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Management of injuries sustained by Bear bite: Our experience in a tertiary centre at RIMS, Ranchi, Jharkhand.

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ABSTRACT

Bear attacks are reported from nearly every part of the world. The incidence of human encountering a bear isincreasing globally due to increase human population resulting in decrease bear natural inhabitats.

The sloth bear is one of the three species of bear found in India which inhabits the forest of eastern India.

Bears are strong and agile wild animals, potentially dangerous, can cause serious injuries. Bear attack takes important site in traumatology because of their high complication rate as compared to similar soft tissue injuries by other causes.Bear bite may lead to fatal injuries and wounds that are potentially contaminated with variety of pathogens. The most common site involved is face and scalp but no part is spared.

Treatment of bear bite wounds always consists of both the management of soft tissue deformities and underlying bone fracture. Management of such injuries often need prompt multidisciplinary approach as it may leadpermanent disfigurement and disabilities especially of the maxillofacial region.

I. INTRODUCTION

Bear attack on human are rare, but are often encountered. Industrialization and human invasion in bear habitat has led to increased confrontation between bear and human. However a very small fraction of this results in human critical injury. Bears are strong and agile wild animals, potentially dangerous, unpredictable and can inflict serious injuriesThe chance of human encountering a bear increases as the remote bear territory diminishes. Bear bite wounds are more common on upper extremities and a large percentage are located on the head and face1. The commonly involved injury sites being the face more than 90% and head (54.67%). Bite wounds by large animals can present in a more serious fashion with bone injuries. All the bony injuries will be associated with soft-tissue injuries namely punctures, lacerations and avulsions with or without an actual tissue loss.2 The facial bones were involved in more than 70%, followed by the skull (5.75%). Predominance of zygoma in the face and frontal bone in the skull explains the fact that the most prominentparts are easily targeted.3 The management of facial bite wounds often is a challenge because of high risk of infections that can occur because of primary bacterial invasion. The reported incidence of wound infection varies from 13 to 30% and their optimal management is difficult.1, 4 Extensive soft tissue defects should be treated according to the criteria of an esthetic reconstructive surgery. The purpose of this article is to study different cases of bear bite in eastern India mainly involving ethnic population living in topical forests of Jharkhand, Bihar and Orissa.

Here we describe multiple cases who came to our emergency department with critical injury mainly involving head and faceand upper extremity. They were managed by team of doctors involving various department like ENT, maxillofacial, neurosurgery, plastic surgery etc.

CASE STUDIES

Case 1

64 years old male patient present in our emergency with history of bear attack during walking in own fields in the early morning. There was no history of loss of consciousness and vomiting. Patient first got primary treatment at local hospital then was referred to RIMS Ranchi.

ON EXAMINATION

Extensive laceration over right side of face extend from root of nose along with right lower eyelid to right ear lobule along with avulsion of nose and avulsion of right maxilla and mandible. Shown in Fig. 1.1 & 1.2

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Fig. - 1.1 **Fig. - 1.2**

PRE-OPERATIVE & JUST AFTER REPAIR PHOTOGRAPHS

RADIOLOGICAL EXAMINATION – 1.3

# of B/L maxilla and their frontal process.
Nasal septum.
B/L lateral and medial pterygoid plate, right angle &coronoid process of mandible.

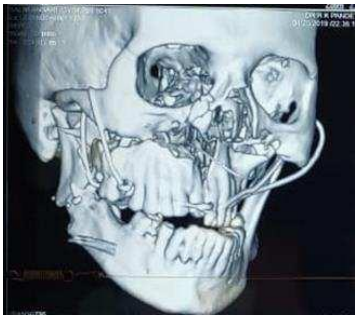

Fig. 1.3 - CT scan face with 3D - reconstruction

MANAGEMENT

The patient was immediately put on intravenous fluid resuscitation with Ringer Lactate and Normal Saline andbroad-spectrum antibiotics. An anti-rabies and tetanus vaccination was started.
While a neurosurgery, orthopedic, and maxillofacial consultations were done, the wounds were thoroughly debrided and bleeding points were identified and ligated which leading to arrest of hemorrhage and fracture segment of maxilla and mandible was stabilized with the help of wire.
The wound was repaired in layer.
Nasogastric feeding was started as soon as possible.
After 2 days, skin start to becomes black (ischemic necrosis) and beginning of decomposition of fractured segment of maxilla. After demarcation, wound was debrided and decomposed bone was removed and antiseptic dressing done.
After complete appearance of granulation, full thickness forehead flap was placed over granulation/ over bare area of face.
On bare area of forehead covered by skin graft from antero-medial aspect of left thigh.

FOLLOW-UP

Fig. 1.4 shows after palatoplasty and rhinoplasty with residual facial disfigurement and ectropion in medial half of right eyelid.

FUTURE PLAN

Correction of ectropion.
Formation of external nares.

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Fig. 1.4

CASE – 2

17 years old patient present in our emergency with history of bear attack.
There was no history of loss of consciousness and vomiting.

ON EXAMINATION

There was extensive laceration on right side extending from root of nose to pinna.
Avulsion of right side of lower eyelid.
Deep laceration of the face extending from left side of lateral border of nose to tragus.

Fig. – 2.1 & Fig. - 2.2 PRE-OPERATIVE PHOTOGRAPHS

RADIOLOGICAL EXAMINATION - 2.3

# of B/L zygoma and zygomatic arch # Lateral wall of right orbit.# Right condylar and left coronoid process with dislocation of B/L temporomandibular joint.

Fig. 2.3 - CT scan face with 3D reconstruction

MANAGEMENT

Open reduction and internal fixation with plate with sub-mandibular approach on left side under G/A.

FOLLOW UP

Fig. 2.4 well healed wound over face with residual disfigurement offace with right ectropion.
Fig. 2.5 shows partial disfigurement of face with depressed rightzygomatic region and ectropion.

FUTURE PLAN

Correction of ectropion.
Custom made implant at right side depressed zygomatic region.

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Fig.2.4 - post op.7th day photograph

Fig.2.5 - post- operative 6th monthphotograph

CASE 3

11 yrs old female patient reported on our emergency with history of bear attack.
There was no history of vomiting and loss of consciousness.

ON EXAMINATION
There was deep laceration on the right side of face extending from mid-eyebrow to pre-auricular area. Some lacerated wound over right upper and left lower limb. Fracture segment were evident over right zygomatic bone aswell as zygomatic arch. Fig. 3.1

Fig . 3.2 shows patient has minimal scar and no any facial deformity.

Fig. 3.1 pre-operative photograph

Fig. 3.2 after 2 years photograph

CASE 4

37yrs old patient report in our emergency with history of bear attack. Patient has no history of vomiting and loss of consciousness

ON EXAMINATION

There was deep laceration on left side of forehead, deep laceration over mid face involving nose & head, submandibularregion B/L and other region. Shown in **Fig. – 4.1 & 4.2**

RADIOLOGICAL EXAMINATION – FIG. 4.3

B/L nasal bone, lateral wall of left orbit and anterior wall ofleft maxillary sinus.
Comminuted depressed # B/L parietal bone.

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Fig.4.1 Pre-op photograph

Fig.4.2 imm. Post-op photograph

Fig.4.3 CT scan face with 3D reconstruction

CASE – 5

25 yrs old patient report in our emergency with history of bear attack.
There was history of nasal bleeding for 5 mins and no history of vomiting and loss of consciousness.

ON EXAMINATION

Incised looking lacerated wound over face.

Rest five cases report in our emergency has history of bear attack. Patient's has no history of loss of consciousness & vomiting. There was minimal laceration over face and other parts of body. They were managed with minimal invasiveprocedure.

II. DISCUSSION

Reports of Bear attacks on human are rare and most of them are non life threatening though few of thevictims may suffer serious injuries. 5

Incidence of bear attacks on human can be prevented by applying the knowledge of bear behavior and ecology.

Degradation and Deforestation of forests poses a major threat to sloth bear populations. 6

Decrease in the forest area because of overgrazing, tree cutting, forest fire, conversion of forest to grain fields, reclamation for other uses, and overextraction of forest resources has led to threat for bear survival , particularly in the topical dry forests. 7

There are eight types of bears in the world. They include the American Black Bear, Brown Bear, Polar Bear, Giant Pandas, Asiatic Black Bear, sloth Bear, Spectacled Bear, and the Sun Bear. The sloth bears inhabit forests and tall grasslands in India, Nepal, Sri Lanka, and Bhutan. For those inhabiting these topical forest mainly in eastern india , sloth bear presenta considerable danger and threat, worse than other wild carnivorous animals like fox, tiger or leopards 7.

Bargali et al. 8 did a study in a forest division in India to describe sloth bear attacks and human injuries while defining an "attack" as an encounter that ends with human injury or death. His study observes that attacks were predominantly by a single bear (93%) and rarely by 2 (4%) or 3 bears. Most victims suffered multiple injuries (52%): single injuries on legs (25%), hand (12%), and head (8%). They also mentioned that most of the bear attacks were in the monsoon season.

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As per review of literature the injuries due to bear jaws are in the form of puncture wounds, lacerations, abrasions caused due to canines; crush injuries and bruises caused due to molars; cuts caused due to incisors. Injuries due to paws include abrasions, bruises and incised looking wounds lacerations, due to nail tips. Other injuries may cause fractures; either of skull bones and axial skeleton. But in our hospital mostly we encountered injury inflicted bypaws and involving upper half of body.

Most wounds can be treated in the emergency room, as a major trauma. Bear attack have always been considered complex injuries contaminated with polymicrobial inoculum. Facial wounds generally display low infection rates, because the rich blood supply of the area. Significant delay beyond 6–12 hr in seeking medical attention increases the likelihood of infection 1,2,9. The bacteriology of animal wounds is varied and it is multibacterial with Pasteurella being the most common species. Pasteurella multocida organism are associated with a rapid onset of infection, whereas the latency period is more than 24 h, staphylococci, streptococci or anaerobes are more likely etiologic agents. Culturesare most useful in case initial antibiotic therapy fails 2,10,11. In a report by Kunimoto et al. 12 they isolated mainly the aerobic gram-negative bacilli and enterococcus from their cases but they do not deny the presence of anaerobes in bearbite wounds. So it seems prudent to administer broad spectrum antimicrobial agents.

Essentials of treatment are inspection, debridement, irrigation (with saline and antibiotic solution) and closure, if indicated. Wounds are inspected to identify deep injury and devitalized tissue preferably under general anaesthesia. In most of the bear attack cases soft tissue injuries will be associated with underlying bony injuries. So radiographic examination should be carried out to rule out the fractures before attempting to close the wounds. The bony injuries should be addressed accordingly.

Close follow up is necessary in these cases to avoid any complications and to treat any such complications as early as possible. In our cases the management of residual deformities such as lower lid ectropion seen after 2 monthsin the first case and dacrocystitis in the second case who reported after one and half year needed treatment.

Removing devitalized tissue, particulate matter, and clots prevents these from becoming a source of infection, much like any foreign body. Head and neck wounds have a very low infection risk 1,15.

The Risk of Rabies: The foremost danger that any wild animal poses to humans apart from physical insult is the danger of transmission of rabies. Post-exposure prophylaxis (PEP) must be started immediately. The paper concluded that the impact of rabies on the population dynamics of polar bears probably is minimal and that rabies in polar bears constitutes a potential health hazard for polar bear hunters 13 .

Antibiotics should always be a broad-spectrum (authors use ß- lactam or 3rd generation cephalosporins and metrogyl) with subsequent alterations depending on the culture sensitivity report. The gold standard antibiotic is amoxicillin with clavulanic acid, or be a combination of penicillin and cephalosporin, in penicillin allergic patients clindamycin with ciprofloxacin covers most bite wound isolates. Azithromycin can be used in penicillin allergic pregnantwomen and in children. Duration of antibiotics can range from 3 to 5 days in cases of prophylaxis, 7–14 days in soft tissue infections and minimum of 3 weeks in infections involving the joints and bones. 10, 11 Bite wounds are considered tetanus prone, so appropriate immunization should be administered if the patient has had fewer than five doses of tetanus toxoid in their lifetime or more than 5 years have passed since the last dose. 2,4 In our cases we administered cephalosporin along with metronidazole and in some cases amikacin and clindamycin. Antibiotics were administered for a period of 7–10 days to three weeks, preferably in the first 24hrs to get the best results.

Many of the bear bite wounds resulted in disfiguring scars which required reconstructive plastic surgery.

III. CONCLUSION

Bear attack injuries require a prompt multidisciplinary team approach, as the injuries are not restricted to one area.

Careful evaluation of bite wounds with physical as well as radiological examination should be carried out prior to definitive management.

Proper surgical toilet with wound irrigation followed by careful debridement along with addressing the bony injuries remains the mainstay of treatment of all bite wounds.

Most of these cases though treated with primary closure at the earliest, come with residual deformities that requiremultiple surgeries in a staged manner.

In all these cases clinical judgement should be used and close follow up is recommended for the early management ofresidual deformities.

DECLARATIONS

We declare that patient's specific written consent was obtained prior to diagnostic and therapeutic procedures and the preparation of the current manuscript and that ethical and legal principles as expressed by local committee and relative national legislation were respected .
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