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SHORT COMMUNICATION

Heart valve pathology in regularly slaughtered horses

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Summary

In this study we examined macroscopic and microscopic lesions in the mitral valves of 50 regularly slaughtered horses in Italy. Macroscopically the results were minor. Microscopic lesions to the valve were found in both young and elderly subjects, confirming that there is no correlation between age and onset of lesions. We set out to evaluate whether the lesions correspond to valve disorder during the life of the animal.

Keywords

Endocardiosis,
Lambli's excrescences,
Horse.

Parole chiave

Endocardiosi,
Escrescenze di
Lambli,
Cavalli.

Riassunto

Gli Autori hanno condotto uno studio sulle lesioni, macroscopiche e microscopiche, rilevabili su valvola mitrale in 50 equini regolarmente macellati in Italia. A livello macroscopico i risultati sono stati poco rilevanti. A livello microscopico sono state riscontrate lesioni a carico della valvola sia in soggetti giovani che anziani, confermando una mancata correlazione tra età e presenza di lesioni. Sarebbe opportuno valutare se a tali lesioni corrispondono disfunzioni valvolari nell'animale in vita.

**Patologia
della
valvola del
cuore in
cavalli
regolarmente
macellati**

Introduction

Endocardiosis is a degenerative-dystrophic process of the heart valves, especially the mitral valve, which involves the myxomatous transformation of the valvular matrix and tendinous chords. Macroscopically, it's possible to distinguish various degrees of gravity: the first stage is characterized by the enhancement of glycosaminoglycans, hyaluronic and chondroitin-6-sulfuric acid. Then, the valve became thickened and deformed, losing the tight seal and causing some blood move backward in the heart. With the progression of the pathology, the valve cusps are distorted converting a minor leak into a massive incompetence of the valve. Finally, atrial impact jet lesions can be observed.

Following Barlow's report (Barlow *et al.* 1963) on the mitral valve prolapse in humans caused by endocardiosis, studies in veterinary fields have been intensified in order to understand the etiologic and histogenetic mechanisms of endocardiosis.

Endocardiosis has recently been recognised in dogs and cats. It has also sporadically been found in nonhuman primates – in horses, rats, and pigs.

Little is known about the causes of endocardiosis, although the genetic component seems to play a very important role. A hereditary familial autosomal dominant trait has been identified in humans. A polygenic basis in dogs has been demonstrated in some breeds, such as the Cavalier King Charles Spaniel (50% prevalence in dogs 4 years old and 100% in dogs 10 years old).

A correlation between the gravity of endocardiosis and the phylogenetic evolution of the affected species has also been suggested. In this note we describe the lesions at the mitral valve in regularly slaughtered horses.

Materials and methods

Animals

The study was conducted with 50 horses regularly slaughtered in Puglia (southern Italy; n. 25) and Piedmont (northern Italy; n. 25). The horses were imported from either Poland or France.

The 25 subjects slaughtered in Puglia (17 females and 8 males) were between 1.5 and 15 years old. The 25 subjects slaughtered in Piedmont (13 females and 12 castrated males) were between 6 and 21 years old.

Histological techniques

Immediately following slaughter, the mitral valve was resected and fixed in 10% buffered formalin. The valves with lesions were macroscopically photographed and then cut into several cusp sectors for histological and histochemical examinations.

The sections obtained were stained with hematoxylin-eosin. The Azan method was used for the connective tissue, and the Weigert van Gieson method for elastic and Pas-Alcian fibres. Moreover, Pas-Alcian and metachromatic staining with toluidine blue at different pH were performed to point out the presence of glycosaminoglycan.

Results

Macroscopic lesions were not observed in horses slaughtered in Puglia except for 2 horses of 14 and 15 years old respectively, in which the mitral cusps showed irregular atrial surface, higher and thickened areas, and slightly oval edges.

Histologically, Lambl's excrescences were observed. Blood vessels in the valve tissue were observed in 9 subjects and in 1 large haemorrhages due to the endothelial lesions of the near vessels. The valves were normal in 4 animals and the beginning of the fibrosis process was observed in 16 horses and were observed to increase with age.

In 6 subjects of 1.5-3 years old, endocardiosis was observed at the valve margin, or scattered in the cancellous. The lesions were round in shape with absence of connective fibres and presence of embryonic type cells; furthermore, the area of lesions appeared metachromatic with toluidine blue staining and Alcian positive.

In older animals, the endocardiosis process was always located at the edge of the valve and in the cancellous tunica, with a consequent increasing volume.

In 8 subjects Lambl's excrescences were observed, although limited in number and small in volume.

Rare and small foci of inflammation with mononuclear cell accumulation were found in 2 samples.

Alterations were more complex and evident – even macroscopically – in horses slaughtered in Piedmont, Italy.

In all animals, the atrial surfaces of the valvular leaflets were irregular and opaque and they appeared bulbous and rounded instead of flat and thin at the ends.

In 8 valves collected from animals over 8 years old, Lambl's excrescences were macroscopically evident on the atrial surface and were characterized by white and transparent small laminated formations of about 1-2 mm (Figure 1). They histologically resemble small lamellae, generally linear or mushroom-shaped with branches on the surface; they were covered by endothelium and formed by connective tissue (Figure 2).

The lesions attributable to endocardiosis were never very evident, even with increasing age.

The margins were completely transformed by

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Figure 1. Horse, 12 years, mitral valve: macroscopic appearance of the Lambl's excrescences.

Figure 2. Horse, 24, mitral valve: histological appearance of the Lambl's excrescences (HE) 40x.

the fundamental substance, with few starry cells, without elastic fibers, due to the increase of glycosaminoglycan in the valvular leaflets that appear Alcian-positive and metachromatic with Toluidine blue staining. In other areas we noted only well-defined endocardiosis outbreaks in the cancellous.

In 3 subjects, there was a proliferation of myofibroblastic cells in myxomatous tissue under the endothelium.

In only 1 valve a fibrous plaque was highlighted above the fibroelastic layer of the atrial surface.

The most significant and frequent valve lesions were characterized by a fibrosis with gradual disappearance of the valve architecture (Figures 3 and 4).

Calcification foci were observed in 2 valves of likely dystrophic etiology and in another valve an arteriole with intimal proliferation was highlighted.

Discussion and conclusions

Despite being carried out on a limited number of animals, the findings from this study allow us to make the following conclusions: Horses are not inclined to endocardiosis. Moreover, although the disease can occur in young animals, there is no substantial worsening with age as has been observed in dogs and pigs.

Examinations of the histological findings of the heart valves frequently demonstrated a proliferative phenomena of connective tissue with a consequent fibrosis that was able to change the functionality of the valve.

Regarding the Lambl's excrescences observed in a large number of both young and adult animals: it should be recalled that these are made by threadlike excrescences covered by endothelium and are located at the level of the atrioventricular and semilunar valves (Aziz and Baciewicz 2007). In human pathology these are quite rare, while in veterinary medicine, they have been described in horses (Else and Holmes 1972) and dolphins (Scaglione *et al.* 2013). It is believed that the Lambl's excrescences are not related to specific valve diseases. However, it is possible that excrescence fragments embolise in organs far from the heart, in particular the brain, creating a link between the presence of excrescences and neurological disorders caused by ictus or cerebrovascular lesions.

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Figure 3. Horse, 14 years, mitral valve: foci of endocarditis in the end edge (HE) 40x.

Figure 4. Horse, 24, mitral valve: fibrosis and foci of endocardiosis on the end flap (Alcian PAS) 40x.

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