Introduction

- The endothelial glycocalyx (EG) is a multicomponent structure lining the innermost surface of the vasculature.
- Hyaluronic acid (HA) is a component of this structure and can be used as a direct marker of glycocalyx integrity.
- The EG is affected by systemic inflammation and intravenous fluid administration. EG degradation is fundamental in the pathophysiology of sepsis, but little is known about shedding of EG components in dogs.

Objective

- This study aimed to describe daily changes in HA concentration during the course of septic peritonitis in dogs and to explore whether HA concentrations, markers of inflammation and patient daily fluid status are related.

Methods

- The study was performed at a university teaching hospital. Daily serum samples were prospectively collected from dogs diagnosed with septic peritonitis from admission through hospitalization.
- Samples were stored at -80°C since collection (2012-2014).
- Serial measurements of HA, IL-6, IL-8 and IL-10 were performed. Retrospectively, patient data including admission APPE score, daily fluid administration (mL/kg/day), type of fluid and daily lactate and CBC results were recorded.
- Parameters of interest included time, cytokine concentration, total WBC count, segmented neutrophil count, band neutrophil count, lactate concentration and daily fluid volume.
- Independent predictors of HA were identified using multivariable logistic regression.

Results

- A total of 33 samples from eight dogs were included. All survived to discharge.
- HA concentration ranged from 18-1050 ng/mL (IQR = 49-119 ng/mL) throughout daily analysis. The median daily fluid volume administered was 69 mL/kg/day (IQR = 47-109 mL/kg/day).
- IL-6 concentration was a significant predictor (p< 0.0001) of HA concentration. No significant difference was measured between HA and IL-8 or IL-10.
- Total administered daily fluid volume (mL/kg) was a significant predictor (p<0.04) of HA concentration when the patient’s IL-6 concentration was accounted for.
- There was no significant changes of HA concentration over time. However, HA concentrations were noted to increase on days 2 or 3 of hospitalization.

Discussion

- Results establish the utility of HA as a biomarker in dogs, and document changes in daily HA concentrations in septic dogs from admission through recovery.
- The interaction between IL-6 and HA concentration supports increased EG shedding in systemic inflammatory states. Study results suggest that as the patients’ degree of inflammation increased, the total administered daily fluid volume required to cause a significant increase in HA concentration became lower.
- Patients with more severe inflammation may have more extensive EG degradation, and therefore may be more susceptible to the exacerbating effects of liberal fluid therapy.
- Limitations of this study include small population size, observational design, the use of a single biomarker of EG degradation, and prolonged storage time of serum samples.

Conclusion

- Results support that inflammation is associated with glycocalyx degradation.
- They also suggest that in a state of inflammation, patients recovering from septic peritonitis may become more susceptible to further glycocalyx damage as increasing fluid volumes are delivered.
- Further prospective investigation of the effects of fluid on the glycocalyx in varying states of disease and recovery are warranted.