

Camel bite: An uncommon mode of maxillofacial injury, its mechanism and fatality: Case series and review of literature

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ABSTRACT

Introduction: Maxillofacial injuries are presented with many different patterns. It mostly depends upon the mode of injury like physical assault, road traffic accidents, occupational injuries, fall, sport injuries and animal attacks. Animals bites are common with wild animals but attack from an otherwise calm animal like camel is unusual and unexpected. They may cause a severe kind of maxillofacial injury which ranges from minor lacerations to total loss of soft and hard tissues. Such incidences are frequently seen in Rajasthan, India where camels are kept as a pet. Present study throws light on literature related to animal bite injuries and their management along with our experience with camel bite injuries. **Materials and Methods:** Twenty patients (19 male and 1 female) of different age groups with variable extent of maxillofacial trauma induced by camel attacks were included in the study. Among them, different patterns of maxillofacial injuries were observed involving both soft and hard tissue. **Result and Conclusion:** This study provides the comprehensive incidence, pathophysiology, and management of camel inflicted injuries. Understanding the behavior patterns of this animal may prevent such severe injuries.

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Key words: Animal bite, camel bite, facial fractures, maxillofacial trauma

INTRODUCTION

Camels are domestic animals in Rajasthan, India and are commonly used as a means of transportation in desert where other modes of transportations are nearly impossible. It is a very simple and quiet animal and obeys the proprietor. However, low threshold of tolerance has been observed among them during their breeding season which is from December to March. During such days, people near them become vulnerable to their attacks.

Camel causes an unusual and severe type of maxillofacial injury.^[1-3] The pattern of injury is not

fixed, but it usually involves mandible, maxilla, zygoma, nose, and orbit. About 60–70% of all camel bites involve head and neck region due to accessibility.^[4] Although the exact incidence of camel bite is not known and only a few such cases have been reported; thus, a detailed discussion of this subject will interest the readers.^[1,2] This study was conducted at Jaipur in coordination with National Research Center for Camels, Bikaner, Rajasthan and is focused on knowing such an unexpected behavior from an otherwise calm animal which can help in preventing such injuries.

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MATERIALS AND METHODS

Twenty cases of camel inflicted maxillofacial injuries were reported at Sawai Man Singh Hospital, Jaipur between September 2005 and March 2006 which were included in the study. Some of them were also having associated injuries in spinal cord, upper limbs, and trunk. Out of 20 cases, 19 were adult male (95%) of different age groups (average 36 years), one female (5%), and none of the child was found injured.

At the emergency, after triage primary survey was conducted as per protocols and emergency care was provided as required. Three patients required emergency tracheostomy as an airway management. After stabilizing the patient, thorough examination was conducted from head to toe. Both soft tissue and hard tissues were inspected extraorally as well as intraorally. All patients received rabies immunoglobulins (40 IU/kg), half infiltrated intralesionally, and half given intramuscularly and after receiving three doses of human diploid cell antirabies vaccine they were subjected for final surgical repair.

Involvement of mandible, maxilla, nasal bone, and zygoma [Table 1] were seen in the most of the cases. Deep infected lacerations involving preauricular, postauricular, cheek, chin, and neck regions were presented. Furthermore, the oral mucosa was severely avulsed in some cases. Three patients had a total detachment of central segment of mandibular bone along with dental arch as well soft tissue involving floor of the mouth, base of tongue, soft palate and tonsillar pillars, overlying chin skin, and a part of cheek skin [Table 2]. Associated injuries included limb trauma in three cases. In one case, the upper limb was severely crushed which subjected him to shoulder disarticulation. Three cases had a cervical spine injury.

Surgical debridement and wound toileting were done under local anesthesia for few days. The light dressing was applied with nonadhesive cotton wool. Fracture segments were supported with the help of interdental wire or suspension bandage until the final reduction and fixations were carried out.

The goals of the management of maxillofacial fractures were to reestablish proper jaw function and facial esthetics. Most cases required open reduction and internal fixation. The surgical approach varied based on the degree of comminution. Eleven patients who had a fracture of symphysis or parasymphysis [Table 1] were treated with titanium plates and screws [Table 3]. Six patients had a fracture of body of the mandible and condylar neck unilateral and or bilateral [Table 1]. Fracture of

Table 1: Different combinations of fracture

Part of body involved in injury	Number of patients
Fracture of the body of the mandible with contralateral condylar neck	4
Fracture of the body the of mandible with bilateral condylar neck	2
Comminuted fracture of mandible body and symphysis includes complete detachment of segment of mandible with soft tissue loss	11 + 3
Associated fracture of maxilla and zygoma	3
Associated injury e.g. Limb and spinal	4

Table 2: Extent of injury

Region of mandible involved	Number of patients
Fracture of body of mandible with condylar neck	6
Comminuted fracture of mandible (symphysis or parasymphysis) with deep laceration of oral mucosa	11
Segmental loss of mandible with soft tissue injury	3

Table 3: Management protocol

Type of injury	Treatment done
Fracture of body of mandible with contralateral condylar neck (4 cases)	Open reduction and internal fixation with screw and plates and IMF
Mandibular body with bilateral condylar neck (2 cases)	Open reduction and internal fixation with screw and plates and IMF or external fixator
Comminuted fracture of mandible body and symphysis (11 cases)	Open reduction and internal fixation with screw and plates
Complete detachment of segment of mandible with soft tissue loss (3 cases)	Mandibular reconstruction with plates and screws and soft tissue reconstruction with pectoralis major and deltopectoral flap
Mandibular fracture with maxilla and zygoma	Open reduction and internal fixation of maxilla and zygoma with mini plate and screw
Associated injury e. g. Limb and spinal	Laceration repair and raw area skin grafted. One shoulder joint disarticulation. Spinal injury by conservative management

IMF: Inter maxillary fixation

body of mandible was managed by open reduction and internal fixation and fracture condyles were managed nonsurgically by doing intermaxillary fixation (IMF) for 2–3 weeks as a standard protocol. Fractures of midface were reduced and fixed at infraorbital region via infraorbital approach and zygomaticomaxillary and nasomaxillary buttresses were fixed via intraoral approach. Titanium plates and screws were used in the fixation. Maxillary sinus cavity was packed with betadine-soaked gauze strips, and inferior nasal antrostomy was done which was removed after 2 days.

One patient with loss of soft tissue was managed by pectoralis major myocutaneous flap for oral lining and deltopectoral flap as skin drape [Table 3]. Another patient who had loss of central segmental of mandible along with skin of upper and lower lip was reconstructed by costomyocutaneous pectoralis major flap [Figure 1].



Figure 1: Post operative photograph: costomyocutaneous pectoralis major flap was used along with deltopectoral myocutaneous flap

Mandibular reconstruction plate and screws were used for fixation. Skin cover was given by deltopectoral myocutaneous flap. The third patient who had a loss of cheek and segment from body of the mandible in an injury from parasymphiseal region to angle of mandible was stabilized with external mandibular fixator.^[3] In this case, oral mucosal continuity was restored by pedicled forehead flap based on superficial temporal artery and outer surface was covered by occipital hair-bearing flap. Nonvascular ileac crest bone graft was used for bony defect and was fixed with reconstruction plate and screws.

Postoperatively, cleaning and suctioning of the nasal cavity was regularly done to keep airway free of mucus and blood. Oral hygiene was maintained by frequent mouthwashes and tooth brushing technique. IMF was carried for 4–6 weeks except for condylar fractures where it was done for 2–3 weeks. Patients were kept on regular follow-ups.

RESULTS

The choice of treatment modalities used in this study accomplishes optimal results with the least invasive and most efficient methods available.

The mouth opening and masticatory function were returned to normal in 16 patients (80%), three patients required prosthetic rehabilitation, and one had severely restricted mouth opening due to loss of oral mucosa and fibrosis.

The fragments completely deprived of their blood supply become nonviable resulted into fragment necrosis and sequestration. Those were managed by removal of the plate and necrosed bone followed by delayed bone grafting.

DISCUSSION

The hot and sandy deserts which cover most of the Rajasthan regions allow animals like a camel to survive and thrive. Camels are being used as a mode of transportation and as a source of milk for ages in the villages of Rajasthan. They are very calm and helpful pets but not during the breeding season which is observed between December and March, during which males become very energetic and aggressive.^[1] During this time, small interventions can provoke the camel to attack its own owner or any one in close vicinity. The head and face of the victim is the most vulnerable part, which is directly attacked. Due to large jaws size camel engulfs the head of the victim and crushes it like a “nutcracker” resulting severe soft tissue and skeletal injuries to face.^[2]

The severity of injury caused by camel bite is attributed to its dentition.^[5,6] The upper incisor of camel is vertical peg-like while lower incisors are oblique and smaller than upper. The lower incisors are projected outward. The upper canine is well-developed in the form of recurring (posteriorly directed) tusk. Canines are the main teeth that inflict serious injury during bite. Shape of the canine is vertical tusk-like, and it is separated from incisor by a space at alveolar margin. The lower canine bites into the space between the upper incisor and canine. While lower incisor bites against the fibrous pad. When any object comes between the jaws, bending forces are generated between incisors and canines, supported by powerful masticatory muscles. These forces along with recurring canines engage the subject and animal shakes its head to get rid of the victim. This results in tearing of the tissues caught in between and often causes loss of hard and soft tissue which is severe in nature.

The surgical management of animal bite remains an area of controversy among those who treat them.^[7] The treatment of each particular case depends on factors such as nature of injury, the location of injury, and type of animal.^[8] The primary suturing of the punctured wound is not recommended because they are heavily contaminated. Rabies prophylaxis should be used because it remains the most serious complication possible, secondary to the bite of animal.^[9]

The management of this complex injury requires various methods and protocol.^[10] The comminuted fractures and their repair requires special consideration because they are technically difficult.^[11] Communion also places the patients at higher risk for ischemic compromise and vascular necrosis of fragments and thus may lead to nonunion, infection, and in some cases continuity defect.^[12,13] In such cases, reconstruction of

both soft tissues and hard tissues become a challenge. A multidisciplinary approach and proper planning becomes mandatory to achieve good results.^[14,15]

SUMMARY

Usually, comminuted fractures are caused by missiles injury, direct blow with sharp or blunt objects, or crushing in machine, etc.^[16] On the other hand, the camel inflicted injuries are a bit different. This is a type of compression, crushing, and bending injury which is quite unexpected from a pet animal. Severity of injury can be judged by the fact that bones get fractured in several segments and not in a linear fashion.^[17] The displacement of fracture fragment is associated with shearing force generated by shaking movements of camel head.

The study describes the “camel bite” as a very unusual mode of maxillofacial trauma, frequently encountered in Rajasthan, India. The circumstances for all cases were almost similar. Most of the victims were owners of camel and very much familiar with their pet. In most of the cases, injury occurred in their own houses. The extent of injury was minor to severe ranges from a minor laceration to total detachment of the jaw and respiratory passage obstruction. The injuries caused by camel were quite different from other modes of injuries and were not described in literature of maxillofacial trauma. Typical of camel bite is that whole face is crushed between two strong jaws resulted into compression and crushing type of injury, which is surprising and different from other any other animal bite.

This study emphasizes the magnitude of trauma caused by otherwise calm animal during its breeding season which is from December to March. Moreover, knowing such behaviors can prevent a lot of people from getting injured who keep camels as their pet.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will

not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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