

## SURGICAL MANAGEMENT OF LUXATED MANDIBLE AND LACERATED JAW IN AN INDIAN ROCK PYTHON (*Python molurus molurus*)

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### ABSTRACT

A 2.2 meter long juvenile Indian Rock Python (*Python molurus molurus*) weighing 12kg was presented at the District Veterinary Centre, Kannur, with severely lacerated jaw muscles along the right labial commissure following a road traffic accident. Physical and radiographic examination confirmed the presence of open luxation of the right mandible-quadrangle joint along with severe laceration of anterior *temporalis* muscle and tracheal puncture. The luxated mandible was reduced and fixed in alignment with the quadrangle bone using 1-0 polyglactin 910 under general anaesthesia. The lacerated right anterior *temporalis* muscle along with its fascia was apposed in simple continuous suture pattern using 2-0 polyglactin 910 followed by the skin in horizontal mattress suture pattern using 2-0 monofilament polyamide. The tracheal wound was apposed in simple interrupted suture pattern using 3-0 polyglactin 910. Postoperative antibiotics and analgesics

were administered along with regular wound dressing. The skin wound healed completely by the 4<sup>th</sup> postoperative week and the muscles healed by the 5<sup>th</sup> postoperative week. Oral feeding was attempted using a Ryle's tube during the 5<sup>th</sup> postoperative week. The snake started using the jaw by the fifth postoperative week and the normal jaw movement and jaw tone was restored by the 10<sup>th</sup> postoperative week. The snake had an uneventful recovery and was later released into its natural habitat.

**Keywords:** Mandible, Quadrangle, Luxation, Indian rock python

### INTRODUCTION

Snakes suffer various traumatic injuries as a result of accidents on roads that ran through snake inhabited forests, agricultural operations using automated machineries and assault by humans out of panic (Anoop *et al.*, 2020; Filius *et al.*, 2020; Bhandarkar and Paliwal, 2021). The loss of the forest area and rapid degradation of the natural habitats of snakes due to

urbanization make them vulnerable to trauma (Hiremani *et al.*, 2022) in addition to their species-specific ecological traits, behaviors and movement patterns (Baxter-Gilbert *et al.*, 2015). The Indian rock python (*Python molurus molurus*) is one of the two subspecies of *Python molurus* that inhabits in India, Pakistan, Nepal and Sri Lanka. Accidental trauma in Indian rock pythons due to road traffic accidents and assault by humans confirmed during postmortem examinations have been previously reported (Das *et al.*, 2013; Thathoo *et al.*, 2018). The present case report describes the successful surgical management of luxated mandible and lacerated jaw along with tracheal puncture in an Indian rock python.

#### CASE HISTORY AND OBSERVATIONS

A 2.2 meter long juvenile Indian Rock Python (*Python molurus molurus*) weighing 12 kg was presented at the District Veterinary Centre, Kannur, following a road traffic accident. On general examination, the python was active and alert to stimulus and reflexes. On physical examination, the jaw muscles were found to be severely lacerated along the right labial commissure (Fig. 1A). The proximal end of the right mandible was found hanging beside the ruptured fascia of the severely lacerated anterior *temporalis* muscle which was protruding along its right labial commissure. The examination

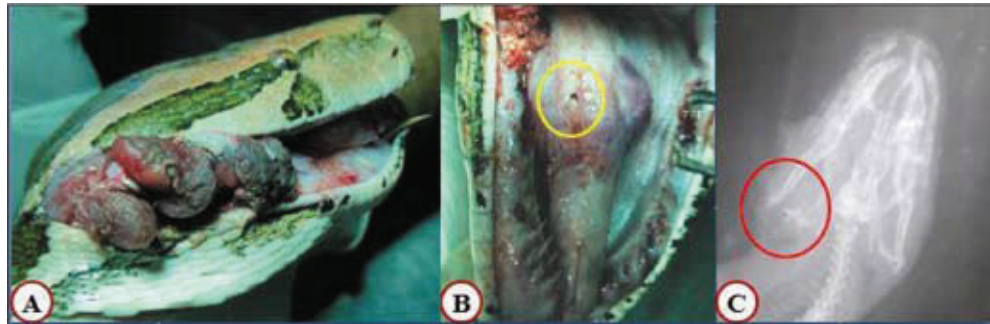
of oral cavity revealed the presence of streaks of blood and avulsion of teeth along the anterior lower jaw. A punctured wound was observed on the dorsal anterior end of trachea (Fig. 1B). Despite the lesion, the body condition of the python was good. Dorso-ventral radiographs revealed luxation of the right mandible from the quadrate bone (Fig. 1C). All the other skull bones were found to be intact. Based on the findings of physical and radiographic examination, the condition was diagnosed as an open luxation of the right mandible-quadrate joint along with laceration of anterior *temporalis* muscle and tracheal puncture. Surgical repair of the condition was resorted to under general anaesthesia.

#### TREATMENT AND DISCUSSION

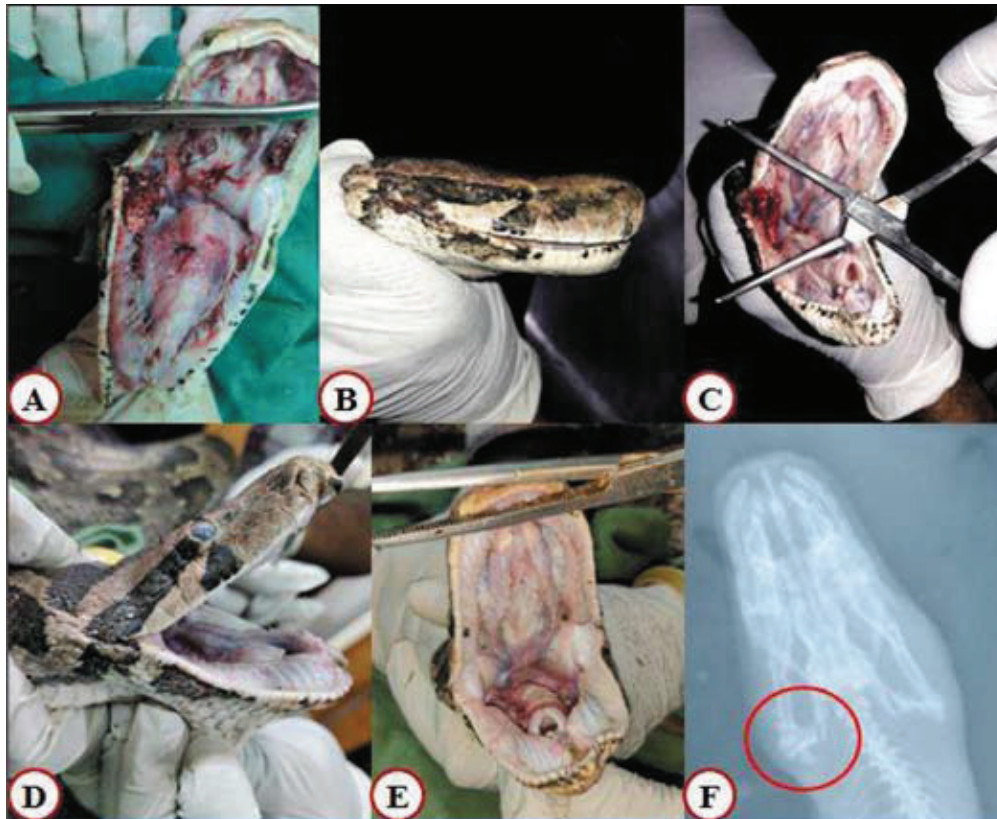
The python was restrained manually until administration of general anaesthesia. Preoperatively, butorphanol tartrate (Butrum, Aristo Pharmaceuticals Pvt. Ltd., Solan, Himachal Pradesh, India) at the rate of 10 mg/kg body weight followed by xylazine hydrochloride (Xylaxin, Indian Immunologicals Limited, Telangana, India) at the rate of 0.3 mg/kg were administered intramuscularly using 23G needle into the dorsal epaxial muscle on the caudal third of the body. General anaesthesia was induced with ketamine hydrochloride (Aneket, Neon Laboratories Limited, Mumbai, India) at the rate of 20 mg/kg

intramuscularly. Endotracheal intubation was done to keep the airway patent. The scales over skin around the lacerated muscles were clipped. The surgical site was scrubbed with 1% chlorhexidine

solution and was aseptically prepared with povidone iodine (5%) solution. The oral cavity was irrigated with 0.9% normal saline solution. The body temperature of the snake was maintained with the help



**Fig. 1:** **A.** The Indian Rock Python presented with lacerated jaw muscles, **B.** Punctured wound observed on dorsal trachea, **C.** Luxated right mandible-quadrates joint on dorso-ventral radiograph



**Fig. 2:** **A.** Appearance of oral cavity after surgical repair of luxated mandible and lacerated muscles, **B&C.** Healed skin wound and healing muscle on the 4<sup>th</sup> postoperative week, **D&E.** Normal movement and appearance of jaw on the 10<sup>th</sup> postoperative week, **F.** The mandible-quadrates joint in alignment along with pseudoarthrosis formation on dorso-ventral radiograph during the 12<sup>th</sup> postoperative week

of heating pads. A clear surgical field was created with the help of jaw retractor. The luxated mandible was reduced and fixed in apposition with the quadrate bone by double loop reinforced surgeon's knot using 1-0 polyglactin 910 (Relyon glactin, Mco Hospital Aids Pvt Ltd., Hubli, Karnataka, India). The lacerated right anterior *temporalis* muscle along with its fascia was apposed in simple continuous suture pattern using 2-0 polyglactin 910 followed by the skin in horizontal mattress suture pattern using 2-0 monofilament polyamide (Dynalon, Dynamic Techno Medicals Pvt. Ltd., Aluva, Kerala, India) (Fig. 2A). The tracheal wound was apposed in simple interrupted suture pattern using 3-0 polyglactin 910 (Fig. 2A). Postoperatively, long acting enrofloxacin (Fortivir, Crescent Labs Pvt. Ltd., Vadodara, India) at the rate of 10 mg/kg body weight and meloxicam (Melonex, Intas Pharmaceuticals Ltd., Ahmedabad, India) at the rate of 0.2 mg/kg body weight were administered intramuscularly. Regular dressing of the skin and oral wounds was carried out.

The skin wound and the tracheal puncture healed completely by the fourth postoperative week and the skin sutures were removed (Fig. 2B&C). The muscle healed by the subsequent week. The snake started using the jaw by the fifth postoperative week and oral feeding of

minced meat was attempted with the help of Ryle's tube under manual restraint. By the 8<sup>th</sup> postoperative week, the snake was fed with chicken which was swallowed with difficulty. Normal jaw movements and tone were restored (Fig. 2D), and reinstatement of the usual appearance of jaw was observed by the 10<sup>th</sup> postoperative week (Fig. 2E). Dorso-ventral review radiographic projections on the 12<sup>th</sup> postoperative week showed properly aligned right mandible-quadrate joint along with pseudoarthrosis formation (Fig. 2F). The python started taking prey normally by the 12<sup>th</sup> postoperative week. The snake had an uneventful recovery and was later reintroduced into its natural habitat after deworming with fendendazole (Safezole-600, Kevinjo Pharmaceuticals Pvt. Ltd., Ernakulam, Kerala, India) at the rate of 100 mg/kg body weight orally.

Snakes are vulnerable to vehicular trauma because of their behavior and movement patterns in addition to the current scenario of fragmentation and urbanization (Baxter-Gilbert *et al.*, 2015; Filius *et al.*, 2020). Although threats to reptiles from roads are multifaceted, the seasonal movement or basking on road surfaces to absorb radiant heat expose them to traffic and increase the likelihood of collisions (Gregory and Isaac, 2005). Further, 2.7 per cent of drivers may intentionally run over

snakes increasing threat to the population (Baxter-Gilbert *et al.*, 2015). Snakes are often presented with lacerated wounds, evisceration and fractures of skull bones following traumatic event (Rahal *et al.*, 2011; Gouveia, *et al.*, 2015; Anoop *et al.*, 2020). However, luxation of mandible-quadrates joint is uncommon. According to Mader *et al.* (2006), fractures of mandible may occur in snakes despite its flexibility and mobility as a result of the vigorous forces applied during attempts to capture live prey. The characteristic cranial kinesis of ophidian skull and the absence of mandibular symphysis enable them to move the upper and lower jaw bones of each side alternatively during feeding (Pough *et al.*, 2015). The loose articulations of the freely movable quadrates bone synchronise with the movement of mandible of lower jaw and the palatamaxillary bone of upper jaw enabling them to raise their upper jaw like a hinge to increase gape during feeding and is often termed as streptostyly (Jacobson, 1993; Gregory and Isaac, 2005).

Luxation of the mandible-quadrates articulation in the present case had resulted in drooping of lower jaw and it affected the effective movement of the digastric, anterior *temporalis* and protractor pterygoid, which are the chief muscles that aid in gaping and swallowing of large prey in snakes. The concurrent laceration of the right anterior *temporalis*

muscle and the avulsion of teeth along the lower jaw worsened the mobility and integrity of the jaw. Unlike in mammals, the luxated mandible-quadrates joint was fixed in apposition rather by a double loop suture fashion using 1-0 polyglactin 910 than using orthopaedic internal fixation techniques due to the high fragility and small size of the bone. Initial signs of clinical recovery of the repaired joint were observed by the 8<sup>th</sup> postoperative week and a radiographically visible pseudoarthrosis formation was observed by the 12<sup>th</sup> postoperative week. Tissue repair process usually takes a longer duration of even 4 to 6 weeks in snakes (Smith *et al.*, 1988). In the present case, the healing of soft tissues such as skin and muscles was observed by the fourth and fifth postoperative week, respectively. Systemic antibiotics are eliminated relatively slowly in snakes and a single day administration of long acting enrofloxacin at the rate of 10 mg/kg was found effective in combating infections (Waxman *et al.*, 2014). This could be the first report of successful management of luxated mandible-quadrates joint and lacerated jaw in an Indian rock python.

## CONCLUSION

Diagnosis and successful surgical management of open luxation of the right mandible-quadrates joint along with severe laceration of anterior *temporalis* muscle

and tracheal puncture in a juvenile Indian rock python is reported and discussed.

#### ACKNOWLEDGEMENT

The authors are thankful to the Director, Animal Husbandry Department, Kerala, and the District Animal Husbandry Officer, Kannur, Kerala for providing facilities for the study.

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