Published online: 2019-08-26

Reflections

A review of 48 patients after bear attacks in Central India: Demographics, management and outcomes

Surendra B. Patil, Nikunj B. Mody, Satish M. Kale, Sonali D. Ingole

Department of Plastic surgery, Government Medical College, Nagpur, Maharashtra, India

Address for correspondence: Dr. Nikunj B. Mody, Department of Plastic surgery, Government Medical College, Nagpur - 440 009, Maharashtra, India. E-mail: nikunjbm31@yahoo.in

ABSTRACT

Introduction: Bear attacks though relatively rare are frequent enough to be of concern for those who are in bear habitats. Our centre at Nagpur, being surrounded by dense forests from all the sides, treats a large number of victims. **Aim:** The aim was to document the injuries, management and the potential complications of bear attacks. **Materials and Methods:** We reviewed the records of 48 consecutive patients who were treated in our department from January 2006 to December 2013 for bear attacks. **Outcome:** The majority of patients were referred 24-48 h post-attack. All but two patients had involvement of either the face or scalp. Involvement of eyes, mandible, facial nerve, was common. Reconstruction included simple suture of lacerations to management of complex compound injuries with three-dimensional defects. Thirteen patients developed infection. **Conclusion:** Bear attack victims need a multidisciplinary approach. Early broad spectrum antibiotics, anti-rabies prophylaxis and irrigation and debridement of the wound are needed. We advise early referral to tertiary treatment centres.

KEY WORDS

Bear mauling; complications; reconstruction; sloth bear

INTRODUCTION

Sloth bear attacks are disastrous events causing major disfigurement and psychological trauma. We documented bear mauling injuries and made recommendations for managing patients with these severe injuries.

Access this article online	
Quick Response Code:	Website: www.ijps.org
	DOI: 10.4103/0970-0358.155267

MATERIALS AND METHODS

Data collection

We retrospectively and prospectively studied all patients with bear maulings who were treated in our Department of Plastic and Reconstructive Surgery from January 2006 to December 2013.

We identified 48 patients, 34 retrospectively (January 2006 to July 2012) and 14 prospectively (August 2012 to December 2013). The retrospective records were retrieved from our department while for the prospective group, a detailed history was taken including activity preceding attack, region, type and date of attack, type of bear (if known), patient demographics, time from attack

to first medical treatment, time from attack to hospital, type and severity of injury, operations, length of hospital stay and complications. Any primary treatment taken before reaching our hospital was noted.

Initial treatment

On arrival in the casualty section, life-threatening complications were promptly dealt with by proper resuscitative measures. Patients were then evaluated for head, chest, abdominal or skeletal injuries. Details of all the wounds were recorded as mentioned in charts. Routine investigations including radiographs were done in all patients besides special investigations such as ultrasonography, computed tomography scan, magnetic resonance imaging scan, Doppler studies when indicated. A single dose of antibiotic Cefotaxime was given pre-operatively and continued for 3 days post-operatively. Further antibiotics were given only in patients who showed the presence of infection. Anti-rabies vaccinations were started according to the WHO regimen. We followed five dose intramuscular regimen, that is, one dose of vaccine administered on days 0, 3, 7, 14 and 28 in the deltoid region or small children in antero-lateral thigh muscles. It should never be given in the gluteal region. Anti-rabies immunoglobulin was given in the dose of 40 IU/kg body weight of which half was given locally at the site of the wound, and half was given intramuscularly. A single shot of tetanus toxoid was given in accordance with the immune status of the patient.

Demographics

Most of the patients were middle-aged males [Table 1]. Only sloth bears were involved in all attacks. The mechanism of bear attack was mostly from the front with clawing in a high velocity swinging motion. The majority patients were referred to us after 24-48 h [Table 2].

Totally, 46 out of 48 patients had involvement of either the face or scalp or both [Table 3]. The cheeks, lids and nose were the most common sites involved [Table 3 and Figures 2-7] while the mandible and orbits were the most common bones fractured [Table 3 and Figures 3-6]. All 48 patients had soft tissue involvement while 18 had bony injuries. Four patients had eye injuries that resulted in blindness. Two patients had bilateral eye injuries [Figure 4]. Two patients had facial nerve and salivary gland injuries [Figure 7].

Table 1: Age distribution

Age groups	*Number of patients*
0-10	4
11-20	4
21-30	5
31-40	9
41-50	12
51-60	9
>60	5

Table 2: Time from injury to referral

Time interval in hours	*Number of patients*
<24	4
24-48	19
48-72	14
72-96	6
>96	5

Table 3: Distribution as per body parts involved

Body parts involved	*Number of patients*
Face	36
Scalp	13
Lower limb	4
Upper limb	2
Penis and scrotum	1
Facial part involved	Number of patients
Forehead	7
Lid	12
Eyeball	4
Nose	11
Cheek	17
Ear	4
Lip	8
Chin	8
Facial bone fractured	Number of patients
Skull	4
Zygoma	4
Nasal	5
Orbit	7
Maxilla	5
Mandible	9

Procedures

We performed sharp debridement, thorough irrigation with warm normal saline followed by appropriate suturing for all skin lacerations, skin grafting for 13 patients [Figure 4-5] and flaps for 9 patients [Tables 4-5].

One patient had scalp replantation done, but more than 50% of the scalp died, debrided, and the defect was skin grafted. Three patients needed tracheostomy.

Outcomes

All patients referred to us were hemodynamically stable, and there were no deaths. Twenty out of 48 patients were

Figure 1: (a) Sloth bear with a patch over the chest, (b) long claws of sloth bear, (c) distribution of sloth bear in India

treated primarily and required no further intervention. The mean number of operations per patient was two. The mean hospital stay was 21 days. Thirteen patients had post-operative infection, and six of them had gaping sutures. This increased proportion of infection may be attributed to patient presentation after 24 h, lack of initial treatment and poor pre-injury nutritional status. Five patients had graft loss of >20%. Three patients had partial flap necrosis, and two patients had implant exposure which required flap coverage. Ophthalmic complications included blindness from globe injury in four patients and one patient with ectropion and exposure keratitis, requiring lateral tarsorrhaphy [Table 6].

DISCUSSION

Although bear attacks constitute only 0.1% of all animal attacks in India,[1] their prevalence is quite alarming in the Nagpur region. 38% of all animal attacks referred to us were bear maulings.[2]

Three species of bear are found in India, the Himalayan black bear, the brown bear and the sloth bear. Nagpur, which is surrounded by large number of forests, is a habitat only for sloth bears (Melursus ursus ursinus) [Figure 1a and b]. They are medium-sized bears, with an

Figure 2: (a) A 40-year-old lady presented with bear mauling over face after 24 h, (b) profile view, (c) primary suturing of LWs over face was done, (d) primary suturing of LWs over face was done

average weight of 130 kg, 2-3 ft high at the shoulder and a body length of 4.6-6.3 ft. They are primarily nocturnal in nature and hunt for the food during the night. Their ideal habitat is a forested area with rocky outcrops. They mainly eat fruits, tubers and insects with special liking for Mahua flowers. Sloth bears probably view humans as potential predators, as their reactions to them (roaring, followed by retreat or charging) are similar to those evoked by the presence of tigers and leopards. The female sloth bear is most dangerous when she has babies with her and can attack immediately without provocation.[3, 4]

Central India is habitat for sloth bears only [3] [Figure 1c]; so all the attacks were by sloth bears only. In contrast Shah *et al*.[5] reported only injuries by Asiatic black bears that are found in the Himalayan range. In a Canadian report, all attacks were by Grizzly bears except one which was by black bear.[6]

The greater prevalence of injuries to middle-aged population could be explained by their working outdoors majority of the time [Table 1]. Outdoor activity was found to have a relationship with attacks in other studies where hunters, hikers and campers were the victims.[5,6] Our finding that men were 73% of victims parallels other studies.[5-7] This too can again be explained by their outdoor activity. Most victims came from rural areas which is similar to the epidemiological study of animal bites in India.[1]

All but four patients were referred after 24 h of attack [Table 2]. As all the surrounding forests are situated more than 100 km, from our hospital, patients were initially seen at primary health centres before being referred to

Figure 3: (a) 60-year-old male presented after 3 days of bear mauling with multiple LWs over face and fracture mandible, (b) fractured anterior mandibular segment, (c) profile view, (d) tracheostomy was done followed by open reduction internal fixation of fracture mandible and suturing of LWs. Infection was evident leading to suture gap which was allowed to heal by secondary intention, (e) profile view

our hospital that has the only Plastic Surgery Department in Central India.

Totally, 46 out of 48 patients showed involvement of either face or scalp or both [Table 3]. Most case reports in the literature have similar findings.[5-7] As the face and scalp are easily accessible parts of the body (for bears), they are commonly injured. Sloth bears deal with perceived threats by behaving aggressively. Their long claws [Figure 1b], make them less capable of climbing trees to escape perceived danger.[4] This contrasts with Asiatic black bears that are usually defensive.[4]

Table 4: Types of flap done

Type of flap	*Indication*	*Number of patients*
Forehead flap	Exposed parietal bone	1
Transposition flap over scalp	Exposed temporoparietal bone with surrounding raw area	2
Median forehead flap	Right nasal ala defect	1
Arm tube flap	Nasal ala and side wall defect	1
Temporalis flap	To cover exposed plate over left infraorbital region	1
Tarso-conjunctival flap	Left lower lid defect	1
Deltopectoral + pectoralis major myocutaneous flap	Anterior mandibular segmental defect	1
Fasciocutaneous flap (based on peroneal artery perforators)	Exposed right shin of tibia	1

Table 5: Surgical procedure done (*n* = 48)

Surgical procedure	*Number of patients*
Suturing	48
Grafting	13
Flap	9
Fracture fixation	18
Tracheostomy	3
Enucleation	4
Scalp replantation	1
Other	5

Table 6: Complications (*n* = 48)

Complication	*Number of patients*
Infection	13
Suture gap	7
Graft loss	5
Flap necrosis	3
Implant exposure	2
Bone loss	2
Ectropion	1
Blindness	4
Exposure keratitis	1

Visceral injuries from bear mauling in the form of injury to the brain, eyeballs, salivary glands, abdominal organs have been reported.[5,6,8-11] We received no patients with abdominal, chest viscera or brain injury as they were referred to other specialities.

Over 80% of patients had deep lacerations while punctured wounds were not seen. Roka *et al*.[12] reported a case of penetrating head injury with bilateral eye avulsion.

Our mean hospital stay of 21 days and the average number of two operations per patient were similar to the Canadian report of a mean hospital stay of 22 days and the average number of three operations per patient.[6]

Figure 4: (a) 38-year-old male presented after 7 days of bear attack with avulsion injury of the face. Left eye auto evisceration was evident with multiple facial bone fracture, (b) lateral view, (c) grossly infected wound, (d) three-dimensional computed tomography (3D CT) face showing multiple fractures, (e) 3D CT face, (f) 3D CT face, (g) after thorough debridement, (h) wound closed and remaining raw area allowed to granulate, (i) raw area skin grafted, (j) post-operative appearance at 2 months

Figure 5: (a) 20-year-old male presented after 6 h bear mauling involving scalp, (b) profile view, (c) posterior view, (d) after thorough debridement of wound intra-operative photo, (e) after applying skin graft, (f) 6 months post-operative result, (g) 6 months post-operative result

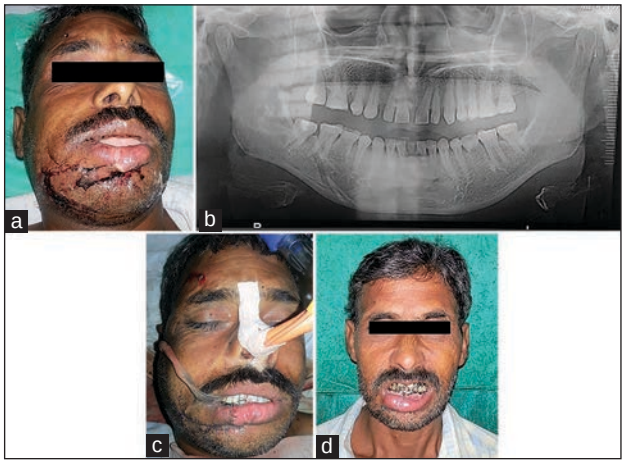

Figure 6: (a) 40-year-old male presented after 12 h of bear attack with lacerated wound over lower lip and chin, (b) orthopantomograph showing right parasymphyseal mandible fracture, (c) intra-operative photo after plating and intermaxillary fixation given to patient, (d) post-operative appearance at 2 weeks

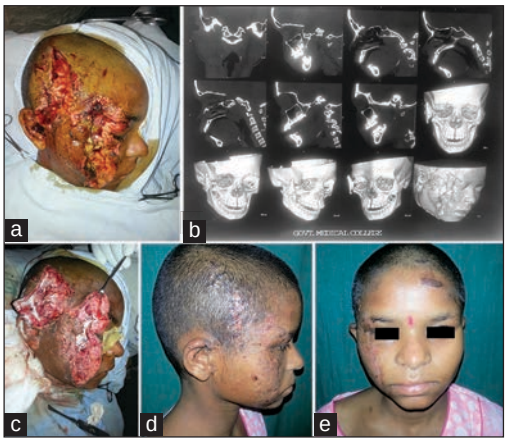

Figure 7: (a) This 18-year-old girl presented after 72 h of bear mauling over face and scalp with transaction of right facial nerve, (b) three-dimensional computed tomography showing fracture right zygoma and maxilla, (c) after thorough debridement and open reduction internal fixation of fracture zygoma, (d) post-operative appearance at day 10 (profile view), (e) front view

CONCLUSION

Bear maul victims are challenging to treat. Early broad spectrum antibiotics, anti-rabies prophylaxis, irrigation and debridement of the wound are useful. We recommend that all such patients should be referred to a tertiary centre at the earliest.

REFERENCES

1. Sudarshan MK, Mahendra BJ, Madhusudana SN, Ashwoath Narayana DH, Rahman A, Rao NS, *et al*. An epidemiological study of animal bites in India: Results of a WHO sponsored national multi-centric rabies survey. J Commun Dis 2006;38:32-9.
2. Kale S, Patil S, Khare N, Jain A. Animal bites-should primary reconstruction be the standard treatment? Euro J Plast Surgery 2011;34:367-73.
3. Wikipedia: Sloth bear. Available from: http://www.en.wikipedia.org/Sloth_bear, last accessed on 18/12/2014 at 19:38 hrs.
4. Wikipedia: Bear attack. Available from: http://www.en.wikipedia.org/wiki/Bear_attack, last accessed on 18/12/2014 at 19:40 hrs.
5. Shah AA, Mir BA, Ahmad I, Latoo S, Ali A, Shah BA. Pattern of bear maul maxillofacial injuries in Kashmir. Natl J Maxillofac Surg 2010;1:96-101.
6. Frank RC, Mahabir RC, Magi E, Lindsay RL, de Haas W. Bear maulings treated in Calgary, Alberta: Their management and sequelae. Can J Plast Surg 2006;14:158-62.
7. Herrero S. Human injury inflicted by grizzly bears. Science 1970;170:593-8.
8. Venkataswamy G, Rajagopalan AV. A case of injury of right eye by a bear. J All India Ophthalmol Soc 1962;10:22-3.
9. Prasad SC, Thada ND, Rao P, Thada SR, Prasad KC. Grievous temporal and occipital injury caused by a bear attack. Case Rep Otolaryngol 2013;2013:957251.
10. Jethani J, Nagori R, Ghodadara B. An unusual case of bear bite with severe loss of tissue. Indian J Ophthalmol 2006;54:287-8.
11. Ram R. Maxillofacial Injuries due to Bear Mauling. J Maxillofac Oral Surg 2011;10:85-9.
12. Roka YB, Roka N, Shrestha M, Puri PR, Adhikari HB. Penetrating head injury with bilateral eye avulsion due to Himalayan bear bite. Emerg Med Australas 2012;24:677-9.

How to cite this article: Patil SB, Mody NB, Kale SM, Ingole SD. A review of 48 patients after bear attacks in Central India: Demographics, management and outcomes. Indian J Plast Surg 2015;48:60-5.

Source of Support: Nil, **Conflict of Interest:** None declared.