



NOTE

Wildlife Science

Traumatic pericarditis caused by a bamboo twig in captive waterbuck (*Kobus ellipsiprymnus*)

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ABSTRACT. A 19-year-old captive male waterbuck (*Kobus ellipsiprymnus*) exhibited traumatic pericarditis at necropsy. The animal weighed 182 kg at necropsy and revealed no remarkable findings in external observation. Severe pericardial adhesions with fibrosis, hepato-diaphragmatic adhesions, straw-colored ascites and hepatosplenomegaly were observed upon examining the internal organs. Perforations made by a 12-cm-long sharp-ended bamboo twig were detected in the reticulum, diaphragm, pericardium, lung and liver. *Trueperella pyogenes* was identified in pericardial fluid. To our knowledge, this is the first documented case of traumatic reticulopericarditis caused by a sharp-ended bamboo twig in a captive waterbuck.

KEY WORDS: bamboo twig, *Kobus ellipsiprymnus*, traumatic pericarditis, waterbuck

The waterbuck (*Kobus ellipsiprymnus*) is classified as a least-concern species by the International Union for Conservation of Nature Red List and is widespread across western, central, eastern and southern Africa [14]. Waterbucks have been eliminated within much of their range mainly due to hunting [13]. According to data extracted in June 2017 from the Zoological Information Management System, 680 waterbucks are in zoos worldwide [16].

Traumatic pericarditis is a sporadic disease of ruminants caused by perforation of the pericardium by a long, thin, sharp foreign body originating in the reticulum [4, 12]. The presence of a mixed bacterial infection from the reticulum causes severe local inflammation, with accumulation of serous or fibrinous inflammatory products [11, 12]. The most noticeable clinical finding is presternal edema. An affected animal may have been severely ill for several weeks showing gradual development of edema. The rapid development of edema within 2–3 days usually indicates a quick death. If chronic pericarditis persists, heart action is restricted due to adhesions of the pericardium to the heart. Death usually occurs suddenly, often without premonitory illness, due to acute, congestive heart failure from compression of the heart by the hemopericardium [11, 12].

Traumatic pericarditis has been frequently reported in bovines [4, 5, 11, 15]. However, no previous reports have been published on waterbucks. We detected traumatic pericarditis caused by a sharp-ended bamboo twig in a captive waterbuck at the Seoul Zoo. The purpose of this report is to describe the pathological features of traumatic pericarditis in a captive waterbuck in the zoo.

In January 2016, a 19-year-old male waterbuck showed poor appetite, loss of weight and lack of activity for five days. He had no remarkable medical history. He was being exhibited with a 15-year-old female waterbuck and four reticulated giraffes in a 4,298-m² outside enclosure. The waterbucks were fed twice a day with alfalfa and timothy hay, sweet potato, carrot and dried pellets for deer (Adult Deer Feed; Chucksan Nonghyup, Ansan, Korea). They took water freely from an overflowing water pond. Typical mineral blocks (GOLD-LICKS UK; Dae Dong Bio Co., Seongnam, Korea) for hoofed animals were offered in the enclosure as supplements. Zoo keepers sweep the enclosure daily with plastic or bamboo brooms. All animals were kept in the First African Pavilion of the zoo during the winter. The waterbuck was found dead the day after a treatment call from the zookeeper.

The animal weighed 182 kg at necropsy, and nothing remarkable was seen on external appearance. In examination of the internal organs, pericardial adhesions with fibrosis, hepato-diaphragmatic adhesions, straw-colored ascites and hepatosplenomegaly were observed (Fig. 1A). Perforations made by a 12-cm-long sharp-ended bamboo twig were detected in the reticulum, diaphragm, pericardium, lung and liver (Fig. 1). A perforation was detected in the cranioventral part of the reticulum (Fig. 2A). Two completely separate perforations were found in the pericardium (Fig. 2B). *Trueperella pyogenes* was identified in the pericardial

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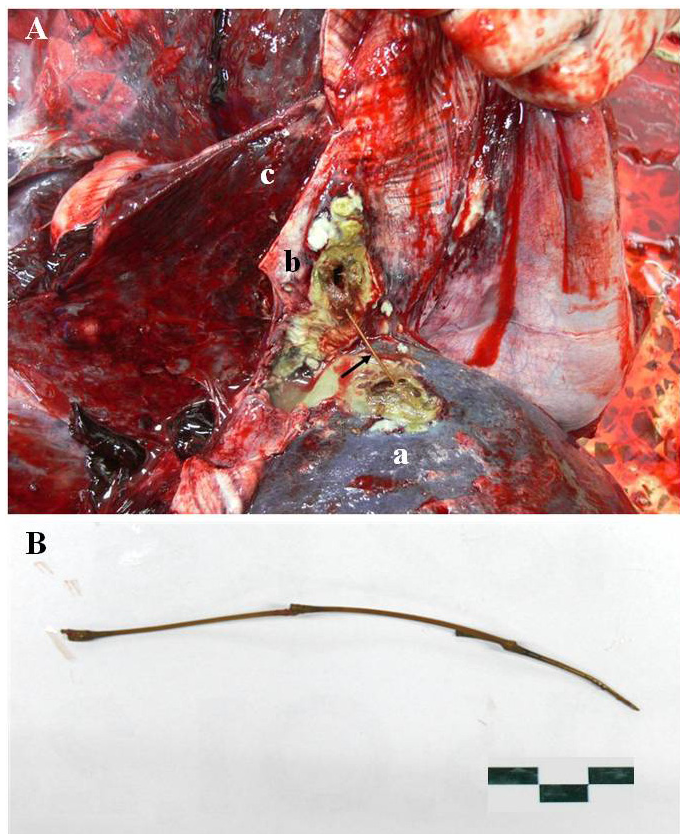


Fig. 1. Gross appearance of the lesions at necropsy. (A) A sharp-ended bamboo twig penetrated from the reticulum to the closely apposed organs, such as the liver (a) diaphragm (b), lung (c) and pericardium. Inflammatory lesions were observed around tissues adjacent to the perforations made by the bamboo twig (arrow). (B) A 12-cm-long sharp-ended bamboo twig of two and a half nodes was found. The twig was speculated to be part of a bamboo broom used to sweep the enclosure. Scale bars represent 1 cm.

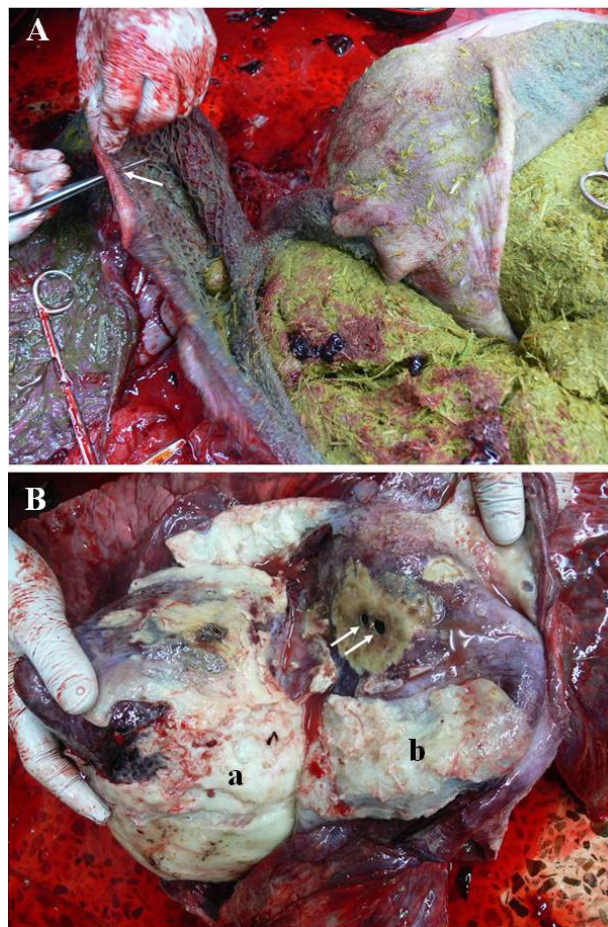


Fig. 2. Perforations at the reticulum and pericardium. (A) A perforation (arrow) was detected in the reticulum which was filled with hay. (B) Thick fibrin deposited on both epicardial surfaces of the heart (a) and inner surface of the pericardium (b). Two perforations were found in the pericardium (arrows).

fluid using the VITEK 2 Compact (bioMérieux, Craponne, France).

Traumatic reticuloperitonitis, or so-called hardware disease, is most common in mature daily cattle after swallowing metallic objects [1]. Traumatic pericarditis can be caused by a foreign object penetrating the diaphragm and entering the pericardium [12]. Traumatic pericarditis, which is one of the most significant cardiac diseases among bovines [3], occurs not only in ruminants, but also in canines [9] and Toco toucans (*Ramphastos toco*) [10]. Although traumatic pericarditis is a major disease of ruminants [5], it has rarely been reported in waterbucks.

The most common cause of traumatic pericarditis is sharp metallic material, such as wire, needles, nails, screws, copper or aluminum [7, 11]. However, the cause in the present case was a sharp-ended bamboo twig (Fig. 1B). About two and a half nodes of a bamboo twig had penetrated the reticulum, diaphragm and pericardium, eventually leading to traumatic pericarditis. We speculated that the twig was part of a bamboo broom used to sweep the enclosure. This is an unusual case of reticulopericarditis in a ruminant caused by a bamboo twig. However, it is required that zoo keepers should pay attention to even a bamboo twig as well as other small metallic material in the enclosure.

Ruminants commonly ingest foreign objects, because they do not discriminate between metal materials in feed and do not completely masticate their feed before swallowing [2]. Moreover, the honeycomb-like structure of the reticulum provides many sites for the fixation of a foreign body, and contraction of the reticulum may be sufficient to push a sharp foreign body through the wall, inducing the disease [8]. Therefore, traumatic pericarditis in the waterbuck might also be caused by the same etiology as other ruminants.

Suppurative inflammation characterized by ascites and abscess in various organs located in the abdominal and thoracic cavities can be observed as a complication of reticulopericarditis [2, 6, 8]. In this case, thick fibrin deposits on the epicardial surface of the heart and inner surface of the pericardium (Fig. 2B), hepatodiaphragmatic adhesion and ascites were found. Therefore, these observations intended that severe septicemia was induced by the bamboo twig and might be cause of the death in the waterbuck.

Perforation of the reticulum allows penetration of bacteria, which contaminates the peritoneal cavity or pericardium. Various bacteria, including *Arcanobacterium pyogenes*, *Escherichia coli*, *Pasteurella* spp. and *Salmonella* spp. are recovered from the affected organs and fluid in the thoracic cavity of an animal affected by traumatic reticulopericarditis [2, 11]. However, in this case, *Trueperella pyogenes* was identified from the pericardial fluid. Although this bacterium is uncommon, it may be considered as one of the pathogens of the pericarditis in the future. This report is the first case of traumatic reticulopericarditis caused by a sharp-ended bamboo twig in a captive waterbuck.

REFERENCES

1. Aiello, S. E. 1998. Traumatic reticuloperitonitis. pp. 188–190. *In: The Veterinary Merck Manual*, 8th ed., Merck and Co., Inc., Whitehouse Station.
2. Akkoc, A. 2007. Traumatic reticulopericarditis in a Saanen goat. *Turk. J. Vet. Anim. Sci.* **31**: 283–285.
3. Attia, N. E. 2016. Cardiac biomarkers and ultrasonography as tools in prediction and diagnosis of traumatic pericarditis in Egyptian buffaloes. *Vet World* **9**: 976–982. [Medline] [CrossRef]
4. Braun, U. 2009. Traumatic pericarditis in cattle: clinical, radiographic and ultrasonographic findings. *Vet. J.* **182**: 176–186. [Medline] [CrossRef]
5. Braun, U., Lejeune, B., Schweizer, G., Puorger, M. and Ehrensperger, F. 2007. Clinical findings in 28 cattle with traumatic pericarditis. *Vet. Rec.* **161**: 558–563. [Medline] [CrossRef]
6. Cevik, A., Timurkaan, N. and Yilmaz, F. 2010. Traumatic Reticulopericarditis in a Goat. *F. Ü. Sağ. Bil. Vet. Derg* **24**: 103–105.
7. Cramers, T., Mikkelsen, K. B., Andersen, P., Enevoldsen, C. and Jensen, H. E. 2005. New types of foreign bodies and the effect of magnets in traumatic reticulitis in cows. *Vet. Rec.* **157**: 287–289. [Medline] [CrossRef]
8. Ghanem, M. M. 2010. A comparative study on traumatic reticuloperitonitis and traumatic pericarditis in Egyptian cattle. *Turk. J. Vet. Anim. Sci.* **34**: 143–153.
9. Kolm, U. S., Kosztolich, A., Hoegler, S. and Kneissl, S. 2001. Canine traumatic pericarditis by an esophageal foreign body. *J. Vet. Cardiol.* **3**: 17–21. [Medline] [CrossRef]
10. Máinez, M., Rosell, J., Such, R., Cardona, T. and Juan-Sallés, C. 2016. Traumatic (foreign body) pericarditis in a Toco Toucan (*Ramphastos Toco*). *J. Zoo Wildl. Med.* **47**: 1097–1100. [Medline] [CrossRef]
11. Mohamed, T. 2010. Clinicopathological and ultrasonographic findings in 40 water buffaloes (*Bubalus bubalis*) with traumatic pericarditis. *Vet. Rec.* **167**: 819–824. [Medline] [CrossRef]
12. Radostits, O. M., Blood, D. C. and Gay, C. C. 1994. *Veterinary Medicine. A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses*, 8th ed., Bailliere Tindall, Philadelphia.
13. Spinage, C. A. 2013. *Kobus ellipsiprymnus* Waterbuck. pp. 461–468. *In: The Mammals of Africa*. VI. Pigs, Hippopotamuses, Chevrotain, Giraffes, Deer, and Bovids (Kingdon, J. and Hoffmann, M. eds.), Bloomsbury Publishing, London.
14. The IUCN Red List of Threatened Species Web site *Kobus ellipsiprymnus*. <http://www.iucnredlist.org/details/summary/11035/0> (accessed March 2, 2017).
15. Watts, A. S. and Tulley, W. J. 2013. Case report: sequelae of traumatic reticuloperitonitis in a Friesian dairy cow. *N. Z. Vet. J.* **61**: 111–114. [Medline] [CrossRef]
16. ZIMS (the Zoological Information Management System). <https://zims.species360.org/> (accessed April 3, 2017).