. The suture was tightened till the toggle anchor on the medial aspect of the arytenoid cartilage lay flush against the mucosa. Preprocedural and postprocedural rima glottidis surface areas were compared using a paired t-test ($P<0.05$).

Results: From phase 1, a mean ideal insertion angle of 73.93° (± 4.83°) was calculated. Subsequently, a simplified insertion angle of 70° was chosen for phases 2 and 3, which resulted in penetration of the central thyroid cartilage in all cases. In phase 3, there was a significant difference between the preprocedural (61.06 ± 9.21 mm^2) and postprocedural (138.37 ± 26.12 mm^2) rima glottidis surface area in all larynges ($P<.0001$). The mean percentage increase in surface area of the rima glottidis was 125.96% (± 16.54%).

Discussion and conclusion: To obtain arytenoid lateralisation by the traditional techniques, a lateral approach to the larynx is required. The intralaryngeal approach seems a valuable minimally invasive alternative approach. An insertion angle of 70° resulted in penetration of the optimal area of the thyroid cartilage in all the larynges tested. In this experimental ex vivo study, the Fast-Fix 360^{TM} meniscal repair system was successfully used for thyroarytenoid lateralisation in normal canine larynges. Tightening of the Fast-Fix resulted in a significant opening of the rima glottidis surface area, but further studies with the larynx in situ are needed before the device can be tested in clinical patients.

CONGENITAL VENOUS ANEURYSM OF THE RIGHT EXTERNAL JUGULAR VEIN IN A GREAT DANE. Lefebvre M, Merveille AC, Rizza M, Claeys S*. University of Liege, LIEGE, Belgium.

Introduction: An aneurysm is described as a degenerative phenomenon that causes a weakness of the vessel wall and an increase in vessel diameter that, without treatment, may progress to rupture or thrombosis.

Case description: An eleven month old entire female Great Dane was presented for a painless swelling on the ventral right side of her neck. The mass appeared 1 month prior to presentation without history of trauma. The size of the mass was variable, increasing when the head was in a down position and disappearing when the head was up. Fine needle aspiration of the mass revealed the presence of blood. Ultrasonographic examination of the ventral cervical region revealed an anechoic subcutaneous tubular structure, limited by a wall and measuring 2 cm in diameter and 4 cm in length at the right ventral aspect of the cervical region, just cranial to the thoracic inlet. A diagnosis of jugular aneurysm was made and surgical excision was planned. A ventral midline cervical skin incision was performed and blunt dissection of subcutaneous tissues enabled visualisation of the aneurysm, which was carefully dissected from surrounding tissue. Double ligatures (composed of 1 simple ligature and 1 modified transfixation ligature) using 2-0 silk were placed proximal and distal to the aneurysm, which was then excised. No intraoperative complication occurred. The dog developed a seroma postoperatively, which was successfully treated conservatively. Histopathologic examination of the abnormal vessel was consistent with the diagnosis of aneurysm.

Discussion and conclusion: Jugular aneurysm has been rarely reported in dogs. Venous aneurysms may be the result of several processes including tumors, inflammation, trauma, or may appear spontaneously or congenitaly, when no etiologic cause can be identified. Surgical excision is the treatment of choice. Venous aneurysm may indeed lead to thrombus formation due to stagnant and low pressure flow within the neck veins. There is also a risk of rupture of the aneurysm from trauma to the neck, although arterial aneurysms are generally more prone to rupture. Ligation of the external jugular vein is possible without any consequence in dogs due to the presence of an internal jugular vein, which will take over venous drainage.

ODONTOGENIC CYSTS IN DOGS; CLINICAL AND DIAGNOSTIC IMAGING FINDINGS AND RESULTS OF SURGICAL TREATMENT. Janssens SDS, Theyse LFH*. University Clinic for Companion Animals, Utrecht, Netherlands.

Introduction: Odontogenic cysts are characterized by a slow painless expansive growth and fluid accumulation, which leads to progressive bone loss within the jaw and swelling in the mouth or the nasal cavity. This can result in clinical signs. Surgical treatment consists of removal of the primarily involved tooth or tooth structure including resection of the dental epithelium. Our objective was to describe the clinical and diagnostic imaging findings, to categorize the odontogenic cysts and to evaluate the results of surgical treatment including recurrence rate.

Methods: A retrospective study of dogs diagnosed with odontogenic cysts was performed. Information on breed, age, gender, localization of the cysts, diagnostic imaging, surgical treatment and clinical outcome was evaluated.

Results: During the 17-year study period, 31 patients met the inclusion criteria. Breeds affected by odontogenic cysts were Boxer (22.6%), Crossbred (19.4%), Labrador Retriever (19.4%) and other breeds (38,7%). In 40.5% (due to bilateral cases) odontogenic cysts originated in the region of the premolars, in 32.4% in the incisors, in 21.6% the canines and in 5.4% the molars. In 6.5% of the patients the cyst included several teeth and could not be linked to a specific element. Bilateral odontogenic cysts were present in 23% of the patients. Histopathology was performed in 11 cases. Six patients (19.4%) out of 31 were diagnosed with an odontogenic cyst due to an odontoma. Two (33.3%) of these 6 patients developed recurrence after the first surgery. Two patients (6.5%) were diagnosed with cyst formation due to an ameloblastoma.

Discussion: In the present study 7 of the 31(22.6%) dogs study were Boxers. An explanation for the high prevalence in brachycephalic dogs might be crowding of teeth as a result of conformation of the skull (4) and the presence of retained premolars. Six of the 31 (19.4%) dogs were Labrador Retrievers. Looking at the distribution pattern of odontogenic cysts in this study, we can conclude that the presence of odontogenic cyst is mainly situated in the region of the premolars (40.5%) and the incisors (32.4%). Two patients (6.5%) out of 31 developed recurrence after treatment of an odontoma and were treated successfully after revision surgery. Radical resection including partial mandibulectomy or maxillectomy is advised in these cases to prevent local recurrence.

USING WHOLE-BODY BAROMETRIC PLETHYSMOGRAPHY TO EVALUATE THE EFFECTIVENESS OF UPPER AIRWAY SURGERY FOR BRACHYCEPHALIC OBSTRUCTIVE AIRWAY SYNDROME IN FRENCH BULLDOGS. Liu N-C[1], Sargan DR[1], Adams VJ[2], Ladlow JF*[1]. [1]Department of Veterinary Medicine, University of Cambridge, Cambridge, United Kingdom, [2]Vet Epi Ltd., Birmingham, United Kingdom.

Introduction: French bulldogs (FBs) often develop upper airway obstructions resulting in brachycephalic obstructive airway syndrome (BOAS). A variety of interventions including conventional surgical procedures, such as staphylectomy, rhinoplasty & ventriculectomy, or advanced procedures, such as folded flap palatoplasty, laryngoplasty & turbinectomy, are used. Currently, surgical effectiveness is evaluated subjectively based on physical examination. Whole-body barometric plethysmography (WBBP) is a non-invasive method to quantify respiratory function and evaluate surgical outcome. The aim of the study was to assess the effectiveness of upper airway corrective surgery in FBs.

Methods: This study was based on our recent work which proposes a breed specific BOAS classifier calculated using 6 WBBP respiratory parameters. The classifier, named qdaFB, shows >95% sensitivity and specificity to discriminate between BOAS (n = 41) and non-BOAS (n = 31) FBs. Posterior probability (ppqdaFB) for BOAS can be obtained from the classifier. For this study ppqdaFB >50% is considered BOAS(+) and ppqdaFB <50% is BOAS(−). Fourteen FBs were included in this study. Each dog was scored as grade II or grade III, moderately and severely affected grades, on an established functional grading system. All dogs had a 20-minute WBBP recording pre-surgery and a second recording 4-6 weeks post-surgery. Surgical procedures were decided for each dog based on lesion sites. Pre- and post-surgery WBBP data from each dog were tested by qdaFB, and ppqdaFB was calculated.

Results: Flow waveform characteristics of the affected dogs showed low flow rates and/or a fluctuating inspiratory phase with abnormal high peaks during expiration (high ratio of peak expiratory flow rate to peak inspiratory flow rate, PEF/PIF). PEF/PIF post-operatively was significantly lower than that of affected dogs pre-operatively. Ratio of expiratory time to inspiratory time (Te/Ti) post-operatively was significantly higher with relatively shorter Ti than that of affected dogs pre-operatively. Grade II FBs (8/14), all presented with grade I laryngeal collapse and overall responded well to surgery. For 7/8 of these dogs post-surgery ppqdaFB was $<50\%$. Grade III FBs (6/14), mostly with either grade II or III laryngeal collapse, did not respond to surgery as well as the grade II BOAS FBs. All retained ppqdaFB $>50\%$ post-surgery. However, the majority did show some improvement as ppqdaFB decreased.

Discussion and conclusion: These results are encouraging for the use of WBBP as an objective clinical tool for surgical effectiveness assessment and patient follow-up. Future studies with WBBP will investigate the different outcome between conventional and novel BOAS surgical techniques.

MAGNETIC RESONANCE IMAGING SHOULD BE PART OF THE DIAGNOSTIC WORK-UP IN DOGS AFFECTED WITH ABDUCTOR POLLICIS LONGUS TENOSYNOVITIS. A CASE REPORT OF COMBINED ABDUCTOR POLLICIS LONGUS AND FLEXOR CARPI RADIALIS TENOSYNOVITIS. Manou M[1], Thibaut JL[2], Manassero M[1], Decambron A[1], Rogalev A[1], De Fornel P[2], Viateau V[1]. [1]Ecole Nationale Vétérinaire d'Alfort, Maisons-Alfort, France, [2]MICENVET, Créteil, France.

Introduction: Abductor pollicis longus (APL) tenosynovitis occurs in both dogs and in people. Diagnosis is generally made by radiography and ultrasonography (US) in dogs. However, information obtained by these imaging modalities may not allow for complete diagnostic investigation. APL tenosynovitis can be associated with extensor pollicis brevis or extensor pollicis longus tenosynovitis in people, prompting the use of MRI in the diagnostic work-up of APL tenosynovitis. Here, we report a case of a dog, where MRI confirmed the suspicion of APL tenosynovitis and allowed for the identification of concomitant flexor carpi radialis (FCR) muscle tenosynovitis.

Case description: A 10 year-old, intact male, Labrador retriever was referred for chronic, progressive bilateral forelimb lameness with swelling, pain and reduced flexion in both carpal joints. Radiography, US and computed tomography (CT) were already performed by the referring veterinarian. Radiographic abnormalities were suggestive of APL tenosynovitis, while US failed to provide an accurate visualization of the area due to the presence of bone proliferation. On CT imaging, severe osteophytosis was observed at the medial sulcus of the distal radius. MRI (sagittal proton density with fat saturation, coronal PD FS and T2-weighted, axial IDEAL, volume proton density and T1-weighted, before and after gadolinium injection, sequences) was subsequently performed to further the diagnostic work-up.

Results: MRI findings included: 1) severe hyperintense extra-capsular swelling of the antebrachio-carpal joint, 2i) heterogeneity of the medial collateral ligament, where it crossed the APL tendon, 3) heterogeneity of the APL tendon surrounded by a hyperintense lesion on each sequence, indicating an APL tenosynovitis, 4) dilatation of the FCR sheath with surrounding hyper-intense soft tissue lesion indicating FCR tenosynovitis. The lesions were more severe on the left forelimb. Management with shockwave therapy was pursued, resulting in clinical improvement.

Discussion and conclusion: To our knowledge, this is the first report of a combined APL/FCR tenosynovitis in a dog. FCR tendinitis is described in people, either as primary (stenosing tenosynovitis) or secondary tendinitis (secondary to carpal bone fractures or cysts, degenerative joint disease). In the present case, CT allowed the exclusion of primary disease of the carpal joint and the identification of new bone formation, causing the mechanical impairment of the tendons. In conclusion, MRI is useful in the diagnostic work-up and the treatment plan of APL tenosynovitis to explore associated tendinopathies and target the shockwave therapy in dogs.

PELVIC MODELLING AND THE COMPARISON BETWEEN PLATE POSITION FOR DOUBLE PELVIC OSTEOTOMY USING ARTIFICIAL CANCELLOUS BONE AND FINITE ELEMENT ANALYSIS. McCartney WT*[1], Loostado Lorza R[2], Macdonald B[3], Kinsella C[1]. [1]NOAH, Dublin, Ireland, [2]University of Rioja, Logorno, Spain, [3]DCU, Dublin, Ireland.

Pelvic osteotomy has been used successfully to treat canine hip dysplasia. Complications rates for pelvic osteotomy can be very high with screw loosening at 62% being the most common problem. Testing was undertaken to compare the rigidity of 3 different fixation methods through the analysis of the degree of deformation under loading. Following 3D scanning a pelvic model was built for Finite element analysis incorporating the plates and screws, with validation of loading results using artificial cancellous bone testing. Osteotomy and plate fixation were set up in the 3 methods: 1. Ventral plate fixation 2. Lateral plate fixation 3. Both ventral and lateral plates. The FE analysis revealed that there was a difference in the degree of deformation and therefore rigidity between the 3 plate configurations. The combined plate configuration was the most rigid followed by the ventral plate and then lastly the DPO plate. The results of the FE analysis are surprising, in that the ventral plate was more rigid than the DPO plate, even though there are 2 less screws and the screws used in the ventral plate are 2.7mm. The authors are of the opinion that a single implant which incorporates the ventral fixation with the lateral fixation would be a superior method of fixation based on the results obtained in the analysis. Consequently further studies to investigate the development of a new DPO plate to incorporate ventral iliac fixation is recommended from the results of this study.

EVALUATION OF THE PERFORMANCE OF A BIODEGRADABLE MAGNESIUM AS A BONE IMPLANT. McCartney WT*[1], Galvin E[2], Cummins C[2], Lally C[2], Macdonald B[2]. [1]NOAH, Dublin, Ireland, [2]DCU, Dublin, Ireland.

Early use of Magnesium alloys as bone implants was abandoned because of excessive hydrogen gas production despite good biocompatibility. More recent studies discovered that Magnesium alloys in vivo activated bone cells. Mechanical testing and follow on use of magnesium alloy pins in the repair 4 clinical cases with natural fractures was performed. To simulate corrosion of the magnesium alloy each specimen was placed in a separate container with 25 ml Hank's balanced salt solution. Mechanical strength testing was performed to determine the influence of corrosion on the mechanical integrity of the specimens. Engineering stress-strain curves were produced for each specimen. The elastic modulus (E), 0.2% offset yield strength (σy) and ultimate tensile strength (UTS) were calculated in accordance with ASTM E111-04 using the TestXpert software package (V11.02). The value of strain at the UTS and at failure was termed the ultimate strain (εu) and failure strain (εf), respectively. Comparison between a 1.2 mm diameter pin made of stainless steel and magnesium alloy revealed not dissimilar properties except in torsion were the magnesium alloy was significantly weaker. The mechanical integrity of the specimens, as denoted by the UTS, decreased in an exponential manner over time. The ductility of specimens was shown to decrease over time. All cases healed uneventfully with no detection of hydrogen gas production. The magnesium pins were still visible although to a much less degree 8 months postoperatively on radiographs. The Magnesium pins used in this study proved to be excellent bone implants apart from the very low torsion resistance which made insertion delicate. There was no problem with hydrogen gas production. The implants were very well tolerated with no clinical signs of any problems. It was very surprising that the pins were still visible radiographically 8 months after insertion. The study has limitations in relation to fracture selection and case numbers, but the results are encouraging and warrant further investigation

A CASE OF ISOLATED DIFFUSE SPLENIC HAEMANGIOMATOSIS IN A DOG. Murgia D*[1], Mori M[2], Rondena M[3], Tacchini D[4]. [1]Peace Avenue Veterinary Clinic, Hong Kong, China, [2]DVM free lance, Siena, Italy, [3]Clinica Veterianria San Marco, Padova, Italy, [4]Department of Medical Biotechnology of the University, Section of Pathology, Policlinico S. Maria alle Scotte, Siena, Italy.

Introduction: Angiomatosis is a vascular endothelial proliferative disorder of unknown origin causing hyperplasia and dysplasia of blood (haemangiomatosis) and lymphatic (lymphangiomatosis) vessels. In humans, diffuse splenic haemangiomatosis may occur as a manifestation of systemic angiomatosis or, less commonly, is confined to the spleen, and it is usually classified as benign disorder.

Case description: A 9 month old entire male crossbreed dog was presented with a history of intermittent episodes of weakness, abdominal pain, and poor appetite. On presentation the dog was subdued. Physical examination revealed no abnormalities, with the exception of mildly pale mucous membranes and splenomegaly on abdominal palpation. Haematology, biochemistry, coagulation profile, urine analysis as well as echocardiography and electrocardiography revealed no abnormalities. Thoracic radiographs were unremarkable. Abdominal ultrasonography showed splenomegaly. The splenic parenchyma had multiple diffuse, hypoechoic and anaechoic cystic lesions of variable size with dimensions from a few millimetres to 1 cm. Splenectomy and histopathology were performed. At histopathology angiomatosis was suspected. To differentiate haemangiomatosis from lymphangiomatosis, immunohistochemical investigation was performed. The endothelial cells were supported by 1 or 2 layers of smooth muscle cells, as demonstrated by immunohistochemical positivity for ASMA antibody and CD34, confirming the haemangiomatous nature of the process. Podoplanin labelling, a marker for the lymphatic vessels, was negative and excluded the diagnosis of lymphangiomatosis. 400 days post-splenectomy, the dog was clinically well.

Discussion: In dogs different clinical forms of angiomatosis have previously been recognised. However, isolated diffuse splenic haemangiomatosis has not been reported before. The differential diagnosis of diffuse haemangiomatosis must take into account the other most frequently diagnosed canine splenic vascular tumours such as haemangiosarcoma, haemangioma, or tumour-like lesions occurring in the spleen. However, both haemangiosarcoma and haemangioma present either as a single mass or multiple nodules within the spleen and, less frequently, as diffuse

cavernous lesions not involving the entire splenic parenchyma. Haematogenous metastasis occurs early in the course of the disease. Clinical staging of the patient failed to show metastatic spread of the disease. Complete cure of isolated splenic haemangiomatosis is usually obtained by splenectomy in humans and was achieved in this case.

CHARACTERISATION OF OPEN WOUND BIOBURDEN IN DOGS AND CATS. Nolff MC[1], Knebel J*[1], Reese S[2], Dening R[3], Fehr M[3], Meyer-Lindenberg A[1]. [1]Clinic for Small Animal Surgery and Reproduction, Ludwig-Maximilians University, Munich, Germany, [2]Ludwig-Maximilians University, Department for basic Veterinary Sciences, Munich, Germany, [3]Small Animal Clinic, University of Veterinary Medicine, Foundation, Hannover, Germany.

Introduction: Wound treatment represents a frequent challenge in veterinary medicine. In contrast to human medicine, where the average bioburden of open wounds has been described in detail, the microbiology of open wounds in dogs and cats has not been extensively studied, neither in terms of types of bacteria nor with regard to multidrug resistance (MDR). The aim of this study was, to describe the bacterial bioburden of open wounds and compare them to a control (bite wounds).

Study design: Retrospective multicenter study.

Methods: The microbial results of wounds treated openly (status at initiation of open therapy n = 88, follow up during open therapy n = 52) between 2011 and 2013 in 2 clinics were assessed and compared to a control group (bite wounds (n = 184)). Statistical analysis was performed using the chi square test. In addition, the odds ratio was calculated for significantly overrepresented bacteria in the open wound group.

Results: 88.5% of wounds that underwent open treatment were cultured positive at the beginning of open treatment decreasing to 69.2% during treatment. Of these 47.7% were considered MDR initially, with a non-significant drop to 41% during therapy. In contrast, only 48.4% of bite wounds were cultured positive with only 6% wounds being affected by MDR bacteria. Comparison showed a highly significant difference ($P < .001$). The following species were significantly over-represented compared to the control group: Enterococcus sp., E. coli, Staphylococcus pseudintermedius and Pseudomonas aeruginosa ($P < .0001$).

Conclusion: The bacteria isolated in open wound differed significantly from the control in terms of bacterial species involved and MDR. The main isolated species are in concordance with published results from human wounds. The high incidence of MDR strains underline the need for more effective antimicrobial treatment options apart from the usage of antibiotics in this cases.

SIMULTANEOUS BILATERAL LUNG LOBE TORSIONS IN A PUG. Retournard M, Poncet C*. CHV Fregis, Arcueil, France.

Introduction: Pugs are over-represented among dogs with lung lobe torsion. In this breed, most torsions involve the left cranial lobe, and anatomic reasons have been suspected. We describe here an unusual case of simultaneous bilateral lung lobe torsion in a pug.

Case description: A 9-month old, intact male pug was presented because of a non-productive cough and syncope of 1-month duration. Thoracic radiographs, bronchoscopy and CT-scan were highly suggestive of torsions of the right cranial and of the left cranial lung lobes. A sternotomy was performed and torsion of the cranial part of the left cranial lung lobe and of the right cranial lung lobe were confirmed. A lung lobectomy was performed on each twisted lobe using hemoclips. The thoracic cavity was flushed, a chest tube was placed and the sternotomy was closed using a monofilament absorbable suture (glycomer 631, 2-0). No postoperative complication was noted, and the dog was discharged 3 days after surgery. Histopathology results were consistent with chronic ischemia and infarction lesion secondary to the lung lobe torsion. Aerobic and anaerobic bacterial cultures performed on lung sample were negative. The dog was asymptomatic at the 2-week recheck. No further clinical signs were observed over the following 4 months.

Discussion and conclusion: Multiple lung lobe torsions are rare, and, to the authors' knowledge, simultaneous bilateral lung lobe torsion has not been described. In the case presented here, the torsions probably didn't occurred simultaneously on the left and right cranial lung lobes. This is supported by computed tomography findings since differences were noted between the left and right cranial lung lobe appearance. Pulmonary pleural thickening and multiple pockets of gas, suggestive of vesicular emphysema, were present on the left cranial lung lobe. The right cranial lobe appeared more congestive. Based on these findings, a chronic presentation on the left cranial lung lobe associated with an acute occurrence on the right cranial lung lobe was suspected. However, the young age of the animal and the short duration of clinical signs suggested that torsions appeared within a short period of time. Some authors have proposed that bronchial cartilage dysplasia may result in bronchial hilus instability, making a lobar torsion more likely. Brachycephalic dogs, particularly pugs, seem to commonly have a collapsus of the left cranial bronchus.

UNUSUAL RECURRENT COMPLICATIONS FOLLOWING CHOLECYSTODUODENOSTOMY IN A DOG: MIGRATION OF FOREIGN BODIES THROUGH THE STOMA OPENING. Rochereau PH, Jossier R, Haudiquet PH*. Vetref Surgical Department, Angers Beaucouze, France.

Introduction: Cholecystoduodenostomy is the surgical procedure of choice for bile flow deversion in dogs and cats. Complications associated with this procedure are: haemorrhage; breakdown of the anastomosis; stricture of the stoma; twisting or kinking of the cystic duct; devitalization of the gallblader; cholangitis; and gastric ulceration. To the authors' knowledge, this clinical case presents the first description of recurrent migration of foreign bodies through the stoma's opening.

Case description: A springer spaniel was presented for anorexia and icterus. Elevated serum hepatic enzymes and increased total bilirubin concentrations were noted. Abdominal ultrasonography showed distension of the extrahepatic and intrahepatic biliary ducts and severe pancreatitis. At laparotomy, severe pancreatitis was observed and confirmed by pancreatic biopsies. Choledochal stenting was performed. Because of the severity of pancreatitis and risk of recurrence with migration of the stent, cholecystoduodenostomy was also performed. Hepatic parameters improved in the post-operative period. Abdominal ultrasonography was performed 4 days after surgery. Distension of the extrahepatic biliary tract decreased. Ten days after surgery, an increase in serum hepatic enzymes and total bilirubin concentration was noted. On abdominal ultrasonography, duodenal distension was observed close to and within the stoma of the cholecystoduodenostomy and distension of the extrahepatic and intrahepatic biliary tract was also reported. Because of a continued increase in serum hepatic enzymes and total bilirubin concentration, persistence of extrahepatic and intrahepatic duct distension, and suspicion of duodenal obstruction, an exploratory laparotomy was performed. Distension of the duodenum and the gallbladder was confirmed and a mass was palpable through the gallbladder wall. A cholecystotomy was performed and a large trichobezoar was removed from the gallbladder. The dog was presented 8 months later for anorexia and icterus. Serum hepatic enzymes and total bilirubin concentration were slightly increased. On abdominal ultrasonography, a large duodenal foreign body was observed. A duodenotomy, distal to the cholecystoduodenostomy stoma was performed. A large piece of material, engaged into the gallbladder was removed.

Discussion and conclusion: To prevent stricture of the stoma and subsequent cholangitis, the size of the stoma should be at least 2.5 cm long. In this clinical case, a large anastomosis might have allowed migration of foreign bodies into the gallbladder. To the authors' knowledge, no limitations in the length of the stoma have been reported. This case suggests that size of the stoma must not be too large to avoid such a complication. The prognosis for dogs and cats with extrahepatic biliary tract obstruction undergoing cholecystoduodenostomy must be considered guarded to poor. It was reported that dogs with pancreatitis or dogs that underwent a biliary diversion had poor prognosis. It appears essential to closely monitor animals after cholecystoduodenostomy. Haematological and biochemical profiles, abdominal ultrasonography should be regularly performed to detect complications.

MANAGEMENT OF PARAURETERAL PSEUDOCYST AND URETERAL INJURY USING A SUBCUTANEOUS URETERAL BYPASS (SUB) SYSTEM IN A CAT. Rossanese M[1], Murgia D*[2]. [1]VetsNow Emergency, Liverpool, United Kingdom, [2]Animal Health Trust, Newmarket, United Kingdom.

Introduction: The use of a subcutaneous ureteral bypass (SUB) is a novel option indicated to bypass ureteral obstruction, ureteral strictures or when traditional surgery and other interventional techniques are contraindicated or fail. There is only 1 case report about the use of a SUB for the management of bilateral ureteral rupture following ureteral stenting failure.

Case description: A 1.6-year-old, neutered male domestic shorthair cat was presented 2 weeks after a road traffic accident with lethargy, anorexia and abdominal pain. On presentation, the cat was tachycardic, pyrexic and a mass was palpable in the left retroperitoneal space. Survey radiographs and abdominal ultrasonography showed normal renal perfusion and confirmed the presence of a cavitary fluid-filled lesion in the left retroperitoneal area. Fluid analysis confirmed uroretroperitoneum. In order to assess post-traumatic integrity of the urinary tract and to plan surgical correction computed tomographic urography was performed. A diagnosis of paraureteral pseudocyst secondary to left ureteral rupture in the proximal third was made. Based on these findings an exploratory laparotomy was performed. The urinoma was excised and the lacerated ureter was dissected and ligated proximally and at level of the uretero-vescicular junction. In order to preserve the left kidney, placement of a SUB device was chosen. Under fluoroscopy guidance a locking loop nephrostomy catheter was placed in the renal pelvis using a modified Seldinger technique; the silicone/Dacron cuff and silicone sleeve were advanced to the renal capsule and the Dacron was anchored to the renal capsule using sterile tissue glue. The urinary bladder catheter was then placed at the apex of the bladder and secured with a purse-string suture and cyanoacrylate glue. Two tunnels were made through

the abdominal wall and the 2 catheters were connected to the shunting port. Diluted iodinated contrast was used to flush the entire system under fluoroscopy guidance and to check for urine leakage. The patient recovered uneventfully and was discharged 48 hours after surgery. Five and 9 weeks after surgery the cat was well and SUB port revealed good patency.

Discussion: In the presence of normal renal function placement of a SUB was considered the best option to preserve the left kidney. The use of the SUB system is primarily indicated for ureteral obstruction, ureteral stricture and stent failure. It is considered the optimal solution to address ureteral strictures and resolve sterile traumatic cystitis. In the reported case, placement of the SUB system allowed preservation of the affected kidney and complete resolution of the clinical signs with no evidence of complications at 9 weeks after surgery.

IN VIVO FLUOROSCOPIC STIFLE KINEMATICS BEFORE AND AFTER TIBIAL TUBEROSITY ADVANCEMENT. Schwede M, Rebentrost P, Schmidt T, Böttcher P*. Department of Small Animal Medicine, University of Leipzig, Leipzig, Germany.

Introduction: The tibial tuberosity advancement (TTA) is described as a method to dynamically stabilize the canine stifle with cranial crucial ligament (CCL) rupture. Commonly, patients so treated have a good clinical outcome regarding improved limb function. While *ex vivo* studies attest stifle stability following TTA, instability may remain *in vivo*. During the TTA, one major objective is to produce a patellar tendon-tibial angle (PTA) of $\leq$90° at presumed mid stance stifle angle. Postoperative PTA is mainly dependent on the size of the implanted cage. By using a smaller cage than required, the PTA can be >90° and instability of the stifle can persist. The purpose of the presented study was to perform a fluoroscopic analysis of the stifles of dogs suffering from a complete CCL rupture before and after TTA. Special emphasis was applied on the dependence of stifle instability on postoperative PTA.

Methods: Eight medium to large breed dogs were included. The presence of CCL rupture was diagnosed clinically and confirmed via arthroscopy and the latter was also performed to treat meniscal injury. The radiographic pre-surgical planning was performed with the stifle at full extension using the common tangent method. Uni-planar fluoroscopic stifle kinematics was carried out whilst each dog walked on a treadmill. Dogs were examined immediately before and 6–8 weeks after TTA. The fluoroscopic analyses were evaluated subjectively by 2 independent observers for the presence of stifle instability that was defined as a clearly visible cranio-caudal displacement of the femur in relation to the tibia.

Results: Pre-operatively, all dogs showed a moderate to severe lameness as well as positive draw and tibial compression tests. Meniscal injury was noticed in 6 of 8 patients. Six to8 weeks after TTA the degree of lameness was visibly improved (absent to mild) in all dogs. Before performing the TTA, all dogs showed a cranio-caudal instability of the stifle during the fluoroscopic analysis. Six of the dogs showed a similar degree of cranio-caudal instability at follow up. PTA in the 6 dogs with remaining instability was both >90° (n = 2) and <90° (n = 4) while in the group of patients without a cranio-caudal movement (n = 2) also both variants of deviation in the PTA were documented.

Discussion: Contrary to the results of *ex vivo* studies, the canine stifle might remain unstable after treatment of a complete CCL rupture with a TTA in vivo. Independent of this observation, all dogs clinically improved regarding the degree of lameness. Furthermore, an influence of the PTA regarding the occurrence of instability seems to be unlikely. The effect of a meniscal injury in view of persistent stifle instability is also uncertain, as the majority of patients in this study had some form of meniscal surgery during TTA.

THE RELATIONSHIP BETWEEN BONE DEFORMITIES OF THE DISTAL FEMUR AND PATHOLOGICAL SEVERITY IN DOGS WITH MEDIAL PATELLAR LUXATION. Shinji Y, Kazuya E, Kenichi O, Koji T, Kenji T, Kazushi A, Tomohiro N. Nihon University, Fujisawa, Japan.

Introduction: Medial patellar luxation (MPL) is one of the most common orthopaedic disorders in dogs. It has been reported that various bone deformities occur in severe MPL cases. However, there have been no detailed studies on the objective measurement of the distal femur. We analysed deformities of the distal femur using computed tomography (CT) and evaluated their association with the severity of MPL.

Methods: Forty-six hind limbs from toy poodles were divided into 5 groups according to the Singleton grading system: normal, and grades 1 to 4. The trochlear groove was divided into 20 equal parts from the most distal to the most proximal site. The sulcus angle (SA), trochlear angle (TA), medial trochlear inclination (MTI), and lateral trochlear inclination (LTI) were measured. We set parameter, MC or LC, which represented the distance between the apex of the medial or lateral trochlear ridge and the most caudal point of the medial or lateral femoral condyle. MC or LC was then divided into 2 sides at the point of the intercondylar fossa: the trochlear side, MC(Gro) or LC(Gro); and the femoral condylar side, MC(Con) or LC(Con). The width of the medial or lateral condyle of the femur (MCW or LCW) was also measured.

Results: In the distal part of the trochlear groove, SA was significantly higher in the grade 4 group than in the other groups. TA tended to be decreased in the grade 4 group. MTI was significantly lower in the grade 4 group than in the other groups. There was no significant difference in LTI among the groups. MC/LC and MC(Gro)/LC(Gro) were significantly lower in the grade 4 group than in the other groups. By contrast, no significant difference was found in MC(Con)/LC(Con). MC(Gro)/MC(Con) and LC(Gro)/LC(Con) were significantly lower in the grade 4 group than in the normal group. We found no significant difference in MCW/LCW among the groups.

Discussion: In the grade 4 group, hypoplasia of the trochlear groove was detected, but no hypoplasia of the medial condyle of femur was found. Interestingly, hypoplasia of the trochlear ridge and subtrochlear bone was the primary anatomical abnormality in the severe MPL cases. The results of the present study are new findings related to bone deformity in severe MPL cases and contribute to a much better understanding of the pathophysiology of MPL in dogs.

EVALUATION PLASMA LACTATE CONCENTRATION AS PREDICTOR OF GASTRIC NECROSIS AND OUTCOME IN DOGS WITH GASTRIC DILATATION-VOLVOLUS: 18 CASES (2012–2014). Spinella G[1], Dondi F[1], Giunti M[1], Portaro F[1], Del Magno S[1], Musella V[2], Valentini S[1]. [1]University of Bologna, Ozzano E. (BO), Italy, [2]University of Catanzaro, Germaneto (CZ), Italy.

Introduction: Evaluation of plasma lactate concentration (PLC) has been widely investigated in veterinary literature during Gastric Dilatation Volvolus (GDV) in dogs. The aim of this study was to test the association of PLC at presentation with the presence of gastric necrosis and overall survival in dogs with GDV. The trend of PLC was also evaluated at 12 and 24 hours for prognostic purposes.

Methods: Dogs with GDV submitted to the Veterinary Teaching Hospital were identified (2012–2014). PLC at the time of admission (T0) and within 12 and 24 hours after surgery (T12 and T24) and outcome (death, euthanasia or survival) were recorded. All dogs were categorized by initial PLC range, presence or absence of macroscopic gastric wall necrosis and survival data. All data were submitted to non-parametric statistical analysis ($P \geq 0.05$).

Results: Eighteen cases met the inclusion criteria: 12 males and 6 females. The breeds included were: German Shepherd (7), Great Dane (2), Doberman Pinscher (2), Saint Bernard (1), Irish Setter (1), Neapolitan Mastiff (1), Siberian Husky (1), Belgian Shepherd (1), Corso Dog (1), mixed breed (1). Mean age was 8.5 years old (range 5.0–12 ys). Gastric wall necrosis was found in 7/18 dogs (39%). Twelve dogs (67%) survived to discharge from the hospital, while 6/18 (33%) didn't survive: 1 dog died intraoperatively, 3 dogs were euthanized during surgery because of extensive gastric necrosis and 2 dogs died in the postoperative period. Five out of 7 dogs (71%) with gastric wall necrosis did not survive. Median values of PLC at T0 in dogs with and without gastric necrosis were 2.7 mmol/L (0.9–12.7) and 2.7 mmol/L (1.9–16.4), respectively. PLC at T0 were also not significantly different between survivors (2.75 mmol/L, 0.9–16.4) and non survivors (2.65 mmol/L, 2.2–12.7). A significant reduction of PLC was found at T12 and T24 ($\geq$40%) compared to T0 in survivors.

Discussion and conclusion: Our study showed that PLC, evaluated on admission to hospital in 18 dogs with GDV, was not able to predict the presence of macroscopic gastric wall necrosis and/or mortality. These results are not concordant with the current literature, but cut-off values of PLC proposed to accurately predict necrosis in previous studies are extremely variable. The significant decrease in PLC shown from T0 to T12 and T24 in surviving dogs of our study suggest that lactate clearance is a more reliable prognostic indicator.

FUNCTIONAL ANATOMY OF THE ANTEROLATERAL AND POSTER-OMEDIAL BANDS OF THE CAUDAL CRUCIATE LIGAMENT IN DOGS. Tanegashima K, Ogawa T, Yasukawa S, Teshima K, Asano K, Nakayama T, Edamura K. Nihon University, Fujisawa, Japan.

Introduction: The caudal cruciate ligament (CaCL) in dogs is composed of 2 bands: the craniolateral band (CrLB) and the caudomedial band (CaMB). There have only been a few studies on the morphology and functions of each of these bands in dogs. Therefore, we aimed to investigate various parameter of the CaCL, as well as the functional anatomy of each band

Methods: This study was conducted using hind limbs (n = 12) obtained from the cadavers of Beagles. We observed structures around the attachment of the CaCl on the femur side. The attachment sites of each band on both the femur and tibia were identified using the quadrant method. The attachment area of each band was measured using image processing software. The CrLB and CaMB were divided into 2 and 4 small fibre bundles, respectively, and the orientation of each bundle was observed. Additional bands, when detected, were also recorded. The tensions and

lengths of the CaCL, CrLB, CaMB, and each divided fibre bundle were measured during stifle joint movement.

Results: No medial bifurcate ridge was observed in dogs. The CrLB originated from the intercondylar fossa of the femur, which is not the case in humans. The centre of the CaMB at the origin on the femur side was located 57.6% cranial to the caudal border of the medial condyle of the femur and 31.5% distal to Blumensaat's line. The centre of the CrLB was located 66.5% cranial to the proximal border of the intercondylar fossa of the femur and 34.9% distal to the innermost margin of the intercondylar fossa of the femur. The centre of the CrLB at the insertion site on the tibia side was located 33.1% lateral to the innermost medial edge of the tibia and 60.9% distal to the intercondylar tubercle. The centre of CaMB was located 37.4% lateral to the innermost medial edge of the tibia and 67.3% distal to the intercondylar tubercle. The areas of origin of the CrLB and the CaMB on the femur were 4.6% and 37.3%, respectively, and they were 1.5% and 6.9%, respectively, on the tibia side. Each small fibre bundle belonging to the CrLB and CaMB overlapped with each other. Additional bands were identified in 2 specimens. While the tensions of the CaCL and CaMB increased as the stifle was extended, the tension of the CrLB increased as the stifle joint was flexed. The entire length of both the CaCL and CrLB tended to shorten slightly in stifle flexion.

Discussion: The morphology and functions of the CaCL in dogs were clarified in greater detail. Compared with previous research, the differences in tension of the CaCL and each of its fibre bundles were smaller than those of the cranial cruciate ligaments. Also small changes in the length of the CaCL were observed during joint movement. This might be one reason why ruptures to the CaCL alone are infrequent.

PAIN RELIEF IMPROVES SLEEP IN DOGS WITH OSTEOARTHRITIS. Knazovicky D[1], Tomas A[1], Motsinger-Reif A[3], Lascelles BDX*[2]. [1]Comparative Pain Research Laboratory Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, [2]Center for Comparative Medicine and Translational Research, Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, [3]NCSU Bioinformatics Research Center, Department of Statistics, North Carolina State University, Raleigh, NC.

Introduction: Chronic pain due to osteoarthritis (OA) can lead to significant disruption of sleep and increased restlessness. We hypothesized that OA in dogs is associated with a disruption of sleep. Our objective was to assess whether canine OA is associated with night-time restlessness using objective measurement of night-time activity and owner-assessed quality of their pet's sleep.

Methods: The study was designed as a 2 part prospective masked, placebo controlled study using client-owned dogs (Part A $n = 60$; Part B $n = 15$). Inclusion criteria consisted of OA-associated joint pain and mobility impairment. The primary outcome measure for both parts was night-time accelerometry. In part B, quality of sleep of the dogs was assessed using a clinical metrology instrument (Sleep and Night-Time Restlessness Evaluation Score, SNoRE). Part A included dogs receiving 2 weeks of non-steroidal anti-inflammatory drug preceded with 2 weeks of no treatment. Part B was a cross-over study, with non-steroidal anti-inflammatory drug (NSAID) (meloxicam) /placebo administered for 2 weeks followed by a washout period of 1 week and another 2 weeks of the opposite treatment. Repeated measures analysis of variance was used to assess differences between baseline and treatment in activity. Linear regression and multivariable models were used to determine variables that influenced nighttime activity. SNoRE data were evaluated using paired t-tests.

Results: There were no significant changes in night-time activity as a result of NSAID administration. SNoRE measures indicated improvement in the quality of night-time sleep. The SNoRE instrument detected a positive improvement due to the NSAID ($P = .001$), but did not detect a difference between the NSAID and placebo ($P = .049$) after p-value adjustment for multiple comparisons. There was a significant ($P < .001$) moderate ($R^2 = 0.47$) correlation between the SNoRE and the starting CBPI pain score.

Discussion and conclusion: Canine OA does not appear to be associated with pain-induced sleep disturbance as assessed using accelerometry, but it is clear that sleep improvement occurred with pain relief, and other measured of sleep disturbance should be explored.