The prognostic value of abnormal coagulation times in dogs that are at risk of developing sepsis

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introduction

Sepsis is a hard to define syndrome associated with a deleterious systemic inflammatory response that ultimately leads to coagulopathy, organ dysfunction, and death. The primary aim of this prospective study was to evaluate if coagulation times could be predictive of disease severity and outcome in patients at risk of developing sepsis. A secondary objective was to correlate activated partial thromboplastin time (aPTT) and prothrombin time (PT) with the quick sequential organ failure assessment (qSOFA) scoring system at the moment of admission to the intensive care unit (ICU) and evaluate their combined prognostic value. The main hypothesis of the study was: Are aPTT and PT correlated with disease severity and outcome, when associated with the qSOFA score, at the moment of admission to the ICU?

methods

A total of 43 dogs were prospectively enrolled in the study between September 2016 and March 2017. Patients that were hemodynamically altered with clinical signs of coagulopathy, infection, shock, or SIRS were included, as well as those affected by polytrauma, organ dysfunction, or neoplasia, upon presentation. These patients had at least one of the previous clinical manifestations, with some having more than one. Regarding the presence of coagulopathies, all alterations in coagulation times were included. All of these patients were susceptible to subclinical infection and bacterial translocation, therefore being at risk of developing sepsis. Coagulation testing and qSOFA scoring were performed at the time of admission to the ICU and were statistically analyzed using tests such as Chi-square tests, T-tests, ANOVA, HSD tests, and Pearson correlation coefficient tests. Other variables such as signalment, diagnosis, duration of hospitalization and post-discharge treatment, and outcome were also recorded and analyzed.

Table 1. The qSOFA score criteria.

qSOFA criteria
Respiratory Rate ≥ 22 bpm
Modified Glasgow Coma Scale Score < 15
Systolic Blood Pressure ≤ 100 mmHg

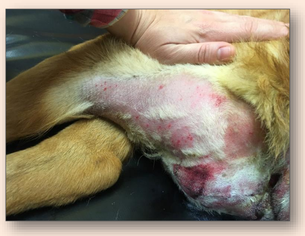

Figure 1. Patient with signs of coagulopathy.

results

Mortality rate was 34.9%. Mortality increased with the number of qSOFA points (0 points: 10%; 1 point: 30.8%; 2 points: 47.1%; 3 points: 66.7%). The aPTT was significantly higher (p = 0.029) in patients with a qSOFA score of 2 points in comparison to those with 1 point. A positive correlation was found between aPTT and PT (r = 0.406, n = 43, p = 0.005). Mean values for aPTT and PT were similar between surviving and non-surviving patients. Ten out of the 15 patients (66.7%) that died did so between the first and fifth day of treatment, and 3 of the remaining 5 deaths (60%) were caused by neoplastic disease. Primary causes of death included: gastrointestinal disease, infectious disease, urinary tract disease, trauma, autoimmune disease, neurological disorder and neoplasia.

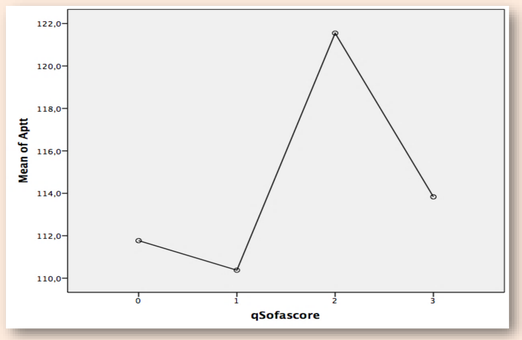

Figure 2. Graphical representation of aPTT values associated with each qSOFA score.

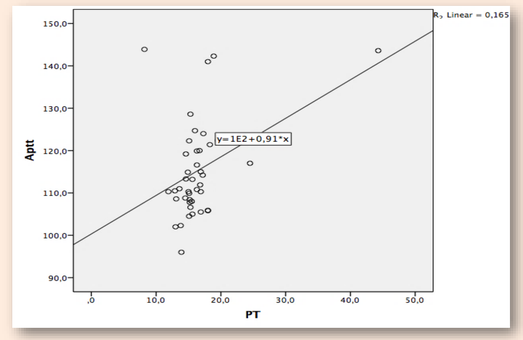

Figure 3. Scatter graph representing a positive correlation between aPTT and PT.

Table 2. The mortality rate associated with each qSOFA score of the study.

qSOFA Score	No. of subjects	No. of survivors	No. of non-survivors	Mortality
0	10	9	1	10%
1	13	9	4	30.8%
2	17	9	8	47.1%
3	3	1	2	66.7%

discussion

The qSOFA scoring system was not only applied because of its quick and straightforward nature but also because an aim of this study was to test if combining qSOFA with coagulation markers would be beneficial in the prediction of mortality in critically ill patients, similarly to what has been investigated before in human and veterinary patients regarding plasma lactate concentration. According to the previous results, there appears to exist a relationship between coagulation times, qSOFA scores and mortality. However, it is possible that the different underlying causes of hospitalization were partly or entirely responsible for fluctuations in aPTT and PT values and outcome, regardless of qSOFA score or septic status. Distinct aetiologies represented by a relatively small number of subjects made it impossible to search for any other statistically significant relationship between diagnosis and other variables.

conclusion

The results of this study suggest the existence of hemostatic dysfunction amongst patients with a qSOFA score of 2 points. In isolation, however, prolonged coagulation times at ICU admission were not predictive of outcome. Further studies involving more subjects in a controlled environment are greatly encouraged.