Maxillofacial Injuries in Bear, Tiger, and Jackal Attacks

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Abstract
Maxillofacial injuries as a result of wild animals attack are not commonly encountered and reported in the literature. Factors such as increasing human population near forest and lack of dependable physical barriers between forest and human habitations lead to frequently encountered incidents of wild animal attacks over humans especially in far western region of Nepal. The authors present two cases of bear attacks, one case of tiger attack, and one case of jackal attack and explain the pattern of maxillofacial injuries encountered along with management strategies undertaken. It was observed that the primary site of attacks of these wild animals was facial region. The magnitude of force with which bears and tigers attack over facial region with their paws can cause significant skeletal injuries irrespective of soft tissue injuries.

Keywords
► bear attack
► jackal attack
► maxillofacial injuries
► tiger attack
► wild animals attack

Case Reports

Case 1
A 35-year-old male reported with an alleged history of bear attack on his way home through a forest in a far-western region of Nepal. As per history, the bear attacked him over right side of his face with left paw following which the patient fell over bleeding profusely but managed to get up and run. He had primary wound management done at local health facility following which he was referred to our center where he arrived on the fifth day of attack.

On examination, the patient had deep facial lacerations over right malar region covered by blood clots with exposure of underlying bone (►Fig. 1). There was evidence of injury to zygomatic, buccal, and marginal mandibular branches of right facial nerve. Mandibular movement was restricted but occlusion was intact. Other associated injuries were not evident. On radiographic examination, there was fracture of right zygomatic arch, body of zygoma, anterior wall of maxilla, and floor of orbit with gross displacement (►Fig. 2).

Antirabies vaccination was started and since there was no evidence of wound infection, primary open reduction and

Wild animal attacks on humans are not commonly encountered and reported in the literature, and maxillofacial injuries are even lesser. Constantly increasing human population near forest, dependency on forest vegetation to feed cattle, decrease in staple forest diet for the wild animals, and lack of physical barriers between forest and human habitation are the major reasons for incidence of wild animal attacks inside and outside conservation areas especially in remote areas of Nepal.1,2

Injuries due to wild animal attacks are different from those of road traffic accidents in that tearing, cutting, penetrating, crushing injuries, combined with falls and blunt trauma are specifically observed.3 Such injuries warrant a multidisciplinary approach to management and there should be a high suspicion of involving underlying vital structures and skeletal injuries as mild-looking soft tissue presentation may sometimes mask grievous underlying injuries.4

In this report, we present two cases of bear attacks, one case of tiger attack and one case of jackal attack, emphasizing on patient presentation, pattern of injuries, and management strategies.
internal fixation (ORIF) and wound closure were done (► Fig. 3).

Case 2
A 18-year-old female reported with a history of attack by a black bear suddenly attacking her from behind and making first hit with its right paw over left side of her face following which she had no memory of the incident. As per her family members, villagers working nearby found her unconscious and took to nearest health facility. Primary wound management was done there and referred to our center where she presented on the third day of attack.

The patient was conscious and well-oriented when she presented. On examination, there were multiple lacerations over left side of face, especially periocular and malar region with exposure of multiple fragments of underlying bone. The left globe was partially avulsed and there was loss of vision in that eye (► Fig. 4). Mouth opening was restricted but the occlusion was intact. She also had multiple small lacerations over right thigh. On radiographic examination, she had gross comminution of left zygomaticomaxillary complex with loss of globe support (► Fig. 5).
Taking into consideration the contaminated nature of wound, primary debridement, thorough wound irrigation and stay suturing were done and patient was kept under intravenous antibiotics. Antirabies vaccination was immediately started and ORIF and reconstruction were secondarily planned after infection control. On fourth day post debridement, there was evidence of pus discharge from the wound. Patient was again taken to operating room for debridement where bone splinters and dead tissues were removed. After a week, ORIF was done. But she again presented with wound dehiscence and underlying hardware exposure after 12 days of surgery that was repaired under local anesthesia.

**Case 3**
A 16-year-old male presented with a history of attack by a tiger the day before. As per history, he was randomly attacked amidst a group of people who went to see a tiger that appeared near a village in eastern Nepal. Observers mentioned of getting a single hit with the tiger’s paw over left side of his face.

The patient was conscious and fully oriented when he presented. On examination, there were few small lacerations over left angle of mouth and lower lip (∼Fig. 6). The occlusion was deranged and mouth opening was restricted. On radiographic examination, the injuries were extensively unmatched with soft tissue presentation. Mandible was fractured at left subcondylar and posterior body. There were fractures of left zygomatic arch, body of zygoma, left maxilla at Le Fort 1 level, and right maxilla at the piriform rim region (∼Fig. 7). Antirabies vaccination was started and ORIF of maxillofacial injuries was performed along with repair of soft tissue injuries.

**Case 4**
A 6-month-old female child was brought to our center with a history of jackal bite 4 days previously. As per the history, the
child’s parents were working in the field laying the child aside when a jackal attacked her over the face, pulled her over a distance of ~20 m and ran away. She was immediately taken to the nearest health center, primary wound management done and then referred.

On examination, there was major avulsion injury over lower third of face. There was total soft tissue loss from bilateral third of upper lip superiorly, mid-cheek region including angle of mouth bilaterally, lower lip, and submental region inferiorly denuding the intermental region of the mandible (Fig. 8).

After immediately starting antirabies vaccination, patient was taken to operating room for debridement and possible primary closure of the defect. Paraffin gauze dressing was regularly given over exposed mandible but a week after first surgery, the denuded mandible appeared avascular. After consultation with plastic surgery team, bilateral deltopectoral flap was performed to cover the mandible. Unfortunately, the flap did not survive but left some granulation tissues over the denuded mandible that gave a base for mucosal drape over the bone (Fig. 9).

Discussion

In all of the cases reported, it was observed that facial region was the first site of attack with very less injuries to other parts of the body. The reason behind targeting the face first could be a strategy to weaken the victim. Most wild animal attacks are observed in remote areas causing significant delay in finding out the victim, rescue, and presentation to definitive care center. There is a paucity of literature mentioning the exact incidence and pattern of injuries sustained over maxillofacial regions from wild animals attacks which makes it quite difficult to devise a universal protocol applicable to all types attacks. But a simple consensus can be reached that such patients need to be managed in a multidisciplinary approach with involvement of maxillofacial surgeons, plastic surgeons, ENT surgeons, ophthalmologists, anesthesiologists, infectious disease specialists, and psychiatrists. An initial dose of tetanus toxoid and antirabies immunization should be on high priority in such cases.

As per a popular book on natural history, black bears stand up on their back legs before attacking and then knock off the victim with their paws. They then make one or two bites on an arm or leg and finish with a snap to the head, this being the most dangerous part of the attack. Similarly, the patients involved in bear attacks in the cases described mentioned that the bears initially attack with both their paws over face and then proceed with biting, tearing, penetrating, and crushing depending upon resistance shown by the victim. It was observed that bear injuries due to bite were far more devastating and morbid as compared with the bear injuries due to hit by paws. Hence, the former showed more tissue loss, delayed healing, wound contamination and repeated infection despite broad-spectrum antibiotics and required complicated reconstructive procedures, thus prolonging hospital stay. It is recommended that primary closure of soft tissue injuries should be done as soon as possible in bear attack injuries except for cases that are grossly contaminated and involve a major tissue avulsion.

According to Leyhausen, the cat family has a similar way of attacking and targeting the victim. They attack the victim with paws over the shoulders or back from behind and then bite over the neck area. The tremendous force of the canines penetrates the spinal cord resulting in instant mortality. It has been documented that ~1500 Newton (N) of biting forces can be applied with canines of tigers. In contrast to this
mode of attack, the patient reported faced a single contact with paw over the face resulting in blunt injury. The reason for this could be that the attack occurred near a village among a group of people unlike the forest where tigers generally attack their prey from behind. The severe maxillofacial skeletal injury that was observed in the patient despite a minor soft tissue laceration in absence of a bite provides an important message that the magnitude of force with which tigers attack with their paws too is significantly high and thorough radiological assessment of the victims must be undertaken to rule out occult skeletal injuries even if soft tissue injuries seem minor.

Literature search could not find scientific documentation of jackal attacks on humans that might make the case reported here the first of its kind. A newspaper article from India in 2012 could be traced which mentioned jackal attack over 11 people in a village with primary injuries to face and body.13 Jackals are not usually regarded as human attackers the reason for which might be the fact that they regard humans as physically stronger. But in the case reported, the victim was a 6-month-old infant where no resistance could be shown that resulted in a comparatively more wild facial injury as compared with other three cases of big animals attack. The reconstructive methods to deal with such large defect in an infant are very difficult to choose. There have been reports of microvascular anterolateral thigh flaps in children as young as 9 months, but the feasibility and reliability of intramuscular perforators are still a major concern since many structures including perforators have not completed their development.14 This fact added with nonavailability of microvascular flap services in our center led us to select bilateral deltopectoral pedicled flap as an alternative to cover the denuded mandible. Despite the failure of flap to survive in defect area, the granulation tissue left over the mandible in a week time served the basis for bone coverage.

Case reports and few case series in literature have made it possible to predict the pattern of attacks and injuries of wild animals over humans and plan the management strategies to some extent. But the location and setting of attack, age and resistance offered by the victim, and many other factors largely affect the way patients present. Early attention to closure of soft tissue injuries, infection control, and proper radiological screening to rule out occult skeletal injuries should be primary focus in maxillofacial injuries due to wild animals attack.

Conflict of Interest
None.

References