Universidade de Évora - Escola de Ciências e Tecnologia

Mestrado Integrado em Medicina Veterinária

Relatório de Estágio

Equine Clinic

Ana Isabel de Oliveira Carvalho Bota

Orientador(es) | Elisa Maria Bettencourt

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O relatório de estágio foi objeto de apreciação e discussão pública pelo seguinte júri nomeado pelo Diretor da Escola de Ciências e Tecnologia:

Presidente	|	Maria Eduarda Potes (Universidade de Évora)
Vogais	|	Elisa Maria Bettencourt (Universidade de Évora) (Orientador) João Paulo Marques (Associação Portuguesa de Acunpuntura Médico-Veterinária) (Arguente)

Évora 2024

DEDICATÓRIA

Dedico este trabalho aos meus Pais, as minhas estrelinhas que olham por mim lá de cima e cá em baixo, ao João, que tem uma paciência de santo para me aturar e que me apoia incondicionalmente, aos meus filhos Ilídio, Carolina, Beatriz e Joaquim que me dão força e coragem para lutar e alcançar os meus sonhos e objetivos, à Li que tem um lugar muito especial no meu coração, à Teresa pela sua amizade e a todos os que tornaram este sonho possível.

Um enorme Muito Obrigada!

ACKNOWLEDGEMENTS

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I would like to thank Prof. Dr. Elisa Bettencourt for all the support over the last step of this journey.

ABSTRACT

The aim of this report is to describe the activities carried out as part of the curricular internship for the Integrated Master's Degree in Veterinary Medicine at the University of Évora.

Firstly, there will be a brief contextualization of the internship period and a presentation of the casuistry monitored throughout the internship, in the different areas of general equine practice, with a description of some medical and surgical clinical cases.

This is followed by a literature review on the use of chiropractic and acupuncture as a complement to equine medicine.

Finally, a clinical case in which acupuncture and/or chiropractic were used as a complement to treatment are reported.

Keywords: Equine, Acupuncture, Chiropractic

RESUMO

O presente relatório tem como objetivo descrever as atividades desenvolvidas no âmbito do estágio curricular do Mestrado Integrado em Medicina Veterinária da Universidade de Évora.

Primeiramente será feita uma breve contextualização do período de estágio e uma apresentação da casuística acompanhada ao longo do estágio nas diferentes áreas da clínica geral de equinos, com descrição de alguns casos clínicos médicos e cirúrgicos.

Seguidamente, é apresentada uma revisão bibliográfica sobre a utilização da quiroprática e acupunctura como complemento na clínica de equinos.

Por fim, apresenta-se o relato de um caso clínico, onde a acupunctura e / ou quiroprática foram utilizados como complemento ao tratamento.

Palavras-chave: Medicina de equinos, Acupunctura, Quiroprática

GENERAL INDEX

CHART INDEX

TABLE INDEX

FIGURE INDEX

ABBREVIATIONS LIST

ACU – Acupuncture
CHIRO – Chiropractic
CT – Computed Tomography
DCP – Dynamic compression plate
DDFT – Deep digital flexor tendon
EOTRH – Equine odontoclastic tooth resorption and Hypercementosis
HPLT – High power laser therapy
IRAP – Interleukin receptor antagonist protein
IVF – Intervertebral foramen
LDD – Left dorsal displacement
LLLT – Low-level laser therapy
MC/MT3 – Metacarpus/Metatarsus third
MRI – Magnetic resonance imaging
NSAIDs – Non-steroidal Anti-inflammatory drugs
PKBM – Pferdeklinik Burg Muggenhausen
PRP – Platelet – rich plasma
RDD – Right dorsal displacement
SDFT – Superficial digital flexor tendon
SI – Small intestine
TCM – Traditional Chinese Medicine
TCVM – Traditional Chinese Veterinary Medicine
H – Heart
Pc – Pericardium
Liv – Liver
Sp – Spleen
Lu – Lung
K - Kidney
GB – Gallbladder
St – Stomach
LI – Large Intestine
B – Bladder
TH – Triple-Heater
GV – Governing Vessel
CV – Conception Vessel

1. INTRODUCTION

This report aims to describe the activities developed during the integrated traineeship of the master's degree in Veterinary Medicine from the University of Évora that took place between November 1st, 2016 and June 30th,2017, at Pferdeklinik Burg Muggenhausen (PKBM) situated between Cologne and Bonn, Germany.

PKBM is a reference equine clinic that is fully equipped to provide the best equine veterinarian medicine to the higher standards, due to the existing facilities and devoted team that ensured a twenty four hour service, 365 days/year.

During the traineeship it was possible to follow and participate in cases in the various areas of equine medicine, not only to treat illnesses but also in preventive medicine, allowing to acquire uncountable knowledge and skills and to put into practice all the competences learned over the five years of the veterinary medicine course.

A description of the PKBM facilities (Figure 1) will be followed by the summary of activities developed throughout the traineeship period, with special attention made to the approach on the different areas of equine clinical cases followed.

Furthermore, a bibliographical revision on chiropractic and acupuncture use in equine medicine will provide background to the presentation of a clinical case where chiropractic and acupuncture complementary therapies were used.

Figure 1. A) Facilities map. B) Pferdeklinik Burg Muggenhausen entrance.

2. TRAINEESHIP REPORT

PKBM is a reference equine hospital located between Cologne and Bonn, in Germany, at that time under the management of Dr. Coco Gather and Dr. Thomas Weinberger, having a team of 15 veterinarians, including my supervisor Dr. Simone Kaiser, and 36 staff members (specialized technicians, grooms, administrative workers, and maintenance workers), offering a wide range of services, extensive and optimal examination and treatment options in a pleasant environment for horses.

The facilities in PKBM are composed by 44 boxes (two isolation boxes, intensive care, surgery recovery, and rehabilitation boxes) (Figure 2), three paddocks, reception, waiting room, observation room, ultrasound room, X-ray room, surgery room, anesthesia room, recovery room, general laboratory, laboratory for processing staminal cells and IRAP therapies, pharmacy, offices for veterinarians and staff, feeding room, endoscopy room, dentistry room, MRI room, farrier facilities, emergency room with two permanent stocks (where standing surgery can also be performed), treatment room with one permanent stock where laser and shockwave therapies can be applied, library, indoor arena, canter track, 40x60 meters outdoor arena, scintigraphy room, meeting room, staff kitchen and rooms, two vehicles for ambulatory practice and one lorry for transportation.

Figure 2. PKB facilities: A) rehabilitation boxes, B) intensive care boxes, C) surgery recovery boxes, D) rehabilitation boxes, treatment room.

The day at PKBM starts with a meeting attended by all staff members to organize the daily work and also to allow everyone to participate on giving their suggestions or talking about concerns, not only on clinical cases but also on other subjects of matter. After the meeting, all veterinarians, trainees and technicians go for the morning round passing on the clinical history and treatment of every single patient admitted and, only after the round, the appointments and programmed surgeries began.

On Wednesdays, particularly, after the round a “Journal Club” takes place, with the presentation of cases or scientific articles for group discussion, and at the end of the day there is also an evening round.

During the traineeship, I was given the opportunity to follow not only my major area of interest, Acupuncture (ACU) and Chiropractic (CHIRO), but all the other areas of veterinary medicine, allowing for a vast knowledge and competence acquirement. All this was achieved due to the possibility of my active participation in appointments and procedures such as physical examinations, administration of medication through different routes, catheterization, nasogastric intubation, transrectal palpation, as well as other procedures that require more specific knowledge as blood analysis, endoscopy, general ultrasound (limbs, neck, abdomen, echocardiograms), x-ray, scintigraphy and MRI practice and interpretation, dentistry procedures, lameness exams with regional anesthesia and joint injection, surgery (vascular, reproductive, soft tissue, orthopedic, ophthalmic, upper respiratory), FP4 Laser and shockwave therapy. I also had the possibility to follow ambulatory practice, not only in ACU and CHIRO but in other areas such as racehorses sports medicine.

3. CASELOAD

This chapter intents to describe the work developed during the traineeship where 1596 cases were followed, distributed among the different areas as shown in the chart 1.

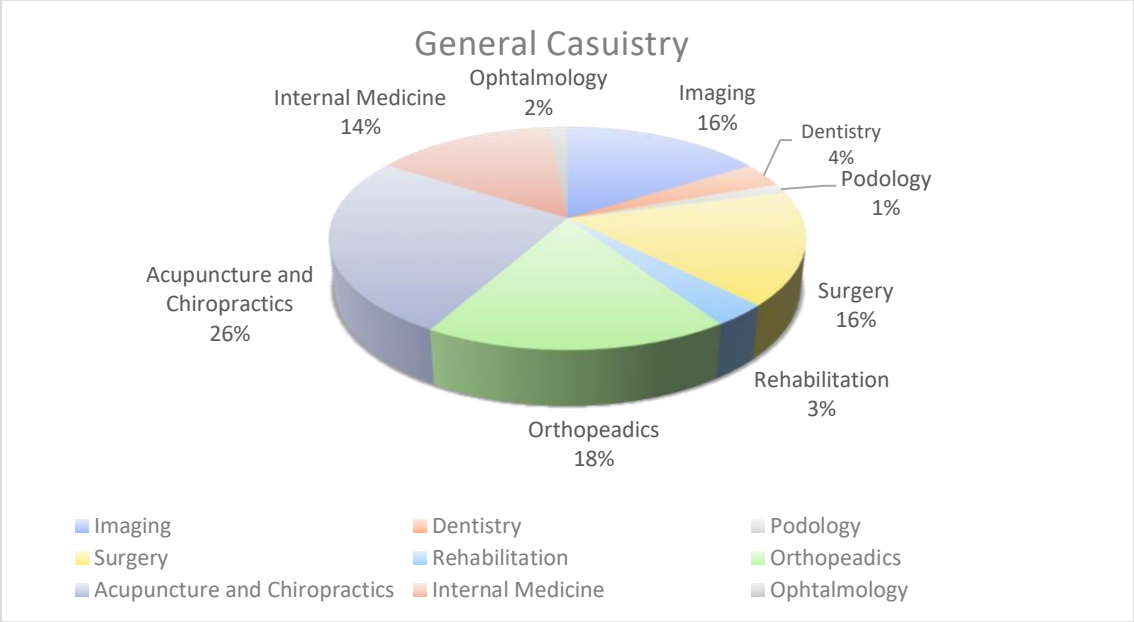

Chart 1. Clinical cases distributed by respective clinical areas (%; n = 1596).

The majority of followed cases were from ACU and CHIRO and Orthopedics. Not all cases in the different clinical areas were related to disease, but they have undergone procedures such as teeth maintenance, castrations, pre-purchase exams and maintenance treatments of ACU and CHIRO.

3.1. ORTHOPEDICS

Along the traineeship, 280 orthopedic cases were followed, of those 278 were lameness examinations, one pre-purchase examination and one mandible fracture (Table 1).

In order to diagnose the lameness, it was necessary to perform static and motion evaluation flexion tests, regional and / or intra-articular anesthesia and to complement the diagnosis with X-

ray, ultrasound, and, when necessary, specific exams such as scintigraphy and MRI. After completing the diagnosis in each case, an appropriate treatment was proposed and implemented.

Regarding the 278 lameness cases, 54 were submitted to X-ray, 33 to ultrasound, 49 to MRI, 61 to Scintigraphy and 107 were surgically treated.

Table 1. Orthopedic cases by diagnosis and region (n = 278).

Diagnosis	Region	Nr. Cases
Abscess	Hoof	3
Laminitis	Hoof	7
Lesion	Biceps	1
Osteomyelitis	Navicular	8
Traumatism	Limbs	2
Incomplete Fissure	Middle phalanx bone	2
Fissure	Metacarpus	11
Fracture	Sesamoid	2
	Metatarsus	7
	Olecranon	2
Osteoarthritis	Cervical articular process	4
	Dorsal Spinous process	4
	Distal Interphalangeal joint	16
	Proximal Interphalangeal joint	14
	Metacarpo/metatarsophalangeal joint	27
	Tarsal joints	11
	Carpal joints	19
	Radiocarpal joint	9
	Tarsometatarsal joint	10
	Tibiotarsal joint	9
	Humeralradial joint	3
	Femorotibial joint	34
	Coxofemoral joint	5
	Sacroiliac joint	7
Desmitis	Annular ligament	11
	Suspensory ligament	15
Tendinitis	Deep digital flexor tendon (DDFT)	16
	Superficial digital flexor tendon (SDFT)	19
	TOTAL	**278**

As PKBM is a reference center, the majority of the orthopaedical cases were referred by the patient's assistant veterinarian, especially the cases where complementary exams were fundamental to perform a more accurate diagnose to the lameness, to be able to have a precise and earlier recognition of the lameness.

An earlier recognition of the lameness is essential for a better prognose and a more effective treatment (Grisel, 2018).

Acknowledging that the existence of ongoing problems can lead to lasting repercussions, for which early handling should be prioritized. It can also complicate the effective management of lameness due to the advancement of both primary and secondary pathological conditions. (Grisel, 2018).

Conditions like osteoarthritis affecting the caudal cervical articular process joints have been noted in correlation with spinal cord compression, stiffness in the neck, and lameness in the forelimbs (Biggi et al 2018).

Radiographic anomalies encompassed joint enlargement of the articular process, periarticular formation of new bone, closure of the neighboring intervertebral foramen, radiolucent regions connected to the articular process, as well as variations in joint space width and irregularities in joint contour (Biggi et al 2018).

In such cases, the suggested treatment involves intra-articular injection of the affected vertebrae with a blend of corticosteroid options (triamcinolone, betamethasone, methylprednisolone, or dexamethasone), hyaluronic acid, and an antibiotic options such as amikacin or gentamicin. It is recommended to prioritize the use of methylprednisolone (at a dosage of 40 to 60 mg per joint) due to its extended duration of effectiveness (Maher, 2014).

3.2. PODIATRY

PKBM has a specialized farrier on the team (Figure 3), that takes part in the resolution and treatment of some hoof pathologies, with proper trimming of the hoof and in some cases corrective shooing (chart 2).

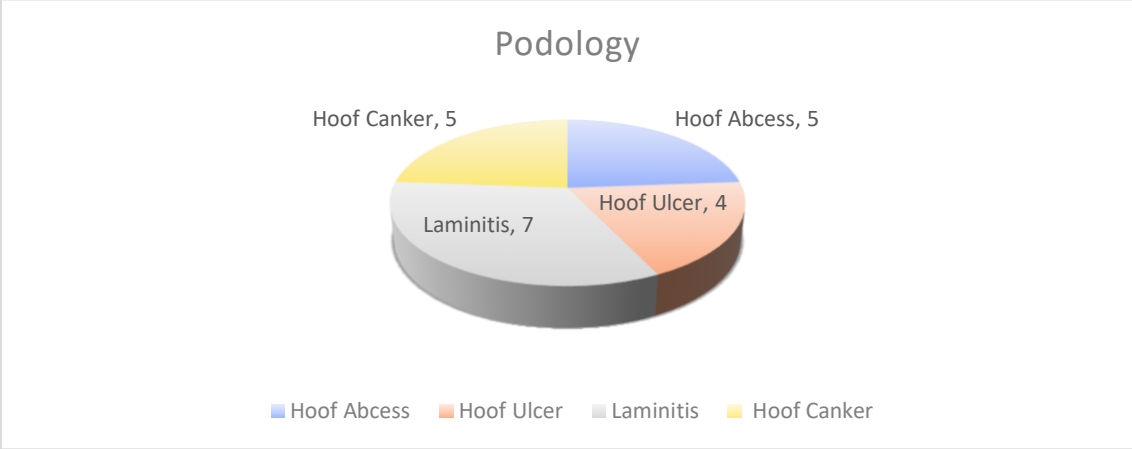

Chart 2. Podology cases (n = 21).

Hoof Canker

Hoof canker is a rarely encountered condition, presenting as a hypertrophic, moist dermatitis affecting both the frog and the bulbs of the heel. It has been identified as a gram-negative bacterial infection specifically targeting the stratum germinativum of the epidermis of the frog (Floyd & Mansmann, 2007).

This infection leads to an irregular production of keratin, referred to as dyskeratosis, which manifests as white, filamentous fronds of soft vegetative horn. The afflicted frog tissue is coated with a white, caseous exudate and may emit a foul odor.

In the early stages, horses may not exhibit lameness. However, in more severe instances, the infection can progress to affect the sole and wall around the heels, leading to significant inflammation of the underlying dermal layers. This can result in the exposure of sensitive tissues after the loss of keratinized frog tissue, causing pain and subsequently, lameness. It's worth noting that this condition can manifest in multiple feet simultaneously. While it is commonly associated with persistently damp and unclean conditions, which create an environment conducive to bacterial growth, it can also occur in horses kept in well-maintained stables (Floyd & Mansmann, 2007).

For a more precise diagnosis and early detection of the disease, it is strongly advised to perform a biopsy. This significantly contributes to the effective management of the condition. It is recommended to first clear away any necrotic debris from the site and then obtain a deep sample that encompasses the dermis. Histologically, canker is identified as a chronic pododermatitis primarily affecting the deep germinal layers of the epidermis, resulting in a focal, proliferative, papillary hyperplasia of the epidermis, with limited involvement of the dermis. Cultures are not particularly helpful, as they tend to yield a range of organisms, both aerobic and anaerobic. The most commonly isolated organism is *Fusobacterium necrophorum* (Floyd & Mansmann, 2007).

Currently, the most effective treatment approach involves a sequential process: first, thoroughly cleaning the affected foot; then, performing a cautious debridement of visibly diseased tissue. This is followed by the application of topical metronidazole. It is crucial to maintain a clean and dry foot environment, achieved using daily hoof bandage changes. During each bandage change, the foot should be cleaned with a surgical scrub detergent, and subsequently, metronidazole or a combination of metronidazole and 10% benzoyl peroxide in acetone should be topically applied until the disease is completely resolved (Floyd & Mansmann, 2007).

Debridement can be performed with the horse in either a standing position, utilizing regional local anesthesia and sedation, or under general anesthesia. In either scenario, it is essential to apply a tourniquet at the fetlock level using a latex bandage or a strip of rubber inner tube to control bleeding, as the affected tissue is highly vascular. This aids in facilitating debridement by providing clear visibility of the demarcation between normal and abnormal tissues. Using a scalpel, sharp hoof knife, electrocautery, or laser ablation, all necrotic, proliferative, and inadequately cornified tissue should be carefully removed down to the appearance of normal corium. Cryotherapy, employing liquid nitrogen, has also been utilized, but it is imperative to exercise great care to avoid damaging the germinal epithelium. As the infection typically remains confined to the epithelium, debridement should be approached conservatively to preserve the crucial germinal layers necessary for optimal healing. The use of caustic agents is discouraged for the same reason. Minor debridement may need to be repeated as deemed necessary. Topical metronidazole, formulated as a 2% ointment, is selected for its effectiveness against gram-negative anaerobic bacteria (Floyd & Mansmann, 2007).

A solution of 10% benzoyl peroxide in acetone, combined with metronidazole, has produced consistent success in 56 consecutive cases. Systemic antibiotics, including oral trimethoprim sulfa and metronidazole, have been used, but topical therapy is usually sufficient to effect a cure (Floyd & Mansmann, 2007).

The time needed for resolution typically averages around one month, and the outlook for recovery is positive. This is largely due to the fact that the replacement horn tends to be functional. This represents a marked improvement over earlier treatment protocols that recommended aggressive

debridement and the use of harsh antiseptics and astringents. These methods ultimately led to harm to the germinal tissues and hindered the healing process (Floyd & Mansmann, 2007).

Figure 3. A and B) PKBM farrier facilities.

3.3. INTERNAL MEDICINE

In total, 231 cases of internal medicine were followed, which are summed in the table 2 according to different medical areas.

Table 2. Internal medicine followed cases (n = 231).

Internal medicine followed cases		Nr. cases
Musculoskeletal	Ataxy	2
	Atypical Myopathy	1
Vascular / Cardiac	Aneurism, thrombose of left jugular vein	1
	Bilateral thrombophlebitis of jugular vein	1
	Vasculitis	1
	Aortic Valvular regurgitation and insufficiency	1
Reproductive	Scrotum Abscess	1
	Uterus hemorrhage	1
	Gynecological exam for artificial insemination	1
	Paraphimosis	1
	Preputium Oedema	1
	Testicular neoplasia	1
Skin	Left scapular laceration	1
	Laceration of left quarter	1
	Eczema	1
	Hives	2
Neonatal	Dummy foal	1
	Meconium obstipation	1
	Orphan foals	2
	Substitute mothers	2
Respiratory	Bronchitis	2
	Pleuropneumonia	1
	Pneumonia	5
	Larynx hemiplegia	2
	Sinusitis	1
	Lung infection	1
	Right nasal constriction due to neoplasia	1
	Pulmonary fibrosis	1
	Aspiration pneumonia	2
Neurologic	Vestibular syndrome, facial paralysis	1

Internal medicine followed cases (conti.)		Nr. cases
Infectious	Botulism	1
	Viral infection	1
	Guttural pouch empyema	1
	Guttural pouch mycosis	2
	Strangles	5
Urinary	Renal insufficiency	2
	Cystitis	1
Other	Anorexia of unknown origin	3
	Mandible abscess	2
	Cushing syndrome	1
	Fistula in the head	1
	Hepatomegaly	1
	Hyperlipidaemia	1
	Recurrent weight loss	1
	Peritonitis	2
	Septicemia	3
	Equine metabolic syndrome	1
	Neoplasia in the auricular pavilion	1
	Tongue oedema (Trauma)	1
Gastric	Stomach ulcer	14
	Parasitosis (Strongylids in stomach)	1
	Oesophageal obstruction	11
	Oesophageal diverticulum	1
	Rectum prolapse with rupture	1
	Colic	130
	Total	**231**

Guttural Pouch mycosis

Guttural Pouch mycosis consists in a fungal infection near or on the internal carotid artery and can extend to the maxillary artery. Although it has an unknown etiology, *Aspergillus* spp. is frequently cultured from the diphtheritic plaques. Fungal plaques develop inside the guttural pouch, and if they breach the walls of the internal, external, or maxillary arteries, it can lead to life-threatening hemorrhage. The most frequently observed clinical sign is unilateral epistaxis, occurring as the lesion erodes into the internal and/or maxillary arteries (Ducharme & Cheetham, 2014).

The most common clinical sign of guttural pouch mycosis is severe epistaxis caused by erosion of the internal carotid artery, external carotid artery and/or maxillary artery. Other clinical signs

include mucopurulent or hemorrhagic nasal discharge, coughing, dysphagia caused by cranial nerve damage (IX and X), unilateral laryngeal hemiplegia, Horner's syndrome, parotid pain, tongue paresis, and head shaking. Endoscopic examination of the nasopharynx can reveal hemorrhage from one or both nasopharyngeal openings (Ducharme & Cheetham, 2014).

The medical treatment for guttural pouch mycosis involves applying nonirritating antifungal agents that are known to be effective against *Aspergillus* spp. These agents include itraconazole, miconazole, and enilconazole. Specifically, the medical therapy entails the use of miconazole, which is administered at a dosage of 70 mg, diluted in 10 mL of isotonic saline. The preparation is administered under endoscopic control at the following schedule: Week 1: once a day, Week 2: Every other day, and Week 3-4: twice a week. Medical therapy can be justified if hemorrhage has not occurred, and the fungal plaques do not involve any blood vessels or if financial constraint prevents surgical options.

If vascular structures are involved, which is most common, the goal of surgical therapy is to occlude the affected arteries (Ducharme & Cheetham, 2014).

3.4. DENTISTRY

Having a regular oral examination and maintenance is extremely important for the horse welfare and the majority of the followed patients had a minimum of a biannual control.

As PKBM is a referral center, it was possible to follow not only routine maintenance procedures but also other more specific orthodontic disorders that were treated by the clinic dental specialist (Chart 3).

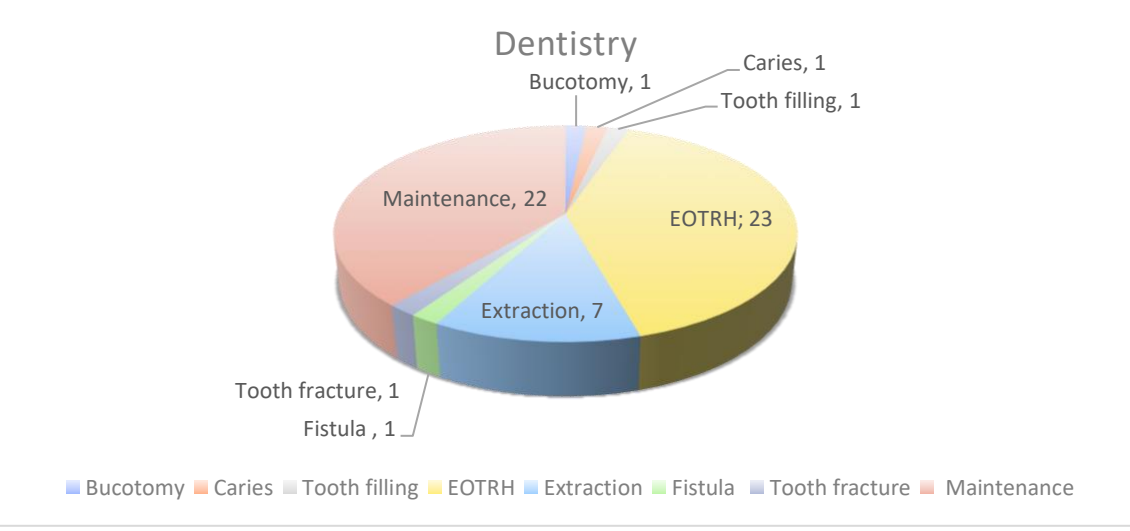

Chart 3. Dentistry cases (n=57).

Unlike many other species, equine teeth are in constant growth. The normal wear of the teeth occurs with the correct occlusion of the teeth while the horse chews. All types of asymmetries in occlusion, both premolars and molars, or incisors, result in asymmetric wear of the teeth (Dixon et al.,2011).

Clinical signs of dental disease are often not specific and may be reflected as systemic disorders, such as weight loss, diarrhea, colic, endocarditis, and septicemia (Dixon et al.,2011).

A complete dental examination includes detailed observation and palpation of both hard and soft oral tissues for evidence of pathological changes.

It is importance to question the owner about the horse's fitness and type of exercise, temperament, stable vices, eating and drinking habits, fecal consistency, physical abnormalities, details of the horse's eating habits and vices should be considered, along with changes in eating or drinking patterns, as described by (Easley & Tremaine, 2011).

Equine odontoclastic tooth resorption and hypercementosis (EOTRH)

Equine odontoclastic tooth resorption and hypercementosis (EOTRH), is an uncommon disorder of incisor and canine teeth of aged horses (Figure 4), with resorptive or proliferative changes of the calcified dental tissue and no plausible etiopathogenesis for this apparent immune mediated syndrome (Dixon et al., 2011).

Figure 4. Patient with EOTRH.

This disorder primarily affects the intra-alveolar aspect of the teeth and causes resorptive lesions extending into cementum, enamel, dentin, and pulp, causing marked loss of normal architecture in some teeth, this is originated by the presence of odontoclastic cells.

The resorbed areas and unaffected dental surfaces have irregular cementum deposition by cells of the periodontal ligament leading to hypercementosis in some areas, the pulp chambers of some

affected teeth present irregular cementum deposition over tertiary dentin lining the chambers (Dixon et al., 2011).

Clinical signs include periodontal disease that is occasionally associated with gingival ulcerations and purulent periodontitis, oral pain, and tooth mobility (Staszyk et al., 2008). Once these signs are apparent on oral examination, substantial changes of the intra-alveolar aspects of the teeth, in the periodontal ligament and in the alveolar bone are usually radiographically obvious.

Not being identical in all horses, radiological findings can be identified as dental resorption and bulbous enlargement of the intra-alveolar aspects of the teeth by radiopaque masses, that often occur concurrently, as well as loss of the periodontal space, disruption of the alveolar bone, osteomyelitis, and tooth fractures (Staszyk et al., 2008).

Affected animals may present clinical signs associated with pain, such as masticatory and biting problems, and halitosis.

Initially, this condition presents as mild gingival inflammation and oedema with small lytic changes observed in the mid reserve crown incisor on X-ray. With progression of the condition, draining tracts may develop in the gingiva, and this may be accompanied by gingival recession, or marked subgingival swelling of incisors, reflecting hypercementosis of their reserve crown and apex (Toit & Rucker, 2011).

Treatments with long-term antibiotics and steroids have been unsuccessful and extraction of affected incisors (Figure 5) has been the only treatment to improve the clinical signs associated with this disease (Toit & Rucker, 2011).

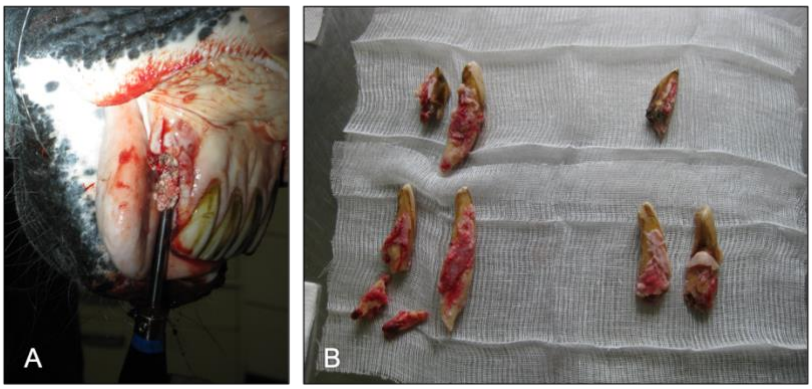

Figure 5. A) EOTRH tooth extraction, B) aspect of EOTRH extracted teeth.

3.5. SURGERY

During the traineeship 263 cases of surgery were followed, 12 ophthalmic, 12 soft tissues, 42 skin, 7 respiratory, 49 reproductive system, 107 orthopedics, 2 vascular and 32 digestive system (Chart 4).

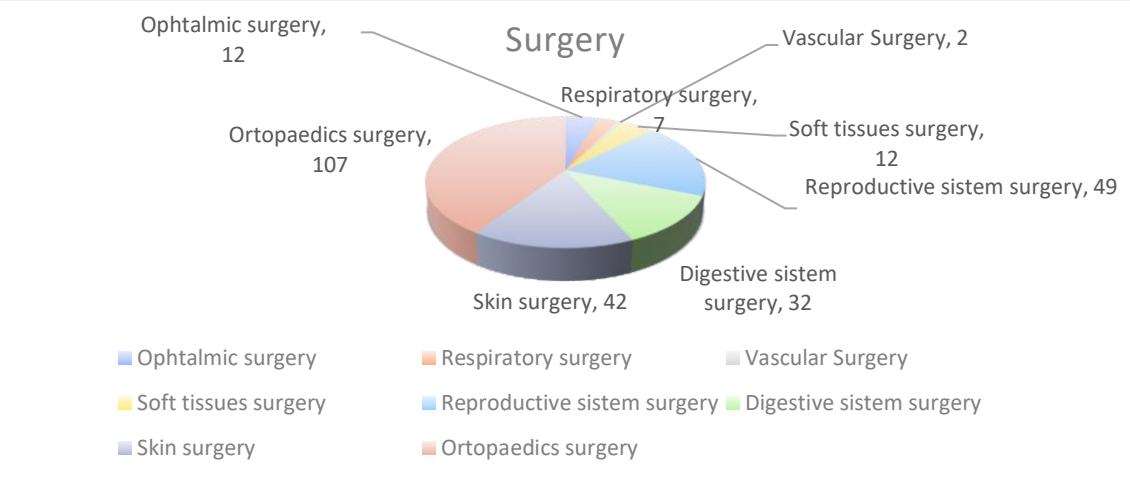

Chart 4. Surgery cases (n = 263).

3.5.1. Ophthalmic surgery

Diseases of the equine orbit may not be as common as diseases in other parts of the equine eye, but the impact of orbital disease is very high. The globe and orbit can be subject to trauma, inflammation, neoplasia, congenital disease, and extension of disease into the orbit from adjacent cranial cavities, particularly the sinuses. Recent advances in imaging techniques and their wider availability have opened the door for more elaborate medical and surgical therapy (Hartley and Grundon, 2017).

Table 3. Orthopedic cases by diagnosis and region (n = 12).

Surgical Procedure	Nr. cases
Enucleation	7
Keratectomy	2
Right orbit bone sequestration	1
Vitrectomy	2
TOTAL	**12**

Enucleation

Enucleation was the most observed procedure (Table 3) and it is indicated for the removal of a painful, blind, deformed, or traumatized eye, or where extensive neoplasia or infection renders survival of the globe unlikely or requires unreasonable pain for the patient. In some situations where only a single anesthesia is tolerable and the ipsilateral globe is visual, enucleation may be preferable to treatment of advanced disease. It is also important to ensure that the anesthesia and post-operative recovery are not of greater risk than the discomfort of the presenting condition.

The techniques for enucleation have been the same for the last years. If neoplasia or severe infection is present, the preferred technique is a closed transpalpebral method. If the ocular disease is contained within the globe or does not threaten the orbit, a transconjunctival approach is simpler, more easily performed, and results in less surgical trauma (Hartley & Grundon, 2017).

It is imperative to remove the nictitans, the eyelid margins, and all of the conjunctiva; otherwise, local or generalized dehiscence is likely to occur, with possible distension of the orbit with mucoid or mucoserous debris. Removal of the lacrimal gland from the dorsolateral orbit might be unnecessary. It is rarely entirely removed, even when intended, because of its protected location. Performing a complete resection of the medial canthus guarantees that there will be no dehiscence or drainage at the location of a persistent mucocutaneous junction after the removal or absorption of sutures (Hartley & Grundon, 2017).

During the traineeship, post-operative treatment of these cases consisted in control of the suture and local edema, and systemic treatment with Non-steroidal Anti-inflammatory drugs (NSAIDs) and large spectrum antibiotics.

3.5.2. Skin surgery

In total, 42 cases of skin surgery were followed (Table 4).

Primary wound closure should be performed within the first hours after injury in fresh, minimally contaminated wounds, with a good blood supply. The delayed primary wound closure should be performed before the formation of granulation tissue and it is used in severely contaminated, contused, or swollen wounds, and for many wounds that involve a synovial structure (Stashak & Theoret, 2014).

The choice of suturing technique and material can significantly influence the healing process of a wound.

Simple interrupted suture in skin wounds compared to continuous sutured skin wounds have been shown to have less edema, increased microcirculation, and greater tensile strength after 10 days, also simple interrupted suture patterns cause less inflammation than vertical mattress and far-

near near-far patterns (Figure 6). Synthetic monofilament sutures are less reactive and stronger and if absorbable, they are absorbed at a constant rate (Stashak & Theoret, 2014).

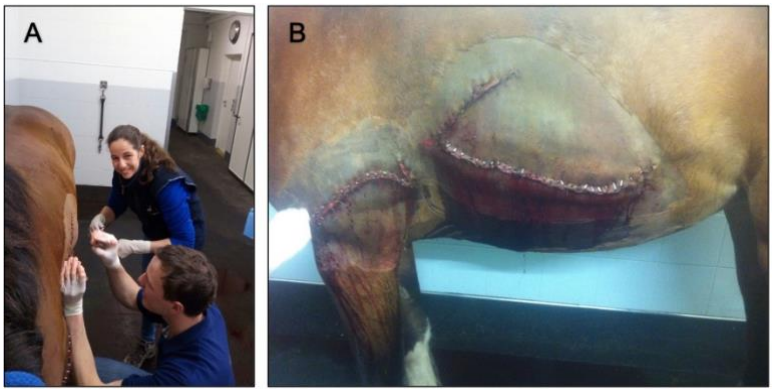

Figure 6. Wound closure with horizontal mattress suture.

Table 4. Skin surgery cases (n = 42).

Diagnosis	Region	Nr. cases
Laceration suture	Fetlock	7
	Carpus	3
	Scapula	4
	Metacarpus	7
	Radial / Forearm	1
	Torso	2
	Tarsus	3
	Pastern	1
	Breast / Peitoralis	2
	Tibial	2
	Vulva / Vulvaris	1
	Ear	1
	Coronary band	1
Removal	Foreign body in head	1
	Sarcoid	5
	Melanoma	1
	TOTAL	42

3.5.3. Orthopedic surgery

Over one hundred orthopedic surgery cases were observed during the internship (Table 5).

Table 5. Orthopedic surgery cases (n = 107).

Surgical procedure		Nr. cases
Arthroscopy with fragment removal	metacarpo/metatarsophalangeal joint	4
Arthroscopy	metacarpo/metatarsophalangeal joint	19
	carpal joint	6
	distal phalanx joint	5
	tibiotarsal joint	8
	tarsometatarsal joint	1
	radiocarpal joint	1
	femorotibial joint	15
Arthrodesis	proximal phalanx joint	2
	metatarsophalangeal joint	1
Osteosynthesis	middle phalanx incomplete fissure	2
	olecranon	1
	proximal phalanx	1
	metacarpal bone complete fissure	1
	frontal bone	1
	zygomatic bone	1
	sesamoid bone	1
	mandibula	2
Ostectomy	metacarpal splint bone	5
	metatarsal splint bone	7
Osteosynthesis plaque removal in Olecranon		1
Hoof perforation		3
Desmotomy of annular ligament		5
Fasciotomy of suspensor ligament		1
Palmar digital neurectomy		1
Tenoscopy of annular ligament		5
Tenoscopy throught the bursa of the digital flexor tendons		1
Annular ligament tenovaginoscopy		6
	TOTAL	**107**

Osteosynthesis

Fractures occur in horses of all ages and can involve almost any bone. Treatment of most fractures requires assessment and must be conducted systematically and thoroughly with a careful review of the injury anamnesis, its complexity and location, a thorough physical examination, different projection X-rays and assessment of related body systems (Nixon, 2020).

The prognosis of the fracture resolutions is determined by a group of factors such as type and location of the fracture, weather it is an open or closed fracture, the degree of concomitant soft tissue damage or vascular injury, age, breed and weight of the horse, cooperative nature of the patient, single or multiple fractures, length of time between injury and repair and effectiveness of first aid measures applied in the field (Nixon, 2020).

In foals, most third metacarpal and metatarsal fractures (Figure 7) can be repaired. Some short oblique or multiple fractures with a large butterfly fragment are ideal candidates for bone plating. In young foals, a single broad Dynamic compression plate (DCP) with additional lag screws to compress the butterfly fragment to the larger bone ends can result in primary bone union with minimal callus (Nixon, 2020).

Figure 7. A) antero-posterior (AP) projection X-ray of metacarpal comminuted fracture, b) laterolateral (LL) projection X-ray of metacarpal comminuted fracture. Images courtesy PKBM.

The treatment of choice and the most stable form of therapy for metacarpus/metatarsus third (MC/MT3) fractures is internal double-plate fixation (Schneider & Sampson, 2020) (Figure 8). While double-plate fixation is usually necessary in foals, it is always necessary in adults. The location of the plates is determined by fracture type and location.

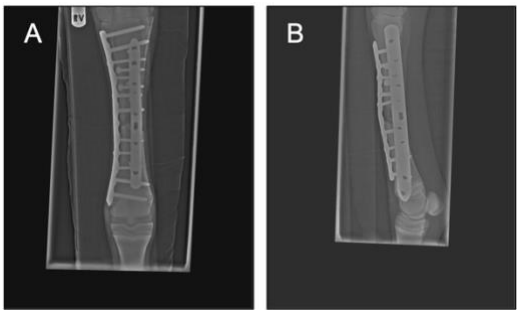

Figure 8. A) AP projection X-ray of metacarpal comminuted fracture osteosynthesis, B) LL projection X-ray of metacarpal comminuted fracture osteosynthesis. Images courtesy PKBM.

Other methods could include full limb cast in the forelimb and cast to the distal tarsus, transfixation pin cast, or a combination of internal fixation and a cast or transfixation pin cast. Casts are often not indicated after internal fixation in smaller foals.

Reduction of MC/MT3 fractures can be difficult. Comminuted fractures with large butterfly fragments are reconstructed into two-piece fractures by lag screw fixation of the free fragments to the proximal or distal piece of bone. The fracture is then reduced by alignment and interdigitation of the proximal and distal fragments. Following reduction, the plates are adjusted and fixed to the bone. The type of plates selected is determined by the size of the horse. The use of 5.5 mm cortical screws is recommended whenever possible but it is very important in the proximal two holes and distal two holes of each plate.

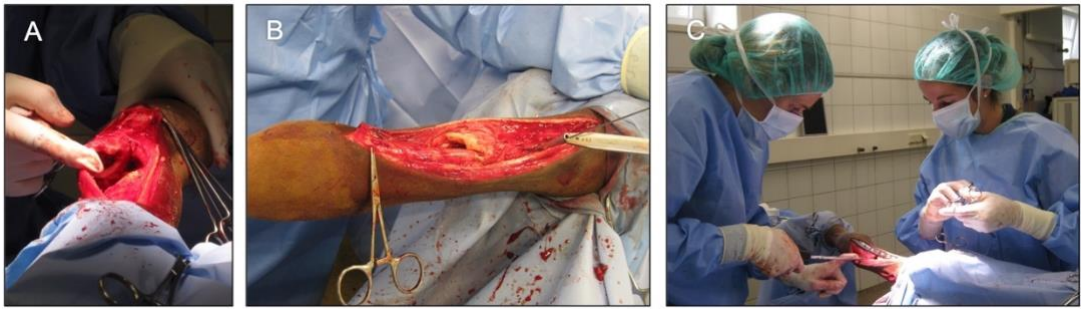

Figure 9. Metacarpal comminuted fracture osteosynthesis with DCO plate.

Any defects remaining in the cortical bone after reduction and fixation should be filled with autogenous cancellous bone. Cancellous bone facilitates bone formation at the fracture site. The most common sites to obtain cancellous bone in the equine species are the iliac crest and the fourth and fifth sternebrae, as performed in the showed surgery (Figure 9). Once the plates are in place and all the screws are tightened, skin closure is important to be accomplished with 0 or 2-0 non-absorb synthetic, monofilament propylene suture (e.g. Prolene®), in a vertical mattress pattern, splitting the thickness of the skin with the near pass of the suture.

A weak skin closure can be a future source of infection to the underlying implants in metacarpal/metatarsal fracture repairs. Osteomyelitis and sequestration are common complications following surgical repair of open MC/MT3 fractures (Schneider & Sampson, 2020).

The limb is supported in a large Robert Jones bandage. Prophylactic antibiotics are recommended as well as intraoperative lavage with antibiotic solutions. Phenylbutazone (4.4 mg kg^{-1}) is administered intravenously and continued orally for several days after surgery, it is also advised contralateral limb frog support, and bedding the stall deeply to encourage the foal to lay down.

Healing of a shaft fracture of MC/MT3 requires at least 90 days. The horse should be in a stable until follow up radiographs confirm that the fracture has healed. The most likely and severe complication is infection and can lead to bone healing failure. In some cases, even though the bone heals, failure results because of breakdown in the opposite limb (foals), due to excessive weight bearing on the good leg. If the fracture heals without complication, the implants should be removed in foals that are sound and whose intended use involves athletic performance (Schneider & Sampson, 2020).

Foals and small horses that are good candidates to stable internal fixation have the best prognosis. The same was true for the observed surgery (Figure 9).

3.5.4. Digestive system surgery

In table 6, the cases related to digestive system surgery are shown.

Making the decision to operate on a horse exhibiting signs of abdominal pain, should be straightforward.

Table 6. Digestive system surgery cases (n = 32).

Digestive system surgery	Nr. cases
Colon Right dorsal displacement (RDD)	8
Colon Left dorsal displacement (LDD)	3
Nephrosplenic entrapment	2
Esophagic Diverticulum (Diverticulectomy)	1
Small Intestine (SI) Epiploicum Foramen entrapment	3
Colon Impaction	1
Ileocecal intussusception	2
Rectal prolapse with rupture	1
Peritonitis	1
Jejunocecostomy	2
Jejunal volvulus	2
SI strangulating pedunculated lipoma	1
Cecocolic intussusception	1
SI mesenterial strangulation	1
Large colon volvulus	2
SI Adhesions	1
TOTAL	**32**

Theoretically, the animal requiring surgery is in pain, has distended intestine palpable on rectal examination, has abnormal characteristics to its peritoneal fluid, few or no intestinal sounds on abdominal auscultation, and, in the case of obstruction of the small intestine, significant volumes of fluid should be retrievable by nasogastric intubation (White & Edwards, 2001). Unfortunately, the theoretical and real worlds do not always coincide. Such is often the case with equine colic, where the type of obstruction, location, severity and the time passed since it has occurred, can variate the clinical signs at presentation.

Surgical intervention is indicated under the following circumstances:

1- The exact cause of the colic can be diagnosed, and the obstructing lesion requires surgery for its correction.

2- There is no exact diagnosis, but there is sufficient evidence to indicate that surgery is the only means of saving the animal's life.
3- Animals with recurrent colic over a period of days or weeks are suspected of having partial obstruction due to intussusception, neoplasia, adhesions, etc. (White & Edwards, 2001).

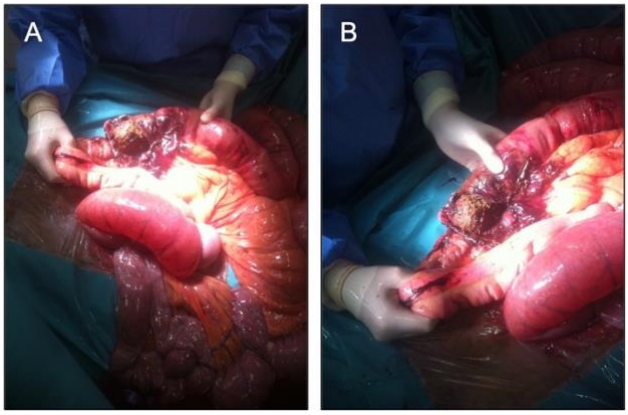

Figure 10. A and B) LI – ischemic left dorsal colon obstruction with rupture.

3.5.5. Reproductive system surgery

During the internship, regarding the reproductive system surgery procedures (Table 7), castration was the most observed procedure, followed by spermatic cord fistulas, and laparoscopic ovariectomy (Figure 11).

Figure 11. Laparoscopic ovariectomy.

Ovariectomy

The most common indication for unilateral ovariectomy of the mare is removal of a granulosa cell tumor. Other indications for unilateral ovariectomy include other, less common, ovarian neoplasia.

Bilateral ovariectomy may be indicated for mares with a congenital defect that prohibits breed registration without bilateral ovariectomy.

Most common indication for bilateral ovariectomy is to alleviate undesirable behavior attributable to a hormonal influence (Schumacher et al, 2013).

Table 7. Reproductive system surgery cases (n = 49).

Reproductive system surgery	Number of cases
Uterus adhesions	1
Penis amputation	2
Caslick	1
Castration	30
Castration cryptorchid	2
Spermatic cord fistula	4
Laparoscopic Ovariectomy	3
Ovarian hysterectomy (Tumor)	1
Castration (Testicular neoplasia)	1
Vulvoplasty	2
Prepuciotomy and falopexy	1
Caesarean section	1
TOTAL	**49**

3.5.6. Vascular surgery

Only two cases of vascular surgery were followed during the internship (Table 8).

Surgical occlusion of the carotid artery branches

Surgical occlusion of the carotid artery branches is indicated as therapy for guttural pouch mycosis when vascular structures are involved (Ducharme & Cheetham, 2014).

Most simply, the internal carotid artery on the affected side can be ligated. This can decrease the hemorrhage, but horses are still at risk for fatal hemorrhage due to collateral circulation through the circle of Willis and the palatine arteries. Alternatively, a combination of internal, external and palatine artery ligation and balloon angioplasty using venous thrombectomy catheters, coil embolization, or nitinol vascular occlusion plugs can be performed. Following occlusion of the rostral portion of the internal carotid artery, embolization coils/balloon/coils are then placed in the caudal portion of the vessels to prevent normograde blood flow. If the external carotid or maxillary arteries are affected, embolization coil vascular occlusion is performed in the maxillary artery just before the alar foramen, and in the external carotid artery, just after it bifurcates from the

linguofacial artery. When obstructing flow into the maxillary artery one should not ligate the palatine artery; instead, it should be catheterized so that the obstruction is located at the caudal aspect of the palatine bone; otherwise, blindness can occur due to steal phenomena (Ducharme & Cheetham, 2014).

Table 8. Vascular system surgery cases (n = 2).

Vascular system surgery	Nr. cases
Left jugular thrombus removal	1
Right carotid branches surgical occlusion	1
TOTAL	**2**

3.5.7. Soft tissue surgery

A total of 12 cases of soft tissue surgery were followed as shown in table 9.

Table 9. Soft tissue surgery cases (n = 12).

Soft tissue surgery	Nr cases
Encapsulated Hematoma in Left Posterior	1
Encapsulated Hematoma in m. peitoralis	1
Umbilical hernia	2
Exploratory laparotomy	4
Melanoma	1
Mesenteric lipoma removal	1
Cyst removal from right nostril	1
Mast cell tumor removal from m. masseter	1
TOTAL	**12**

3.5.7. Respiratory system surgery

Sinus Lavage

Horses with sinusitis frequently have unilateral or bilateral nasal discharge. Sinusitis can be primary if no underlying disease is present or secondary if the sinusitis is due to dental disease or fungal infection. Horses with primary sinusitis frequently have a history of recent upper respiratory tract infection. If the sinusitis is secondary to a cyst or neoplastic mass, facial swelling and deformity of facial bones can be detected as the mass expands within the sinus (Ducharme & Cheetham, 2014).

Because primary sinusitis frequently is a sequel of upper respiratory tract infection, *Streptococcus* spp. is frequently isolated. Penicillin or trimethoprim sulfonamides are appropriate antibiotics to use in the treatment of primary sinusitis, prior to receipt of culture results. In addition to systemic antibiotics, repeated lavage of the sinus with balanced polyionic solution decreases the exudate and dilutes the organisms and inflammatory mediators within the sinus. A chronic irrigation system can be placed following sinus centesis. Sinus centesis can be performed at the cranial or caudal maxillary sinus or frontal sinus. A point 2.5–3 cm dorsal to the facial crest and 3 cm rostral to the medial canthus marks the placement for centesis of the caudal maxillary sinus; 2.5–3 cm dorsal to the facial crest and 3 cm caudal to the infraorbital foramen permits access to the cranial maxillary sinus. Centesis of the frontal sinus is performed at a site midway between the medial canthus of the eye and the midline of the head. Following aseptic preparation, a 2–3 mL bleb of local anesthetic is injected subcutaneously. A stab incision is made through the skin and subcutaneous tissue and a 2 mm Steinmann pin in a Jacob's chuck is used to drill a hole into the sinus. Sterile polyethylene tubing is fed through the centesis site and fluid is aspirated using a needle and syringe attached to the tubing. If elected, a chronic irrigation system can be sutured in place. The chronic irrigation system permits irrigation of the sinus with 1–3 liters of solution two to four times daily until exudate is no longer produced (Ducharme & Cheetham, 2014).

Table 10. Respiratory system surgery cases (n = 7).

Respiratory system surgery	Nr. cases
Larynx hemiplegia – laser surgery	2
Sinus trepanation	2
Sinus lavage	2
Paranasal sinus cyst removal	1
TOTAL	**7**

3.6. REHABILITATION

During the internship, 51 cases of rehabilitation were followed (Table 11), being FP4 Laser treatment the most observed procedure (n = 32).

Table 11. Rehabilitation treatments (n = 51).

Rehabilitation	Nr. cases
Staminal Cells treatment	5
IRAP treatment	8
FP4 Laser treatment	32
Platelet – rich plasma (PRP) treatment	2
Shockwave therapy treatment	4
TOTAL	**51**

Laser Therapy

Recently, the application of medical laser therapy has become increasingly popular in equine orthopedics (Figure 12). At the cellular level, penetrated laser light gets absorbed by photo-acceptors, and triggers a cascade of biophysical effects such as activation of photons, synthesis of collagen and other proteins, increased cAMP levels, and cellular proliferation. As a result, medical laser therapy is deemed to accelerate cellular regeneration and thus healing. This is called the photo-bio-modulation effect. Presently, many devices are on the market, all with different application protocols about power, application duration, and emitted wavelengths. Low-level laser therapy (LLLT, power output of <500 mW) has already been applied in equine orthopedics for many years (Pluim,2019).

Recently, a vast amount of scientific peer-reviewed literature has become available on high power laser therapy (HPLT, output >500mW). HPLT typically applies a much higher power output when compared to LLLT. This may enable deeper tissue penetration, making it possible to produce an electromagnetic field of stable photo-bio-modulation under the skin, where the photo-acceptors are positioned, which is deemed necessary for achieving a proper healing effect.

HPLT seems a promising treatment modality for the healing of tendon tissue, which is notorious for its tendency to heal very slowly and for suffering re-injury when horses go back to their prior level of exercise (Pluim,2019).

3.7. ACUPUNCTURE AND CHIROPRACTIC

During the traineeship I was able to follow 412 cases (Table 5) of ACU and CHIRO appointments, not only with the purpose to treat but also to prevent and to diagnose underdeveloped conditions. Approaching this subject more thoroughly further in this report (chapter 4).

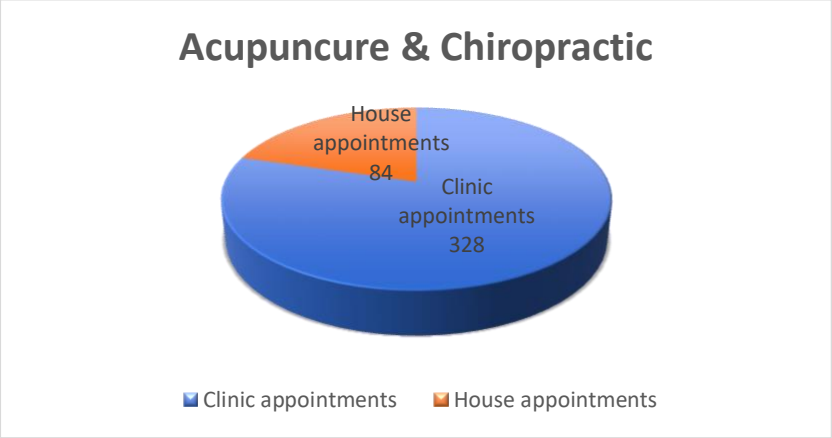

Chart 5. Acupuncture & Chiropractic cases (n = 257).

3.8. IMAGING

Scintigraphy

The basic principle of nuclear scintigraphy is the detection of gamma-rays, emitted from the decay of a radionuclide, by a gamma camera (Figure 12). When the radionuclide is attached to a specific pharmaceutical, a graphical representation of the physiological function, shape, size, and position of the target organ can be made. The clinical information obtained from the images depends on the biochemistry of the pharmaceutical, its interactions with the target organ specifically, and its transport through other tissues and organs (Driver, 2003).

Figure 12. PKBM Scintigraphy room.

While scintigraphy images give anatomical information about the target organ, the spatial resolution is poor compared to other imaging modalities such as radiography, magnetic resonance imaging (MRI) and computed tomography (CT). The main information obtained from the images is based on a physiological process of the target organ, e.g. in bone scans the turnover of bone and blood flow to the bone are assessed; in renal scans the glomerular filtration rate, tubular clearance or drainage can be assessed, depending on the radiopharmaceutical used. This is a fundamental principle when interpreting the images formed; it is not the anatomy of the organ that is being investigated but a physiological process associated with that organ. Therefore, as with all imaging modalities, scintigraphy should never be used in isolation for diagnosis, but in conjunction with a full clinical evaluation, and other imaging or diagnostic modalities, as required.

In the horse, scintigraphy has been used predominantly for the detection of bone pathology, particularly stress fractures and enthesopathies.

Scintigraphy is not only more sensitive in the detection of stress fractures than radiography but allows imaging of sites in which radiography would be difficult or contraindicated, such as the pelvis. Because of its sensitivity, it allows monitoring of the healing process so that horses may be returned to training at the correct time (Driver, 2003).

4. ACUPUNCTURE AND CHIROPRACTIC

4.1. ACUPUNCTURE

4.1.1. History and Concepts of Veterinary Acupuncture

Veterinary acupuncture has a long history, and it is closely associated with human acupuncture. Acupuncture has been systematized by the Chinese. They classified the points, described the meridians, and developed the laws of acupuncture from centuries of meticulous observations (Jaggar, 1994).

The term acupuncture drives its meaning from the Latin words ***acus***, meaning “needle” and ***pungare***, meaning “to pearce”. ACU is a method by which special solid metal needles are inserted into specific locations in the body called acupuncture points to prevent and treat disease (Jaggar, 1994).

Traditional Chinese medicine uses the concepts of Yin and Yang to portray and attempt to simplify an understanding of the dynamic nature of life in all its interrelationships. Everything is paired with its relative opposite and represented as Yin or Yang. Disease will eventually manifest when the body is in a state of imbalance, due to the combination of several causes that lead to it (Jaggar, 1994).

The basic principle of the Yin-Yang Theory is that yin and yang constantly interact with, and react to, each other to achieve a balance; thus, one cannot exist without the other, and each constantly affects the other. According to the theory, the universe is always in a dynamic state, trying to achieve an equilibrium between yin and yang. The interactions and reactions of all the organs and functions of humans and animals are thought of in the same way (Klide & Kung,1993).

The Yin-Yang theory is based on observations of natural phenomena. After observing the pattern and the regularity of movement of the stars, the Chinese assumed that the heavens moved, and the earth was stationary. The heavens were classified as yang, or having an active, positive quality and the earth as yin, or having a negative, passive quality. The sun was classified as yang, because its heat and light made things grow and it was considered active. The moon was classified as yin, because it represented diminished light and it was considered passive. The seasons and directions were also classified: The north and west were yin, the east and south were yang; autumn and winter were yin, summer and spring were yang. According to this theory, every organic and inorganic thing in the universe was classified either predominantly yin (passive) or yang (active) (Klide & Kung,1993).

4.1.2. Five Elements Theory

The Chinese developed the theory of the so-called Five Elements (Phases) to help detect where in the body a fundamental imbalance is occurring, once the signs of an imbalance have been recognized. The five elements are Wood, Fire, Earth, Metal and Water. This theory does not concern these elements as such; instead, it is a theory about the qualities represented by them, for which these substances are used as symbols (Jaggar, 1994).

Traditional Chinese Medicine (TCM) relates the Five Element theory to the body by identifying the qualities of the Five Elements in five organs, or five organ systems. These are named the Liver (Wood), Heart (Fire), Spleen (Earth), Lung (Metal) and Kidney (Water). These organs should not be construed as the anatomic organs. Though early Chinese doctors had a basic understanding of the anatomic viscera, here the reference is to particular body functions. Thus, in attempting to reconstruct TCM in terms of Western science, the Five Element "organ" termed “Liver” in TCM relates to the function of immunity; the “Heart”, to the function of the endocrine system, because of its function in coordinating the activities of all other organs; the “Spleen”, to the function of digestion; the “Lung”, to the function of respiration; and the “Kidney”, to the function of regulating the circulation and water in the body. However, this is not as obvious in the case of the spleen, and TCM includes other organs, such as the “Triple Heater”, for which there is no single corresponding anatomic organ. Comprehension of TCM requires study to understand the complexity of these metaphors; otherwise, there is no way to make sense of TCM terminology, which might speak, for example, about "the Fire of the Liver" or "Dampness leading to deficiency of Yin in the Kidneys." This concept is implicit in the Chinese theory of Five Elements, which incorporates the classic negative-feedback system as a necessary physiologic mechanism for biologic homeostasis (Jaggar, 1994).

The goal of treatment "is to correct the imbalance to shift Yin toward Yang, or Yang toward Yin, as needed."

The empiric science of acupuncture has determined a precise method for the application of needles to bring about the required shift in balance within particular organs and their functions. As the dynamic balance between organ systems is restored, the patient is restored to health(Jaggar, 1994).

Western diagnosis attempts to learn the nature of body disturbances from the clinical history, physical examination, and laboratory tests that may include blood and urine analyses, or in the reports of specialized procedures. Western medicine considers elevated or decreased biologic values to indicate hypofunctioning or hyperfunctioning of body systems. Both Western medicine and TCM attempt to return the body to a homeostatic state. However, they achieve this goal by different means. The Western approach tends to rely on use of drugs that either mimic or block

the action of the body's biochemistry, whereas the TCM approach is to apply acupuncture treatments to affect activity levels in the tissues of various organs of the body.

To generalize, the main difference in treatment between Western medicine and acupuncture is that Western medicine repairs structural damage, whether caused by microorganisms or trauma, whereas acupuncture repairs abnormal functioning of the tissues and organs of the body often by affecting neurologic or neurohumoral reflexes (Jaggar, 1994).

- **Characteristics of the Five Elements**

The five elements are not static, they are always dynamically in motion through the processes of growth and transformation (Klide & Kung,1993).

There are two aspects of change in the universe changes resulting from the growth and development of living organisms and the transformation of nonliving materials, and changes in the environment. Environmental changes directly affect the growth and transformation of living and nonliving materials. Chinese philosophy postulates five fundamental changes that take place in nature. These are related to the five elements of the universe and to environmental changes. Human beings and animals also go through five fundamental changes corresponding to the changes in nature. The interaction of the five elements serves as a description of the rule that regulates the universal pattern of changes. This interaction is duplicated in the organisms (Klide & Kung,1993).

The basic rule governing the interaction of the five elements is that of mutual creation and mutual destruction both of which occur simultaneously in the universe and in the organism to maintain equilibrium. Pathologic conditions occur when the regulated relationship of creation and destruction is disrupted.

The order of mutual creation is shown in figure 13: wood creates fire; fire creates earth; earth creates metal; metal creates water; and water creates wood.

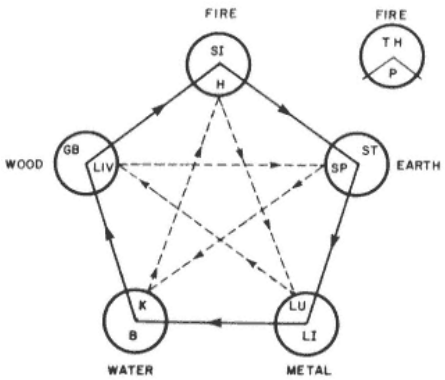

Figure 13. Diagrammatic representation of the Theory of Five Elements (Klide, AM and Kung, SH,1993).

The solid line is the creation (Sheng) cycle, and the broken line is the destruction/control (Ko) cycle. Small intestine (SI); Heart (H); Stomach (St); Spleen (Sp); Lung (Lu); Large intestine (LI); Kidney (K); Bladder (B); Gall bladder (GB); Liver (Liv); Triple Heater (TH); Pericardium (Pc).

Wood may be burned; therefore, it creates fire. The materials, being burned in the fire, become ash; therefore, fire creates earth. Earth is where the minerals are located from which the metal is extracted; therefore, earth creates metal. The moisture of the air condenses on metal to become water drop-therefore, metal creates water. Water provides the moisture necessary for the growth of vegetation; therefore, water creates wood.

At the same time, mutual destruction takes place. Mutual destruction, or inhibition, is designed to limit overdevelopment and excessive creation. The order of mutual destruction is also shown in figure 13: wood destroys earth; earth destroys water; water destroys fire; fire destroys metal; and metal destroys wood.

The roots of the tree stretch into the earth and absorb the nutrients; therefore, wood destroys earth. An earthen dam can limit the flow of water; therefore, earth destroys water. Fire melts metal, therefore, fire destroys metal. Metal can be an axe to cut down the tree; therefore, metal destroys wood. Each element creates and destroys another simultaneously, while it is being created and destroyed by another element. For example, wood creates fire and destroys earth while it is created by water and destroyed by metal.

The same principles are applicable to the Zang and Fu organs. Each Zang organ stimulates and inhibits another Zang organ and stimulates and inhibits a fu organ, and at the same time it is being created and destroyed by another Zang organ and another fu organ. The same is true for the fu organs (Klide & Kung,1993).

- **Cycles**

Placing these Phases on a circle makes it easier to visualize laws that govern the five elements. Two distinct cycles of the elements are used in diagnosis and treatment: the Sheng cycle and the Ko cycle (Limehouse & Taylor 1998).

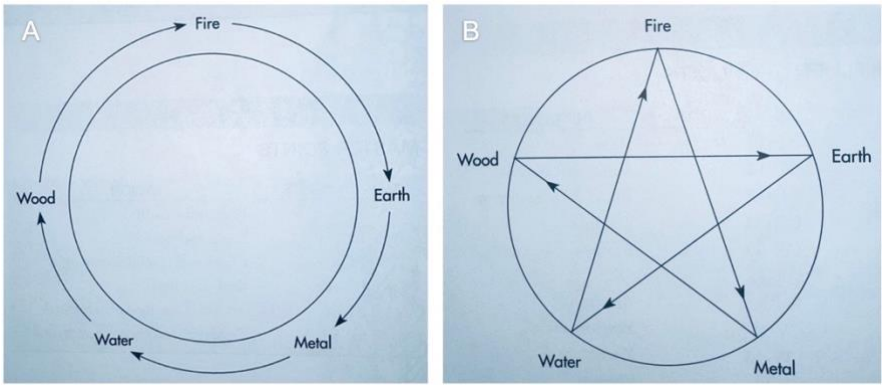

Figure 14. A) The Sheng cycle, B) The Ko cycle (Limehouse & Taylor, 1998).

The Sheng cycle

The Sheng cycle is one of creation or production. A certain phase creates another to its right in a clockwise fashion, which produces the next one, and so on around the circle. Therefore, Fire produces Earth, Earth produces Metal, Metal produces Water, Water produces Wood, and Wood produces Fire. More specifically when Fire burns, it produces ashes, which then go into Earth. From the Earth we receive ore, which is made into Metal, Metal at high temperatures becomes molten or liquid, which gives off steam, thus producing Water. Wood is produced from this Water, much as vegetation needs water or moisture to grow. When burned, this Wood gives off Fire, thus completing the Creative, or Sheng Cycle. Commonly used terms are Mother and Son. The promoting element represents the Mother, and the one it promotes represents the Son. According to these terms, Wood is the Mother of Fire and Fire is the Son of Wood (Limehouse & Taylor 1998).

The Ko cycle

The Ko cycle is one of control or destruction. Everything created in nature can be destroyed. Destruction is nature's way of keeping things in balance so that nothing can become harmful by being too powerful. Wood restrains Earth, Earth restrains Water, Water restrains Fire, Fire restrains Metal, and Metal restrains Wood. For example, Wood destroys Earth when its roots erupt through the Earth's surface and its leaves shadow or cover the ground. Earth destroys Water by damming the flow of Water through the Earth or absorbing it into the ground. Water destroys Fire in an obvious way. Fire destroys Metal by melting it. Metal destroys Wood by cutting into it or chopping it down. Other cycles represent disruptions, but that information is not pertinent to this discussion (Limehouse & Taylor 1998).

In Traditional Chinese Medicine (TCM) the Five Elements are used to categorize organs, tissues, senses, colors, seasons, and emotions. Early in the development of Chinese medicine the Five

Element theory was used to explain physiologic and pathologic processes in the body. The meridians and organs interact in a particular way when one part of the body is diseased. According to the Five Element theory, other tissues become involved because of the Creation may (Sheng) Cycle or Destruction (Ko) Cycle. For example, when the Liver has a disease, this disease can be transmitted to the Heart. In this instance the Mother is affecting the Son. When a disease of the Liver affects the Spleen, it may be described as Wood dominating Earth (Limehouse & Taylor 1998).

Treatment using the Sheng cycle

Specific points on each meridian correspond to each of the Five Phases, and points representing each of the Five Elements appear on each meridian. These points are referred to as command points and are used clinically in the Sheng cycle according to the theory of the "Mother-Son Law." This law states the following: “In a deficiency condition, tonify the Mother; in an excess condition, sedate the Son” (Limehouse & Taylor 1998).

Some clinical examples:

- Azotemia; chronic renal disease: This signifies a Kidney deficiency (Water) and it is treated by tonifying the Mother point (Metal) on the Kidney meridian (KI-7).
- Syncope; irregular, weak pulse: This indicates a Heart deficiency (Fire) and is treated by tonifying the Mother point (Wood) on the Heart meridian (HT-9).
- Hyperthyroidism with cardiomyopathy: This is an excess condition of the Heart (Fire) and is treated by sedating the Son point (Earth) on the Heart meridian (HT-7).
- Feline urologic syndrome with crystalluria: An excess condition of the Bladder (Water), feline urologic syndrome is treated by sedating the Son point (Wood) on the Bladder meridian (BL-65) (Limehouse & Taylor 1998).

Treatment using the Ko cycle

The same principles of tonification and sedation are followed when using the Ko cycle, but the theory (law) is as follows: “In an excess, tonify the Grandparent; in a deficiency, sedate the Grandparent”. In this situation, the "Grandparent" is the element that restrains or destroys (Limehouse & Taylor 1998).

Some clinical examples:

- Convulsions: This condition indicates Liver excess (Wood), which is treated by tonifying the Metal point on the Liver meridian (LIV-4).
- Canine infectious tracheobronchitis: This indicates a Lung excess (Metal) and is treated by tonifying the Fire point on the Lung meridian (LU-10) (Limehouse & Taylor 1998).

Treatment using both the Sheng and the Ko cycles

In this case the theory (law) is as follows: “In an excess, sedate the Son and tonify the Grandparent; in a deficiency, tonify the Mother and sedate the Grandparent” (Limehouse & Taylor 1998).

Clinical examples:

- Convulsions: This condition indicates Liver excess and is treated by sedating the Fire point and tonifying the Metal point on the Liver meridian (LIV-2 and LIV-4, respectively).
- Chronic renal disease: This indicates a Kidney deficiency. Treat by tonifying the Metal point and sedating the Earth point on the Kidney meridian (KI-7 and KI-3, respectively) (Limehouse & Taylor 1998).

4.1.3. The Concept of Qi

Qi (or Ch') is a Chinese word with several meanings. It is sometimes thought of as a "life energy" or "life force," that essence that makes something alive.

In the West, we think of things being matter or energy, or in terms of their potential to be converted from one to the other We do not ordinarily think of the gray area, where things are between these two states, or in terms that break down the distinction between them. Qi is concerned with this state, where there is no such distinction between matter and energy, and where something can be in a state varying in its tendency to materialize or become ethereal relative to the properties of some other substance (Jaggar, 1994).

Qi refers to the sum of patterns (of, for example, dynamic physiologic changes) that function to keep the body operating as a smooth whole. Qi in this sense is not a substance but an idea or principle of the smooth interaction of these rhythmic patterns or biorhythms within the body. It presents a synthesis of function (or dysfunction) of the body, in contrast to the Euro-American preoccupation with analysis (Jaggar, 1994).

Acupuncture uses a different paradigm for understanding health and disease than is used in the West. In the case of TCM, there are also difficulties of terminology. Symbolic systems are used to help understand the interrelationships between organ functions, for example, and to appreciate the effect of imbalance in the biorhythms and intercellular resonance (Jaggar, 1994). It attempts to correct the imbalance caused by an extreme of yin or yang when the body itself can no longer correct it. However, acupuncture does not correct the imbalance by directly manipulating yin or yang. It manipulates ch'i, the basic dynamic energy of the universe, which flows in a specific pattern throughout the body. Ch'i flows in the meridians, which link all the body organs to each other and to the surface of the body. Yin and yang flow in the form of ch'i within the meridians, and acupuncture tries to keep the balance of yin and yang in the body through the manipulation of ch'i by the needle.

The Theory of Five Elements, the classification of the Zang and fu organs, the "Ching Lo", or Meridian Theory, the concepts of ch'i, wei, ying, hsueh, spirit and fluid, the classification of Chi Heng Chih Fu and the four methods of diagnosis all extend the basic principles of the Yin-Yang Theory (Klide & Kung,1993).

4.1.4. Eight Conditions

TCM uses several methods to diagnose disease, including the Five Phases theory, the theory of meridians and collaterals, the theory of Qi and Blood, the theory of Yin and Yang organs (Zang-Fu), and differentiation of disease according to the Eight Conditions. Combinations of these

theories can be used to refine or expand on the diagnosis and disease process. For the experienced doctor, diagnosis depends on understanding the cause or causes of the disease. Without an understanding of the Eight Conditions, most of TCM is incomprehensible (Limehouse & Taylor 1998).

The Eight Conditions are expressed as opposites: Yin and Yang, internal and external, cold and hot, and deficiency and excess. Based on a primary consideration of Yin and Yang pathology, these principles allow further identification of the location, quality, and quantity of the pathogenic factor (Limehouse & Taylor 1998).

Characteristics of each subdivision become useful when using this aspect of TCM in diagnosis. Yin and Yang are general terms that usually incorporate the other six conditions, because Exterior, Heat, and Excess are Yang, and Interior, Cold, and Deficiency are Yin. Interior and exterior refer to the depth and location of the disease and are useful in identifying the exogenous etiology as well as the course of development. Pathogens rarely invade the interior without first passing through the exterior. Heat and cold describe the quality or nature of the disease and the activity or reaction of the body and provide clues as to whether warming or cooling herbs should be used in treatment. Finally, the terms excess and deficiency indicate the relative strength of the pathogen versus antipathogenic Qi (Wei Qi). If the Wei Qi is strong or compromised, the strength of the antipathogenic factor itself and the presence of either hypofunction or hyperfunction of the Zang-Fu organs involved must be considered. One of the most important conditions in classifying disease, this differentiation between excess and deficiency determines whether the treatment should involve stimulating or sedating (Limehouse & Taylor 1998).

The Eight Conditions are seldom expressed singularly; TCM practitioners rarely speak of a simple "Yang" or "Cold" condition. More commonly, these principles are considered together to describe the condition at hand. For example, the dog who has a fever and a harsh, loud, productive cough with yellow mucus is described as exhibiting a Lung Yang excess with Heat signs. The elderly cat with failing kidneys who moves slowly, meows weakly, and seeks heat shows a pattern characteristic of a Kidney Yin deficiency with Cold (Limehouse & Taylor 1998).

4.1.5. The Zang and Fu Organs

An organ in traditional Chinese veterinary medicine differs from its Western counterpart in that its definition includes more than the function of the isolated organ itself. An organ is defined as the physical organ itself, including all its functions, the relationship of its functions to the other organs, and the functions of the other organs that specifically interact with it. It has a specific yin or yang characteristic, and it possesses a specific and individual ch'i that interacts with the ch'i of the other organs and the total ch'i of the body (Klide & Kung,1993).

The six Zang and six fu organs are visceral organs. The Zang organs are yin; the fu organs, yang. Each is assigned an element as well as a specific function. In general, the Zang organs are responsible for the absorption, transformation, and transportation of nutritive elements; the fu organs are responsible for storage and excretion. The visceral organs mediate between the ch'i of the universe and the ch'i of the body. They absorb the ch'i of the universe as the nutrients and excrete the ch'i of the organisms back into the universe as waste (Klide & Kung,1993).

The Zang organs, which are relatively solid, are the heart, pericardium, lung, liver, spleen, and kidney. The fu organs, which are hollow, are the gallbladder, small intestine, stomach, large intestine, triple-heater, and the urinary bladder.

The Zang and fu organs interact with each other to form a closed and balanced system in which all life-sustaining functions take place. Each Zang organ has a corresponding fu organ, with which it has a permanent relationship and must be in balance in accordance with the theories of Yin-Yang and of Five Elements. Because of the close relationship of these organs, pathologic changes in one organ influence and are reflected in other organs. The signs of disease are both on the surface and readily apparent, and subsurface and not readily apparent. In diagnosis, if disease of a Zang organ is suspected, its corresponding fu organ is checked and vice versa. Generally, diseases of the fu organs are less severe and are more responsive to treatment; diseases of the Zang organs are more severe and less responsive. Each organ manifests its pathologic condition through a specific orifice, color, pulse, taste, and fluid secretion, all of which are checked when disease is suspected (Klide & Kung,1993).

Table 12. The Five Categories in Nature and Living Beings (Adapted from Klide, AM and Kung, SH,1993).

Five Elements	Wood	Fire	Earth	Metal	Water
Five Seasons	Spring	Summer	Late Summer	Autumn	Winter
Five Directions	East	South	Center	West	North
Five ch'i	Wind	Fire, heat	Moisture	Dryness	Cold
Five tsang organs	Liver	Heart	Spleen	Lung	Kidney
Five fu organs	Gallbladder	Small intestine	Stomach	Large intestine	Bladder
Five Colors	Green	Red	Yellow	White	Black
Five tastes	Sour	Bitter	Sweet	Spicy	Salty
Five pulses	Taut	Full	Slow	Light	Deep

- **The** Zang **Organs**

The Heart (H)

Blood converges in the heart and is sent out to various parts of the body. The pulse reflects the characteristics of blood flow and the state of circulation.

Because the heart is the main organ of circulation, any changes in heart function affect the physiological activity of the blood and pulse. The physiological conditions of the heart, blood, and pulse are reflected by the condition of the inside of the mouth and the color and brightness of the hair, because the ch'i that carries the nutritive elements of the blood makes the hair smooth and shiny, and the mouth red. When the heart is overworked or weak, the blood does not transport nutrients properly, and the hair looks dry and dull, and there are changes in the color of the mouth.

Clinical practice has proven that if the tongue is scarlet red, it is a symptom of an excess of fire. If the tongue is light red, it is a symptom of an insufficient amount of blood and ch'i; furuncle on the tongue is a symptom of heat accumulation in the heart meridian.

The heart is related to the small intestine, a fu organ (Klide & Kung,1993).

The Pericardium (Pc)

The pericardium surrounds the heart and has two functions: to protect the heart and to enable the blood to flow to and from the heart.

When disease invades the body, the primary function of the pericardium is to fight the invasion and protect the ch'i of the heart from being destroyed, because the heart by controlling the blood flow, controls the life-sustaining activities of the organism. The pericardium may be considered a separate Zang organ (bringing the total number to six), or part of the heart. When counted as a separate organ, it is related to the triple- heater, a fu organ. The pericardium is also known as "heart constrictor", and "envelope of the heart" (Klide & Kung,1993).

The Liver (Liv)

The liver supports and nourishes growth and promotes the ch'i related to all growth functions. It is most important for the liver ch'i to avoid congestion and retardation. Liver diseases produce yin symptoms. The signs include an upward gaze and dazed expression, unstable gait, foaming at the mouth, tight jaw, stiff neck, distended abdomen, dyspnea, and conjunctivitis.

The liver and kidney are related. If the kidney cannot nourish the liver, a disease resulting in an excess of liver yang will occur. Acupuncture points are used to promote the strengthening of the kidney yin and the moderation of liver yang.

The liver retains the most nutritive elements of the blood and regulates the quantity of blood in the body. When the animal is quiet and at rest, part of the blood flows into the liver and is stored there. During activity, when the energy of the body is being spent at a faster rate, the rate of blood flow increases, and the blood stored in the liver is released into the meridians to be circulated through the Zang and fu organs to provide nourishment for the body.

Nourishment of the eyes originates in the liver. Under normal conditions and with proper nourishment, the eyes are sharp, bright, and clear. With improper nourishment, the eyes appear dull and are dried and irritated. Also, vision seems to be impaired, and dizziness occurs. When animals are infected by disease, the symptoms of the eyes differ according to the type of resulting imbalance. For example, if there is excessive wind and heat of the liver and its meridian, the eyeballs protrude, there are congestion, opacity, and sticky eyelids. For excessive cold, the eyes are hypersensitive to external irritation.

The liver supplies blood to the muscles for their activities and is related to the flexion and extension of the joints. Under normal conditions, the liver nourishes the muscles by providing them with nutrient-laden blood, resulting in normal muscular activities. If the liver is not functioning properly, nourishment of the muscles and joints is not normal. The following symptoms may appear: convulsion, opisthotonos, stiff neck, and muscle spasm. An insufficient amount of the blood from the liver results in softness and thickness of hoof and paw keratin, and retardation and disturbance of their development.

The liver is related to the gallbladder, a fu organ (Klide & Kung,1993).

The Spleen (Sp)

After food is absorbed and digested in the stomach, some ch'i must be absorbed for use and some ch'i may be excreted. The function of the spleen is to extract the useful (nourishing) ch'i from the useless ch'i and dispatch it to the lungs, where it combines with the ch'i of the universe to form ching ch'i. The ching ch'i enters the meridians and is transported to the rest of the body. Also, the spleen sends the gaseous ch'i to the lung to be excreted.

If the spleen is weak and digestion of water, grain, and grass is insufficient, the symptoms are abdominal distension and diarrhea. The sick animals are skinny, suffer general malaise; and their limbs are fatigued and weak.

The spleen functions to transform water and moisture into the ch'i of the body. A weakness in splenic ch'i decreases the efficiency of this water and moisture transformation. In mild disorders,

there is a loose stool. In severe disorders, water and moisture overflow below the umbilicus, becoming edema and ascites.

If wind and cold invade the body and affect the spleen, coldness of the ears and nose, excessive motions of the head and tail, lying on the ground with body bent, twisting limbs, rumbling intestines, and diarrhea may result. These symptoms are caused by extended periods of exposure to cold winds and rain during feeding, exposure to frost and snow, excessive thirst, and excessive drinking of cold water on an empty stomach.

The growth of the muscles of the mouth and lips depends on the nutrients (which are the essential parts of the water, grains, and grass) transformed by the spleen. With insufficient nutrients, the animal becomes skinny and weak, and the hair coarse and loose. In clinical practice, it is possible to appreciate the relationship of the mouth and tongue muscles to the spleen for example, when splenic function is normal, the muscles are rich and full, and the interior of the tongue and lips (oral mucosa) is moist and shiny. When splenic function is abnormal, muscle bulk is lean, and the oral mucosa is pale. If the spleen is cold, the lip is twisted; if the spleen is poisoned, the lips become swollen (Klide & Kung,1993).

The Lung (Lu)

Ch'i may be understood in two ways: one is the functional ch'i of respiration; the other is the ch'i of the animal. The ch'i for respiration is the process in which the lung continuously inhales uncontaminated ch'i of the universe and exhales the unwholesome ch'i. Thus, under normal conditions, the lung is able to distinguish the clear from the contaminated ch'i of the body, and the lung provides swift and comfortable respiration. If the lung is sick, the clear ch'i cannot be inhaled and the contaminated ch'i cannot be readily exhaled, and cough, shortness of breath, and purulent nasal discharge result. This the lung controls the ch'i of respiration (Klide & Kung,1993).

The ch'i of the animal is composed of the vital elements of the body, without which the body dies. The ch'i of the body is constantly renewed from the intake of ch'i from the water, grains, and grass. However, without the ch'i of respiration to inhale the clear and exhale the contaminated portions, the ch'i from water, grass, and grains cannot sustain the life of the animal. In the process of respiration, the contaminated ch'i is exhaled and the clear ch'i is inhaled, combining with the ch'i of the water, grass, and grains to become the ch'i of vitality. Thus, the life processes are maintained. Clinically, the high and low levels of lung ch'i determine the strong or weak physical condition of animals.

The lungs control the ch'i of breathing, but inhalation and exhalation take place through the airways of the nose, clearly indicating an intrinsic relationship between the nose and the lungs. Clinically, the signs from the nose are related to the functional state of the lungs. For example, in horses and donkeys with asthmatic lung disorders, noisy breathing, flaring of the nostrils, purulent

discharges, and offensive odors from the nose are evident. These can be treated by needling the lung meridians.

Some of the usable ch'i derived from undigested food collects in the lungs. After combination with the clear ch'i of respiration, it is transported from the surface of the lungs to the surface of the body, where the skin and muscles are located. It then becomes wei ch'i, which protects and fortifies the body surface against the invasion of diseases. If the ch'i from the lung is weak, the wei ch'i is insufficient. The defense mechanism is then weakened, and disease may invade the body. The sick animals may develop fever, chills, fu pulse, and nasal discharges. If these disorders are not treated soon enough, symptoms such as coughing, shortness of breath, and redness of the mouth appear.

Treatment consists of cleaning the lung and fortifying the body surface to prevent further influence by the wind. The skin must also be cleaned. If domestic animals are not bathed in the summer, dirt may obstruct the hair orifices, causing an imbalance between the temperatures of the interior and exterior of the body (yin and yang). Thus, heat accumulates in the heart and thorax, affecting the lung; and the heat of the lung produces the wind that causes itchy skin. Sick horses may be itchy over the entire body surface, or they may have small extremely itchy papillary rashes. The sick animal loses normal appetite, becomes skinny, loses hair, and has crusted skin (Klide & Kung,1993).

The larynx, located the upper end of the trachea, is the passage of inhalation of lung ch'i. It is also the organ of vocal function. When the lung malfunctions, vocal changes occur. Other symptoms such as laryngeal edema and frequent hemorrhage of the larynx and lung are related.

Diseases of the larynx also spread to the lungs; for example, if laryngeal edema is not diagnosed and treated early enough, coughing and purulent nasal discharges will develop. Treatment for this type of disease expels the heat of the lung, cleans the larynx, and relaxes the respiratory muscles, thus opening the thorax and creating a favorable condition for the diaphragm by managing the fire.

The Lung is related to the fu organ, large intestine (Klide, AM and Kung, SH,1993).

The Kidney (K)

The kidney stores the surplus ching ch'i. The water, grain, and grass possess their own ching ch'i when they enter the body. This, plus the surplus ching ch'i not used by the body, is stored in the kidney. The ching ch'i is stored in fluid form and is called kidney fluid. There is a constant conversion of the body ching ch'i into stored ch'i and a simultaneous conversion of the stored ch'i for the use of the whole body. The kidney also controls the flow of excessive water for excretion and therefore regulates the quantity of water retained by the body.

A coordination of the right and left kidneys catering to the need of the individual depends on the balance of yin and yang. An insufficiency of yang causes diarrhea, and an insufficiency of yin causes constipation and oliguria. Treatment for the former is "warm strengthening" of the kidney; treatment of the latter includes the nourishment of kidney yin. Furthermore, when kidney function is disordered, a disturbance of the transformation of ch'i makes it impossible for the ch'i to condense into kidney fluid and may cause an accumulation of the fluid, resulting in edema, ascites, and bladder retention.

For treating these diseases, it is necessary to strengthen the kidney yin and kidney yang so that the two may properly regulate the fluid of the body. The kidney has its own ch'i, which is also referred to as kidney yin. This ch'i controls reproduction (Klide & Kung,1993).

The ch'i stored in the kidney includes the ch'i for copulation. When domestic animals become mature, they have enough ch'i for reproduction. When they grow old, the production of ch'i diminishes or even stops and reproductive ability is reduced or lost. Clinically, reproductive disorders include an insufficient sex drive in the male animal, sterility, and an inconspicuous and inaccurate mating period in the female. The treatment for this type of disorder is to strengthen the kidneys.

The kidney produces and regulates water. The kidney fluid is yin; and where there is yin, there is yang. If physiological condition is to be normal, yin and yang must be in balance. Therefore, a balance of water and fire is mandatory to maintain good health. The fire of the kidney is the fire of the "gate of life", the manifestation of which is the sex drive. If the fire of the gate of life is insufficient, impotency and other symptoms of reproductive disorders will appear. If the fire of the gate of life is in excess, the sex drive will be hyperactive. Therefore, the treatment of the former disorder is tonification of the kidney and strengthening of the yang; treatment of the latter is tonification of yin and lowering of the fire (Klide & Kung,1993).

- **The Fu Organs**

Because each fu organ has a relationship to one of the Zang organs, illness in a fu organ is first manifested in a Zang organ. These manifestations are easily recognized (Klide & Kung,1993).

The Gallbladder (GB)

The gallbladder stores bile. It is considered the "pure" organ because, while the other fu organs store the nutrients and residues of the digested water, grass, and grains, bile from the gallbladder is a pure product that is secreted into the small intestine to help digestion.

The liver is yin and the gallbladder is yang. In clinical practice, it is not uncommon to see gallbladder disorders. In most cases they are a pathological sign that the yang of the liver has overflowed (Klide & Kung,1993).

The Stomach (St)

The stomach absorbs water, grain, and grass, and separates them into usable and unusable nutrients. The ch'i of the stomach is essential to life because it aids in transforming the nutrients into ching ch'i, which supports the ch'i of the body, in turn maintaining and perpetuating the life-sustaining functions. If the gastric ch'i is weak, the capacity of the stomach for storage and separation is reduced, and splenic function is impaired. The supply of nutrients to the other Zang and fu organs and other parts of the body is reduced, and illness results (Klide & Kung,1993).

The Relationship between Spleen and Stomach

The spleen and the stomach cooperate to supply the body with nutrients as far as the functional characteristics are concerned. The spleen is yin and the stomach is yang. Under normal conditions, the characteristics interact with each other, establishing an equilibrium. However, under pathologic conditions, disorders of one organ adversely affect the other.

If the yang of the stomach is insufficient, and there is an excess of cold, there will be cold symptoms. For example, if the animal has a stomach cold, salivation becomes excessive. In disorders of this nature, the pulse is slow and weak, and the colors of the mouth are green and yellow.

To treat this disease, the spleen should be strengthened, the stomach and the intestine should be warmed, and the Zang organs should be tonified.

If horses are excessively labored and heat accumulates and spreads in the stomach, the fire of the stomach is distributed throughout the six Zang organs, resulting in heat syndrome. The symptoms are general malaise, loss of appetite, lung weakness, and dislike of water. Treatment of this disease includes prescriptions for clearing stomach heat, cooling the spleen, and sweeping away the accumulation (Klide & Kung,1993).

The Small Intestine (SI)

The small intestine extracts the ching ch'i originally in food and sends it to the kidney for storage. It also separates the ch'i to be excreted into fluid and solid parts and sends the fluid to the urinary bladder and the solid to the large intestine.

If the basic function of the small intestine is impaired, diseases result. If more fluid than normal stays in the large intestine, less urine will be secreted, and diarrhea will result. If an excessive amount of fluid is retained by the bladder, there will be excessive urine secretion and constipation; therefore, in treating diarrhea, diuretic medicine is used so that more water will enter the bladder (Klide & Kung,1993).

The Relationship of the Heart to the Intestine

The heart is related to the small intestine, a fu organ. The clinical signs that illustrate this relationship are a red, swollen, ulcerated tongue and the production of sparse, colored urine. The tongue is related to the heart, and symptoms related to the tongue may indicate excessive heat in the heart. Symptoms of abnormal urine provide evidence that the fire of the heart is so excessive that it runs downward into the small intestine. As a result, the nutrients, ch'i, and blood are not in harmony, causing production of urine with a bloody color. The principle for treating the disease is to clear the heat of the heart using the diuretic method (Klide & Kung,1993).

The Large Intestine (LI)

The large intestine is the fu organ for transporting material to be excreted. Different animal species have structural differences in the large intestine; for example, the cecum of the horse is better developed. The principles of Chinese veterinary medicine, however, apply to these variations in structure.

The large intestine is related to the lung, a Zang organ. The large intestine consolidates, clears, and dries the residue passing from the small intestine and reduces it for passage from the body.

The large intestine is the main thoroughfare by which contaminated ch'i is excreted, expelling the portion of the contaminated ch'i not excreted by respiration. The contaminated ch'i is then excreted through the anus in the form of solid waste (Klide & Kung,1993).

Diseases of the large intestine are shown by the state of the solid waste. For example, if the large intestine is excessively dry, constipation is evident. If the organ is excessively moist, diarrhea results. The large intestine is responsible for the excretion of the contaminated ch'i. When there is no obstruction, descendance of the contaminated ch'i is rapid, corresponding to the rapid ascendence of the contaminated gaseous ch'i from the lungs. The excretion of the gaseous ch'i is in balance with the excretion of the solid ch'i. If the lung is not functioning properly, the gaseous ch'i will descend to seek excretion, causing intestinal difficulties. If the excretion of solid waste is inefficient, the contaminated ch'i will try to ascend and invade lung ch'i, causing respiratory ailments. These conditions further cause the heat of the lung and asthmatic disorders. Treatment should focus on sweeping away the obstructions for the swift flow of ch'i and to disperse the

accumulation of heat. For constipated animals without asthmatic disorders, it should aid the lung to resist ascendence of ch'i and help contaminated ch'i to descend.

Treatment of large intestine ch'i deficiency is by tonification of the lung ch'i. In horses and donkeys, the deficiency type of anal prolapse syndrome is mostly caused by the overlaboring of the lung. The effect of the lung injury is transmitted into the large intestine, causing weakness and loss of large intestine function (Klide & Kung,1993).

The Bladder (B)

The urinary bladder stores polluted fluid for excretion. Because the quantity of water in the body of an animal is constant, and excessive water is excreted through the surface of the body as sweat and through the urinary bladder as urine, there is a close relationship between fluid, sweat, and urine.

Body fluid is depleted rapidly when perspiration and diarrhea are excessive. Thus, the amount of urine output is diminished. Conversely, urine output is increased as the body fluid increases; for example, when the animal does not perspire after drinking a large quantity of water.

The yang ch'i of the kidney is necessary for the formation of urine. Therefore, if kidney yang is weak, ch'i formation is insufficient. The fluid does not become urine, causing diarrhea and edema. Reduced urine secretion caused by kidney ch'i insufficiency can be treated by tonification of the kidney ch'i and strengthening of the original yang.

Urinary bladder disorders are manifested by abnormal urine. The accumulation of moisture and heat disrupts urinary bladder function, causing an accumulation of sand and stones, and thus blocking the ureter (Klide & Kung,1993).

The Triple-Heater (TH)

The triple-heater is one of the six fu organs and the only fu organ without a fixed anatomic location and morphology. Two theories about this fu organ are widely accepted today. The triple-heater represents a group of specific functions as an organ in itself is physically nonexistent.

The sphere of functional influence of the triple-heater includes the whole trunk and the six Zang and six fu organs. It facilitates and synchronizes the physiological activities and pathologic changes of the whole organism. It facilitates the flow of fluid, blood, and ch'i; promotes the circulation; and supports digestion, excretion, and other vital functions. It is a medium of transportation and exchange.

The organ is divided into three parts: the upper, middle, and lower portions. The upper heater includes the area cephalad to the diaphragm or pylorus. Included are the head, neck, thorax, heart, and lungs. The middle heater includes the region between the umbilicus and the

diaphragm, including the cranial abdomen, the spleen, and stomach. The lower heater includes the region caudal to the level of the umbilicus, including the caudal abdomen, the liver, large and small intestines, and urinary bladder.

Although the triple-heater consists of three separate portions, these are closely interrelated. In a general sense, the function of the triple-heater is to facilitate the circulation of ch'i, blood, and fluid in the skin and muscle and in and between the Zang and fu organs.

The upper heater includes the lung. Although the movement of ch'i is regulated by the lung, the origin of ch'i is the middle heater, where grain and water are digested before being transformed into minute elements that condense in the lung to form ching ch'i. In this way, the muscle and skin get the nutrients needed to form the wei ch'i, or defense mechanism. The upper heater also serves as the passageway for grain, water, and grass to pass through to the stomach. Disorders of the upper heater are caused by the accumulation of heat in the lung. An example of the disorder in the horse is a cough and serous nasal discharge.

The middle heater includes the spleen and the stomach. These organs receive food, which is then digested. The ch'i, blood, and fluid thus produced then nourish the whole body. The function of the middle heater, therefore, is to facilitate the distribution of ch'i, blood, and fluid throughout the body. To assure that the stomach and spleen function properly, the middle heater has a regulatory and moderating effect. Thus, disorders of the middle heater cause indigestion. In the horse this is manifested by loss of appetite, and in cattle, by gaseous distension.

The main functions of the lower heater are to ensure the proper drainage of fluid, to separate the clear from the contaminated ch'i, and to ensure the excretion of the contaminated ch'i as fluid and solid wastes. Disorders of the lower heater disrupt the formation of fluid in the urinary bladder, and edema, ascites, and reduction in urine production are found (Klide & Kung,1993).

4.1.6. Introduction to Meridians

- **The *JING-LUO* system**

There are two major components in the Jing-Luo system: Jing-Mai and Luo-Mai. Jing can be translated as meridian, channel, or major trunk. Mai means vessels. Luo is a collateral or branch. Thus, Jing-Mai translates as major trunk vessel, and Luo-Mai refers to the collateral or branch vessels.

Jing-Mai consists of 12 regular channels, eight extraordinary channels, and 12 regular channels' associates, including 12 divergent meridians, 12 muscle regions, and 12 cutaneous regions. Luo-Mai consists of 15 collaterals, small branches (Sun- Luo), and superficial branches (Fu-Luo) (Xie & Preast, 2007).

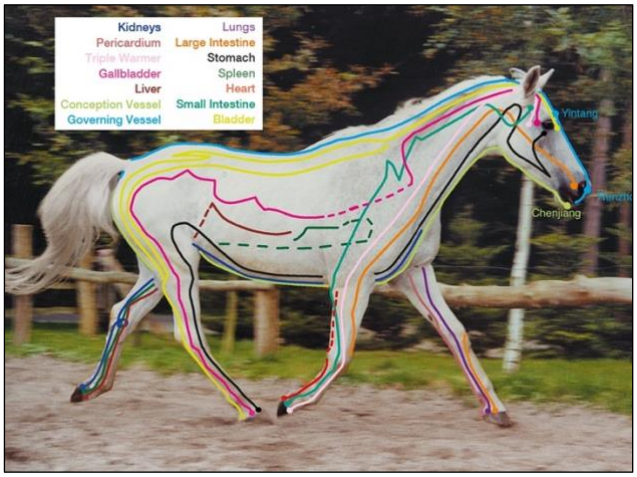

Figure 15. The Meridians. https://horsenetwork.com/2017/07/good-kind-pressure/. Accessed: 14/9/2023 16:30).

Table 13. The Eight Extraordinary Channels – Functions and Treatment indications (Adapted from Xie & Preast, 2007).

Extraordinary Channels	Function	Treatment indications
DU MAI (GV)	Connects marrow, brain and Yang meridians. Controls inner QI.	Marrow affections, mental disorder, high fever, and YANG deficiency.
REN MAI (CV)	Connects YIN meridians. Womb recovery.	Reproductive affections, YIN deficiency.
CHONG MAI	Sea of the 12 meridians. Sea of Blood. QI and blood reserve in meridians.	Infertility, estrus and post-partum alterations, incontinence.
DAI MAI	Protects Lumbar area.	Lumbar and posterior limbs weakness. YANG deficiency.
YANG-QIAO	Regulates limb movements.	Ataxy and unbalance.
YIN-QIAO	Controls eye lid movement.	Insomnia, Wobbler, eye affections.
YANG-WEI	Dominates outside of the body.	Diseases caused by external pathological agents.
YIN-WEI	Regulates YIN meridians.	Depression, functional failure of YIN organs, kidney, heart and liver failure.

The Jing-Luo system is the pathway through which Qi and blood circulate. It regulates the physiological activities of the Zang-Fu organs. It extends over the exterior of the body, but it pertains to the Zang-Fu organs located on the interior. It connects and correlates all the tissues and organs, forming a network that links the tissues and organs into an organic whole (Xie & Preast, 2007).

Table 14. The 12 Regular Channels (Xie & Preast, 2007).

Channel Location	Zang-Fu Organ
Tai-yin of the thoracic limb	Lung
Tai-yin of the pelvic limb	Spleen
Shao-yin of the thoracic limb	Heart
Shao-yin of the pelvic limb	Kidney
Jue-yin of the thoracic limb	Pericardium
Jue-yin of the pelvic limb	Liver
Yang-ming of the thoracic limb	Large intestine
Yang-ming of the pelvic limb	Stomach
Tai-yang of the thoracic limb	Small intestine
Tai-yang of the pelvic limb	Bladder
Shao-yang of the thoracic limb	Triple heater
Shao-yang of the pelvic limb	Gallbladder

- **The general pathways of the channels**

The Zang organs belong to Yin, and the Fu organs belong to Yang. The medial aspect of the limb is Yin, while the lateral aspect is Yang. Thus, the six channels for the Zang organs are Yin Channels, which are distributed on the medial aspect of the limbs. Likewise, the six channels for the Fu organs are Yang Channels, which are distributed on the lateral aspect of the limbs. The Yin Channels, which belong to the Zang organs, are also able to communicate with the Fu organs. Similarly, the Yang Channels, which belong to the Fu organs, can communicate with the Zang organs. In this way, an exterior-interior, or a husband-wife, relationship exists between the Yin and Yang Channels and their Zang-Fu organs (Xie & Preast, 2007).

The 12 regular channels together with the Governing Vessel (GV) Channel and the Conception Vessel (CV) Channel constitute the 14 channels. The 12 regular channels are distributed symmetrically on the left and right sides of the body. The CV and GV Channels, however, are unpaired. The CV Channel runs along the ventral midline, and the GV Channel courses along the dorsal midline (Xie & Preast, 2007).

The three Yin Channels of the thoracic limb start from the chest, circulate along the medial aspect of the thoracic limb, and terminate at the end of the front feet. The three Yang Channels of the thoracic limb start from the end of front feet and circulate along the lateral aspect of the thoracic limb to end at the head. The three Yang Channels of the pelvic limb start at the head, circulate along the back and the lateral aspect of the pelvic limb, and terminate at the end of the hind feet. The three Yin Channels of pelvic limb start from the end of the hind feet, circulate along the medial aspect of the pelvic limb, and travel along the abdomen to end at the chest (Xie & Preast, 2007).

Table 15. General Pathways of the 12 Regular Channels of the Body (Adapted from Xie & Preast, 2007).

Channel	Limb	Organs			Origin	Pathway	Terminus
		Cranial	Middle	Caudal			
Yin (Zang Organs)	Thoracic	Lu	H	Pc	Chest	Medial aspect thoracic limb	End of front feet
	Pelvic	Sp	Liv	K	End of hind feet	Medial aspect pelvic limb	Chest
Yang (Fu Organs)	Thoracic	LI	TH	SI	End of front feet	Lateral aspect thoracic limb	Head
	Pelvic	St	GB	Bl	Head	Lateral aspect pelvic limb	End of hind feet

The 12 regular channels join with one another in a fixed order. Along this course there is an endless, cyclical flow of Qi and blood within the channels. The flow always passes from one channel to the next in a specific order throughout the day. However, the Qi dominates within certain meridians at designated times. This is the traditional Chinese veterinary medicine (TCVM) circadian rhythm, which provides the body with its own internal clock. Disorders of this rhythm can be used to assist with pattern identification and TCVM diagnosis (Xie & Preast, 2007).

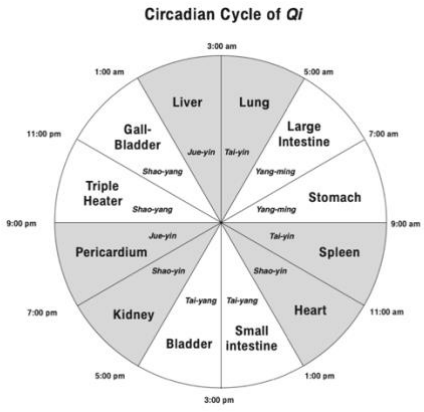

Figure 16. TCVM circadian clock of the 12 Regular Channels (Xie & Preast, 2007).

4.1.7. Acupuncture Points

Along the meridians are acupuncture points or acupoints. These specific points range in size from 1 mm to 25 mm and can be located by their electrical conductivity, which differs from that of surrounding tissue. Acupoints are used to both diagnose and treat conditions. When palpated, the points may be sensitive if there is an imbalance of Qi: a deficiency of Yang and an excess of Yin, or an excess of Yang and a deficiency of Yin. Classic acupuncture theory recognizes about 365 acupuncture points located on the surface meridians. With the inclusion of miscellaneous points and new points used in ear acupuncture and other recent methods, the total has risen to at least 2,000 points for possible use.

Each acupuncture point has a defined and specific function, based upon the response of the body. Some points may be used singly, but it is more common to use several points, treated simultaneously, to achieve the desired effect. A typical treatment may involve use of as few as 1 to as many as 20 points Following is a summary of the different types of points or classifications of points (Limehouse & Taylor, 1994).

Each point receives a unique combination of letters and numbers to form its name. The alphabetic prefix is the abbreviation of the meridian on which the point lies. The numeric suffix represents the sequential position of that point on the meridian (Xie & Preast, 2007).

Table 16. Abbreviations and Number of Points for the 14 Meridians (Adapted from Xie & Preast, 2007).

Meridian	H	Lu	Pc	SI	LI	TH	Sp	K	Liv	B	S	GB	GV	CV
Number of points	9	11	9	19	20	23	21	27	13	67	45	44	28	24

- **Special Acupoints**

In addition to the above three general therapeutic effects, some acupoints have special functions and clinical applications. Special acupoints include five Shu-transporting points, Yuan-source points, back-Shu association points, front-Mu alarm points, Luo-connecting points, Xi-cleft points, lower He-sea points, eight influential points, eight confluent points, and crossing points (Xie & Preast, 2007).

Association Points (Shu Points): Association points can be the most important points in acupuncture diagnosis. These points are also named for the organ or meridian they treat. All association points are located on the Bladder meridian along the back, on either side of the dorsal midline, 3 cun lateral to the dorsal spinal processes. A painful response to light pressure indicates an acute condition, while pain from deep pressure indicates a chronic condition of the meridian or corresponding organ (Limehouse & Taylor, 1994).

Table 17. Shu points (Adapted from Limehouse & Taylor, 1994).

Acupoint	B 13	B 14	B 15	B 18	B 19	B 20	B 21	B 22	B 23	B 25	B 27	B 28
Affected Organ	Lu	Pc	H	Liv	GB	Sp	St	TH	K	LI	SI	Bl

Table 18. Tonification and Sedation Shu points in each meridian (Adapted from Xie & Preast, 2007).

Meridian	H	SI	Pc	TH	Sp	St	Lu	LI	K	Bl	Liv	GB
Tonification points	9	3	9	3	2	41	9	11	7	67	8	43
Sedation points	7	8	7	10	5	45	5	2	1	65	2	38

Alarm Points (Mu Points): Alarm points are located on the ventral abdomen. There is an alarm point for each of the 12 Zang-Fu organs, but it may or may not lie on the same meridian for which it serves as the alarm point. Alarm points are used in both diagnosis and treatment. Sensitivity at an alarm point indicates a problem with that organ or meridian for which it is named (Limehouse & Taylor, 1994).

Table 19. Alarm points (Adapted from Limehouse & Taylor, 1994).

Acupoint	Lu 1	CV 17	Liv 14	GB 24	CV 14	CV 12	St 25	CV 5	CV 4	CV 3	Liv 13	GB 25
Affected Organ	Lu	Pc	Liv	GB	H	St	LI	TH	SI	Bl	Sp	K

Tonification Points: These are used to increase or stimulate energy flow on the meridian for which it is named, or to stimulate that organ. Sedation Points: Sedation points are used to selectively decrease the energy level in a specific meridian or organ (Limehouse & Taylor, 1994).

Source Points: These points, always located in the carpal or tarsal area, are often used in treatment of organ disease or dysfunction. They augment the action of the tonification and sedation points, and are extremely powerful points (Limehouse & Taylor, 1994).

Luo Points (Connection Points): These points couple meridians. A Yin meridian is connected to a Yang meridian via the Luo point. When stimulated, it permits the direct transfer of energy, Qi, from one meridian to its coupled counterpart: Lung/Large Intestine, Spleen/Stomach, Heart/Small Intestine, Kidney/ Bladder, Pericardium/Triple Heater, Liver/Gallbladder (Limehouse & Taylor, 1994).

Table 20. LUO Points (Adapted from Xie & Preast, 2007).

Meridian	H	SI	Pc	TH	Sp	St	Lu	LI	K	Bl	Liv	GB	GV	CV
LUO	5	7	6	5	4	40	7	6	4	58	5	37	1	15

Horary Points (Element Points): In TCM there are five elements. Each meridian has a horary point for each of the elements. When stimulated during the time of day that the meridian is receiving its greatest energy, the effects are enhanced Qi travels throughout the body in a circadian rhythm throughout the 24 hours. If we start with Lung receiving its maximum energy at 4:00 AM, Qi moves through a different organ every two hours to arrive at the Liver at 2:00 AM (Limehouse & Taylor, 1994).

Accumulation Points (Xi-Cleft Points): These points are where the energy is always at a maximum on that meridian. They are very responsive in acute cases and are used for sedation (Limehouse & Taylor, 1994).

Table 21. Xi-Cleft Points – Meridian points and Functions (Adapted from Xie & Preast, 2007).

Meridian	Point	Function
H	6	Acute cardiac pain
SI	6	Shoulder pain
Pc	4	Acute chest pain
TH	7	Deafness, epilepsy seizure
Sp	8	Acute abdominal pain, diarrhea
St	34	Acute epigastric pain
Lu	6	Upper air way infection, hemoptysis
LI	7	Acute abdominal pain
K	5	Anestrus, irregular estrus cycle
B	6	Headache, epilepsy
Liv	6	Hernia
GB	36	Elevated YANG from Liv
YANG-QIAO	B 59	Lumbar pain
YIN-QIAO	K 8	Irregular estrus cycle
YANG-WEI	GB 65	Chest fullness
YIN-WEI	K 9	Hyperactivity

Trigger Points or Local Points: These points are apparent only when a localized pathologic process is occurring. They may or may not lie directly on an established meridian. Acupuncture or acupressure can be applied directly to these points to treat the area involved (Limehouse & Taylor, 1994).

Extra Points: These points are not found on meridians, but they do have special effects, usually on nearby areas (Limehouse & Taylor, 1994).

Master Points: Six master points can be used in treating conditions in certain areas (Limehouse & Taylor, 1994).

Table 22. Master points (Adapted from Xie & Preast, 2007).

Master Points	Region
LI 4	Face and Mouth
Lu 7	Head and neck
Pc 6	Chest and cranial abdomen
B 40	Back and hips
St 36	Abdomen ans gastrointestinal
Sp 6	Caudal abdomen and urogenital

Special Action Points: These are points used solely for their influential effects (Limehouse & Taylor, 1994).

4.1.8. Treatment Techniques

- **Needling**

Traditional Versus Modern Needling

Generally, the Chinese employ a method of stimulation that is considered strong compared with that used in the United States. The more traditional needles are thicker than the Japanese-style needles used in the United States. The latter are of stainless steel and available in many lengths (0.5 to 20 centimeters) and several gauges (32- to 36-gauge). Most of these needles are presterilized, disposable, and encased in an insertion tube. The insertion tube is thought to reduce the pain of insertion and make the technique easier for the operator. These needles are particularly useful on the distal limbs, where reduction of pain is essential; 30-gauge, 1.5-inch needles work well for most points. Often larger-gauge needles are necessary in the hip region because of the thickness of the skin (Fleming 1998).

Needle Acupuncture

Learning the proper procedures and techniques for inserting needles to the correct depth, at the proper angle, manipulating the needles, and properly removing the needles requires many hours of training, study, and practice (Altman, 1994).

Needle Size

The most commonly used needles are 28- to 34-gauge (0.22 – 0.35 mm) filiform stainless- steel needles 1/2 to 2 inches (1.25-5 cm) long. The needle length is determined by the species and size of the animal and the location and depth of the point being treated. Shorter needles (1/2 inch or 1.25 cm) are used for points over such bony areas as the head, face and distal limbs, and in areas where body cavities or underlying viscera could be penetrated. Middle-sized needles (1 inch or 2.5 cm) are used along the dorsal midline and paravertebrally and in the proximal thighs and shoulders. Longer needles (1.5-2 inches or 3.75-5 cm) are more commonly used near the hip joints (Altman, 1994).

Needle Type

The needles are stainless steel, solid and flexible and have a smooth shaft. Good-quality needles should be flexible enough to bend to at least a 90-degree angle without breaking and then straightened to the original shape without kinking.

Clean the patient's skin before needle insertion. Do not insert needles in grossly dirty or contaminated areas. Use short needles and angled insertion in areas where the body wall is thin. Be familiar with the anatomy of the area underlying the point of insertion, i.e., know what you are puncturing. Be sure to remove all needles after treatment (Altman, 1994).

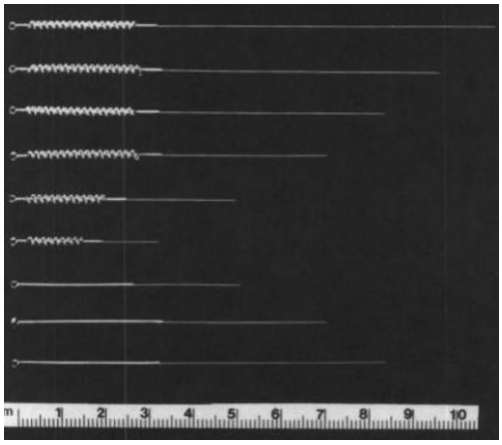

Figure 17. Typical stainless-steel acupuncture needles (Altman, 1994).

Needle Insertion

Needle insertion should be smooth and rapid. Slow insertion causes more pain and discomfort to the patient. Most pain occurs when penetrating the more superficial skin layers. Once the needle is through the skin, little pain is experienced. The needle handle is held between the thumb and index finger, or between the thumb, index finger and middle finger, inserted with a short, quick thrust, and rotated clockwise and counterclockwise between the fingers if resistance is met. The needle is then advanced to the proper depth. A slight reaction by the patient is often seen as the needle reaches the acupuncture point. This is manifested by a quick respiratory inspiration, slight flinching or ear flick. The reactions are often very subtle. With experience you will be able to perceive "by feel" if the point has been reached. The patient's reaction is termed de chi, or arrival of energy. It is a tingling sensation (Altman, 1994).

Descriptions of acupuncture insertion at specific points usually mention angle of insertion. This refers to the angle of the needle shaft to the surface of the body. The angles described are perpendicular, slanted or parallel. Perpendicular or straight insertion means that the shaft of the needle is at right angles to the body surface. This angle is used over heavily muscled areas. Slanted or angled insertion is at a 30- to 60-degree angle to the body surface and is used for less heavily covered areas and when using such techniques as tonification (insertion in the direction of energy flow in a channel), and sedation (insertion against the direction of energy flow in a channel). Parallel or horizontal insertion is at a 10- to 20-degree angle to the body and is used in areas with little underlying muscle tissue, such as over the skull or bony prominences or over the thorax or abdomen in thin animals. The depth of insertion is determined by the attributes of each individual point and by the effects desired. It varies according to the area of the body being treated, the patient's muscle build and condition, and the nature of the malady being treated. Usually, the deeper the insertion, the stronger the needle sensation. Caution should be exercised in using deep insertion on weak patients or when using needles over major intestinal organs and body cavities (Altman, 1994).

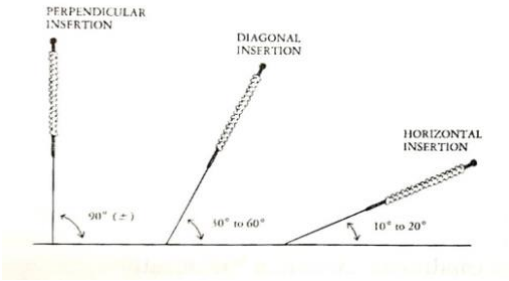

Figure 18. The angles of needle insertion: perpendicular, slanted or angled, parallel or transverse (Altman, 1994).

Needling Techniques

After needles have been inserted and advanced to the proper depth, various means of manual stimulation and manipulation may be used. With simple insertion the needle is inserted and left in position with no further manipulation.

When the appropriate time has elapsed, the needle is removed. To perform the technique known as crack-in, the handle of the needle is steadied with the fingers while the thumbnail is drawn across the windings of the needle handle toward the patient's body surface.

Crack-out is the opposite technique. The thumb is placed on top of the needle handle to prevent the needle's being pulled out, and the middle fingernail is drawn across the windings of the needle handle in a direction away from the body surface.

Lifting and thrusting refers to a short up-and-down, pushing and pulling of the needle after initial insertion into the acupoint. The more active this motion, the stronger the stimulation of the point.

Twirling or rotating refers to rolling the handle between the thumb and index finger-middle finger combination to rotate the needle first in one direction, then back in the opposite direction. This motion is repeated rapidly or slowly, depending on how strong a stimulation is applied to the point. The wider the arc and more rapid the rotation, the stronger the stimulation. This technique may be combined with the lifting and thrusting method. The needle shaft is usually rotated from 180 to 360 degrees. Care should be taken not to exceed 360 degrees or to in only a clockwise or counterclockwise direction, as this may cause subcutaneous fibrous connective tissue or muscle tissue to twist around the needle shaft, causing pain and making it difficult to remove the needle.

Retaining the needle refers to leaving the needle in the acupoint for the duration of treatment. This duration can range from the time it takes to insert the needle, turn it until the animal shows some recognition of the presence of the needle (de chi), and remove the needle, to as long as 20-30 minutes. To achieve surgical analgesia, the induction period can be as long as 45-60 minutes, and the needles are retained in place throughout the entire surgical procedure.

To withdraw the needle, the fingers of one hand steady the tissue around the acupoint while the other hand rotates the needle gently and lifts it to the subcutaneous level. The needle is then withdrawn rapidly, and pressure is applied to the insertion site to prevent bleeding.

Selection of Needling Technique

A "strong" stimulation technique can be used to treat acute pain and cramps and, usually, when using points on the limbs, if the patient is strong and has high tolerance to needling. This technique involves rotating, lifting and thrusting the needle rapidly with wide amplitude and an up-and-down motion.

A "mild" stimulation technique is used to treat weak patients, nervous patients, first-time acupuncture patients, and animals with low needle tolerance, as well as on points overlying major organs. This technique involves rotating, raising and thrusting the needle slowly, using little rotary or vertical amplitude, sometimes using just enough stimulation to cause the de chi sensation.

In most patients and for most conditions treated, a "moderate" stimulation technique is used (Altman, 1994).

- **Laser Therapy**

The use of low-intensity or "cold" lasers to stimulate acupuncture points has become popular in the equine field.

Laser therapy provides good results in treatment of pain and inflammation associated with neurologic disorders, and enhanced healing of wounds, burns, ulcers, and injuries to tendons and bones.

Low-intensity laser therapy has been defined as "a form of intense light therapy using various frequencies and wave lengths which promote positive physiologic changes within cells that support the living organism in healing and reducing or eliminating pain".

Laser Types

The 2 most common types of lasers are red light emitters (wavelength, 632-650 nm, generated by either a helium-neon (He-Ne) gas tube or a laser-simulating diode device) and the infrared light emitters (wave length, 902 nm, generated by a gallium-arsenide diode). The red light penetrates 0.8-15 mm into tissue, whereas the infrared light reaches a depth of 10 mm to 5 cm (Altman, 1994).

4.1.9. Chinese Medical Diagnosis of the Horse

Traditional Chinese examination is based on four factors: looking (observation), listening (auscultation), asking (history taking), and touching (palpation).

Using the results obtained from the four factors, an acupuncturist must first determine if the disorder represents a deficiency or an excess. If the condition is one of deficiency, the patient must be tonified (i.e., points are used to strengthen the involved meridians and the Qi of the horse). For example, in a deficiency disorder, specific signs are accompanied by exhaustion, depletion, and motor retardation; in an excess disorder, symptoms may include heat, spasm, increased fluid production, nervousness, and overexcitement (Fleming 1998).

The second step is to determine the quality of Yin (cooling ability, fluid production) and Yang (warming ability, moving ability, metabolism). If the Yin is deficient, the patient may show dryness and appear unduly warm (anhidrosis). Points are then chosen to improve the Yin of the body. If the Yang is deficient, the patient may demonstrate an inability to stay warm with concomitant lethargy (as in hypothyroidism), and Yang tonification points might be added to a point formula.

The third step is to identify the meridians (musculoskeletal disorders) or Zang-Fu organs (internal disorders) that are involved. This is determined by comparing the presenting signs with response to palpation of the 12 meridians and pulses. Equine acupuncture places greater emphasis on meridian palpation because of the difficulty in evaluating pulses (Fleming 1998).

- **Diagnostic Palpation in the Horse**

Acupuncture palpation skills involve palpation of the acupuncture points along each meridian using either finger pressure or an object such as a needle cap. Response to light pressure indicates an excess, acute, or superficial condition (Yang), whereas a reaction to deep pressure usually indicates a state of deficiency (Yin) (Fleming 1998).

The examination begins at the neck. BL-10 and GB- 20 are palpated to determine dysfunction in the cervical spine. This step is important because trigger points often result from chiropractic problems (rotation of the atlas is common in horses because of the use of halters and fixed ties). These trigger points make an evaluation of the meridians more difficult and often obscure the presence of discrete, painful diagnostic points until chiropractic adjustments are performed (Fleming 1998).

LI-18 is reactive when a problem exists below the coronary band. Coupled with PC-1 and CV-17, pain in these regions is a reliable indicator of hoof problems. Tendon problems are often manifested as sensitivity at SI-16. However, pain at this point may also be caused by chiropractic disorders of the second or third cervical vertebra. Often sensitive in performance horses, LI-16 reacts strongly when forelimb pain is present. As a general rule, a large region around LI-16 is

usually painful, and the more distal the loci of pain, the more distal the problem on the forelimb. In fact, knee problems are reflected by pain occurring closer toward the region of LI- 17. When coupled with pain at SP-20, this point is often a reliable diagnostic indicator for problems in this joint. TH- 15, located on the cranial border of the scapula at the junction of its dorsal edge and the scapular cartilage, is an important diagnostic point for problems on the lateral aspect of the suspensory or check ligament. The final diagnostic point found on the neck is ST-10. This point is often painful when stifle problems are present (Fleming 1998).

The most important part of the examination is the palpation of the back Shu, or association, points. Pain at these points can reflect pain along the associated meridian or organ. Once again, the importance of differentiating pain at these points caused by traumatic chiropractic malalignments cannot be overstated. Although BL-13 is an important diagnostic indicator for respiratory disorders or medial forelimb pain, it can become tender simply from an improperly fitting saddle (Fleming 1998).

BL-14 (Pericardium Shu point) and BL-15 (Heart Shu point) are often sensitive when the patient is overly anxious. This sensitivity is due to the role of the Pericardium and the Heart in protecting the shen. If BL-13, -14, and -15 are all reactive, particularly on the right side, the horse may be a bleeder. Further tests should then be performed to verify this finding (Fleming 1998).

BL-18 (Liver association point) may be painful in any conditions overseen by the Liver, including the state of the muscles, tendons, hooves, and eyes and the presence of allergies. Because BL-19 (Gallbladder association point) is the paired meridian to the Liver, it usually reacts for the same reasons. BL-19 may also become sensitive when problems such as hip and lateral hock pain arise along its meridian pathway (Fleming 1998).

BL-20 (Spleen association point) is often painful in disorders involving circulation (it usually reacts in bleeders for instance) and digestion. Along with BL-21, ST-10, and BL-36,-37, and -38, BL-20 may reflect stifle problems. BL-21 (Stomach association point) is often reactive in chronic digestive disorders and dental problems (Fleming 1998).

BL-22 (Triple Heater association point) is a major diagnostic point for most endocrine disorders, particularly those related to the ovary. A mare with this condition often experiences pain along the ipsilateral path of the Triple Heater as it courses down the neck. These mares often appear to be suffering from shoulder pain (Fleming 1998).

BL-23 (Kidney association point) often reacts in patients suffering from urinary disturbances or reproductive disorders. Along with BL-35, BL-39, and BL-18, it is used in the diagnosis of hock problems (Fleming 1998).

In addition to disorders of the Large Intestine, BL-25 (Large Intestine association point) also becomes reactive in horses with problems of the opposite front limb. Apparently, caudal to the

umbilical cord the association point-meridian relationship goes from ipsilateral to contralateral (Fleming 1998).

This contralateral relationship is also related to the Small Intestine association point BL-27. Tenderness at this point can reveal problems of the posterior aspect of the opposite forelimb (flexor tendinitis) (Fleming 1998).

Because BL-28 is the association point of the Bladder meridian, it is important in the treatment and diagnosis of problems of the spinal column. Of course, this point may also become sensitive when problems arise along the lateral aspect of the hindlimb or the Bladder (Fleming 1998).

Some equine acupuncturists use the alarm points to assess disorders in the associated organs (Fleming 1998).

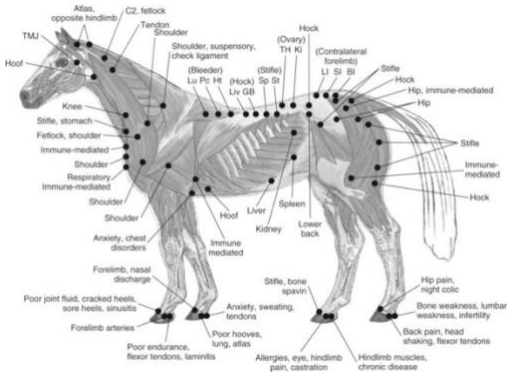

Figure 19. Diagnostic acupuncture palpation points (Fleming, 2001).

4.1.10. Acupuncture Point Selection

Acupuncture can be used alone or with other alternative modalities. In China, TCM comprises not only acupuncture but also herbalism, massage, and manipulation. In fact, most organ disorders are treated primarily with herbs, with acupuncture serving as a secondary form of therapy. Musculoskeletal disorders, on the other hand, are treated primarily with acupuncture, massage, and chiropractic (Fleming 1998).

A horse's response to therapy can be rapid, usually much faster than that of humans. A marked clinical improvement is often apparent after one treatment. In chronic disease, however, multiple treatments are often necessary before the patient responds. The patient should generally respond after four treatments. If no response is evident by then, the case should be reevaluated. A good schedule for most horses is one or two treatments per week for a month, tapering off to one treatment a month; of course, this frequency varies depending on the case (Fleming 1998).

Because all aspects of a disease must be considered in determining a treatment protocol, a look at the underlying causes in terms of prevention is also necessary acupuncturist must examine all

predisposing factors surrounding the problem. In organ disease, this workup includes an evaluation of the feeding program, toxicities in the environment, the effect of previously administered drugs, and emotional stress. In musculoskeletal disease the acupuncturist must consider the integrity of the spinal column (e.g., malalignment of the sacroiliac joint can cause abnormal weight bearing on the stifle), shoeing and hoof balance, improper saddle fit, poor footing, inappropriate training schedules, unskilled riders, and the use of hot walking machines (which can put stress on the cervical spine) (Fleming 1998).

4.2. CHIROPRACTIC

Chiropractic comes from the Greek words, *cheir*, which means hand, and *praxis*, which means practice, or done by hand. A drugless form of therapy, chiropractic is based on manual spinal manipulation (Willoughby, 1998).

Chiropractic is defined as a study of health and disease from a structural point of view, with special consideration given to spinal mechanics and neurologic relationships.

Virgil Strang outlines the rationale for the scientific basis of chiropractic with the following points:

- *Chiropractic theories* are based on the law of biology known as homeostasis. This denotes that the organism can maintain internal stability and normal operation of all the principal organ systems by an inherent recuperative ability.
- *Chiropractic science* is further based in the physiologic fact of the supremacy of the nervous system and that this nervous system controls homeostasis.
- *Chiropractic concepts* are based on clinical and scientific observations that faulty musculoskeletal relationships cause neurologic dysfunction. Skeletal disrelationships, particularly in the complex spinal structures, can lead to loss of nervous system integrity and loss of health elsewhere in the body.
- *Chiropractic science* thus uses existing knowledge of anatomic and physiologic relationships to provide a rationale for application of spinal therapy (Willoughby, 1994).

4.2.1. Vertebral Subluxation Complex

Chiropractors treat faulty musculoskeletal relationships call subluxations. The term vertebral subluxation complex is better used to encompass the diverse nature of the lesions and characteristics associated with subluxations. Use of the word subluxation tends to create confusion between the chiropractic and veterinary professions. Traditional veterinary thought defines a subluxation as an incomplete or partial dislocation, less than a luxation, and does not include within that description any neurologic component. The chiropractic definition of subluxation is much broader: "a disrelationship of a vertebral segment in association with contiguous vertebrae, resulting in a disturbance of normal biomechanical and neurologic function" (Willoughby, 1994).

The characteristics of chiropractic subluxations are diverse (Table 23). The most commonly held understanding of subluxation is that the motor unit is unable to return to a normal resting position or is fixed outside normal alignment. In this case, there is vertebral malposition or misalignment.

Subluxations may be present, however, with fixation of a motor unit in normal alignment. Other subluxation types are characterized by a motor unit's inability to move properly through various ranges of motion or exhibiting abnormal vertebral motion. Subluxations are generally characterized by a lack of joint play, palpable soft tissue changes, muscle contraction or imbalance, or aberrant function of associated neural elements (Willoughby, 1994).

The results of subluxations can be divided into those resulting in neurologic dysfunction and those creating disturbances in kinetic or motor function. Disturbance of proper neurologic function is called neuropathy. The neurologic dysfunction resulting from a subluxation may be either facilitation or inhibition. Facilitation causes stimulation of end-organs and creates such signs as muscle hypertonicity, increased glandular function, increased vasomotor activity, paresthesia or pain. Inhibition of neurologic function may cause muscular atrophy, decreased vasomotor activity, or analgesia. Inhibition generally follows facilitation and is often the result of long-standing neurologic dysfunction (Willoughby, 1994).

Table 23. Characteristics of the vertebral subluxation complex (Willoughby, 1994).

Motor unit fixation in normal alignment
Motor unit unable to move properly through entire range of motion, abnormal vertebral motion.
Motor unit unable to return to normal resting position or fixed outside normal alignment, vertebral malposition.
Aberrant function of associated neural elements, facilitation or inhibition.
Aberrant function of associated motor elements, muscle or ligament.
Palpable soft tissue changes.

Subluxations may also cause a disturbance in motor function or kinesiopathy. Kinesiopathy may be expressed as hypomobility or hypermobility. Hypomobility or fixation is inability of the vertebra to move freely in correct ranges of motion. Hypermobility is an increased range of motion in vertebral joints, causing increased stress on joint structions and supporting ligaments.

The vertebral subluxation complex encompasses all spinal elements at risk of pathologic change, such as the spinal nerves, the spinal cord, vascular components intrinsic muscles, supporting ligaments and vertebral articulations (Willoughby, 1994).

- **Pathophysiology of Subluxations**

Chiropractic is based on the same anatomic and physiologic facts used by all medical practitioners. The same anatomic, physiologic, and pathologic research is analyzed. From this common foundation, several current theories have arisen to explain the subluxation complex and the effects of spinal adjustments (Willoughby, 1998).

Facilitation hypothesis

The facilitation hypothesis states that subluxations produce a lowered threshold for firing in spinal cord segments. Subluxations result in afferent bombardment to the central nervous system from pathologically altered tissues surrounding the vertebral misalignment. The afferent input to each segment of spinal cord is largely composed of nonmyelinated C fibers or nociceptors. This nociceptor stimulation can create spinal lesions that may affect dorsal horn cells, autonomic fibers, the lateral spinothalamic tract, and other components of the complex neurologic system. The result can be clinical findings such as localized tenderness, muscle spasm, trigger points, or muscle hypoxia. Trigger points are hard, nodular, hyperirritable structures within muscle or fascia and generally occur in stable anatomic sites (Willoughby, 1998).

Somatoautonomic dysfunction

The somatoautonomic dysfunction hypothesis is based on the theory that autonomic responses are initiated by altered neurologic functions present in subluxations. When the adaptive mechanisms of the nervous system fail as a result of strong or long-lasting stimuli, the resulting aberrant somatoautonomic reflexes may be associated with several visceral disorders affecting functions such as heart rate, bronchial smooth muscle, and gastrointestinal tract function (Willoughby, 1998).

Nerve compression

The nerve compression hypothesis states that pressure on spinal nerve roots is caused by a subluxation, or misaligned vertebra, altering normal transmission of nerve energy. This pressure may arise from intervertebral foraminal encroachment, nerve root traction, axoplasmic transport block, or changes in the amplitude and velocity of the action potential. Chiropractic researchers agree that the explanation of "bone out of place" is too simplistic physiologically and believe that ischemia and edema may instead be the major causes of spinal nerve dysfunction (Willoughby, 1998).

Compressive myelopathy

The compressive myelopathy hypothesis theorizes that vertebral subluxation, particularly those in the cervical region, may compress or irritate the spinal cord. The cord can be affected by ischemia from spinal arterial spasm or even directly (by an upward translocation of the odontoid) (Willoughby, 1998).

Fixation

The fixation hypothesis is based on the theory that a subluxated vertebra may be in normal or abnormal position yet still fixed within its normal biomechanical range of motion. This fixation includes the involvement of paraspinal musculature and kinesthetic receptors, creating somatic bombardment of spinal pathways with somatic and autonomic reflex facilitation (Willoughby, 1998).

Vertebrobasilar arterial insufficiency

The vertebrobasilar arterial insufficiency hypothesis maintains that the vertebral arteries are constricted in subluxations, especially when passing through the transverse foramina of the upper cervical spine. This interference causes vascular insufficiency, or ischemia, to the spinal cord or the structures of the cranium (Willoughby, 1998).

Axoplasmic aberration

The axoplasmic aberration hypothesis maintains that intracellular movement of proteins, glycoproteins, or neurotransmitters in nerve cell processes is altered by irritation or blockages created by subluxations. In addition, altered axoplasmic transport may result in toxic levels of proteins, creating clinical symptoms of pain and numbness in peripheral nerves (Willoughby, 1998).

Neurodystrophic hypothesis

The neurodystrophic hypothesis states that neurologic dysfunction is stressful to the viscera and other body structures and that this lowered tissue resistance can modify the immune response. This theory, contrary to traditional veterinary ideas, proposes an interaction between the central nervous system and immunity. The work of Selye, however, has demonstrated neuroendocrine-immune connections in the response of the organism to stress. Mechanisms proposed by other researchers include a connection between the thymus and the CNS norepinephrine immunomodulation, and a connection between the hypothalamus and immune responses (Willoughby, 1998).

- **Adjustment versus Manipulation**

Chiropractors identify subluxations of the spine during clinical examination and then proceed to correct these lesions by specifically adjusting the involved segments. A spinal adjustment has specific characteristics that distinguish it from spinal manipulations. An adjustment is a specific

physical action designed to restore the biomechanics of the vertebral column and indirectly influence neurologic function. Haldeman (1992) defines it as a "passive, carefully regulated thrust or force delivered with controlled speed, depth and magnitude to articulations at or near the end of the passive or physiological range of motion." (Willoughby, 1998).

An adjustment is characterized by a specific force applied in a specific direction to a specific vertebra. It is a short-lever maneuver, with a contact taken directly on the involved vertebral segment. Adjustments are high-velocity procedures designed to deliver maximal force with minimal tissue damage. The adjustment is unique to the chiropractic profession and requires a great deal of skill to control the depth, direction, speed, and amplitude of the procedure (Willoughby, 1998).

Manipulations are not characterized by specificity to vertebral segments and often distribute force to multiple segments, as in traction and mobilization procedures. Furthermore, manipulations are generally characterized as long-lever and are delivered with slow velocity. A chiropractic practitioner may use a combination of short-lever, long-lever, and no thrust techniques in clinical practice. However, the distinct nature of the spinal adjustment distinguishes the chiropractor from the manipulator or the physical therapist (Willoughby, 1998).

4.2.2. Anatomic Knowledge

All medical practitioners must understand the anatomy of the tissue or organ targeted by their therapeutic modalities. Before performing an adjustment, the chiropractor must understand the specific articular relationships in the vertebral column. The chiropractor must be able to visualize vertebral structures in a three-dimensional context, understanding accurately the orientations of joint surfaces. One of the most important anatomic features in the context of adjusting technique is joint surface orientations. Chiropractic adjustments produce vertebral movement along the plane line of joints. It would be counterproductive to apply forces to a joint that would cause jamming of the articular surfaces. A veterinary chiropractor must become familiar with all the articular surfaces and types in the spinal column of each species to which chiropractic will be applied. For example, the joints between lumbar vertebra five and lumbar vertebra six in the horse consist of two synovial zygapophyseal joints, one synarthrodial intervertebral joint, and two synovial intertransverse joints. The zygapophyseal joints are characterized by a sagittal curved surface and classified as trochoid joints. The partially movable intervertebral joint displays a slightly curved surface with an eccentric center of rotation. The intertransverse joints, which are distinctive in the horse, also display a curved articular surface (Willoughby, 1998).

Chiropractors divide the spinal column into functional or motor units for a more precise concept of the biomechanics involved in spinal movements, misalignments, and adjustments of subluxated segments. A motor unit consists of two adjacent vertebrae, the intervertebral disk,

articular facets, ligaments, tendons, muscles, nerves, and the blood vessels that combine two vertebrae into a movable unit. The practitioner must study each of these motor units individually because each has a different type, number, and joint orientation. For example, a midthoracic motor unit exhibits coronal articular facets, slightly curved intervertebral disk joints, synovial ball-and-socket costovertebral joints, and plane costotransverse joints (Willoughby, 1998).

The chiropractic practitioner must know the location and orientation of vertebral processes in the animal. This knowledge is necessary to achieve the desired therapeutic result. The chiropractic practitioner must understand the relationships of neurologic components of the vertebral column to determine the potential pathology created by a subluxation (i.e., pain, paresthesia, and autonomic nervous system manifestations) and predict the possible benefits of the adjustment. The intervertebral foramen (IVF) is of particular interest to the chiropractor because its boundaries consist partially of the osseous structure of the vertebrae and partially of ligamentous structures involved in spinal movement. The IVF is the communication portal of the nervous system, with the enclosed spinal nerves carrying the afferent and efferent fibers essential to the coordination of nerve centers and target organs. Foraminal encroachment by surrounding structures could interfere with the relay of neurologic information (The contents of the IVF are in Table 24) (Willoughby, 1998).

Table 24. Contents of Intervertebral Foramen (Willoughby, 1998).

Structure	Function
Spinal Nerve	Radicular nerve with distribution to skin, muscles and viscera
Recurrent meningeal nerve	Nerve supply to disk, dorsal longitudinal ligament and meninges; sympathetic function
Dural extension	Dura mater that flows spinal nerve through the IVF and blends with the epineurium of the nerve
Cerebrospinal fluid	Circulates between dural extension and radicular nerve carrying neurotransmitters and neuroendocrines
Intervertebral veins	Carry blood supply from ventral venous sinus
Spinal artery	Carries blood supply into the vertebral canal
Connective tissue	Areolar and adipose tissues filling in spaces between previous structures
Lymphatic vessels	Lymphatic drainage

Other anatomic features of the nervous system are important in chiropractic theory, including the flow of cerebrospinal fluid, the meningeal suspension of the spinal cord within the vertebral foramen, the relationships of cranial nerves to vertebral structures, and the proximity of the autonomic chain ganglia to the ventral surface of the column (Willoughby, 1998).

The study of vertebral biomechanics necessitates fundamental knowledge of muscular attachments and actions on the vertebrae. Many of the major muscle groups, such as the longissimus and gluteal, have attachments on the vertebral column. Other less well-known intrinsic muscles, such as the multifidis and the rotators, may be used in a chiropractic

examination. Motor nerves form a functional loop with the muscular system; that is, motor fibers incite the muscles to contract, producing movement, and sensory fibers relay proprioceptive and stretch readings back to the central nervous system (Willoughby, 1998).

4.2.3. Vertebral Movement

Chiropractic science focuses on the biomechanics of spinal movement and the encompassing nature of this movement. The vertebral column, a jointed structure at the core of every vertebrate, enables movement in a variety of gaits, postures, and stretches. As a mechanical structure the vertebrae move in controlled directions by a complex of levers and pivots restrained by ligaments and activated by muscles. Vertebral movement can be extremely subtle, such as that present during respiration, or very obvious, such as flexion and extension in the equine gallop. Freedom of movement requires that the organism experience peak flexibility, precise proprioception, maximal muscular response, and an absence of musculoskeletal pain. Horses trained for dressage must be able maintain flexion of the entire vertebral column. The thoracolumbar spine is flexed to "round" the back, resulting in lowering of the hindquarters for forward impulsion. Dressage horses must elevate or flex the cervicothoracic region, shifting the center of gravity to the hindquarters and lightening the forehand. The cervical spinal column is flexed for proper head carriage. Restriction or pain in one or two functional motor units may create minimal gait problems yet markedly restrict spinal movement (Willoughby, 1998).

Movement of the spinal column is the result of the sum of movements at individual motor units. The motor unit is the smallest segment of the spine that exhibits biomechanics characteristics and consists of two adjacent vertebrae and their ligaments. The range of motion at each motor unit is relatively small; however, the sum of movement at multiple motor units can be considerable. Furthermore, minimal range of movement at the vertebral level can create exponential movement in the extremities. Consider the movement of a pendulum in a grandfather clock. The point at which the pendulum attaches to the clock does not move in a great arc, but further from the attachment point, at the end of the pendulum, a wide arc is created. Similarly, movement created at the vertebral level in a horse creates a great amount of movement at the hoof (i.e., the end of this living pendulum). A good example of this occurs when the standardbred moves at a racing pace, using both lateral flexion and axial rotation of the thoracolumbar region. A pendulum-like movement is created in the hindquarters, with the feet traveling in a wide are created by minimal but critical movements of the spinal column (Willoughby, 1998).

Spinal movements are as essential to athletic performance as the movements of the extremities. When motor units are restricted in range of motion, the results are restrictions in the character and range of motion of the extremities, such as stride length. A restricted lumbosacral joint may result in short stride of a rear leg. Chronic alterations in the biomechanics function of the spinal

column can result in degenerative joint disease when extremity joints land repeatedly in abnormal patterns (Willoughby, 1998).

The vertebral column undergoes movement in several ranges, including flexion, extension, lateral flexion, axial rotation, compression, tension, vertical glide, and horizontal glide. In some cases, these movements are combined simultaneously into coupled motions.

Flexion-extension

The jointed spinal column can flex and extend around the X-axis. This ability is apparent when horses gallop by folding or flexing the lumbar spinal column and then opening or extending the lower back. The behavior of a motor unit during flexion or extension varies depending on the spinal region. Generally, the disk becomes wedged, and the nucleus pulposus moves dorsally in flexion and ventrally in extension. The dorsal annular fibers exhibit tension at flexion, and ventral annular fibers exhibit tension at extension (Willoughby, 1998).

Axial rotation

The jointed column can also rotate around the Z-axis. Here the vertebral body twists along its horizontal axis. The oblique fibers of the annulus are brought into tension. This tension is most pronounced in the central fibers of the annulus, where the fibers are most oblique. The nucleus is strongly compressed during axial rotation. Movements with excessive combinations of flexion and axial rotation tend to tear the annular fibers and drive the nucleus dorsally through these tears (Willoughby, 1998).

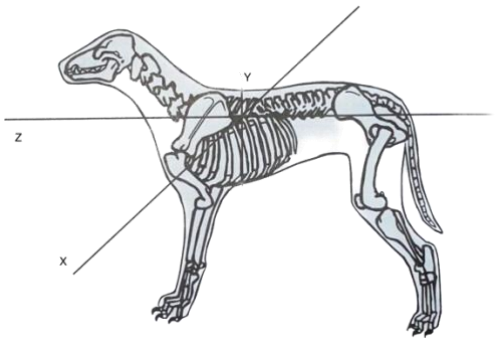

Figure 20. Axes of movement (Willoughby, 1998).

Lateral flexion

The jointed column curves around the Y-axis in lateral bending. The intervertebral disk wedges to the side opposite the lateral bend. The nucleus is then driven toward the open-wedge side of the disk, creating tension in the annular fibers (Willoughby, 1998).

Compression/tension

The spinal column is also able to stretch and shorten along the horizontal or Z-axis, altering the overall length of the column. Tension or elongation of the column increases the disk height and puts tension on the annular fibers. When the spine shortens, the disk undergoes compression and becomes flatter and wider. Tension and compression are also part of coupled motions during axial rotation, flexion, extension, and lateral bending. For example, in flexion the dorsal portion of the ligaments in the motor unit undergoes tension as the ventral portion undergoes compression (Willoughby, 1998).

Vertical gliding or shear

Forces acting on the spinal column in a vertical direction create movement that tends to separate or shear contiguous vertebrae. Gravity is the most constant vertical shear force acting on the backs of quadrupeds. Excessive shear forces, such as a heavy load on this horizontal column, disrupt the intrinsic resistant properties of spinal ligaments (Willoughby, 1998).

Horizontal glide or shear

The spine separates in response to horizontal shear or forces that produce an impact on the vertebral column at 90 degrees. Extreme horizontal shear can exceed the capacity of the ligamentous structures to resist (Willoughby, 1998).

Coupled movement

Vertebral movement is the result of several joints in a motor unit acting in multiple planes with different axes of motion. A combination of movements is called a coupled motion. Each joint in the motor unit moves in a particular plane according to anatomic characteristics. For example, when the lumbar spine flexes, the upper portion of the disk undergoes tension, and the lower portion undergoes compression. The curved lumbar zygapophyseal joints glide and separate along the Z-axis. In the cervical spine, lateral flexion combines with flexion and extension to become circumflexion. In chiropractic technique, this coupled movement is accommodated by

using adjustments designed to act on all relevant phases of movement involved in a subluxation complex (Willoughby, 1998).

4.2.4. Functional Spinal Regions

When considered as a functional entity, the vertebral column should be divided into regions that differ from those used for purely anatomic categorization. Several of these divisions are transition regions between groups of vertebrae that bear similar anatomic characteristics. The vertebrae in transition areas display unique anatomic features and distinct motion characteristics. Spinal pathologies, including the chiropractic subluxation complex, are frequently located in transition regions (Willoughby, 1998).

4.2.5. Anatomic Study of the Vertebral Column

Practitioners interested in the study of chiropractic technique must first study vertebral anatomy. Chiropractors must be able to visualize individual vertebrae beneath layers of soft tissues. An understanding of the three- dimensional structure of each vertebra (including orientation and size of processes, joint surfaces, and foramens) is the foundation of this study. The chiropractor must also understand the movement characteristics of coupled segments of jointed vertebrae and the spatial relationships of segmental processes. Finally, to understand the vertebral column as a functional anatomic whole, the chiropractor must understand the way the spinal regions are combined into a unit. The vertebral column should be studied by using nonarticulated vertebrae that can be considered both individually and together (Willoughby, 1998).

4.2.6. Chiropractic Examination Techniques

Patient Observation

All types of physical examination include initial observation of the patient. In a chiropractic examination the subtleties of patient posture, gait, and behavior must be considered at the vertebral level of mechanic and neurologic function. When observing a lame horse, for example, the practitioner should observe the extremity joints without disassociating them from their functional connections to the vertebral column. If the horse is shortening the stride length of the right rear leg, chiropractic considerations should include the following:

- Mechanical pathology of the extremity joints: Decreased range of motion in joints as a result of abnormal joint alignments; ligamentous damage, such as spurs, scar tissue, and inflammation; uneven muscular contraction of stabilizing and opposing muscle groups
- Neurologic pathology of the extremity joints: Pain, abnormal proprioception
- Mechanical and neurologic pathology of the sacroiliac joint and lumbosacral joints: Decreased range of motion of joint as a result of abnormal joint alignments; ligamentous damage, such as spurs, scar tissue, or inflammation; uneven muscular contraction of stabilizing and opposing muscle groups
- Neurologic pathology of the lumbar spine: Affected lumbosacral plexus motor nerves, nerves from joint receptors, and pain fibers

The chiropractor does not isolate the observation of extremity joints but considers neurologic and core biomechanics function. The veterinary practitioner must see the animal as a functional whole rather than the sum of its parts.

Chiropractic examination includes observation of the skin, muscle condition, and general attitude. Some types of behavior patterns are related to neurologic problems such as pain. The horse who flattens its ears and bites during saddle placement is indicating that the saddle is causing or aggravating pain. If this behavior changes when the pain is eliminated, the behavior can be attributed to the former neurologic condition (Willoughby, 1998).

Static Palpation

A chiropractic spinal examination incorporates static palpation of the topographic processes of the vertebrae. Static palpation findings may be informative, but several precautions are relevant. Without an intimate grasp of normal spinal anatomy, practitioners may make inaccurate assumptions. For example, the anticlinal vertebra (T10) in the dog has a very abbreviated spinous process compared with adjacent segments. Palpation of the spinous process of this vertebra often detects a depression that might be inaccurately interpreted as a ventrally subluxated segment (Willoughby, 1998).

Asymmetric processes may occur with no pathology present in the vertebra or motor unit. For example, a spinous process may be twisted away from the exact midline, whereas the vertebral body and the articular joints are in normal apposition. Finally, static palpation does not provide any information about the functional condition of the segment as it participates in its motor units. For example, upon palpation a vertebra may show normal alignment of the spinous process and transverse process, when in fact the segment is restricted in range of motion.

Static palpation is used on vertebral prominences that lie beneath soft tissue. Relying on anatomic knowledge and palpation skills, the examiner compares the relationships between adjacent vertebrae. For example, the relative heights of transverse processes are compared bilaterally on the same vertebra and between adjacent vertebrae. The global relationships of the column are assessed through palpation for such conditions as kyphosis (roach back), scoliosis, and lordosis. Static palpation examination involves the soft tissues that surround the vertebral segments, such as alterations in muscle tone; inflammatory symptoms, such as those produced by heat; and sensory aberrations, such as pain or hypoalgesia (Willoughby, 1998).

Motion Palpation

A key element in chiropractic examination is evaluation of the active and passive ranges of motion in vertebral motor units. The examiner must assess each joint in all directions of motion, such as lateral flexion, axial rotation, and ranges flexion/extension. Ranges of joint motion have been divided into several categories (Table 25). Active range of motion refers to the portion of vertebral movement that is available with voluntary muscle action. When a horse laterally flexes its neck to the right, each motor unit moves to provide maximal global range of motion for the neck. If one cervical joint loses all or part of the active range of motion, muscular contractions fail to produce total active range of movement. Every joint has an additional range of motion beyond the active range. This is called passive range of motion, or joint play. Joint play gives elastic and protective properties to joints when they are in the closed-pack position. This range of motion is much more limited than the active range and is not produced by voluntary muscular contraction. It is available only when an external force is applied (as, for example, during examination) (Willoughby, 1998).

Table 25. Ranges of joint motion (Willoughby, 1998).

Range	Cartesian Movement
Flexion	Movement around the X - axis
Extension	Movement around the X - axis
Axial rotation	Movement around the Y - axis
Lateral flexion	Movement around the Z - axis
Compression/tension	Translation around the Y - axis
Horizontal shear	Translation around the X - axis
Vertical shear	Translation around the Z - axis

The chiropractor assesses the motor units' active and passive ranges of motion during motion palpation examination. Evaluation of passive and active range of motion considers the expected ranges of motion at each motor unit. These ranges of motion can be expected to vary among species and individual animals and in the presence of degenerative joint disease. For example, the lumbar spine of the cow has limited flexion-extension compared with the same region in the

horse. The cervical spine of the older dog would be expected to have less range of motion than that of the puppy. Furthermore, thoracolumbar extension in a dog with spondylosis is less than that in a dog with a healthy column. The practitioner must have sufficient experience in motion palpation to recognize these differences and properly evaluate the motion findings in an examination (Willoughby, 1998).

In human chiropractic practice, active range of motion can be easily assessed in cooperative patients who participate actively in the examination. In animal chiropractic, however, motion palpation is more difficult. Animal patients may be uncooperative, actively resisting the examination or activating muscle groups that artificially change range-of-motion findings. Motion palpation of the vertebral column in animals is a difficult skill to perfect (Willoughby, 1998).

4.2.7. Chiropractic Adjustments

An alteration in range of motion is an important reason to perform a chiropractic adjustment on a vertebral joint. In chiropractic practice an adjustment is a specific force applied to a specific articulation with a specific vector of application. Adjustment can also be defined as follows: "a short-lever, specific, high velocity, controlled forceful thrust by hand or instrument which is directed at specific articulations and designed to restore biomechanical and neurological function" (Haldeman, 1992) (Willoughby, 1998).

The goal of the adjustment is not to return a vertebra to a specific position but to initiate or activate the homeostatic mechanisms of vertebral kinesthetics. When a restricted joint is moved along its functional plane lines, the innate proprioceptive and restorative mechanisms of the joint are initiated. If the joint ranges are altered by muscular hypertonicity or ligamentous scarring, the subluxation may reappear and may require multiple adjustments. Neurologic reprogramming of muscular contractions and healing of damaged ligaments are not immediate results. The innate homeostatic mechanisms of the body require time to respond to an adjustment. Depending on the severity, duration, and pathology of the subluxation pattern, chiropractic care is generally used in a series of therapeutic visits that allow gradual restoration and then maintenance of biomechanics and neurologic function (Willoughby, 1998).

Vertebral motor units that are severely damaged with osseous bridging (characteristic of spondylosis) may respond poorly or not at all to adjustments. However, routine radiographic examination does not reveal the amount of vertebral motion present in either normal or in pathologically altered segments. Many cases of spondylosis identified by radiographic examination are restricted in some ranges of vertebral motion. Many vertebral sections that appear normal on radiographs exhibit severe restriction in motion characteristics (Willoughby, 1998).

- **Understanding Adjusting Speed**

Chiropractic adjustments are characterized by manual thrusts delivered at high velocity. Understanding the theory behind high-velocity adjustments requires knowing the basic law of physics that governs quantity of force. Force (F) is created by the interplay of mass (M) and acceleration (XA); that is:

$$F = M \times A$$

The chiropractor wishes to increase acceleration during the physical act of the adjustment. This effectively increases the resultant force. The chiropractor can also increase the resultant force to increase the mass during an adjustment. However, increasing the mass may endanger soft tissues surrounding the motor unit. This technique can be compared to driving a nail into a board: A sledgehammer can be used to increase mass, producing the force necessary to drive the nail. However, the sledgehammer may be inappropriately heavy for the type of wood. The same result can be achieved with a lighter-weight hammer head. A carpenter develops the skill to deliver a biomechanically effective force by increasing acceleration with a smaller hammer (Willoughby, 1998).

The chiropractor generates higher forces with acceleration, facilitating effective adjustment of large quadrupeds such as the horse. In large animals, sufficient force must be created to move only one vertebral segment along its articular lines. The size of the entire organism is irrelevant to the effective adjustment of one vertebra in one motor unit. The nature of jointed motor units underscores their primary function of movement. This movement is specific along plane lines created by the orientation of facet surfaces and the intrinsic properties of the ligaments. The speed and timing of the adjustment overcome the relative stability of the motor unit against shear forces (Willoughby, 1998).

- **Understanding Short-Lever Techniques**

The chiropractor adjusts forces as closely as possible to the joint or joints that display biomechanics aberrations. For example, in the lumbar region a rotational misalignment may be characterized by right zygapophyseal joint fixation. The appropriate choice of vertebral contact points for the adjustment would be the right mammillary process. The right mammillary process is just lateral to and slightly superior to the vertebral joint in question. Because the center of rotation of vertebral segments lies within the nucleus pulposus, the resultant lever arm is relatively short between the mammillary process and the nucleus. The combination of high velocity and short lever creates an effective and specific adjustment (Willoughby, 1998).

Some long-lever techniques may be used on an extremity, such as the foot, and delivered in a way that generates sufficient leverage to act at the vertebral level. Al- though sometimes effective, these long-lever techniques require increased application of force at the end of the lever arm.

Because the lever arm in question is a leg with multiple joints, the potential exists to damage intermediate extremity joints. For example, pulling the foot of a horse far and high enough forward to affect the sacroiliac joint places the hock and stifle at risk (Willoughby, 1998).

- **Joint Biomechanics**

At the end of the passive range of motion is an elastic barrier that consists of the ligamentous structures of the joint. Chiropractors describe the relatively small portion of joint motion beyond the elastic barrier as the paraphysiologic space. A chiropractic adjustment is designed to force the joint slightly beyond the elastic barrier and into the paraphysiologic space. Because this paraphysiologic space is relatively small, the depth of adjusting force must be skillfully controlled. At the limit of the paraphysiologic space is the anatomic barrier. This barrier marks the end of the greatest possible range of joint movement. Movement generated beyond this barrier alters the ligamentous and osseous integrity and may cause a vertebral pathologic condition. An adjustment is applied to restore active and passive ranges of motion by rapidly forcing the joint though the fixed regions of joint motion and temporarily into the paraphysiologic space (Willoughby, 1998).

- **Line of Correction**

Vertebral motor units have limited ranges of motion that are determined by the facet orientations of the multiple joints involved and the intrinsic stability of the ligamentous structures. For example, the anatomic characteristics of the atlantooccipital joint effectively restrict is rotation of this motor unit. The atlas and occiput therefore tend to subluxate in lateral flexion malposition. If the goal of the adjustment is to restore biomechanics function, the movement characteristics of each motor unit must be understood. The adjustment is applied to vertebral segments along articular plane lines. Simply put, the way a motor unit moves out of alignment is the opposite of the way it should be moved to return to its proper position. Because each motor unit presents variations in articular planes and muscular and ligamentous stability, a precise anatomic understanding of each vertebral articulation is necessary. Inappropriate or inaccurate adjustments can cause joint and soft-tissue damage, ranging from pain to ligamentous tears (Willoughby, 1998).

4.2.8. Chiropractic Technique

Individual motor units can be adjusted in several ways. Different osseous contacts, such as transverse processes or spinous processes, may be used. Adjustment may be made directly, using the physical skills of the chiropractor, or indirectly, using a small impacting device called an activator. Adjustments may vary in the amount of force applied or type of stabilization given to the vertebral segments during the adjustments. An adjustment is generally designed to affect one motor unit at a time, and stabilization is used to prevent the force of the adjustment from affecting other vertebral areas. Stabilization during the adjustment may be brought about by patient position, the adjuster, or an assistant.

The timing of the adjustive thrust also depends on voluntary muscle relaxation around the motor unit. Muscle relaxation in animals is achieved by skillful handling that results in a relaxed and cooperative patient. Anesthetics are contraindicated during adjustments because normal proprioceptive mechanisms are not active, and damage may occur in motor units that are chemically relaxed. Anesthetics are also impractical for repeat adjustments.

In an adjustment, after the animal's voluntary muscles relax, the joint is brought to tension by removing joint play or passive range of motion. At the elastic barrier a specific adjusting force is applied in a specific direction determined by articular characteristics. The thrust moves the joint temporarily into the paraphysiologic space, restoring lost active and passive ranges of motion. The motor unit maintains its proper alignment and biomechanics function as the neurologic and biomechanics dysfunction is repaired (Willoughby, 1998).

4.3. FINAL CONSIDERATIONS

Acupuncture therapy and chiropractic manipulation share some similarities in their physiologic effects and mode of action. These effects include local effects, somato-visceral reflexes, and central nervous system effects. Both therapies have effects on connective tissue, muscles, and nerves. The neurophysiologic theories of acupuncture and the neurophysiologic theories of chiropractic care have great similarities in the proposed mechanisms of action (Schoen, 1994).

The combination of acupuncture therapy and chiropractic manipulation has a synergistic effect, demonstrating longer-lasting results than when either is used separately. From the diagnostic standpoint, when one is using Shu-point diagnosis in the horse, based on the Five Element theory, it is beneficial to also incorporate a chiropractic diagnostic exam simultaneously. Combination of the two exams offers further insight into the etiology of the lameness. One can base the diagnosis on the Five Element theory and also on the concepts of subluxations. In addition, one can

correlate specific trigger points and association points with specific subluxation complexes (Schoen, 1994).

Continued clinical research may correlate the specific acupuncture points with specific subluxation complexes in the future. For instance, an atlantooccipital subluxation may cause a tightening of the M. cleidotransversarius and cleidomastoideus muscles in horses. This may correlate with diagnostic sensitivity upon palpation of BL-10 and LI-16. There may be secondary sensitivity at local points at the cervical intervertebral spaces, correlating with secondary subluxations at additional cervical vertebrae (Schoen, 1994).

Acupuncture also works synergistically with chiropractic care in treatment. Acupuncture therapy may produce significant muscle relaxation so that chiropractic adjustment is more easily performed, and chiropractic effects are extended. For instance, an equine patient with an atlantooccipital subluxation may be treated with dry needle acupuncture therapy at BL-10 and LI-16. The cervical musculature then relaxes, and the patient lowers its head. After a few minutes of stimulation, the M. cleidotransversarius and cleidomastoideus muscles relax. This makes it easier to adjust the atlantooccipital joint and appears to prevent recurrences for a longer period (Schoen, 1994).

There is much to be explored, researched, and validated in correlation of acupuncture points, both diagnostically and therapeutically, with chiropractic subluxation complexes. The biomechanical association of these two fields of veterinary health care will prove to be a great contribution to equine sports medicine and general veterinary health care in the future (Schoen, 1994).

5. CLINICAL CASE

The purpose of this point is to describe a clinical case using an integrated treatment regimen. A successful approach with ACU and CHIRO in a mare with lameness history.

5.1. CASE PRESENTATION

DAY 1

Anamnesis:

A seven-year-old Oldenburger mare (Figure 21) was presented to PKBM with her five-month-old foal. The mare presented lameness and edema on both hindlimbs and showed signs of pain all over the body, turning out to be impossible to perform an accurate lameness exam or a proper diagnostic.

This mare was living outdoor in a paddock along with other horses and was found with these clinical signs by the caretaker, in that morning, and without any evidence of what had happened.

Figure 21. Seven-year-old Oldenburguer mare presented at PKBM with lameness.

Course of action:

Due to the condition of the mare, it was decided that the best course of action would be to just evaluate and relieve, as much as possible, the general discomfort through ACU and CHIRO.

After performing a diagnostic palpation exam, ACU and CHIRO treatments were executed in order to reduce discomfort and promote the welfare of the mare.

Table 26. Acupoints used on day one treatment.

Acupoint	Function
4 Gates (LI4 & Liv 3)	Circulates the Qi and blood through the body, opens all the meridians, increases circulation, and decreases pain anywhere in the body
LI16	Shoulder and elbow pain, increases bloodflow, lower cervicals
K3	Back pain, stimulates vital energy of regular meridians
B23	Edema, supports Kidney, area where M. biceps femoralis origins – Lame hindlimbs
B17	Digestive issues (i.e., epigastric pain, reflux), influential point for Blood, opens Diaphragm, Fascia crossing
Bai Hui	Hind quarter pain, contusion, colic, meeting point for all Yang meridians

Table 27. CHIRO treatment findings and adjustments on day one:

Region	Displacement type
Occipital	Superior right
C7	Posterior left
C3	Posterior right
Atlas	Posterior right
T4	Posterior
T3	Posterior left
T12	Posterior
T15	Posterior
T18	Posterior right
L6	Posterior left
L4	Posterior
Sacrum apex	Left
Shoulder Humerus lateral	Posterior left
Ilium	Posterior Interior right and Anterior Superior left

Therapeutical recommendations:

The mare was sent home with the following recommendations:

- Relocate to a smaller paddock, without other horses and stabled overnight.
- Massage/stretching exercises:
  - Massage the cold muscles to prepare for stretching. The massage techniques and stretching exercises should always be performed on both sides and carried out regularly.
  - Massage the neck, back and long ischial muscles for approx. 5minutes per side (a massage roller can be used).
  - 10-15 shoulder stretches from top to bottom.
  - Slight stretching of the neck muscle for approx. 10-15 seconds.
  - Carrot stretch exercise to the right, left, up and down.
  - Abdominal muscle workouts.
- Reevaluation ten days later.

DAY 2

Reevaluation:

The mare returned to PKBM for a reevaluation ten days later as recommended, presenting edema and a lameness.

Course of action:

Lameness exam – The mare presented a 2/5 lameness on both hindlimbs on hard ground and a 2/5 lameness on right front limb on soft ground, and no willingness to move forward.

ACU and CHIRO treatment.

Table 28. Acupoints used on day two treatment.

Acupoint	Function
4 Gates (LI4 & Liv 3)	Circulates the Qi and blood through the body, opens all the meridians, increases circulation, and decreases pain anywhere in the body
LI16	Shoulder and elbow pain
GB41	Metatarsal region pain, flexor tendonitis, opens up Dai Mai
B40	Master point for caudal back and hips, hip and back pain

Table 29. CHIRO treatment findings and adjustments on day two.

Region	Displacement type
Occipital	Superior right
C7	Posterior left
C4	Posterior right
Atlas	Posterior left
T12	Posterior
L6	Posterior right
Sacrum apex	Left
Shoulder Humerus lateral	Posterior left and right
Ilium	Anterior Superior right

Therapeutical considerations:

Evaluating the progress of the mare recovery, from the last ACU and CHIRO session, ten days ago, it was possible to observe significant improvements by analyzing the performed treatments. Regarding ACU, the acupuncture points used in the first treatment were more general focused (K3 combined with B23 to stimulate kidney energy in regeneration/restoration and reduce edema and back pain issues; B17 for stomach conditions and Bai Hui for stomach, intestine and hind limbs affections), whereas this new treatment protocol uses more specifically oriented acupoints (GB41 to treat swelling and pain in the metatarsal region and B20 master point for the caudal back), maintaining in both treatment protocols the use of the Four Gates and LI16 for general pain relief and shoulder pain relief, respectively.

Regarding the CHIRO treatments, it is noticeable the remarkable improvement in between treatments. On the last treatment performed four joints had the same type of displacement, revealing to be more complicated subluxations to reposition, requiring a more prolonged treatment, some new subluxations appeared in the result of compensatory displacement due to the vast number of articular subluxations present in the first treatment.

Therapeutical recommendations:

The mare was sent home with the same recommendation of space restriction and stabling overnight, also to return for a follow up in two weeks.

DAY 3

Reevaluation:

Two weeks after the last appointment, the mare presented majorly edema on the left hindlimb, showed signs of irritation (indicator of Yang disorder by excess), had a foul odor from the mouth (indicator of Heat in stomach – Yang organ), her feces had a sour smell (indicator of heat in intestines – Yang organs).

Course of action:

During ACU diagnostic palpation exam the mare reacted exuberantly to light pressure applied (indicator of an excess, acute or superficial condition – Yang) to several acupoints.

Table 30. Reactive acupoints on diagnostic palpation exam.

Acupoint	Function
St25	Alarm point for LI
Cv12	Alarm point for St / Disorder Yang organs
Liv13	Alarm point for Sp (Yin organ of St)
B20	Digestive disorder
B21	St association point, digestive disorder
B25	LI Shu point

ACU and CHIRO treatment.

Table 31. Acupoints used on day three treatment.

Acupoint	Function
4 Gates (LI4 & Liv 3)	Circulates the Qi and blood through the body, opens all the meridians, increases circulation, and decreases pain anywhere in the body
LI16	Shoulder and elbow pain
Bai Hui	Hind quarter pain, contusion, colic
B17	Digestive issues (i.e., epigastric pain, reflux)

Table 32. CHIRO treatment findings and adjustments on day three.

Region	Displacement types
C7	Posterior left

Atlas	Posterior
Ilium	Anterior Superior right and Posterior Interior left

Therapeutical considerations:

Despite generally showing improvement regarding musculoskeletal disorders since the last ACU and CHIRO treatment, in this ACU diagnostic palpation exam, the mare revealed exuberant reaction when light pressure was applied in St25, CV12, Liv13, B20, B21 and B25, along with other symptoms lead to a strong suspicion of gastric pathology. In terms of CHIRO treatments, a surprising improvement of the homeostasis of the vertebral complex was observed.

Therapeutical recommendations:

The mare was sent home with the same recommendation of space restriction, bandage over night with cooling gel on both hind legs.

Due to the strong suspicion of gastric ulcer, it was prescribed GastroGard® (omeprazole 4mg/kg) one injector of oral paste per day, and to thoroughly evaluate the stomach with a gastroscopy, as soon as possible.

DAY 4

Reevaluation

Three days later, the mare showed less signs of irritation, and still presented sour smell feces.

Complementary diagnostic exams

The same day, gastroscopy (Figure 22) was performed at PKBM.

Figure 22. Gastroscopy procedure at PKBM.

Examination findings showed hyperkeratosis and isolated small lesions of the gastric mucosa, next to *Margo plicatus* in the non glandular portion of the stomach proximal to the greater curvature and discrete soreness of the glandular portion proximal to the pylorus (as observed in Figure 23).

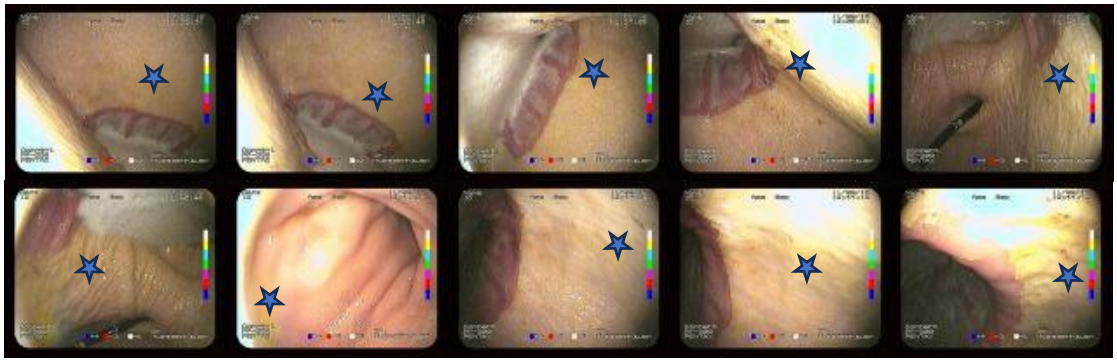

Figure 23. Gastroscopy showing hyperkeratosis and small lesion of the gastric mucosa.

Therapeutical recommendations:

After being diagnosed, the mare continued the treatment with omeprazole and her usual feeding routine of muesli for breeding mares, twice a day, in a total of 1.5 Kg, complemented with some oats as well as linseed oil and hay *ad libitum*.

Since ACU or CHIRO treatments were realized three days prior, and the mare presented improved condition, next ACU and CHIRO treatments were planned in four weeks.

DAY 5

Anamnesis

Seventeen days after the last visit, the mare came referred to PKBM by the assistant veterinarian, with abdominal pain non responsive to medication and no peristaltic movements in the abdomen with indication for surgical intervention.

Course of action:

Emergency abdominal surgery disclosed a 180 degree rotation of the colon, which was successfully treated. After the surgery the mare had a good recovery, no symptoms of gastric condition and it was discharged nine days later.

5.2. SUMMARY

Acupuncture exam, in this case, was crucial on diagnosing and treating the gastric alterations in an early stage, preventing severe complications that would outcome with the progression of the condition throughout time.

Nevertheless, the combined action between Chinese Traditional Veterinary Medicine, CHIRO and Western medicine enabled a prompter and more effective course of action in early diagnose and treatment of the patient, not only highly contributing for the success of this case, but also providing awareness of the importance of the combined use of both types of medicine.

6. CONCLUSIONS

This traineeship had an extreme importance in accomplishing consolidation of the knowledge obtained thought the years of veterinary medicine academic frequency, allowing to experience different realities of clinic and surgery of veterinary medicine in different medical areas and countries and enabling professional and personal growth.

Acquiring knowledge in ACU and CHIRO and raise awareness for these complementary and alternative veterinary medicines, is a focal point that should be taken in consideration by many veterinarians to be more permissive and open in the use of them in order to better understand and treat every single patient as a whole.

Noteworthy, the regular frequency of ACU and CHIRO appointments, not only promotes the wellbeing and the welfare of the animal, but also enables the recognition of discomfort symptoms and pathologies in an early stage, providing bigger rates of a successful treatment.

These complementary practices in veterinary medicine should not be used singularly but be used symbiotically along with the more conventional, western veterinary medicine.

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