Snakes are members of the class Reptilia and belong to the order Squamata. Infraorder Serpentes is represented by around 2750 species living in different parts of the world, of which around 275 species (10%) are found in India. Indian rock python (Python molurus molurus) belongs to the family Pythonidae in which more than 25 species are known to exist. Python's often referred as old world snakes are largely found in the African, Asian and Australian continents. Indian rock python is common throughout the forests of India.

Anatomy of python is best done by considering the python in three sections. The proximal one third contains trachea, oesophagus, thymus, thyroid and heart. The second section contains lungs, liver, stomach, spleen, gallbladder, pancreas, proximal small intestine and air sac. The last section contains small intestine, kidney and large intestine and gonads. The skull of the python is highly kinetic and does not have a rigid mandibular symphysis. The two rami of the mandible have a ligamentous connection. The snakes have an extra bone, the quadrate bone which connects the lower jaw to the skull. This helps snake to open the jaws approximately 180 degrees. These unique features allow snake to ingest prey larger than would be possible by a reptile with a fixed skull (Eric and Murray, 2015).

A study conducted by Swarup et al. (2009) revealed that only three clinical cases of python were recorded in 35 Indian zoos over the ten years of study, which included single case each for wound, anorexia and internal injury. Similarly authors seldom encountered even small injuries among wild or domestic reptiles in Kanpur Zoological Park, Kanpur.

On 7 August 2014 an injured python was brought to Kanpur Zoological Park hospital by forest department with badly smashed lower jaw. The mammoth reptile was kept in an iron barred cage of hospital. The appearance of the python showed that it had recently ingested medium sized animal. The length of the female python was fifteen feet. On examination all rows of the teeth were damaged along with slitted tissues inside the buccal cavity and the tongue was also badly injured. Since ingested prey was in proximal part of gastrointestinal tract hence anaesthesia at this juncture was avoided but in order to safeguard the reptile from any infection and further inflammation parenteral antibiotics, NSAID and antihistamines were administered for five days. Apart from this the wound were daily irrigated with betadine mouth wash. Meanwhile when the prey descended further in gastrointestinal tract it was decided to undergo for surgical intervention as after five days of treatment the wound began to show granulation but the lower jaw was still in hanging position. Therefore cosmetic surgery was the only option to reshape the jaw muscles of python. According to Mader (2006) cranial kinesis is common in reptiles especially the snakes, fracture still occur even though they have relatively malleable skulls. In those reptiles with a more rigid skull, fracture of the mandible and separation of symphysis are common.

Cosmetic Surgical Management of Lower Jaw in Indian Rock Python
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Fig 1. Severely damaged mandible and tissues of python

Fig 2. Opening of buccal cavity with the help of small animal vaginal speculum

Fig 3. Suturing of lower jaw muscles

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Dissociative anaesthetics, propofol, local anaesthetics and inhalant anaesthetics are the frequently used anaesthetics in snakes (Eric and Murray 2015). While Mader, 2006 defined that Ketamine is often combined at lower dosages with synergistic agents such as benzodiazepines (diazepam, midazolam), opioid agents (butorphanol, buprenorphine), or alpha2-adrenergic agonists (medetomidine). The addition of synergistic agents allows for the dose of ketamine to be reduced and results in smoother induction and recoveries and improved muscle relaxation and analgesia during maintenance. Whereas Betz (1962) injected 18 *Natri rhombifera*; water snake with 30 mg/kg of nembutol or suritol. Anaesthesia administered induced a surgical plane of anaesthesia in 40 to 60 minutes as evidenced by the loss of the tail withdrawal reflex. Recovery required 18-36 hours. According to West et al (2007) for large and aggressive specimens, injection with low doses of ketamine or tiletamine/zolazepam, with or without medetomidine or midazolam, may be used to allow safe handling.

In order to conduct the procedure safety was the prime factor. Therefore the selection of anaesthesia to tranquilize the python was a challenging task but we were in dubious mind since very few practical manipulations regarding the python was available. Ultimately, after thorough study and discussions we decided to use diazepam @ 0.2 mg/kg body weight by intramuscular route as preanaesthetic and ketamine @ 10 mg/kg body weight by intramuscular route as a main anaesthetic agent. Sedation was maintained by ketamine @ 5 mg/kg body weight twice during two hours hectic surgical procedure. The mammoth reptile was restrained by tying its whole length with a smooth bamboo piece of similar length.

Since pythons are kept in a safe and secured reptile houses in the zoo hence usually wilddomestic pythons rarely sustain any injury. Therefore usually zoo vets seldom come across such situation except in case of rescued animals and as a result no specific or helpful input is available if any zoo come across such condition. So a proper planning was chalked out before conducting the operation. Initially outer debris of dead tissue was removed and the mouth was opened using a vaginal speculum of small animals. The mandible was found to be deeply slitted apart and teeth were badly damaged. After opening the mouth the debris and necrosed tissue of buccal cavity were removed with surgical blade till fresh blood oozed out then terminal part of broken jaw was sutured. Lacerated muscles were sutured and fresh muscles around damaged portion were implanted over it by stretching them over damaged tissue. Severed tongue was stitched and Amoxicillin-clavulaxin 1.5 gram was poured on it and betadine mouth lotion was applied. In order to produce analgesia and to prevent infection inj. meloxicam @ 0.1 mg/kg, inj. ceftiofur @ 1.1mg/kg were given. Complete operative procedure took two and half hours. All the physiological parameters were recorded throughout operative procedure and were found as heart rate 18 beats/minute, respiration rate 10 breaths /minute and body temperature was 86.8 degree Fahrenheit.

West et al (2007) described that induction time, anaesthetic dose, and recovery time, as well as general metabolism, are all temperature dependent; maintaining the animal's body temperature within the preferred optimum zone is crucial. This is achieved through the use of heating pads, circulating water blankets, water bottles, bean bags, etc. For most temperate and tropical species, a body temperature of 25°C to 35°C during induction, anaesthesia and recovery is appropriate. Recovery time also depends on the depth and duration of anaesthesia, and is relatively short (2–12 minutes) following brief, shallow anaesthetic events, intermediate (30–40 minutes) following light surgical anaesthesia, and more prolonged (50–70 minutes) following deep anaesthesia. In general, recovery time appear longer and more variable in snakes than lizards. According to Mader (2006) recovery of the reptilian patient from anaesthesia should be in temperature controlled and humidity controlled environment that closely resembled the natural requirements of the species.

Since the surgery of python was carried out during evening hours of the month August when temperature remains around 35° C in North India and further cools down to POTR (preferred optimum temperature range) i.e. 30° C which favours smooth recovery correspondingly. In our case after three hours of surgery caudal reflex was noticed but corneal and palpebral reflexes were absent but the python was completely out from the trans of anaesthesia after 12 hours and after 24 hours of surgery the python recovered completely by showing usual hissing with tongue movements when approached. Next morning inflammation along with exudate was noticed at the lesion. Exudate was evacuated and a synthetic glucocorticoid
triamcinolone acetonide (Vetalog, M/s. SZAH Ltd) 2 ml was infused. inj. ceftriaxone @1.1mg/kg, inj.B-Complex 2ml was given for next five days along with spray of betadine lotion twice a day. The surgical wounds healed and natural protrusion of tongue was observed after thirteen days of surgery.

Observing the hunger gestures of python a live Guinea pig was given. The python attacked and killed it but could not eat it. Considering the dwindling energy level of python it was fed with 250g minced meat soaked in the four raw eggs and 200 ml of pasteurised milk on 22nd day of surgery. On 35th day after surgical intervention the python killed and ate the prey offered and afterwards it began exhibiting normal activities. The python was released in the natural habitat after three months.

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References


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Announcement

**National Conference on Perspectives and prospects in Aquatic Research, Coimbatore, 16 February 2016.**

Kongunadu Arts and Science College, Coimbatore, conducting National Conference entitled, “Perspectives and Prospects in Aquatic Research”. The conference aim is to provide a platform for discussion among industries, Scientists, Faculties, Research Scholars on various topics related to Aquatic research. In addition, a book entitled ”Renaissance in Aquatic Science” will be published. The related topics are invited.

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