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## Medical management of dystocia and vestibulotomy for removal of a retained fetus in an African elephant (*Loxodonta africana*)

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In April 2003, dystocia occurred at full-term pregnancy in a 34-year-old nulliparous African elephant cow that conceived by artificial insemination. Progression of labor was monitored by frequent transrectal and transabdominal ultrasound examinations and staff observations. Induction was attempted over the course of two days before further attempts were abandoned based on the concerns for the cows' condition. Medical management of the cow afterwards consisted of regular monitoring of blood parameters and clinical signs, ultrasound exams, and long-term administration of antibiotics, anti-inflammatories, and topical therapy for vulvar edema. The elephant was relatively stable although her white blood cell count remained elevated compared to her previous values.

In May 2003, clinical signs, rectal palpation and ultrasonography confirmed that the cow was experiencing uterine contractions and had pushed the fetus up to the pelvic brim. Estradiol cypionate was administered to aid in cervical softening the cervix and mucus production. Contractions were unsuccessful in expelling the fetus overnight and the calf dropped back into the abdominal uterus. A similar set of events occurred in November 2003, except that the contractions resulted in the fetal feet protruding through the cervix and under the cow's tail, with the appearance of a "bulge." A vestibulotomy was performed under standing sedation to surgically remove the dead fetus. Post-surgical management of the incision has included a short course of antibiotics and anti-inflammatories, and a series of surgical debridements and attempts at closure. A small vestibular fistula remains one year post-operatively, although the elephant is clinically normal in all other aspects. This case report will review the overall medical and surgical management of the case.

### INTRODUCTION

Reproductive management of captive elephants is often complicated by lack of access to bulls, ability to adequately time breeding in estrous cows, and reproductive problems such as urogenital pathology or endocrine anomalies (Agnew et al., 2004; Brown et al, 2004; Olson 2004). The advent of assisted reproductive techniques and improved understanding of reproductive physiology has lead to increased numbers of successful pregnancies. Since many captive elephants are older or may have other health issues by the time they are bred, the risk of gestational, parturient and post-partum problems may be increased (Hermes et al, 2004).

Methods traditionally used to manage complications of pregnancy and deliveries in other species are usually not feasible in elephants due to their large size and unique reproductive anatomy. Few reports have been published on successful techniques for addressing dystocia in elephants (Foerner 1999). Cesarean sections have been attempted but have uniformly resulted in the death of both dam and calf. Although some elephants have been able to retain fetuses for long periods, dystocia has also had fatal consequences in elephants (Schmitt, pers. comm.). This case describes one technique that can be considered when presented with a dystocia in an elephant.

Attempts to promote contractions included administration of 30 mg ECP IM, rectal massage and enema. No progress of the fetus was seen over the next four days, although a second dose of ECP was given. Due to concerns that the weight of the fetus could compromise vital structures in the pelvic canal, vestibulotomy with extraction was elected as the most viable treatment.

The cow was sedated with 60 mg butorphanol and 60 mg detomidine administered IM in a single syringe. Restraint with leg and abdominal straps in the elephant restraint device resulted in minimal movement during the procedure. Due to the length of the entire procedure, supplemental doses of butorphanol and detomidine were given at 1.5 hours (15 mg of each drug IM) and 2 hours (20 mg of each drug IM). Sedation was reversed with yohimbine (150 mg IV, 150 mg IM) and naltrexone (300 mg IV, 300 mg IM). Additional local analgesia was provided by a line block using 2% lidocaine injected ventral to the anus and along the incision line.

A vertical incision was made just below to the anus, over the fetal feet and extended ventrally for approximately 60 cm. Once the fetal feet were exposed, nylon webbing straps were placed around the fetal limbs. The surface was lubricated using petroleum gel and general liquid lube pumped by a stomach pump and tubing placed around the fetus. A block-and-tackle was attached to the nylon webbing straps so that the limbs could be independently manipulated in a downward direction. The fetus was extracted intact and weighed 135.5 kg.

Immediate post-operative care included flushing of the uterus with warm tap water and thorough palpation to assess trauma to soft tissue structures, administration of oxytocin, antibiotics, non-steroidal anti-inflammatories, hydrotherapy and topical treatment with silver sulfadiazine cream for the incision. Antibiotics and anti-inflammatories were continued for eight days. Complete blood counts, chemistry panels and fibrinogen were monitored on a regular basis until values returned to normal (approximately three weeks post-op).

Five attempts were made to surgically close the vestibulotomy incision. The first attempt was December 1, 2003 (six days post-vestibulotomy). The cow was sedated using the butorphanol-detomidine combination described above. After debriding the wound margins, the dorsal third of the incision was closed. Mucosa and submucosa was sutured using 0 PDS in inverting horizontal mattress patterns, and the skin was closed using umbilical tape and plastic stents in a simple interrupted pattern. Due to movement and tension on the suture line, the closure started to breakdown after 2-3 weeks. A second closure was attempted on January 8, 2004. This closure included only the mucosa. Unfortunately, the cow rubbed out the sutures three days after surgery. Additional surgeries were performed in February, May, and June 2004, using different surgical techniques and materials to close only the mucosal layer. Eventually, all wound closure techniques resulted in dehiscence. However, during this time, the wound continued to contract. At one-year post-vestibulotomy, there is an 8 cm long elliptical opening to the vestibule. The wound continues to contract and re-epithelialize. No complications or medical problems persist.

## DISCUSSION

Management of dystocia in elephants is difficult due to their size and the limited success of techniques that can be used in other species. Recognition and treatment of dystocia may be complicated if the temperament of the elephant or facilities limit veterinary evaluation and intervention (Foerner 1999). Most elephants will deliver a calf within 3-4 hours after active contractions are seen, but labor may stop, especially if the cow is disturbed (Schmidt 1999).

The trend of aging in the captive elephant population may increase the likelihood of dystocia in those cows that are bred, especially for the first-time, as older animals (Lung et al, 2002). Lack of fitness, uterine and abdominal tone, the presence of intra-abdominal fat, fusing of pelvic symphysis, increased fetal size and number, and metabolic conditions (ex. hypocalcemia) are general risk factors for dystocia (Roberts, 1986). The incidence of dystocia increased in farmed red deer that had higher

body condition scores (Audige et al., 2001). The large size of the fetus was believed to result in a mechanical obstruction in the elephant described in this case. Both age and over-nutrition were speculated to be possible contributing factors. Currently all pregnant elephant cows are managed to minimize weight gain during pregnancy.

The elephant in this report was conditioned for monitoring and examination by multiple methods that facilitated early recognition of dystocia and treatment. Ultrasonography was critical to assessing the position and progression of the fetus. In addition, medical and surgical intervention would not have been possible without prior training. Peri-parturient and post-partum medical problems are not uncommon in elephants; therefore, training and planning by elephant and veterinary staff is critical prior to the requirement for these procedures (Foerner, 1999; Lung et al, 2002; Murray 1996; Schaftenaar, 1996).

Vestibulotomy was used to extract the fetus once it was in the pelvic canal and could be reached. This surgical approach has been previously described for use in assisted reproduction techniques for insemination (Schmitt, pers. comm.), evaluation of the reproductive tract by endoscopy (Lung et al, 2002), and treatment of dystocia through attempted fetal reduction (Foerner, 1999) or removal of a dead fetus (Schaftenaar, 1996). Although applied both under general and standing anesthesia for dystocia, the only other successful cases (2 Asian cows) have been in Europe with standing sedation, similar to this report. In both of those, the calf was dead at the time of delivery. Similar to our elephant cow, attempts at surgical closure of the incision in one of the cows resulted in dehiscence and a small fistula (Schaftenaar, 1996).

## CONCLUSIONS

1. Weight control in pregnant cows is important part of their management.
2. Conditioning for ultrasound and other medical procedures is critical prior to the potential need for these procedures.
3. ECP should be used in combination with oxytocin when induction is necessary.
4. Vestibulotomy should only be considered a viable procedure if the fetus can be easily reached.
5. Managing the surgical incision should include considering allowing healing by second intention; surgical closure is often hindered by movement and tension on the suture line.

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## REFERENCES

- Agnew DW, Munson L, Ramsay EC. 2004. Cystic Endometrial Hyperplasia in Elephants. *Vet Pathol* 41: 179-183.
- Audige L, Wilson PR, Morris RS. 2001. Risk Factors for Dystocia in Farmed Red Deer (*Cervus elaphus*). *Aust Vet J* 79: 352-357.
- Brown JL, Walker SL, Moeller T. 2004. Comparative Endocrinology of Cycling and Non-Cycling Asian (*Elephas maximus*) and African (*Loxodonta africana*) elephants. *Gen Comp Endocrinol* 136: 360-370.
- Focner JJ. 1999. Dystocia in the Elephant. In: Fowler ME, Miller RE, editors. *Zoo & Wild Animal Medicine: Current Therapy* 4. Philadelphia: W.B. Saunders Co. pp 522-525.
- Hermes R, Hildebrandt TB, Goritz F. 2004. Reproductive Problems Directly Attributable to Long-Term Captivity – Asymmetric Reproductive Aging. *Anim Reprod Sci* 82-83: 49-60.
- Lung NP, Ferrell ST, Schmitt DL. 2002. Parturition and Stillbirth in an Asian Elephant – The Medical and Institutional Challenges. *JEMA* 13:95-98.
- Murray S, Bush M, Tell LA. 1996. Medical Management of Postpartum Problems in an Asian Elephant (*Elephas maximus*) Cow and Calf. *J Zoo Wild Med* 27: 255-258.
- Olson D. 2004. Elephant Husbandry Resource Guide. Azle, TX: International Elephant Foundation. pp123-141.
- Roberts SJ. 1986. *Veterinary Obstetrics and Genital Diseases (Theriogenology)*. 3<sup>rd</sup> ed. Ithaca, NY: Roberts. p 277-286.
- Schaftennar W. 1996. Vaginal Vestibulotomy in an Asian Elephant (*Elephas maximus*). *Proceedings of American Association of Zoo Veterinarians Annual Conference*. Puerto Vallarta, Mexico. pp 434-439.
- Schmidt MJ. 1999. Calving Elephant (Normal). In: Fowler ME, Miller RE, editors. *Zoo & Wild Animal Medicine: Current Therapy* 4. Philadelphia: W.B. Saunders Co. pp 521-522.