



# Surgical treatment of baculum fracture in sloth bear (*Melursus ursinus*): A case report

A. SHA. ARUN\*, A. S. VIRK, AND S.P. PATIL

Wildlife SOS, Bannerghatta Bear Rescue Centre, Bannerghatta, Tamilnadu, India

\*[arun@wildlifesos.org](mailto:arun@wildlifesos.org)

Date of receipt: 16.11.2021

Date of acceptance: 03.05.2022

## ABSTRACT

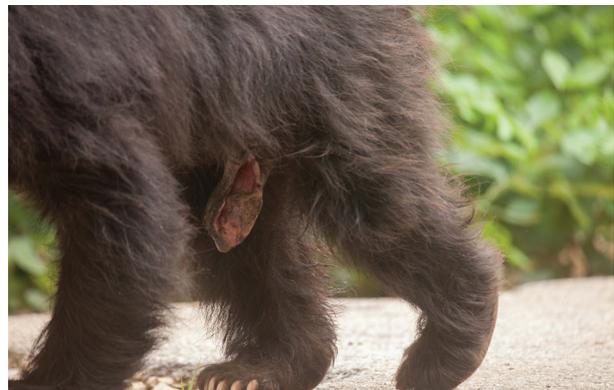
A rescued dancing male sloth bear (*Melursus ursinus*) neutered according to CZA norms at Wildlife SOS, Bannerghatta bear rescue center, aged around 24 years was noticed to exhibit frequent behavior of licking and biting of penile region. With the aid of radiographic examination, it was confirmed as a novel case of baculum fracture in the sloth bear. Radiographic examination revealed complete fracture of baculum at its anterior one third. Under general anesthesia with ketamine and xylazine in combination at a dose rate of 5 mg kg<sup>-1</sup> and 2 mg kg<sup>-1</sup>, respectively, a surgical procedure was performed which involved removal of the anterior fractured portion of the bone without causing any damage to urethra. Utmost post-operative care was provided. After the completion of the surgical intervention, the bear was recovered and stopped exhibiting the abnormal behaviour of licking and biting.

**Key words:** Baculum fracture, sloth bear, surgical correction

## INTRODUCTION

Sloth bear comes under the family Ursidae along with 7 species of bears which include brown bears, polar bears, American black bear, Asian black bears, sun bears, spectacled bears and the giant panda. Baculum also referred to, as heterotopic or extra-skeletal bone is found in the penis of certain placental mammals and primates but absent in humans (Sharir et al., 2011). Anatomically it is in the glans tissues at the distal end of penis and dorsally to the urethra. Generally distal end of corpus cavernosum touches the proximal end of the baculum. The baculum has variations in its shape, size and length in different species. Multiple theories are associated with the significance of baculum but the function of baculum is still not ruled out (Baryshnikov et al., 2003). A study suggests that variation in the length is associated with the taxonomic and behavioral variations, length of baculum varies according to the intromission time in some species (Dixson, 1987). Baculum fracture is amongst the

uncommonly observed clinical case with the most probable etiological cause, i.e., aggressive behavior within the species while mating and also snapping associated with the sudden removal of penis during copulation (Bartosiewicz, 2000). One of the male sloth bears, aged around 24 years, was observed with an injury on his penile region (Fig. 1) and the same bear was subjected for a close examination (Fig. 2) after immobilization.



**Fig. 1.** The sloth bear showing the visible damage of the penile region



**Fig. 2.** Close examination of injury after immobilisation

### MATERIALS AND METHODS

This procedure was conducted at Wildlife SOS; Bannerghatta bear rescue center on a rescued dancing sloth bear aged 24 with the symptoms of frequent licking and biting of penile region. For restraining and in-depth examination of animal chemical immobilization was preferred. Sedative and anesthetic agent was selected considering the safety of the animal. Xylazine and Ketamine were selected considering their safety and smooth recoveries from the previous observations. Based on the body weight the required dose was calculated, i.e., for 90 kg body weight Ketamine ( $100 \text{ mg ml}^{-1}$ ) @  $5 \text{ mg kg}^{-1}$  the calculated dose was  $450 \text{ mg}$  and Xylazine ( $100 \text{ mg ml}^{-1}$ ) @  $2 \text{ mg kg}^{-1}$  the calculated dose was  $180 \text{ mg}$ . Hind quarter muscles were the preferred site for the administration of the anesthetic drugs. The drugs were combined and loaded in dart with a capacity of  $5 \text{ ml}$  with partial dose of Ketamine, i.e.,  $320 \text{ mg}$  and complete dose of Xylazine; the remaining dose of ketamine was administered after animal achieved sternal recumbence for complete induction of anesthesia. Darts were delivered with the aid of blow pipe.



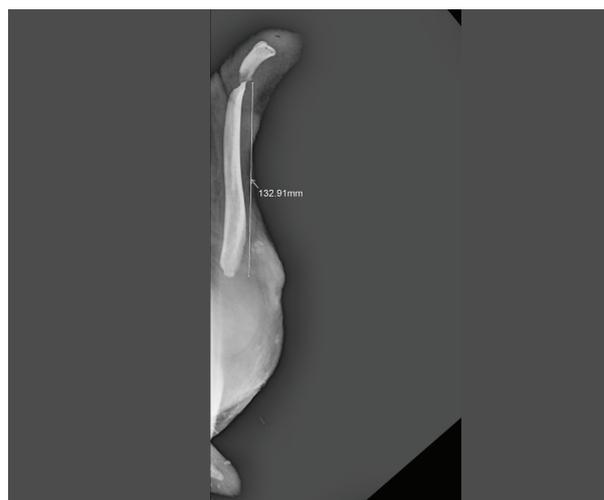
**Fig. 3A.** Radiographic image of hip region showing the fracture at one third of the baculum.

After the confirmation of complete induction of anesthesia, the animal was blind folded and under continuous monitoring of its vital signs, was shifted to the Wildlife SOS, Wildlife Veterinary Hospital at Bannerghatta Bear Rescue Center. Palpation of the suspected penile region emphasized the need for a radiographic confirmation to rule out the fracture of the baculum at its anterior one third (Fig. 3A, 3B, 3C).

For surgical procedure, the sloth bear was intubated with  $18 \text{ mm}$  endotracheal tube (Fig. 4) and gaseous anesthesia was maintained with  $4 \text{ liters}$  of oxygen and  $2\%$  to  $4\%$  isoflurane gas. Intravenous line was started in the saphenous vein.



**Fig. 3B.** Radiographic image of the baculum fracture



**Fig. 3C.** Radiographic image of the baculum fracture with measurement



**Fig. 4.** Endotracheal intubation for gaseous anesthesia.



**Fig. 5.** Removal of broken piece of baculum



**Fig. 6.** Post surgical intervention and sutured wound

The pelvic area was trimmed and cleaned with spirit and wounds inflicted by biting were cleaned by hydrogen peroxide and 5% povidone iodine and further wound debridement was done. A longitudinal incision of 3-4 cm was made at the site of fracture from the lateral side of the penis by using a No. 3 bp blade. During incision minimal damage to the underlying structures were ensured by displacing the tissues and muscles. The broken proximal part of the penis was removed using forceps (Fig. 5) and, the surrounding tissues were disinfected by using hydrogen peroxide and 5% povidone iodine, followed by the removal of the excessive fibrous tissues. The blunt edges of exposed bone were smoothed by filer to avoid injuries to the tissues and urethra as well. Blood vessels were thermo cauterized to avoid excessive bleeding. The edges were cleaned and sutured by using 2-0 absorbable sutures (Fig. 6) and antibiotic powder was adequately applied.

The post-operative medication regimen was adhered to



**Fig. 7A.** Post healing of the soft tissue



**Fig. 7B.** Radiographic image of baculum.

- Antibiotic tablet Cephalexin (Hatvet Pharma Private Limited, Meerut, Uttar Pradesh) @ 15 mg kg<sup>-1</sup> body weight twice daily – to avoid the secondary infections
- Cap. Tramadol (Intas Pharmaceuticals Limited, Thaltej, Ahmedabad) 50 mg and combination of enzymatic anti-inflammatory, i.e., Trypsin, Bromelain, Rutoside twice daily – to alleviate pain and inflammation.

## RESULTS AND DISCUSSION

After the surgical correction of the deformity the bear recovered from anesthesia smoothly and was observed to be alert and active exhibiting normal feeding behaviour and was noticed to refrain itself from exhibiting the previous abnormal behaviour of sucking and licking of penile region leading to a healthy recovery of the sloth bear (Fig. 7A ) and its radiographic healing was confirmed (Fig. 7B).

Behavioral changes of the animals are the important factors while considering the health status of individual. Behavioral changes in the wild animals are very less known so far and can be assessed rarely to resolve a cause unlike the domestic animals. Assessing the condition or abnormality amongst wild animals needs broader perspective and requires understanding of normal behavior. A specific term called “Zoocosis” is associated with stereotypic behavior in captive wild animals where there is substantial alteration of behavior which includes array of signs including sucking, over grooming or excessive licking and self-mutilation, biting, rocking, head bobbing, vomiting, and regurgitating, coprophilia, coprophagia and circling movements.

In captivity, the life of animals has a remarkable difference between what they exhibit in the wild. Factors like space, human presence, climate, social interactions and diet have a peculiar impact on the animal behavior (Vickery and Mansion, 2005). Thus, while accessing the health issues of the captive animals, the stereotypic behaviors and natural behavior must be considered along with the alterations in behavior associated with illness. There should be a clear understanding of stereotypic, normal and illness associated behavior to get the complete and

accurate diagnosis of the illness (Sha et al., 2020). While dealing with health issues and abnormal behavior in the wild animal’s implementation of conventional knowledge and modern diagnostic aids can act as liaison to achieve confirmatory diagnosis. However, there must be proper considerations or assumptions to act accordingly, which can minimize the time duration and ensure quick healthy recovery of the distressed animal.

In this study, the observed behavior of sucking was due to baculum fracture resulting in pain and discomfort of the animal. Such pain and discomfort can lead to aggression in the animals. Injuries in the penile region may cause ascending urinary tract infections where the bacteria first invade the urethral mucosa, towards urinary bladder further to kidneys and finally into the circulatory system (Belyayeva and Jeong, 2021). The authors documented that the average length (Fig. 8) of an adult sloth bear baculum falls around 162 mm to 167 mm (n=18).



**Fig. 8.** Radiographic image of intact baculum of sloth bears

## ACKNOWLEDGEMENT

The authors are thankful to Executive Director, Bannerghatta Biological Park and Mr. Kartick Satyanarayan and Ms Geeta Seshamani, Co-Founders, Wildlife SOS, for extending their support during the study. The authors would also like to thank and acknowledge the support of staff at Bannerghatta Bear Rescue Centre for their valuable field assistance during the upkeep of the rescued sloth bears.

## REFERENCES

- Bartosiewicz, L. 2000. Baculum fracture in carnivores: Osteological, behavioural and cultural implications. *Int. J. Osteoarchaeol.* **10**(6): 447-450.
- Baryshnikov, G.F., Bininda-Emonds, O.R. and Abramov, A.V. 2003. Morphological variability and evolution of the baculum (Os Penis) in Mustelidae (Carnivora). *J. Mammal.* **84**(2): 673-690.
- Belyayeva, M. and Jeong, J.M. 2021. Acute Pyelonephritis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing.
- Dixson, A.F. 1987. Baculum length and copulatory behavior in primates. *Am. J. Primatol.* **13**(1): 51-60.
- <https://www.worldatlas.com/articles/what-is-zoochosis>.
- Sha, A.A., Bakde, R. and Adhithyan, N.K. 2020. Successful rescue and rehabilitation of an injured wild sloth bear trapped in a poacher's snare. *e-planet* **18** (2): 158-163.
- Sharir, A., Israeli, D., Milgram, J., Currey, J.D., Monsonego-Ornan, E. and Shahar, R. 2011. The canine baculum: the structure and mechanical properties of an unusual bone. *J. Struct. Biol.* **175**(3): 451-456.
- Vickery, S.S. and Mason, G.J. 2005. Stereotypy and perseverative responding in caged bears: further data and analyses. *Appl. Anim. Behav. Sci.* **91**(3-4): 247-260.