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A Case of Crocodile Bite Injury: The Management, Analysis and the Literature Review.

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ABSTRACT

The interaction between human and wild animals commonly ends in mauling of the human beings. We report a case of crocodile bite injury, its management, analysis and the literature review specifically relating to crocodiles' biting force.

Keywords: crocodile bite injury, management, analysis, biting force.

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INTRODUCTION

The interaction between human and wild animals at times happens. This occurs either very accidentally during the former venturing into the latter's space as in hunting or the latter moving into the former's space in search of food water or salt. eg in the case of elephants. Whatever is the interaction, the most common result is either the human is mauled or left handicapped after the incident. It is common that the wild animals, that caused the incidence escapes unhurt. We report a case of wild animal attack which left a patient with a repairable injury fortunately.

Case report

A 30 year old gentleman presented with a bleeding wound with deformity in his right forearm to our casualty. There was an irregular wound of dimension 12 x 5 cm, on the dorso-ulnar aspect of the right forearm. The open fractured radius and ulna were directly seen through the wound and also were felt inside the wound. Figures 1, 2 and 3. When enquired, interestingly the man told that he was attacked by a crocodile. He elaborated that on a Sunday, he was fishing with a fish net in a pond, a regular place where he frequents. While lifting his fish net up something suddenly snatched his right hand. Only later he noticed it was a crocodile, he summoned courage and immediately wriggled his hand out of the mouth of the crocodile. He ran to the land. He had initial first aid at a nearby government facility and he was referred to our hospital.



Figure 1, 2 and 3: Presentation of the patient the wound in his right distal forearm. Even on moving the patient's wrist to slight valgus, the medial side wound opened out showing the bone fragments.



Figure 4 and 5: Lateral and anteroposterior radiographs of the patient showing, the fractures of distal ulna and radius at the same level, with gross displacement.

The radiographs of his forearm and wrist (figures 4 and 5) showed the displaced fractures of distal radius and distal ulna. On the same day under regional anaesthesia he had debridement of the wound and provisional fixation with K wires as seen in figures 6 and 7.



Figure 6, 7: The post-operative wound after initial debridement and provisional fixation

Later as the re-look of the wound showed no gross infection, he was again taken up for a definitive fixation. The distal ulna fracture was fixed with a lag screw and radius fracture was stabilized with an external fixation. K wires were added for stability. Figures 8 a to 8f. The fixation is confirmed by radiographs. Figure 9.



Figure 8 a



Figure 8b

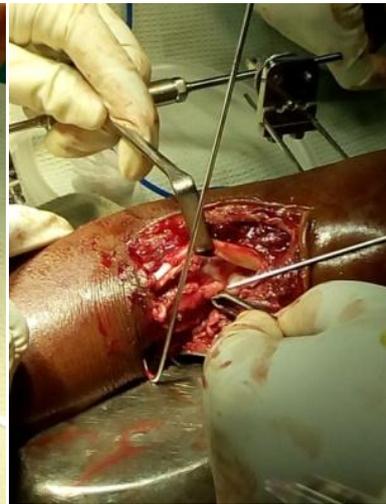


Figure 8c



Figure 8d



Figure 8e



Figure 8f

Figures 8a to 8f show the intra operative photographs showing the accurate reduction of the ulnar fracture and its fixation. The radius fracture was already stabilized with external fixation.

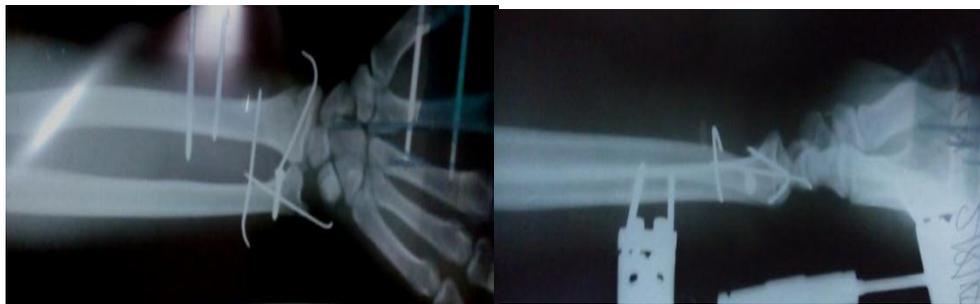


Figure 9: Post-operative radiographs after reduction and fixation of the ulnar fracture and the radius fracture was stabilized with external fixation.

He was treated with hand elevation, intravenous antibiotics and aggressive finger movements. There was a concern about giving Anti Rabies Vaccine to this victim .Since there was no canine in crocodiles; Anti

Rabies Vaccine was not given after discussion with the physician. At six weeks, the wound settled and the external fixator was removed. His radiographs without any external fixation are seen in figure 10. At six weeks, his wrist was gently mobilized. He recovered a good range of movement especially the hand grip and rotation of forearm except full supination Figure 11-14. At three months, the patient returned to his original work of fishing. At the latest follow up of one year, he was comfortable and was doing his regular activities.



Figure 10: Post-operative radiographs after removal of all the wires. Good alignment of the distal radius and distal ulna. The fractures have united.

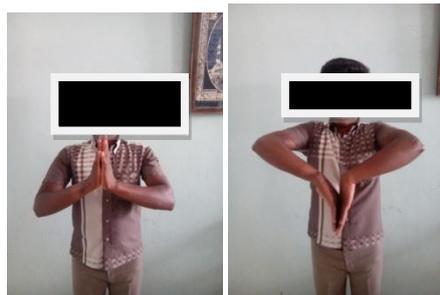


Figure 11: Post-operative clinical photographs after removal of all the wires showing the dorsiflexion and volar flexion movements at one year follow-up.



Figure 12: Post-operative clinical photographs after removal of all the wires showing the power of hand grip at one year follow-up.



Figure 13: Post-operative clinical photographs after removal of all the wires showing the dorso medial scars at one year follow-up



Figure 14: Post-operative clinical photographs after removal of all the wires showing the scars in front of the forearm- at one year follow-up

DISCUSSION

Most crocodile attacks were accidental and rarely occur during sporting shows with crocodile trainer putting their limbs and sometimes their heads into the mouth of trained crocodiles [1]. The biting force of the crocodile can only be visualised. For example human bite force was only 150 to 200 pounds per square inch (psi). The hyenas, lions, and tigers produce around only five times more than humans i.e.1,000 psi. A 21-foot great white shark's bite force as estimated by a computer model forces of was nearly 4,000 psi [2]. If one analyses the jaw bite power of the crocodile, though the jaw opening strength of the crocodiles is weak, their bite strength was enormous producing about 7700 psi (Pascal's per square inch). It was the strongest bite ever measured on living animals [2,3]. Dissection on crocodiles had shown substantial jaw-closing muscle mass [2]. Experimentally pressure gauges were placed into the jaws of the crocodiles and their bite strength was measured. The larger the crocodile the larger was the closing bite force [4]. So , if the crocodile was as large as a limousine eg *Deinosuchus*, the estimated bite force would be 23100 psi . This would be more than the estimated bite force of even *Tyrannosaurus rex* which was estimated to be only 12814 psi [2].

The range of victims a crocodile could bite with effective bite force and pressure was from a very small insect to a large mammal that was living near the water source it lived in. Such an adaptation had allowed this reptile species to survive 85 million years [2]. It had been theorized that biomechanical models of extinct reptiles, tyrannosaurus and even fossil crocodiles, resembling modern crocodiles could be validated [2]. Since only bones were available to study the *Tyrannosaurus rex* and no muscles are available at present for any analysis, its bite force was estimated based on body size, wide skull and short snout [2].

There are also certain studies which analysed the pattern of injuries in aquatic animal bite e.g. the shark biting the hand and the buttock of subsequent divers as a previous diver had fed fish to the shark earlier [5]. There were no such instances in our case this was the first such episode reported from the same village. Elaborate methods of deduction are done to find the type of bite and age of the animal or its health status or any oral injury e.g. for a crocodile [6] or a shark [5] Crocodiles are known to chomp off the limbs. The individual presented in this paper was lucky to escape in the present the episode with some repairable injury, which itself was rare.



CONCLUSION

Though similar forearm fractures do occur due to different violence, such a fracture in a survivor of crocodile bite was a rare case in any casualty. That was the reason of presenting this case.

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