
A SURVEY OF DENTAL DISEASE IN CAPTIVE BLACK RHINOCEROSES (*Diceros bicornis*)

Beth Westernen Romig, DVM,^{1,2*} Michael Q. Lowder, DVM, MS¹, and Scott B. Citino, DVM, Dipl. ACZM³

¹Department of Large Animal Medicine and Surgery, College of Veterinary Medicine, University of Georgia, Athens, GA 30602, USA; ²Present address Greenville Zoo, Greenville, SC 29601, USA; ³White Oak Conservation Center, Yulee, FL 32097, USA

Abstract

An online survey was sent to 33 institutions that currently hold black rhinoceroses (*Diceros bicornis*) in their collection. The survey contained questions about the frequency of immobilization and oral exam in each individual, as well as history of dental disease or chronic health problems, and housing and diet information. The goal of the study was to determine the incidence and severity of dental disease in captive black rhinos and to attempt to discover the etiology of these abnormalities by surveying the husbandry and diets of these animals. Only 29% of individuals had ever had a complete oral exam under general anesthesia, and all of those animals had abnormalities such as enamel points or severe periodontal disease. A low percentage of browse in the diet was a common finding amongst institutions. The results of this study illustrate the need for more routine oral exams in captive black rhinos, as well as the need to further evaluate the frequency and cause of dental disease in this species.

Introduction

Performing routine oral exams and being able to appropriately diagnose and treat dental disease is an important aspect of zoo medicine. In domestic species, dentistry is a rapidly expanding field of knowledge, the benefits of which are seen in length and quality of life. Two of the most important aspects of oral health include routine dental care and appropriate nutrition. In captive wildlife species, both of these factors can be difficult to provide due to restrictions with patient size or temperament, anatomic limitations, and availability of suitable diets. An excellent illustration of this point is emerging in the captive black rhinoceros (*Diceros bicornis*)¹. It has become apparent in the last few years that individuals of this species are developing significant dental disease that has previously gone unidentified. It is particularly interesting that the skulls of wild black rhinoceroses do not show evidence of dental disease. The captive individuals have bone loss and periodontal disease that is not appreciated in the wild specimens (S. Citino, personal communication). It is also of note that the disparity between oral health in captive and wild individuals is not seen in the white rhinoceros (*Ceratotherium simum*)(S. Citino, personal communication). It is likely that this is due to the different diets and feeding methods used by each species; white rhinos are grazers, whereas black rhinos are browsers. It is notoriously difficult to replicate a browser's diet in captivity, and it is unknown how much the actual feeding method contributes to oral health. Therefore, in an effort to better understand this disease process and improve the health and quality of life of this captive species, a survey was compiled

and distributed to 33 of the institutions accredited by the Association of Zoos and Aquariums (AZA) in the United States that house black rhinos to determine the incidence and nature of dental disease in this species.

Materials and Methods

The survey was distributed online to the veterinarian of record for each institution. It gathered data about the subspecies of black rhino in each collection (eastern [*D. bicornis michaeli*] or southern [*D. bicornis minor*]), the number, age and sex of rhinos at each institution, and the basic feeding methods and diets offered to the black rhinos (including percentage and frequency of browse given). For each individual, there were questions regarding the medical history including date of most recent immobilization, history of oral exam and dental disease, and any chronic health problems and associated therapies. Of the 33 institutions surveyed, there was a 45% response rate.

Results

The eastern subspecies was present at 11 institutions, while the southern subspecies were only at 4 institutions. Data was gathered for 51 individuals, 53% of which were male and 47% of which were female. The average age was 15.4 yr, with an age range of 2-33 yr.

When questioned about immobilization, 49% of the individuals had no known record of a physical exam under general anesthesia. Another 8% had not been immobilized within the last 10 yr. Only 29% of individuals had ever had a complete oral exam under general anesthesia; of all the oral exams performed, every individual had abnormalities ranging from sharp enamel points to severe periodontal disease and tooth loss. More than half of the oral exams (8/15) reported were performed by authors of this paper.

As many as 22% of individuals were noted to have a decrease in appetite or were seen quidding (dropping food). When asked about dental disease, 24% of individuals had a confirmed history. Other chronic medical problems reported included many of the common diseases seen in captive black rhinos⁽²⁾ such as eosinophilic granulomas and oral or lingual lesions (some associated with idiopathic hemorrhagic vasculopathy syndrome), as well as colic, weight loss, loose stool, rhinitis, skin lesions, and foot problems.

Data gathered about diets and feeding methods were reflective of the difficulty of feeding a browser of this size in captivity. While the overall diets varied greatly, most consisted primarily of either a high-fiber pelleted diet or a grass hay. The enclosure substrates and feeding methods also vary, but browse is often included as part of an enrichment program. Only one institution reports feeding 10-25% of the total diet as browse, with all the others feeding less than 10% browse. Two-thirds of respondents do not offer browse daily. Most individuals receive nutritional supplements in accordance with current recommendations, such as additional vitamin E.

Discussion

The data collected in this survey illustrates the need for further study of dental disease in captive wildlife species. It especially brings to light the challenges faced when it comes to recreating an animal's natural diet and the importance that feeding practices may have on an individual's overall health. It is unclear at this time how much browsers rely upon appropriate gingival exercise, but interspecies differences that have been observed seem to suggest that it may have a significant impact. For black rhinos the need for immobilization and size limitations means that oral examinations are performed infrequently. However, this study demonstrates the need for such regular exams, particularly as this species seems to be so severely affected and so greatly endangered.

The data gathered in the survey raises other health concerns. Chronic health conditions that have been particularly described in captive black rhinos, including eosinophilic granulomas and idiopathic hemorrhagic vasculopathy syndrome, have no pathophysiology that is well-described. At least one case of death from sepsis has been reported which included severe bacterial endocarditis, necrotizing myocarditis, and microabscesses in the brain that were attributed by the pathologist to the animal's underlying periodontal disease. However, for the most part the relationship between dental disease and other diseases is unknown in black rhinoceroses. More frequent oral exams would increase our understanding of dental disease in this species and provide the opportunity to treat the disease as it is identified. At the same time it would present an opportunity to perform a general physical examination under anesthesia to identify other health problems that might improve the overall wellbeing of black rhinoceroses held in captivity.

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LITERATURE CITED

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