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# Thoracic aortic aneurysm in a buck associated with caseous lymphadenitis

[*Aneurisma de aorta torácica associado à linfadenite caseosa em caprino reprodutor*]

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## ABSTRACT

This paper reports the clinical, bacteriological and pathological findings of a thoracic aortic aneurysm in a four-year-old Anglo-Nubian goat buck, related to a framework of visceral caseous lymphadenitis. General clinical examination showed heart rate of 75 beats per minute, respiratory rate of 20 movements per minute and ruminal movements of four movements per minute. Superficial lymph nodes were normal upon palpation. Rectal temperature was slightly high (40.5°C). Blood test showed an intense leukocytosis (54,000/µL), characterized by strong neutrophil shift to the left. At necropsy, a large blood clot was detected in the thoracic cavity. The thickening of the myocardium and dilatation of the aorta in the thoracic portion, presenting a saculiform format was also observed. A large number of abscesses were disseminated in the media and intima layers of aorta. The aorta lumen obstruction by arterial plaques consisting of inflammatory infiltrate, predominantly neutrophilic was also detected. Abscesses were found spread in turbinate, rumen, reticulum, kidneys, liver, spleen, testicles and aorta wall. The microbiological exam of exudate confirmed *Corynebacterium pseudotuberculosis* as the causal agent.

Keywords: abscesses, caprine, *Corynebacterium pseudotuberculosis*, leukocytosis

## RESUMO

*Este trabalho descreve os achados clínicos, bacteriológicos e patológicos de um aneurisma da aorta torácica em um reprodutor caprino da raça Anglo-Nubiana, de quatro anos de idade, relacionado a um caso de linfadenite caseosa visceral. Ao exame clínico geral observaram-se: frequência cardíaca de 75 batimentos por minuto, frequência respiratória de 20 movimentos por minuto e movimentos ruminais de quatro movimentos por minuto. Os linfonodos superficiais encontravam-se normais à palpação. A temperatura retal estava ligeiramente aumentada (40,5°C). No hemograma completo, observou-se leucocitose intensa, 54.000/µL, caracterizada por um forte desvio neutrofílico à direita. Nos achados de necropsia, observou-se, na cavidade torácica, presença de um grande coágulo de sangue. No coração, foi identificado espessamento do miocárdio. Uma dilatação na porção torácica da artéria aorta foi detectada, apresentando um aspecto saculiforme. Um grande número de abscessos estava presente nas camadas média e íntima da aorta. Observou-se, também, obstrução do lúmen da aorta por placas de infiltrado inflamatório, predominantemente neutrofílico. A disseminação de abscessos nos cornetos, rúmen, retículo, fígado, baço, rins, testículos e parede da aorta foi detectada. O exame microbiológico do exsudato confirmou o* Corynebacterium pseudotuberculosis *como o agente causal.*

*Palavras-chave: abscessos, caprino,* Corynebacterium pseudotuberculosis, *leucocitose*

## INTRODUCTION

Caseous abscessation of lymph nodes and internal organs in goats and sheep, caused by *Corynebacterium pseudotuberculosis*, occurs worldwide and characterizes caseous lymphadenitis disease (CL). *C. pseudotuberculosis* is a positive Gram bacillus, short and irregular, presenting, approximately, 0.5 to 0.6µm x 1.0 to 3.0µm. It is a facultative

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intracellular parasite that is found in fomites, soil and manure contaminated with purulent exudates. Generally the disease presents itself in two different forms. The superficial form affects lymph nodes close to the skin surface and results in swollen nodes, commonly seen under or at the rear of the jaw, in front of the shoulder, in front of the hind leg or above the udder or scrotum. The internal form usually affects organs like lungs, liver and kidneys (Benham *et al*., 1962).

Economic losses result primarily from condemnation of infected carcasses and devaluation of hides. It is an important endemic infection in regions with large sheep and goats populations. CL is also a cause of ill-thrift and sudden death in animals with internal abscesses. However, producers often report that the major impact in the flock is related to early culling and disagreeable esthetics of the animals, which may result in loss of breeding stock sales. Although CL mainly affects small ruminants, sporadic diseases also occur in horses, cattle, camelids, water buffalo, wild ruminants, primates, pigs and fowl (Aiello, 2001).

In Brazil, CL is one of the major health problems of goats and sheep. The depreciation of skin value, carcass condemnation, decrease in meat, milk, and wool production and reproductive efficiency are some of the main damages caused by the disease (Paton *et al*., 1994). In addition, CL acts as a public health risk, considering the zoonotic potential already described for *C. pseudotuberculosis* (Join-Lambert *et al*., 2006).

An aneurysm is defined as a pathological dilatation of an artery induced by its weakening or partial destruction, caused by inflammatory and/or degenerative disease. Nutritional causes and infectious or parasitic diseases can be involved on the process. The etiology of aneurysm in goats is not well explained, although it is believed that inflammatory processes are the primary cause (Aiello, 2001).

The aim of this study was to report the occurrence of a thoracic aortic aneurysm in an Anglo-Nubian goat buck related to a framework of visceral CL. General clinical examination and bacteriological and pathological findings were also described.

## CASE DESCRIPTION

A four-year-old Anglo-Nubian buck was referred to a veterinary clinic presenting normal appetite, apathetic behavior, erect fur and a body condition score of 2.5.

The animal had been raised under semi-extensive grazing native (caatinga lowered), using a stocking rate of 1.2 hectare/animal/year. The goat buck was constantly moved at night to a soil ground house, where it had free access to water and mineral supplementation; 500g of concentrate, composed by 61% of corn, 37.6% of soybean meal, 0.7% of dicalcium phosphate and 0.7% of limestone, were offered daily to the animal.

General clinical examination was performed in accordance with Diffay *et al*. (2005). A blood sample was collected via jugular vein puncture, using a vacutainer® tube containing anticoagulant (EDTA), to perform hematological exams. The complete blood count determined the following parameters: erythrocyte count, packed cell volume, hemoglobin, mean corpuscle volume, mean corpuscle hemoglobin and mean corpuscle hemoglobin concentration, total leucocyte count and differential leucocyte count.

After animal death, necropsy was performed. Exudate samples were collected from all abscesses, utilizing a swab to accomplish bacteriological analysis. The material was plated on a blood agar base. In order to confirm *C. pseudotuberculosis* as the etiological agent, colonies were macroscopically characterized and submitted to Gram staining, catalase, coagulase, urease and carbohydrates fermentation tests.

General clinical examination showed a heart rate of 75 beats per minute, respiratory rate of 20 movements per minute and four ruminal movements per minute. Superficial lymph nodes were normal upon palpation. Rectal temperature was slightly high (40.5°C). Dehydration and pale pink mucosal membranes were also noted. No change was found on auscultation or percussion of internal organs. The main trouble observed was related to the reproductive system. The animal showed signs of testicle inflammation suggesting an orchitis framework. The animal did not respond to natural mating and showed increased sensitivity to testicle palpation.

A complete blood count determined the following results: erythrocyte count of 10.5 million/mL, packed cell volume of 27%, hemoglobin of 9.2g/dL, mean corpuscle volume of 25.71 fL, mean corpuscle hemoglobin of 9.14 pg and mean corpuscle hemoglobin concentration of 35.5%. White blood cell count showed an intense leukocytosis (54,000/μL), characterized by a strong neutrophil shift to the left. 3% of metamyelocytes (1620/uL), 16% of rod shaped leukocytes (8640), 65% of segmented (35100/μL), 14% of lymphocytes (7560/μL), 2% of monocytes (1080/μL) and 0% of eosinophils and basophils were detected. An intense presence of neutrophil anisocytosis and toxic granulation was also observed.

After four days of hospitalization, the animal came to death. The necropsy showed a large blood clot formed inside the thoracic cavity, occupying approximately one third of the whole cavity (Figure 1). The thickening of myocardium and dilatation of the aorta in the thoracic portion was also detected, presenting a saculiform format (Figure 2). The aorta rupture is demonstrated in Figure 3.

Abscesses were disseminated in the media and intima layers of the aorta (Figure 4). The obstruction of aorta lumen by arterial plaques consisted of inflammatory infiltrate (Figure 5), predominantly neutrophilic.

Abscesses were found spread in rumen, reticulum, kidneys, liver, spleen, testicles and aorta wall. Necrosis and calcification were observed in the testicle tissue (Figure 6). Epididymis was full of necrotic areas. The central nervous system was surrounded by a milky cap. Samples of exudate on abscesses found in aorta, kidneys, liver and testicles confirmed *C. pseudotuberculosis* as the causal agent of the disease, through bacteriological exam.

## DISCUSSION

The intense leukocytosis, associated with a marked left shift in white blood cell count, a neutrophil anisocytosis and a toxic granulation, are explained by the abscess fistula into aorta. The reactionary tissue inside the artery dramatically reduced its lumen, promoted the weakening of the wall tissue and, consequently, caused the rupture of aorta.

Physical interconnections between components of tunica media are important in maintaining structural integrity and physicomechanical properties of the aortic wall (Dingemans *et al*., 2000; Silver and Siperko, 2003). It confers plasticity, adaptability and flexibility to the aortic wall enabling it to function as a mechanically homogenous structure (Ogeng'o *et al*., 2010). It ensures the efficient functioning of the aorta in dampening out pulsatile flow and blood pressure delivered by the heart, thus limiting distal shear stress and allowing regular irrigation of peripheral organs (Faury, 2001). Disruptions of these linkages implicate disease processes such as atherosclerosis (Lavezzi *et al*., 2005) and aneurysm formation (Hayashi *et al*., 2009). In this case, the presence of abscess caused by *C. pseudotuberculosis* disturbed vascular integrity, disrupted these linkages and determined the formation of an aortic aneurysm. The aorta rupture triggered the animal's death.

Bacteriological exams proved that *C. pseudotuberculosis* was the etiological agent involved in the formation of abscesses. Lesions were disseminated into the animal organism and were probably responsible for the evidences identified on clinical exam, such as dehydration, pale mucosal and testicle inflammation. The large number of internal abscesses can also explain the apathetic behavior and low body condition score. *C. pseudotuberculosis* has already been reported to be present in the same organs or tissues described in this study (Alves *et al*., 2004).

Figure 1. Blood clot in the thoracic cavity.

Figure 2. Dilatation of the aorta.

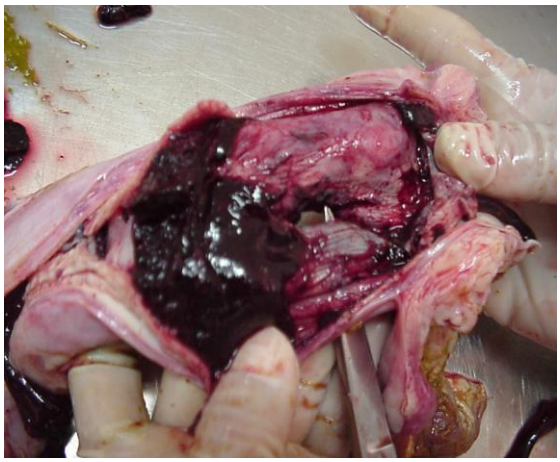

Figure 3. Local of rupture of the aorta aneurism.

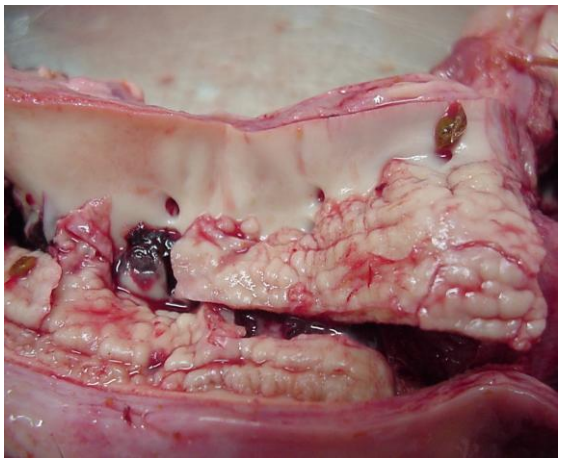

Figure 4. Reactionary tissue obstructing the aorta lumen.

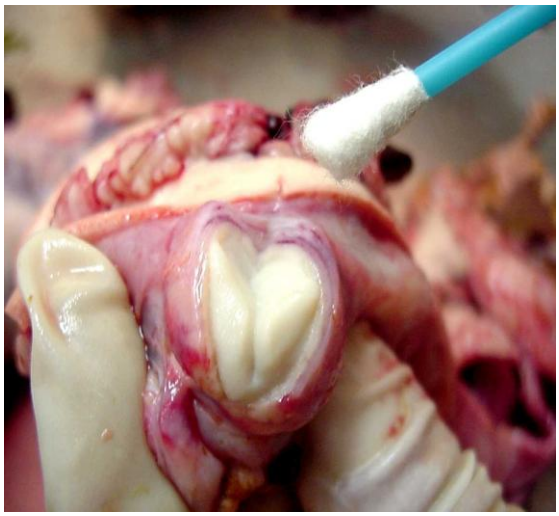

Figure 5. Collection of pus in aorta wall.

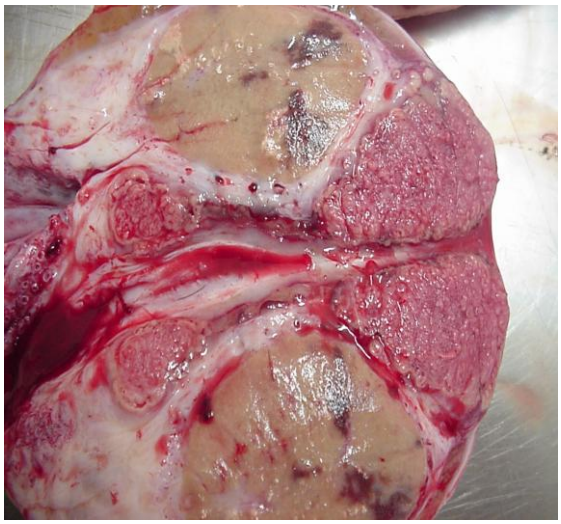

Figure 6. Areas of necrosis, calcification and abscesses present in testicles.

## CONCLUSIONS

*C. pseudotuberculosis* infection was disseminated into the animal organism. The abscess located in the thoracic aorta wall was responsible for the aneurysm formation. Animal death was caused by aorta rupture. Based on these results, it is concluded that *C. pseudotuberculosis* may be involved in the causes of animal death, if the abscesses are located in vital organs.

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