Scientific Report

Endocarditis associated with *Erysipelothrix rhusiopathiae* in a fat-tailed ram

Aslani, M. R.[1*]; Ebrahimi Kahrisangi, A.[2]; Baghban, F.[3]; Kazemi, A.[1]; Heidari, M.[1] and Salehi, N.[1]

[1]Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran; [2]Department of Pathobiology, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran; [3]Department of Veterinary Medicine, Yasuj Branch, Islamic Azad University, Yasuj, Iran

[*]***Correspondence:*** *M. R. Aslani, Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran. E-mail: aslani_mr@yahoo.com*

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Summary

Endocarditis is rarely reported in sheep and information presented for ovine endocarditis is based mostly on comparative findings in the cattle. Infective vegetative endocarditis of the right heart was diagnosed in a 3-year-old fat-tailed ram. Clinical findings included tachycardia, marked brisket edema, jugular veins distention and pulsation and pale mucous membranes. Hematologic abnormality included neutrophilic leukocytosis. Necropsy confirmed severe right atrioventricular and pulmonary valves vegetative endocarditis with evidence of right heart failure. *Erysipelothrix rhusiopathiae* was isolated from those vegetative lisions.

Key words: Atrioventicular valve, Endocarditis, *Erysipelothrix rhusiopathiae*, Pulmonary valve, Sheep

Introduction

Endocarditis is defined as infection of one or more of the endocardial surfaces of the heart which usually involve the heart valves. The pathogenesis of endocarditis in large animals is not clearly defined, but chronic active infections elsewhere in the body such as mastitis, arthritis and metritis, leading to sustained or intermittent bacteraemia, is believed to be a predisposing factor (Reef and McGuirk, 2009). In cattle, different predilection site for valve vegetation has been reported. Radostits *et al*. (2007) described that endocarditis in cattle occurs most commonly on the right atrioventricular (tricuspid) valve and the left one (mitral) is the second valve of predilection. On the other hand, Millard *et al*. (2007) and Mohamed and Buczinski (2011) reported highest involvement of pulmonary valves in cases of bovine endocarditis.

Endocarditis is rarely reported in sheep (Scott and Sargison, 2001) and information presented for ovine endocarditis is based mostly on comparative findings in the cattle. This short communication describes a case of tricuspid and pulmonic valves involvement endocarditis in a ram which is the first report of endocarditis in sheep from Iran.

Case report

A 3-year-old fat-tailed ram with a three to four week history of progressive exercise intolerance, brisket edema, anorexia and weight loss was presented to the Veterinary Teaching Clinic, Shahrekord University, for clinical evaluation. The animal was grazing on pasture in a herd of 200 sheep and had received a dose of levamisole (5 mg/kg body weight) 4 days before admission. On clinical examination, the ram was underweight and the body condition score was 3. The rectal temperature was 38°C. The respiratory rate was 35 per min and the heart rate was regular and elevated to 140 beats per min. No murmur, friction or splashing was audible on both sides at the time of cardiac auscultation. There was a marked jugular distention and pulsation. There was also an obvious brisket pitting edema (Fig. 1). Abdominal ballottement did not reveal any abnormality. The mucous membranes were pale and the eyes were sunken, showing marked dehydration. The peripheral lymph nodes were normal. Occasional teeth grinding was audible during examination. An electrocardiogram (ECG) was obtained by means of a base-apex lead. No alternations on rhythm were recorded but there was a low P and QRS wave amplitude, probably due to brisket edema and pericardial effusion (Fig. 2). A blood sample was taken for hematology and the animal was referred for thoracic radiology and ultrasonography. During radiography, when the ram situated in the lateral position, it suddenly collapsed and died after gasping movements. However, the radiography was not remarkable.

At postmortem examination the peritoneal cavity contained 4-5 L ascitic watery fluid. The liver was congested, enlarged and its cut surfaces showed a pale and mottled appearance (nutmeg liver). There was a small amount of effusion in thoracic and pericardial cavities. The heart had a rounded appearance and when

opened there was an extensive cream-colored, firm, verrucous proliferative lesion on cusps of right ventricular valves up to 3 cm in diameter and five distinct similar lesions on pulmonary valves with 0.5-1.5 cm in diameter (Fig. 3). Fragments of vegetative lesions were collected for bacteriology. Tissue samples were also collected from valvular lesions and liver, and fixed in 10% neutral formalin for histopathology.

Hematology revealed changes consistent with moderate dehydration (PCV 42%). There was a moderate leucocytosis (WBC count 16.4 × 10^9/L) with 82% neutrophils, 14% lymphocytes, and 4% monocytes. Bacterial culture of the heart valve lesions on blood agar resulted in the isolation of α-hemolytic Gram-positive and non-acid-fast rods. The microorganism was identified as *Erysipelothrix rhusiopathiae* using biochemical tests according to Quinn *et al*. (1999). Histopathology revealed a severe proliferative endocarditis with a mixture of degenerated and non-degenerated inflammatory cells, necrotic cellular debris, red blood cells, infiltration of inflammatory cells with neutrophil dominance, fibrin and bacterial colonies. The myocardium adjacent to vegetative lesion was severely infested by *Sarcocystis* species and showed some degrees of myositis and fibrosis (Fig. 4). Liver showed marked congestion and edema in a centrilobular pattern, hemorrhage and some extent of cell necrosis and fibrosis.

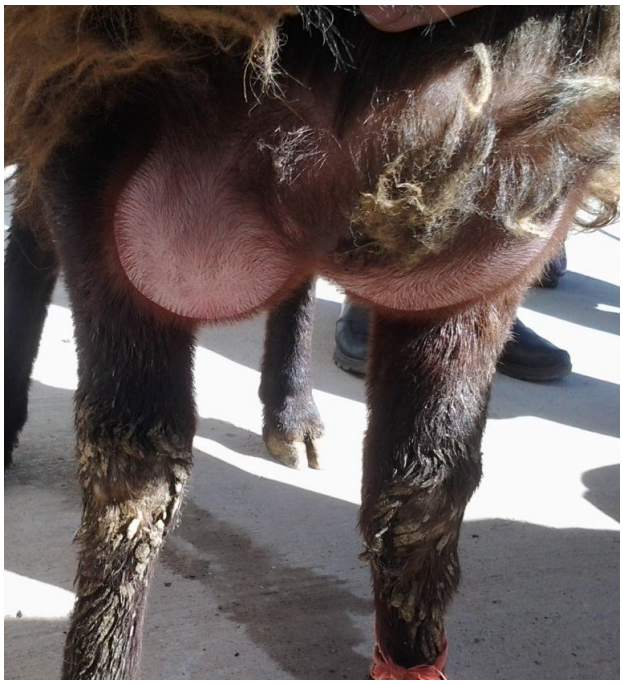

Fig. 1: Marked brisket edema associated with endocarditis in a fat-tailed ram

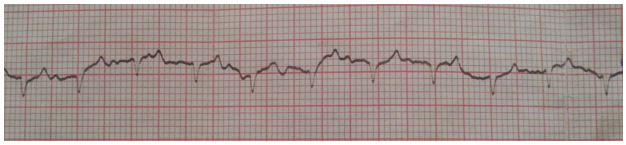

Fig. 2: ECG of the fat-tailed ram with congestive heart failure associated with endocarditis, showing sinus tachycardia and low-voltage complexes (base-apex leads, 25 mm/s, 10 mm/mv)

Fig. 3: Vegetative endocarditis of the right atrioventicular and pulmonic valves in a fat-tailed ram

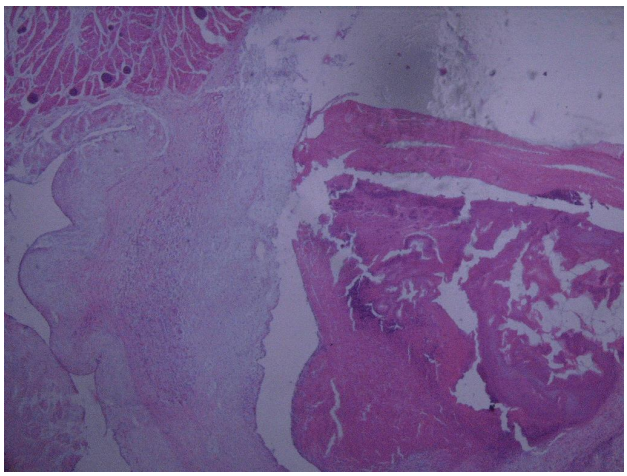

Fig. 4: Atrioventicular valve of the ram show in thickening of the valve due to infiltration of inflammatory cells, fibrin and cell debris; and a large vegetation containing bacterial colonies present in fibrinous exudates appears dark purple

Discussion

Erysipelothrix rhusiopathiae is a facultative anaerobic, non-motile, non-spore forming, non-acid-fast, small, Gram-positive bacillus with worldwide distribution. It is ubiquitous in nature and affects a wide variety of vertebrate and invertebrate species including domestic and wild mammals, marine mammals, birds and some arthropods. Livestock are infected by this organism by entering through mucous membranes, abrasions or skin lesions. Diseases characterized by skin and joint involvement in pigs and polyarthritis in sheep and calves are caused by *E. rhusiopathiae* (Wang *et al*., 2010). It is an important zoonosis and three forms of human disease, a localized skin infection, a diffuse

cutaneous disease and a systemic form of infection are described (Boo *et al*., 2003).

The most common bacterial isolate from bovine endocarditis is *Arcanobacterium pyogenes* (Reef and McGuirk, 2009), while endocarditis due to *E. rhusiopathiae* has rarely been reported in cattle (Edwards *et al*., 2009) and other farm animals including horse (McCormick *et al*., 1985) and sheep (McClachlan, 1978). Bacteriology of vegetative lesions is rarely undertaken although isolates have included *E. rhusiopathiae* and streptococci (Scott, 2015). Isolation of *E. rhusiopathiae* has been reported from a few cases of endocarditis in dogs (Eriksen *et al*., 1987). Cases of endocarditis caused by *E. rhusiopathiae* have also been reported in humans and it is believed that the systemic infection with this bacterium is almost always associated with endocarditis, with a predilection for left-sided heart valves, especially the aortic valve (Boo *et al*., 2003; Ko *et al*., 2003; Wang *et al*., 2010; Campbell and Cowan, 2013). Similarly, the mitral and aortic valves are most often involved in dogs (Eriksen *et al*., 1987). Preexistence of valvular or myocardial disease predispose valves to implanting and colonization of circulating bacteria (Radostits *et al*., 2007). Concurrent *Sarcocystis myositis* and vegetative endocarditis of right atrioventricular valve has been reported in a shearling ram with no detection of causative bacterial agent (Scott and Sargison, 2001). In the case of present report, heavy infestation of myocardium by *Sarcocystis* species was also a histopathologic feature. *Erysipelothrix rhusiopathiae* was isolated as etiology of endocarditis in this ram, however, the rout of infection could not be established. *Erysipelothrix rhusiopathiae* infection causes substantial economic losses in animal industries and so control procedures including sound husbandry, herd management, good sanitation and immunization procedures are recommended (Wang *et al*., 2010).

Conflict of interest

There is no conflict of interest.

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