

# TRAUMATIC CONSTRICTIVE PERICARDITIS IN A HORSE

## PERICARDITIS CONSTRICTIVA POR TRAUMA EXTERNO EN UN EQUINO

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### INTRODUCTION

Pericarditis is an inflammatory condition of the outer layer of the heart, the pericardium. It has been related to different etiologies, including bacterial and viral infections (May *et al.* 2002; Perkins *et al.* 2004; Bolin *et al.* 2005), traumas (Bertone & Dill, 1985), neoplasias (Stoica *et al.* 2004) and secondary to inflammatory processes in adjacent organs or septicemia (Benson & Sweeney, 1984; Jesty & Reef, 2006). Idiopathic or immunological causes are also described, such as eosinophilic and inflammatory sterile effusions (Worth & Reef, 1998; Bonagura & Reef, 2005). Likewise, outbreaks of seasonal pericarditis have been described in horses related to migrating worms (*Malacosoma americanum*) in some regions of the USA, although the causes have not been clarified (Seahorn *et al.* 2003; Jones *et al.* 2007; Sebastian *et al.* 2008).

Traumatic pericarditis is more frequently presented in bovines and originates from the penetration of metallic sharp objects through the reticular wall, diaphragm, pericardium and, sometimes, the myocardium (Radostis *et al.* 2007). Pericarditis is an uncommon pathology in horses (Rooney & Robertson, 1996), in particular the traumatic one. This report describes the occurrence of pericarditis caused by a perforating thoracic trauma, and diagnosed on the necropsy.

#### Patient examination

##### Anamnesis and clinical findings:

A necropsy service was required for a two year old mixed-breed female horse. The animal had suffered a perforation in the thoracic area with a wood splinter when it jumped over a fence 1.5 months earlier. At the time, the horse caretaker had sutured and treated the wound topically; the animal also

received antibiotics (22,000IU/kg/im/bid procaine penicillin) and an anti-inflammatory (phenylbutazone 4.4mg/kg/iv/sid) for one week. According to the caregiver the animal exhibited anorexia, intense dyspnea, reluctance to movement and abdominal strain for days prior to its death.

##### Necropsy findings

The most important injuries found in the necropsy were the presence of a scar on the ventral thoracic wall (Figure 1A), and the presence of yellowish areas indicating fibrin in the subcutaneous tissue of the thorax. Also, severe pulmonary and pleural congestion were found, as well as the presence of serosanguineous fluid in the thoracic cavity (hydrothorax) (Figure 1B); besides a hypertrophied heart, the pericardial sac was notably thickened and adhered to the epicardium. On the epicardial surface of the heart, a thick fibrin layer was noticed (Figure 1C). The abdominal cavity presented an abundant quantity of yellowish fluid (ascites) (Figure 1D) and the liver was congested and enlarged.

### DISCUSSION

It is always difficult to determine the cause of a pericardial inflammation based on the macroscopic examination of an injury. For this reason, a morphologic classification is commonly used (Mexie & Robinson, 2007). Although, a traumatic pericarditis is a relatively common event in bovines (Radostis *et al.* 2007), different species can be also affected (Kolm *et al.* 2001; Torki *et al.* 2011), but in horses there are few cases of the traumatic pericarditis. One dates from 1985 (Bertone & Dill, 1985), related to the ingestion of a metallic foreign body that moved from the stomach producing a restrictive pericarditis, described as a case of gastro pericarditis.

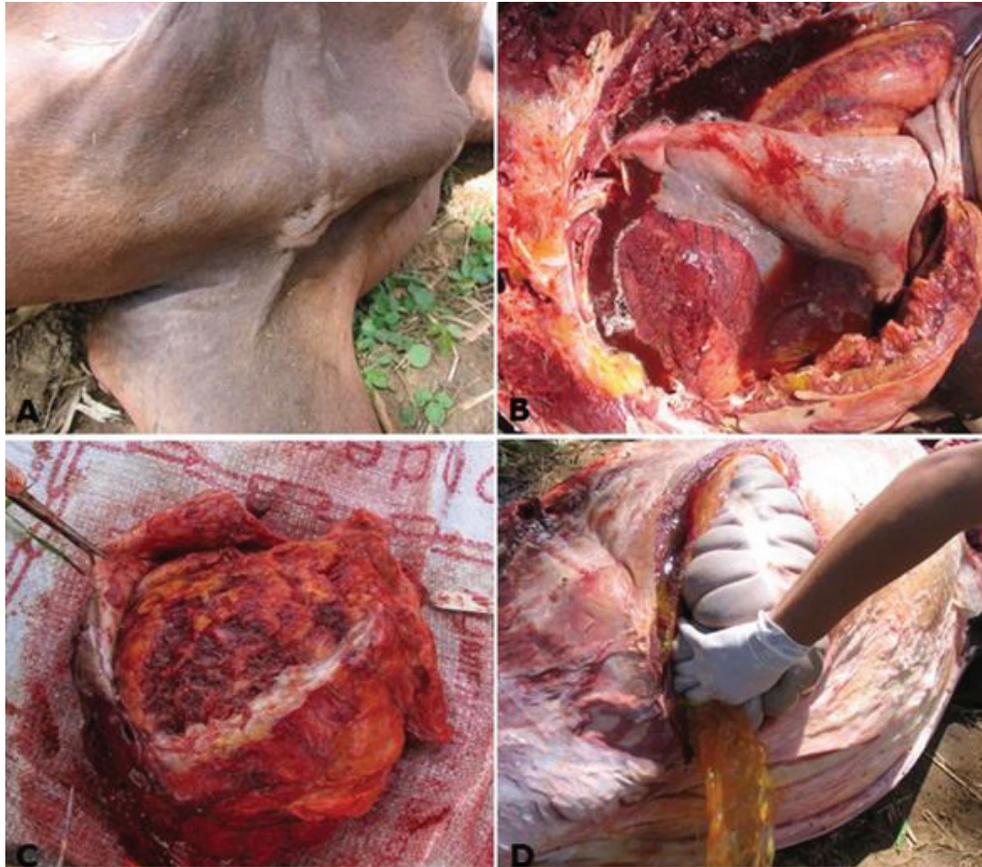


Figure 1 - Lesions observed during necropsy. Scar on the ventral thorax between fifth and sixth costochondral junction (A), presence of bloody fluid in the thoracic cavity and cardiac hypertrophy (B), thickened pericardium epicardium and endocardial surface with presence of fibrin (C), ascites (D).

Even though there was no ingestion of any foreign body, it is valid to consider this case like being of a traumatic origin, since it is directly related to the perforation in the thorax of the animal while jumping over a wood fence. However, cytological and microbiological studies of the fluids found in this case were not made to further diagnose the infectious pathogens.

In the horse anatomy, the ventral area of the fibrous pericardium is attached to the sternum by the sternopericardial ligament, from its fifth costochondral junction to the xiphoid process (Schaller, 1999; Barone, 1993) (Figure 2). Evaluating the scar on the ventral thoracic wall of the animal, it was obvious that the injury reached a point between the fifth and the sixth costochondral junction. Considering the close anatomical relation that this region has with the pericardium, it is likely that the trauma initiated the inflammatory process.

Sojka *et al.* (1990) reported one case with similar pathogeny of septic pericarditis in a cow in which the cause was related to the penetration of a wire through the skin and the sternum,

finally reaching the pericardium. Davis *et al.* (2002), in a retrospective study, described pleural and pericardial effusion in a horse as a result of a trauma on the left side of the thorax, despite the intensity of the trauma was not specified. This proves the sensitivity of this area because of the proximity of the cardiac silhouette to the thoracic wall.

The sternal bone marrow aspiration technique is considered an innocuous procedure. However, Jacobs *et al.* (1983) related the death of a horse after an sternal bone marrow aspiration, and in the necropsy it was found that the cause of the death was the restriction of diastolic filling (cardiac plugging) resulting from a small laceration on the left ventricle during a biopsy. Similarly, Durando *et al.* (2006) described a case of non-lethal pneumopericardium during a sternal bone marrow aspiration in a horse. Though those cases are rare, they probably resulted from a wrong assessment of the topographical anatomy of the aspiration area, therefore making mistakes when determining the right place and depth of needle insertion (Kasashima *et al.* 2011).

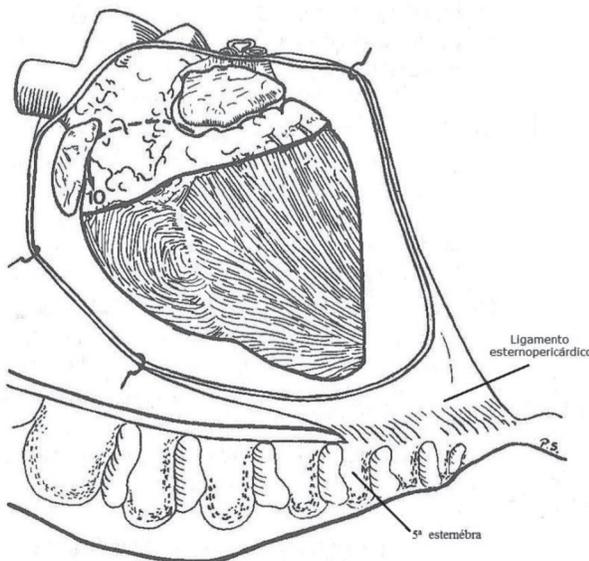


Figure 2. Anatomical relationship of the fibrous pericardium to the sternum from the fifth costochondral junction (Modified from Schaller, 1999).

The anatomopathological findings suggest a case of constrictive pericarditis, characterized by extensive fibrosis and thickening of the pericardial sac as a sequel of inflammatory processes or presence of fibrin between the visceral and the parietal pericardium layers (Worth & Reef, 1998). The piercing trauma possibly reached the pericardium and caused substantial injuries to the adjacent structures. Constrictive pericarditis can decrease the ventricular filling and the diastolic function, compromising the cardiac function and causing a congestive cardiac failure (Bonagura & Reef, 2005).

Davis *et al.* (2002) have studied cases of congestive cardiac failure in horses and they have found that this condition can be associated, among other causes, to pericarditis. In addition, they concluded that this is a rare condition in horses and the prognosis is serious in the long term. These statements are compatible with the case related in this article, in which some injuries took place as a consequence of a pronounced left and right sided cardiac failure, such as hypertrophy, congestion in diverse organs, hydrothorax and ascites, as well as the death of the animal, for cause of the congestive cardiac failure.

Finally, in the dynamic of the evolution of the clinical symptoms, the initial presence of infecting microorganisms from the penetration in the wound must not be ruled out. After this, it took place the beginning of an inflammatory process and the subsequent origin of pericardial effusion and fibrinous pericarditis that caused cardiac plugging and constriction, leading to an eventual congestive cardiac failure, once all the initial compensatory mechanisms were

exhausted (Reef & McGuirk, 2009). Unfortunately, it was not possible to correlate all the clinical signs since the very specific moment of the accident, owing to the way this case developed.

## CONCLUSION

Traumatic pericarditis is an uncommon condition in horses. However, it must be seriously considered when there are any injuries involving the thoracic wall close to the sternum, because of its anatomical proximity with the sternopericardial ligament. Any injury in this region of the horse body can lead to a complete cardiac failure, as seen in this particular case. It is recommended that equine practitioners perform ultrasonographic evaluation in patients with chest injuries of this nature.

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