

MEDICAL MANAGEMENT OF A PATENT URACHUS IN A SOUTHERN WHITE RHINOCEROS (*CERATOTHERIUM SIMUM SIMUM*) CALF

Rebecca A. Bloch, D. V. M., Holly Haefele, D. V. M., and Lisa Stephens, D. V. M.

Abstract: A female southern white rhinoceros (*Ceratotherium simum simum*) calf presented with a patent urachus at 5 days of age. It was immobilized for examination and medical treatment was elected over surgical repair. Systemic antibiotics and topical treatment of the site by cleaning with chlorhexidine solution were followed by silver nitrate cautery. This animal required no further treatment and has reached 1 yr of age with no other medical problems. Although patent urachus is relatively common in domestic animals, especially horses, neither the problem nor its resolution are well documented in exotic animals and surgical intervention is more commonly performed.

Key words: *Ceratotherium simum simum*, congenital, medical treatment, rhinoceros, urachus.

BRIEF COMMUNICATION

A female southern white rhinoceros (*Ceratotherium simum simum*) calf was born without complication as the 14th calf of a 41-yr-old dam. The pair was separated from the herd for privacy, good maternal care was evident, and the calf appeared healthy. At 5 days of age, the calf lost its umbilical stump and, later that day, it was observed voiding a large amount of fluid from the umbilicus during urination. The following day, the calf was observed with fluid streaming from the umbilicus several times before it postured normally to urinate.

Three days after initial presentation, the dam and calf were sedated to assess the calf for probable patent urachus. The dam, estimated at 1,590 kg, was sedated first with detomidine (Dormosedan®, Zoetis, New York, New York 10017, USA; 11.3 µg/kg i.m.) and butorphanol (Dolorex®, Merck Animal Health, Summit, New Jersey 07901, USA; 15.7 µg/kg i.m.). Once the dam was sedated, the calf, estimated at 68.2 kg, was restrained manually for administration of detomidine (14.6 µg/kg i.m.) and butorphanol (29.3 µg/kg i.m.). Following the procedure, the calf was reversed with atipamezole (Antisedan®, Zoetis; 36.7 µg/kg i.m.) and naltrexone (Naltrexone HCl, Zoo Pharm, Inc., Windsor, Colorado 80550, USA; 0.147 mg/kg i.m.), and then the dam was reversed with atipamezole (31.44 µg/kg i.m.) and naltrexone (62.8 µg/kg i.m.). The calf roused first

and was restrained manually while the dam recovered. The two were allowed to reunite once the dam was alert.

The calf was normothermic (100.2°F) on exam and, other than the umbilicus, had no other abnormalities noted. Direct examination revealed an approximately 2-cm oval area of pink skin in the center of the umbilicus with an approximately 6-mm opening of hyperemic tissue that was probed to a depth of approximately 2 cm with sterile hemostats (Fig. 1). The deep tissue of the defect was cultured before the umbilical area was cleaned with diluted chlorhexidine (chlorhexidine gluconate 2%, Vet One, MWI, Boise, Idaho 83705, USA) solution. Silver nitrate sticks (Grafo, GF Health Products, Inc., Atlanta, Georgia 30360, USA^{5,6}) were inserted into the opening and applied to the surrounding tissue. The calf was treated with ceftiofur crystalline free acid (CCFA) (Excede®, Zoetis; 6.6 mg/kg s.c.) and a penicillin G benzathine/penicillin G procaine injectable suspension (Combi-Pen-48®, Bimeda®, Inc., LeSueur, Minnesota 56058, USA; 30,000 IU/kg i.m.)

Blood was collected for a complete blood count and biochemical analysis. As compared to the provided reference intervals,⁵ hemogram showed leukocytosis (19.58×10^3 cells/µl; 4.86–13.87 $\times 10^3$ cells/µl), neutrophilia (10.38×10^3 cells/µl; 0.88–9.03 $\times 10^3$ cells/µl), lymphocytosis (6.07×10^3 cells/µl; 1.31–4.82 $\times 10^3$ cells/µl), and monocytosis (2.35×10^3 cells/µl; 0–1.563 cells/µl), and biochemical analysis was within normal limits for this calf's age.⁵

The calf was monitored for the remaining day and for at least 8 hr/day in the 48 hr following immobilization to determine if surgical intervention was necessary. The day following cauteriza-

From Fossil Rim Wildlife Center, 2155 County Road 2008, Glen Rose, Texas 76043, USA (Bloch, Haefele); and 5282 Big Valley Circle, Lipan, Texas 76462, USA (Stephens). Correspondence should be directed to Dr. Bloch (rebeccab@fossilrim.org).

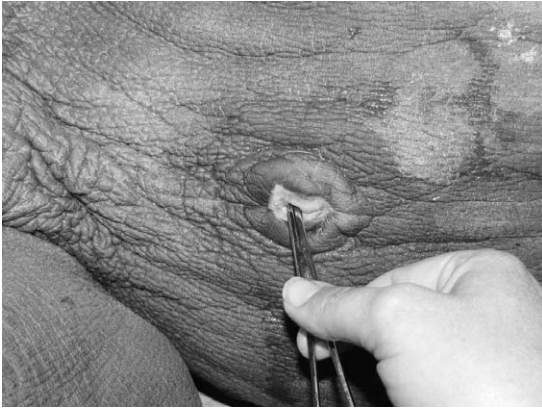


Figure 1. Demonstration of depth and tissue involved in a patent urachus present in a 7-day-old female white rhinoceros (*Ceratotherium simum simum*) calf that was managed medically with silver nitrate cauterization.

tion of the umbilicus, the calf was very active. It continued voiding urine from the umbilicus but, unlike before treatment, the stream was split and heavily soiled the medial thighs. However, on the second day after treatment, no urine was seen coming from the umbilicus and the calf's rear limbs were completely dry. At this time, the calf was observed urinating normally at the perineum. This observation continued through the fourth day following treatment, at which time, an additional dose of CCFA (6.6 mg/kg i.m.) was administered via pole syringe.

The bacterial culture from the umbilicus grew *Staphylococcus aureus* and *Streptococcus equisimilis*, both of which were susceptible to ceftiofur. Given this result and the normal attitude of the calf, no further treatment was pursued. By 5 days following treatment re-epithelialization of the umbilical defect was evident on visual exam. The calf has since passed 1 yr of age with no further signs of recurrent urachal patency and no further treatment needed. It remains active and in good health.

The urachus is the normal embryonic structure connecting the urinary bladder to the allantoic sac. By late gestation, the flow of urine should change so that the majority is drained through the urethra as the urachus closes at birth. When the urachus does not completely fibrose, patent urachus occurs. This presentation may be caused by congenital malformation because of torsion of the umbilical cord in utero⁷ or, postpartum, acquired patent urachus can occur because of excessive abdominal pressure from handling, infection, and urinary tract obstruction, such as

from urolithiasis, causing a persistent or otherwise unsealed urachus to become patent.^{2,7} It is possible that congenital patent urachus was present in this case, as the calf was not handled prior to presentation and no urinary obstruction was apparent. However, infection as a cause of acquired patent urachus cannot be discounted because of bacterial growth on culture and the presence of neutrophilic leukocytosis. *Streptococcus* spp. and *Staphylococcus* spp. are among the commonly isolated organisms from urachal infections in calves.³ *Escherichia coli*, *Proteus*, and *Streptococcus* spp. can be isolated in foals.⁷

Treatment of a patent urachus can be either medical or surgical with the medical options carrying some uncertainty as to success rate. Medical treatment is directed at controlling any infection, and encouraging healing and scarring of the urachus through chemical cautery. Silver nitrate was used in this case, but iodine and phenol have also been used for this purpose.^{1,10} Medical therapy can be used successfully in cases that are treated early and when little to no involvement of surrounding structures is present, although there are documented cases of foals with heat, swelling, and even purulent discharge that survived with medical management alone.¹ Involvement of surrounding structures was not investigated in this case, but abdominal ultrasound is recommended to determine the involvement of the umbilical vasculature, and ascertain the presence of abscesses in the urachus and umbilical vasculature.⁷ Urinalysis also might have helped to determine infection status in this case. Fortunately, the associated structures did not become infected and no abscess formation occurred. Omphalitis, omphalophlebitis, omphaloarteritis, and dissemination of bacterial organisms to form localized infections in other organs or sepsis are possible consequences of patent urachus.³ Investigation of internal structures and infection status could have helped determine the need for early surgical intervention.

Surgical treatment involves removal of the entire urachus, the tip of the urinary bladder, and possibly other infected tissues if more are found. It is recommended in cases that are refractory to medical management, involve other umbilical structures, or are associated with subcutaneous swelling because of a tear in the urachus.⁷ Delayed time to surgery could have resulted in a more complicated case if the patent urachus did not resolve with medical treatment alone. In prior documentation of patent urachus in a white rhinoceros calf, surgical treatment was

opted primarily.⁶ For this case, surgical intervention was not an immediate option, but was arranged to occur within the following 48 hr if improvement was not seen.

Reports of patent urachus in exotic species are limited. Beyond the report involving a white rhinoceros, the only other report in a perissodactylid involved a Grevy's zebra (*Equus grevyi*) foal with swollen, infected joints and a wet umbilicus.⁸ Medical treatment with antibiotics and chemical cautery of the patent urachus using 2.5% iodine was undertaken, but the foal died within 48 hr. Although not well represented in the literature on exotic animals, occurrence of patent urachus is relatively common in domestic animals, especially horses (*Equus caballus*). Congenital patent urachus is seen in approximately 6% of foals with a mean age of 12 days and a range of 4–16 days.^{1,7} The incidence of patent urachus in foals is increased in those animals that are handled in the first 12–24 hr, which results in undue pressure on their abdomens.⁷ Most congenital cases of patent urachus are responsive to medical treatment, whereas foals with acquired patent urachus are more likely to have infection present and require surgery for definitive treatment.⁹ Patent urachus has a low incidence in sheep⁴ (*Ovis aries*) and cattle (*Bos taurus*), in which patent urachus is more often associated with infection³ and therefore often requires surgical treatment. When calves are hand-raised, the incidence of patent urachus not associated with infection more closely resembles that of foals.⁷

Patent urachus is a well described entity in humans and domestic animals, but is not reported extensively in exotic animals. This case demonstrates that it is possible to have a positive

outcome with medical management of patent urachus in a white rhinoceros calf.

LITERATURE CITED

1. Adams SB, Fessler JF. Umbilical cord remnant infections in foals: 16 cases (1975–1985). *J Am Vet Med Assoc* 1987;190:316–318.
2. Baxter GM. Uroperitoneum attributable to ruptured urachus in a yearling bull. *J Am Vet Med Assoc* 1992;200:517–520.
3. Baxter GM. Hernias/umbilicus. In: Fubini SL, Ducharme NG (eds.). *Farm animal surgery*. St. Louis (MO): Saunders; 2004. p. 477–484.
4. Dennis SM. Patent urachus in a neonatal lamb. *Cornell Vet* 1969;59:581–584.
5. International Species Information System. *Physiological reference intervals (CD-ROM)*. Eagan (MN): International Species Information System; 2013.
6. Langan J, Ramsay E, Schumacher J, Chism T, Adair S. Diagnosis and management of a patent urachus in a white rhinoceros calf (*Ceratotherium simum simum*). *J Zoo Wildl Med* 2001;32:118–122.
7. Madgin JE, House JK. Patent urachus, omphalitis, and other umbilical abnormalities. In: Smith BP (ed.). *Large animal internal medicine*. 2nd ed. St. Louis (MO): Mosby-Year Book; 1996. p. 421–423.
8. Ndung'u FK, Ndegwa MW, deMaar TW. Patent urachus with subsequent joint infection in a free-living Grevy's zebra foal. *J Wildl Dis* 2003;39:244–245.
9. Robertson JT, Embertson RM. Surgical management of congenital and perinatal abnormalities of the urogenital tract. *Vet Clin North Am Equine Pract* 1988;4:359–379.
10. Turner TA, Fessler JF, Ewert KM. Patent urachus in foals. *Equine Pract* 1982;4:24–31.

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