

Management of severed ligament of quadrate bone in an Indian Rock Python and its rehabilitation- A case report

A. S. Shalini¹, S. V. Upadhye^{2*}, V. M. Dhoot³, B. K. Bhadane¹ and M. D. Pawshe¹

¹Subject Matter Specialist, Wildlife Research and Training Centre, Nagpur - 441 501, Maharashtra, India; ²Director, Wildlife Research and Training Centre, Nagpur - 441 501, Maharashtra, India; ³Deputy Director, Wildlife Research and Training Centre, Nagpur - 441 501, Maharashtra, India

Abstract

An Indian Rock Python, approximately 4-5 years old, weighing 3.7 kg, and measuring 2.5 m in length, was transferred from Wadali Range, Amravati, to the Wildlife Research and Training Centre, Nagpur, due to an accidental injury on the right side of its head involving the parietal and palatine bones that cover the right eye. Upon examination, it was noted that the python exhibited swelling in the postorbital, parietal, and temporal region extending to the quadrate bone, which led to difficulties in consuming offered mice and a lack of flicking its forked tongue even when disturbed. Radiographic evaluation revealed the absence of the quadrate bone, which could be due to a severed ligament connecting the bone to the skull. Treatment for the python included rest, calcium, and multivitamin supplements, along with force-feeding using a feeding tube at regular intervals over a period of 2.5 months. The python began consuming provided mice and quail on the 85th day. Radiography showed that the Quadrate bone and its ligament had healed after treatment. The python was set free in Unit 1, Compartment 793 at the Gorewada Project in the Nagpur region.

Keywords: Indian Rock Python, Quadrate bone, Release, Severed ligament

Highlights

- Rescued an Indian Rock Python with an old lacerated wound over the parietal and palatine bone covering up to the eye, which was successfully treated.
- Radiography showed the absence of the quadrate bone
- Treatment of python included rest, calcium, and multivitamin supplementation, along with feeding of eggs
- Successful release of Python after recovery into the Gorewada forest of the Nagpur region.

The Indian rock python, scientifically known as *Python molurus molurus*, is classified under reptiles in the order Squamata, suborder Serpentes, and the family Boidae. Commonly referred to as the Indian Python, this species is renowned for being one of the largest non-venomous snakes. It is widely found across the Indian subcontinent and can reach lengths exceeding 20 feet (6 m). The Indian Rock Python is categorized as near threatened in the IUCN Red List (Baillie & Groombridge, 1996) as cited by Babar et al., 2019.

Their slow movement and limited dispersal ability make Indian Rock Pythons more susceptible to various types of injuries, including those caused by vehicular accidents, human interactions, prey-related incidents, and natural disasters (Thathoo et al., 2018; Braga & Ramos, 2021). Other sources of trauma may result from mishandling the snake or injuries from enclosure structures (Horton, 2014). The python's skull is highly mobile and lacks a hard mandibular symphysis. The two rami of the mandible possess a ligamentous attachment. Snakes possess an additional bone, the

quadrate bone, which links the lower jaw to the skull. This enables the snake to open its jaws to an angle of around 180 degrees. The quadrate bone is not firmly affixed, permitting the lower jawbones to move independently. This unique anatomical feature enables the python to consume prey much larger than its head by disarticulating its jaw and expanding its gape (Miller & Fowler, 2015).

In this article, we have discussed the care and management of an injured Indian rock python with a severed ligament of the quadrate bone and its rehabilitation.

A 2.5-meter-long, 3.7 kg Indian Rock Python was brought to the Wildlife Research and Training Centre due to a lacerated lesion affecting the temporal, palatine, and parietal regions, extending to the right eye. The impacted region exhibited edema with loss of skin, accompanied by granulation tissue (Fig. 1). During the examination, it was observed that the python was not flicking its tongue. Dorsoventral and lateral radiography was conducted without sedation,



Fig. 1. Python showing an old lacerated wound over the temporal, palatine, and parietal region, with the presence of granulation tissue



Fig. 2. Dorso-ventral radiograph showing the absence of the quadrate bone, resulting in its separation from the skull

revealing the absence of the Quadrate bone, which could be due to a severed ligament connecting the bone to the skull. The quadrate bone could not be identified in the pre-treatment radiograph, as it was dislodged from the skull and might be lying obliquely during the radiograph. This separation resulted in the absence of the quadrate bone as depicted in Fig. 2. The python was administered oral calcium supplements daily in water to aid in its recovery. Additionally, it received Inj. Calcium gluconate @50 mg/kg I/M basis every week for three weeks as per Doneley et al. (2018). The wound over the temporal region was dressed with application of T-bact (Mupirocin) ointment. Also,



Fig. 3. Post-treatment radiography showing the restoration of the quadrate bone



Fig. 4. Recovered python after successful treatment

force-feeding with 2-3 raw eggs was done at 10-day intervals for 2.5 months as the snake appeared in poor body condition. At the 85th day, it was observed that the python started flicking the forked tongue, and small prey items like white mice, quail, and quail were fed for the 15 days. Post-treatment radiography was repeated, which revealed the restoration of the quadrate bone as seen in Fig. 3. The Indian Rock python was successfully released into Unit 1, 793 Compartment, Gorewada Project, Nagpur region after treatment (Fig. 4).

Snakes are particularly susceptible to injuries from vehicles due to their behavioral tendencies and movement patterns, compounded by the effects of habitat fragmentation and urban development (Filius et al., 2020). The risks posed to reptiles by roadways are complex; for instance, their seasonal migrations or basking on road surfaces to absorb heat make them vulnerable to traffic, thereby heightening the chances of accidents. Additionally, approximately 2.7 percent of drivers may deliberately run over snakes, further

threatening their populations. Following such traumatic incidents, snakes frequently present with injuries such as lacerations, evisceration, and skull fractures (Anoop et al., 2020). However, dislocation of the mandible quadrate joint is rare. The quadrate bone is an extra bone that articulates between the mandible and the skull, thus providing an extra joint. The loose connections of the movable quadrate bone work in tandem with the lower jaw's mandible and the upper jaw's palatamaxillary bone, enabling the upper jaw to elevate like a hinge, which increases the gape during feeding - a mechanism referred to as streptostyly (Sarangom et al., 2022). In this case, the python encountered challenges in expanding its mouth to consume prey due to a severed ligament of the quadrate bone. As a result, supplemental feeding through a feeding tube was implemented during the healing phase to meet its nutritional needs adequately and reduce the risk of pathological jaw fractures.

Ligaments undergo a specific series of cellular processes that unfold in three successive stages: an acute inflammatory phase, a proliferative or regenerative phase, and a tissue remodeling phase. This healing process may span several months, and even with advancements in treatment options, numerous ligaments fail to restore their original tensile strength (Hauser et al., 2013). Wound healing in reptiles typically progresses similarly to that of other animals but at a slower rate (Doneley et al., 2018). The approach to repairing orthopaedic injuries in reptiles mirrors that of domestic animals, emphasizing rigid stabilization, precise anatomical alignment, and minimal disruption to the adjacent soft tissues (Mitchell, 2002). Given the involvement of the joint, immobilizing the affected skull to provide rest was the chosen orthopaedic strategy for managing the severed quadrate bone ligament.

Calcium plays a crucial role in numerous biological

functions, including muscle contraction, blood clotting, nerve transmission, myocardial function, and the formation and maintenance of bones and teeth (Guevara, 2012). An injury to the parietal and palatine bones weakened their strength. To mitigate the effects of the bone and ligament injury, calcium supplements were given to aid in bone healing and nerve repair. The python recovered uneventfully.

The present case elaborates the successful management of the severed ligament of the Quadrate bone in an Indian Rock Python (*Python molurus molurus*) by the provision of rest and calcium supplementation.

Conflict of interest: The author has no conflict of interest.

Author's contribution: ASS: Carried out the management, rehabilitation operation, participated in data analysis, draft and revision of the manuscript; SVU, VMD, BKB, MDP: Participated in the collection of references, compilation of data, photo editing, draft and revision of the manuscript.

Data availability statement: The corresponding author is willing to provide the data upon reasonable request.

Use of artificial intelligence tools: No artificial intelligence tools were used for preparation of the work.

ACKNOWLEDGEMENTS

The authors are thankful to Hon'ble PCCF (WL) and Chief Wildlife Warden, Maharashtra State, the FDCM Pvt. Ltd and Divisional Manager, Gorewada Project, Nagpur, for granting permission to manage the injured Indian Rock python at Wildlife Research and Training Centre, Nagpur, and also for providing the facilities required for its successful management.

REFERENCES

- Anoop, S., Venugopal, S. K., John, J., Jaikumar, V. S., Sarangam, S. B., & Devanand, C. B. (2020). Surgical management of intestinal evisceration in a Spectacled Cobra (*Naja naja*). *Indian Journal of Veterinary Surgery*, 41(2), 146.
- Babar, M. E., Mughal, M. S., Hussain, T., Javed, M. M., & Sherzada, S. (2019). Biology, habitat and conservation of Indian rock python: A brief review. *Journal of Animal and Plant Sciences*, 29(1), 349–352.
- Baillie, J., & Groombridge, B. (1996). *1996 IUCN Red List of Threatened Animals* (p.165). IUCN. <https://portals.iucn.org/library/node/7044>
- Braga, R. R., & Ramos, A. R. L. (2021). Traumatized reptiles: A retrospective study of wild reptiles examined in Northeastern Brazil. *Acta Scientific Veterinary Sciences*, 3(10), 28–32. <https://doi.org/10.31080/ASVS.2021.03.0218>
- Doneley, B., Monks, D., Johnson, R., & Carmel, B. (2018). Appendix-1. In *Reptile medicine and surgery in clinical practice* (p. 476). Wiley Blackwell.
- Filius, J., van der Hoek, Y., Jarrín-V, P., & van Hooft, P. (2020). Wildlife road kill patterns in a fragmented landscape of the Western Amazon. *Ecology and Evolution*, 10(13), 6623–6635.
- Guevara, R. A. (2012). Nutritional secondary hyperparathyroidism in reptiles. *Veterinary Technician*, 33(11), E1-E5.

- Hauser, R. A., Dolan, E. E., Phillips, H. J., Newlin, A. C., Moore, R. E., & Woldin, B. A. (2013). Ligament injury and healing: A review of current clinical diagnostics and therapeutics. *The Open Rehabilitation Journal*, 6, 1-20.
- Horton, S. (2014). Interesting surgeries of the snake head: A collection of case studies. In *Proceedings of the Association of Reptilian and Amphibian Veterinarians* (pp. 25-26).
- Miller, R. E., & Fowler, M. E. (2015). Ophidia (snakes). In *Zoo and wild animal medicine* (Vol. 8, pp. 60). Elsevier Saunders.
- Mitchell, M. A. (2002). Diagnosis and management of reptile orthopaedic injuries. *Veterinary Clinics of North America: Exotic Animal Practice*, 5(1), 97-114.
- Sarangom, S. B., Nair, S. L. M., Surabhy, K. S., Mathai, V. M., Aparna, P. A., Varghese, R., Sandeep, N. C., & Sundaran, S. (2022). Surgical management of luxated mandible and lacerated jaw in an Indian rock python (*Python molurus molurus*). *Journal of Indian Veterinary Association*, 20(3), 101-107.
- Thathoo, A. K., Singh, J. L., & Tufani, N. A. (2018). Necropsy and histopathological findings of an Indian rock python (*Python molurus molurus*) died of accidental traumatic shock: A case report. *Journal of Entomology and Zoology Studies*, 6(2), 812-815.