SAA (Serum Amyloid A Protein) as a measure of short-term postoperative inflammation in elective standing prosthetic laryngoplasty surgery

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Introduction

A prosthetic laryngoplasty, or “tie-back,” is a common elective procedure in equine hospitals, often performed under standing sedation. Acute phase proteins, particularly serum amyloid A (SAA), serve as early markers of inflammation and infection. SAA is the main acute-phase protein in horses, with low levels in healthy horses and a rapid increase in response to injury, rising significantly within 24 to 48 hours. Monitoring SAA concentrations can help assess the inflammatory response during the early phases after surgical procedures like “tie-backs.” This study aimed to measure the inflammatory response in horses undergoing this procedure through serial serum SAA concentration analysis.

Materials and Methods

Samples were collected from horses undergoing elective standing “tie-back” surgeries over 14 months. All subjects were free of pre-operative risk factors and were admitted at least 24 hours prior to surgery.

Surgical Protocol:

- Surgeries were performed by two board-certified equine surgeons using standardised techniques.
- Horses received methadone-based sedation, including premedication with ACP and xylazine, and induction and maintenance with methadone and detomidine.
- Pre-operative antibiotics (Gentamicin and trimethoprim sulfate) and a single dose of phenylbutazone were administered. Antibiotics were continued for another 48 h and phenylbutazone on a tapering dose for 7 d.

Sample Collection and Analysis:

- Blood samples were collected 24-hours pre-operatively and at 48, 72, and 96 hours post-operatively.
- Serum was stored for batch testing under standardised conditions, with results documented in Excel.

Monitoring Recovery:

- Clinical parameters were monitored for post-operative recovery, focusing on signs of complications like coughing or concerns at the surgical site.

Results

Study population

31 surgical events occurred and involved 30 horses. The population's median age was 3 years and consisted of 10 mares, 16 geldings, and 5 colts. Breed distribution was 29 thoroughbreds and 1 warmblood. All horses were graded as a minimum grade 3.2 on the Havermyer laryngeal grading scale, with a median score of 3.2.

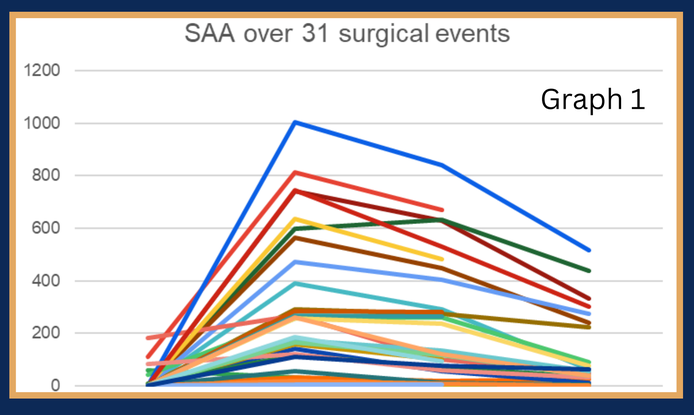
SAA concentrations

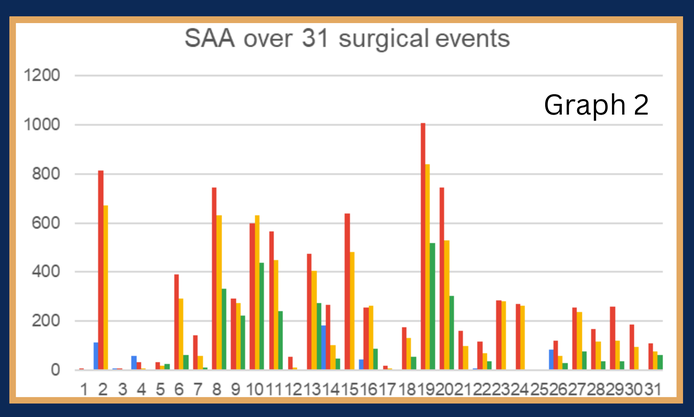
Most horses showed a similar trend through the trial when plotted (Graph 1 and 2). The median value at admission was low, as expected. An increase of approximately 200-fold was seen 48 hours after surgery, halving over the following measurements. Within the data sets, outliers were identified. Four horses had SAAs greater than 20 pre-surgery, with only one of these following the group trend. Two horses showed little change between 48 hours and 96 hours postoperatively.

	24-hour pre-surgery	48-hour post-surgery	72-hour post-surgery	96-hour post-surgery
Range	1-182	4-1006	4-841	2-517
Average	17.63	303.13	238.77	63
Median	2	256	120	53

Table 1: SAA concentrations over time.

Image 1 shows pre-operative surgical site preparation and image 2 shows the surgical site post-operatively.





Graphs 1 and 2 display SAA levels from collected samples. Graph 1 illustrates the SAA levels over time relative to each other, with each plot representing a subject. Graph 2 shows the four SAA values for each subject.

Complications	Number of horses
Post-surgery nasal discharge	5
Post-surgery cough	6
Post-surgery seroma	1
Required repeat tie-back	1
Major complications	0

Table 2: Observed complications

Discussion

Elective surgeries are commonly performed in veterinary medicine. While every precaution is taken to minimise risks and potential adverse outcomes, it is important to acknowledge that surgical interventions invariably result in some degree of trauma to the patient. Understanding the typical levels of inflammation and the expected physiological responses can be valuable for monitoring surgical outcomes and assessing the seriousness of post-operative complications.

In this study, no major complications were observed. However, horses were monitored for complications that are common to the procedure, including coughing, nasal discharge, and abnormalities at the surgical site. Within the ninety-six hours following surgery, six horses exhibited coughing (20%), and five (16%) developed nasal discharge. When comparing the Serum Amyloid A (SAA) levels of these horses with those who showed no post-operative changes, the differences in SAA concentrations were minimal. This suggests that the observed clinical signs may not correlate with surgical inflammation.

Among the cohort, one horse required a second procedure to rectify a failed prosthesis twenty-six days post-initial surgery. This subsequent operation resulted in a smaller increase in overall SAA concentrations, although the post-operative trend persisted.

The variability in SAA concentrations among individual horses highlights the influence of horse-dependent factors. Horses with elevated baseline SAA levels still conformed to the overall trend established by those within normal limits.

Although the dataset is relatively small, the observed trends are noteworthy. The advantage of standardised procedures applied to a homogeneous cohort of horses is underscored by the responses during the measured acute inflammatory phase following surgery.

Conclusion

This study shows surgeons can expect a predictable change in SAA concentrations following standing “tie-back” surgery. An elevation of up to 1000 was recorded in a horse with no significant complications developing, such as wound infection, pneumonia or colitis. Peak levels are found 48 hours after surgery but should be trending towards pre-operative levels by 96 hours after surgery. While coughing and nasal discharge were recorded in 16-20% of operated patients, it was not associated with markedly elevated or prolonged SAA concentrations.

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