

# Surgical Reconstruction of Carapace Fracture in an Indian Black Turtle

Patel Janki Dipakkumar, N. Arul Jothi\* and T.P. Balagopalan

Department of Veterinary Surgery and Radiology, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry-9, India

**Abstract:** Shell injuries are a common presentation in wild and captive turtles. There are many methods of fracture fixation, which based on the characteristics of the fracture. The present paper discussed about the surgical reconstruction of carapace fracture in an indian black turtle by using orthopedic wire and dental luting cement. An Indian black turtle/Indian pond terrapin (*Melanochelys trijuga*) weighing 1.1 kg was presented with a displaced fracture of the right side of the carapace involving IM, IIM, IIIM & IVM marginal, IP & IIP pleural and IVe vertebral scutes with a depressed fracture involving II pleural scute. The coelomic membrane was exposed but intact. The wound was noticed at the fractured site and was contaminated. A dorso-ventral radiograph revealed fractured and displaced carapace over the right forelimb with the intact spinal card. Under Ketamine sedation the fractured fragments were immobilized by 26G stainless steel orthopedic wire, inter fragmental space was sealed using dental luting cement (Lute glass) to avoid infiltration of water into wound when the turtle was left in the water. Enrofloxacin was administered intramuscularly at a dose rate 5 mg/kg every 48 hours interval of 6 days. Meloxicam was administered intramuscularly at adose rate 0.2 mg/kg body weight every 24 hours interval for 3 days post-operatively. After complete recovery the turtle was released in its natural habituated place.

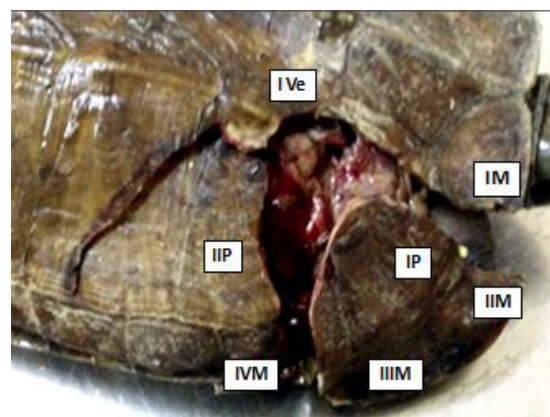
**Keywords:** Indian black turtle, Carapace, carapace fracture.

## INTRODUCTION

Shell injuries are a common presentation in wild and captive turtles [1] frequently caused by vehicular trauma, lawn mowers, predation by dogs, or drops from balconies or porches. Thousands of wild turtles and tortoises are injured by automobile trauma every year, with most of these animals being killed on impact [2]. Shell fractures in turtles can be difficult and time-consuming to repair. Chelonians have a great ability to repair shell injuries and deficits though the length of time required for sufficient healing can take upto 1-2 years. By complementing this process with supportive wound care and fracture repair, very large wound deficits may eventually heal. In aquatic turtles. There are many methods of fracture fixation, epoxies and adhesives are suitable for some fractures. Methods that bridge the fracture include cable ties, metal bridges, clothing hooks and the Top Closure method. Orthopaedic fracture fixation methods include metal sutures, screws with wire and metal plates [3]. The present paper discussed about the surgical reconstruction of carapace fracture in an indian black turtle by using orthopedic wire and dental luting cement and its overall management.

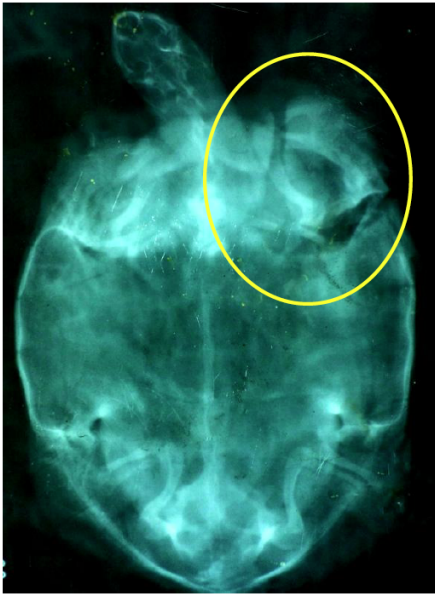
## CASE HISTORY AND CLINICAL OBSERVATION

An Indian black turtle/Indian pond terrapin (*Melanochelys trijuga*) weighing 1.1 kg was presented at the Department of Veterinary Surgery and Radiology with unknown history. Physically, it was active, alert and was able to move all four limbs normally. Clinical examination revealed displaced fracture of the right side of the carapace involving IM, IIM, IIIM & IVM marginal, IP& IIP pleural and IVe vertebral scutes (Figure 1). In addition to this, there was a depressed fracture involving II pleural scute. The coelomic membrane was exposed but intact. Wound was noticed at the fractured site and was contaminated. A dorso-ventral radiograph revealed fractured and displaced carapace over the right forelimb with intact spinal cord (Figure 2).



**Figure 1:** Carapace fracture involving, IM, IIM, IIIM & IVM Marginal scutes; IP, IIP Pleural scutes and IVe Vertebral scutes.

\*Address correspondence to this author at the Department of Veterinary Surgery and Radiology, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry-605009, India; Tel: 9442070610; E-mail: vsr\_jo@yahoo.co.in



**Figure 2:** Dorso-ventral radiograph showing fractured carapace and intact spine.

### TREATMENT

An immediate pain relief was provided by administering Meloxicam intramuscularly at a dose rate 0.2mg/kg bodyweight and pre medicated with Diazepam at a dose rate 0.4 mg/kg body weight I/M and sedated with Ketamine at a dose rate 50 mg/kg body weight I/M [4]. The wound was thoroughly flushed and irrigated with lukewarm saline with 0.1% povidone iodine and necrotic tissues were removed. The depressed fragment was elevated using periosteal elevator and it returned to anatomical apposition using the hammer (Figure 3). Pre-drilling was done through the intact carapace and correspondingly through the fracture fragment using 2.5mm drill bit at four different places (Figure 4). Fractured fragments were immobilized using 26G stainless steel orthopedic wire (Figure 5). Inter fragmental space was sealed with dental luting cement (Lute glass) (Figure 6) to avoid infiltration of water into wound when the turtle was left in the water. Enrofloxacin at a dose rate 5mg/kg was administered intramuscularly at 48hours interval for 6 days and Meloxicam at a dose rate 0.2mg/kg body weight was administered intramuscularly at 24 hours interval for 3 days post-operatively. Level 2 dry docking was employed in which the turtle was partially immersed in the water for 30 minutes twice daily for 10 days in such a way that the water level is below the position of the fracture. After a month Post-operative radiograph showed fractured segments in place (Figure 7) then, the turtle was released into a lake from where it was identified.



**Figure 3:** Leveling- Depressed fragment (II P pleural scute) were lifted back into place.



**Figure 4:** Pre-drilling using 2.5mm drill bit.



**Figure 5:** Fracture fixation using orthopedic wire.



**Figure 6:** Defects in the edges were filled by dental luting cement.



**Figure 7:** Post-operative radiograph showing fracture fixation.

## RESULT AND DISCUSSION

Shell injury is one of the most common presenting problems encountered in wild freshwater turtles. Turtles have a hard bony casing enclosing their vital organs. The dorsal part of the shell is referred to the carapace, the ventral part the plastron. The section of shell linking these two may be referred to as the bridge. The shell is comprised of dermal bone covered with a tough keratin layer. The horny keratin layer covering the bony shell is comprised of individual scutes (also termed scales or shields) which are shed intermittently. Scutes can be named and numbered. This allows any shell injury to be anatomically described in terms of location, extent,

etc. [5]. The goals of shell repair are to restore sufficient function so that the injured turtle can survive, to minimize risk of infection. In the present case the wound was flushed with 0.1% povidone iodine [6] to prevent infection and the fractured segment was fixed with 26G orthopedic wire [5] showed stability for a longer period of time [7] and the luting cement was effective and provided water proof sealing of the edges to prevent wound infection. The main problem with managing shell fractures in semi-aquatic turtles is wound care and keeping the wound covered and specifically maintaining the turtle out of its usual water environment to avoid further contamination of the wound site. This is due to the fact that aquatic turtles generally require immersion in water to eat and drink [3]. It is necessary to keep turtles with fractured shells out of water (dry-docked) while the initial stages of shell healing progresses. Level 2 dry docking was employed in which the turtle was partially immersed in the water for 30 minutes twice daily for 10 days in such a way that the water level is below the position of the fracture was very useful in the present case to promote early wound healing. Watt [6] also reported that different levels of dry-docking are to be employed in aquatic turtles depending on the location of the fracture and type of implant/fixation used. In the present study, level 2 dry-docking was employed (immersion in water for 30mins twice a day) as the injury was confined to carapace only. After complete recovery the turtle was released in its natural habitat to get adopted .

## CONCLUSIONS

Successful surgical reconstruction of carapace fracture in an Indian black turtle can be achieved with orthopedic wire (26G) and dental luting cement . Level 2 dry docking was employed in which the turtle was partially immersed in the water for 30 minutes twice daily was very useful in the present case to promote early wound healing. After healing the the turtle was released into a lake from where it was identified for its betterment.

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