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Original Research Article**Anaesthesia Challenges in Patients with Bear Bite****Jyoti Naitam and Pooja Mamtani****Department of Anaesthesiology, Government Medical College, Nagpur, Maharashtra, India- 440003***QR Code*****Correspondence Info:**Dr. Pooja Mamtani,
Department of Anaesthesiology,
Government Medical College,
Nagpur, Maharashtra, India- 440003***Article History:****Received:** 13/12/2017**Revised:** 23/12/2017**Accepted:** 23/12/2017**DOI:** <https://doi.org/10.7439/ijbr.v8i12.4530>**Abstract**

Background and Aims: Patients injured in bear attack present with different patterns of injuries. A common protocol may not be suitable for the management of injuries inflicted by these large wild animals. Anaesthetic management of such injuries often need multidisciplinary approach. Here, we reported case series of anaesthesia challenges in Bear bite patients who were brought to Govt. Medical College and Hospital, Nagpur; and were managed in emergency situations for surgery under anaesthesia.

Method: This retrospective observational study was conducted on total 10 cases of either sex, having age ranging from 30-50 years, over a period of two years. The data was collected from case records and analyzed accordingly.

Results: Due to injury over face and oedema, there was problem of ventilation with Ambu Bag as far as casualty management was concerned. It was difficult to hold the anaesthesia circuit mask while preoxygenation before induction and intubation. Also we faced difficulty in laryngoscopy and Intubation due to distorted anatomy of face and oedema. In few cases, Bear bite injury was noted on limb, chest and abdomen. Some of patients were required multiple surgical intervention/ operated to cover the wound gap and disfigurement leading to multiple exposure to general anaesthesia. Only one patient was required to be intubated and mechanically ventilated before taken for definitive surgical repair.

Conclusion: In our case series, there was no mortality. The main challenges to anaesthesiologist were 'Emergency Airway Management, Blood and Fluid Resuscitation' either at casualty or in the operation theatre.

Keywords: Bear Bite, Anaesthesia Management, Induction, Intubation, Laryngoscopy, General anaesthesia.

1. Introduction

Human injuries inflicted by bears are rare and nature of reaction to bears is multifactorial.[1] Bears are strong wild animals, potentially dangerous, attacks the persons unpredictably and can inflict serious injuries.[2] The morbidity and mortality is mainly due to bleeding and sepsis. The bony and soft tissue injury may cause sufficient disfigurement. Bear bite injuries have become a common occurrence as the forest covers and natural habitats are diminishing. These animals usually attack in remote areas where composite trauma centres do not exist and urgent referrals of these patients will have significant effect on the final outcome.[3]

The injury due to Bear bite requires immediate attention for surgical intervention to control bleeding and also extensive reconstruction.[4] Anaesthetic management

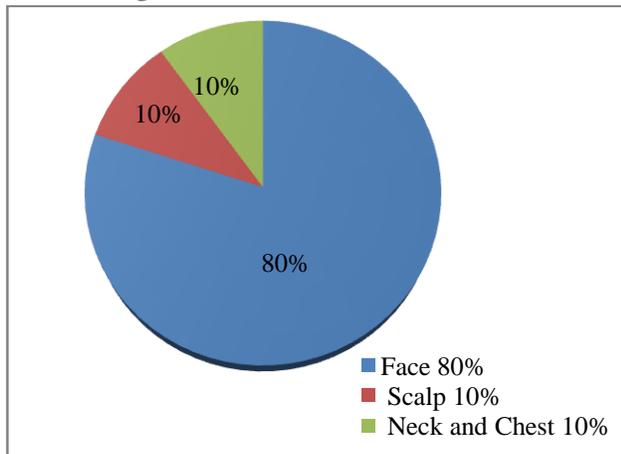
of such injuries often needs multidisciplinary approach. Limited literature is available describing bear bite management in anaesthesia practice. Therefore here we reported case series of anaesthesia challenges in Bear bite patients who were brought to Govt. Medical College and Hospital, Nagpur; and were managed in emergency situations for surgery under anaesthesia.

2. Material and Methods

This was retrospective observational study enrolled total 10 patients predominantly males, came to hospital particularly in night hours, after at least 10 to 12 hours of Bear maul during the period from 2014 to 2016. The age of patients were ranging from 30-50yrs. Maximum number of patients came during summer and dry weather.

Profession of patients was wood cutter, farmers from tribal community of forest areas. Site of injury was scalp, face, neck, chest, extremities (Figure 1).

Figure 1: Sites Involved in Bear Bite



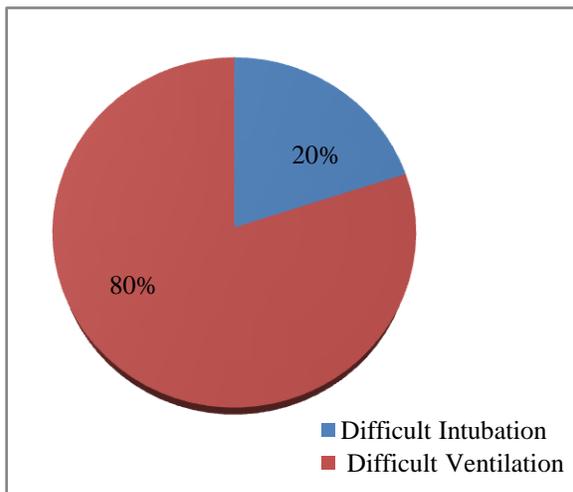
Patients were fearful, anxious and had difficulty in breathing. Patients presented with swelling over face,

bleeding and oozing from wound and with lacerated wound and disfigurement of face. Also patients presented with tachypnoea, tachycardia, hypotension and aspiration. Patients were difficult to ventilate with Ambu bag and mask in EMS dept. The data was collected from case records and was analyzed accordingly.

3. Observations and Results

The Bear bite sites of injury were being clean lacerated wound on face, scalp and neck. Patients had lot of bleeding and oozing from wounds, oedema/ swelling over face, which eventually was causing difficulty in breathing to patient. Due to injury over face and oedema, there was problem of ventilation with Ambu Bag as far as casualty management was concerned (Figure 2). It was difficult to hold the anaesthesia circuit mask while preoxygenation before induction and intubation. Also we faced difficulty in laryngoscopy and intubation due to distorted anatomy of face and oedema (Figure 2). Immediate focus was done on oxygenation, prevention of aspiration, securing airway on spontaneous respiration, blood transfusion.

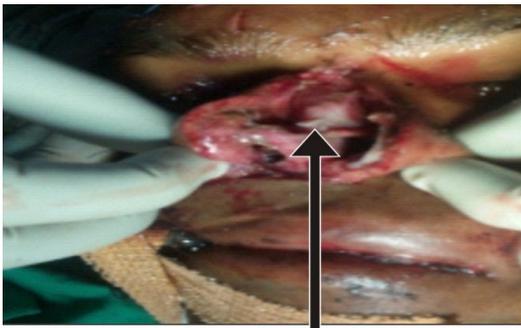
Figure 2: Airway Management



In few cases, Bear bite injury was noted on limb, chest and abdomen. Some of patients were required multiple surgical intervention under general anaesthesia to cover the wound gap and disfigurement by flap surgery to achieve best possible near normal anatomical repair. Only one patient was required to be intubated and mechanically ventilated before taken for definitive surgical repair. All wounds were under category 3 of antirabies prophylaxis.

Tetanus vaccination and antirabies vaccination and immunoglobulin prophylaxis was given to all patients.

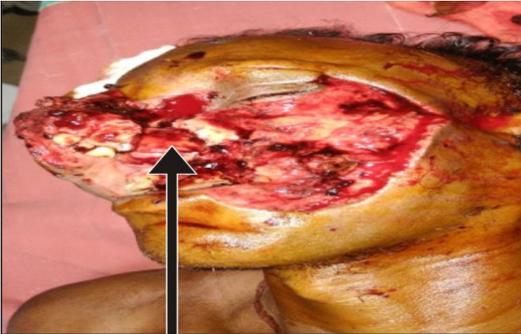
Totally, 9 out of 10 patients had involvement of either the face or scalp or both. The cheeks, lids and nose were the most common sites involved (Case 1, Case 2, Case 3, Case 4, Case 5, Case 7 and Case 8). One patient had right diaphragmatic injury (Case 6).



Case 1 : 36 yrs. / Male; Farmer
 Injury : CLW over nostril
 Problem : Difficult mask ventilation
 Solution : Proper mask seal using sterile gauze



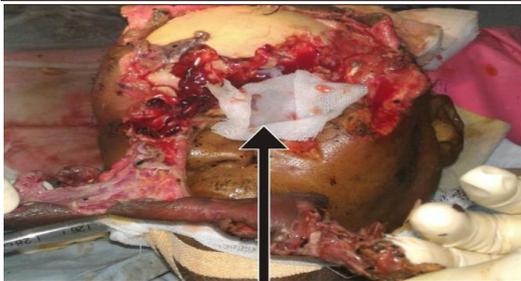
Case 2 : 42 yrs. / Male, Milkman
 Injury : Cervical spine fracture
 Problem : Sniffing position avoided
 Solution : Intubation using airtraq larngoscope



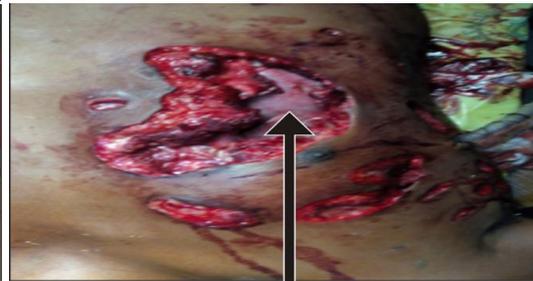
Case 3 : 38 yrs. / Male
 Injury : CLW over cheek, upper lip, lower eyelid
 Problem : Difficult mask ventilation
 Solution : Adequate seal with sterile gauze pad



Case 4 : 36 yrs. / Female
 Injury : CLW over scalp, eye & infra-orbital area
 Problem : Difficult mask ventilation
 Solution : Adequate seal with sterile gauze pad



Case 5 : 45 yrs. / Male
 Injury : CLW over scalp, eye and over nostril.
 Problem : Difficulty in assessing airway & difficult mask ventilation
 Solution : Awake intubation using propofol & difficult airway cart by side



Case 6 : 35 yrs. / Male Wood cutter;
 Injury : Rt diaphragmatic Injury
 Haemo-pneumothorax
 Exposed lung parenchyma
 Problem : Flail chest with V/Q mismatch
 Solution : ICD was inserted & post op ventilatory support



Case 7 : 35 yrs. / Male
 Injury : CLW over upper lip, cheek and temporal region and swollen tongue
 Problem : Difficulty in assessing airway & difficult mask ventilation
 Solution : Awake intubation using propofol & difficult airway cart by side



Case 8 : 40 yrs. / Male, Wood cutter
 Injury : Scalp Injury
 Problem : Fracture Parietal Bone, CSF leak
 Solution : Proper sterilization maintained & Neuroprotective drugs

4. Discussion

The actual incidence of injuries sustained by humans in animal attacks is unknown, as most of the cases are fatal or approach after a certain duration. Animal injuries inflicted on to humans are distinct in nature causing tearing, cutting, penetrating and crush injuries of which having a combination of sharp and blunt trauma.[2] Bear attack is one of the most fulminating injuries of human. Wild animal injuries are distinguished by combination of cutting, penetrating and crushing (due to powerful slap) is commonly seen in the victim of bear attack.

Bears are strong and agile wild animals, potentially dangerous, unpredictable and can inflict serious injuries. Injuries with bear mauling are rare, but compared with soft tissue wounds of other origin, complication rate is high and facial injuries cause sufficient disfigurement to require extensive reconstruction.[2] Mammalian bite injuries are usually on head neck region involving ear, nose, cheek, lip and scalp and mainly these are of avulsion type.[5] These injuries are most commonly seen in those working in forest areas thereby increasing the chances of bear-human interaction. The bite of these animals involves a large amount of crushing injuries contaminated with all foreign material like mud and grass. All these injuries will cause significant functional esthetic disfigurement.[6-8]

The management of these crushing types of wounds involves proper clinical assessment, early surgical intervention and meticulous attention with local and systemic considerations. It must be thoroughly cleansed and debrided. The hard tissues and soft tissues must with all the vital neurovascular structures must be thoroughly assessed. The wound must be assessed in full depth and all the foreign bodies must be removed. The most important concern in these types of injuries is the large number of bacteria in the oral cavity. Bear attacks are uncommon and most of them result in major injuries.[9] Tetanus prophylaxis should be provided in the early management phase.[10] In addition to proper surgical management, parenteral penicillin followed by a course of broad-spectrum oral antibiotic is prudent.[11] Major wounds do require aggressive management. Hence all the injuries must be managed appropriately by administering the antibiotics as early as possible. In our cases, the wound was thoroughly debrided with povidine and iodine solution and antibiotics were started the same day.

The facial injuries need reconstructive surgery to gain optimal functional and aesthetic outcomes in the long term.[12] Airway management in these facial injuries is problematic to anaesthesiologists because of difficult mask ventilation (DMV), and difficult airway due to altered anatomy, tissue oedema and facial fractures.[13] In our case series the 9 cases facial injuries caused lacerations, loss of

some soft tissue, tissue oedema and airway rent resulting into difficult mask ventilation and hence, difficult airway. DMV, an underestimated problem of airway management than difficult intubation, may occur before attempting intubation or after intubation failure.[14] In DMV, a conventionally trained anaesthesiologist experiences difficulty with face mask ventilation of the upper airway, and it may be due to inadequate mask seal, excessive gas leak, or excessive resistance to the ingress or egress of gas.[15] Anaesthesiologists should have knowledge of difficult mask ventilation, predictive risk factors and alternative techniques when mask ventilation technique becomes difficult or impossible.[16] Signs of inadequate or absent mask ventilation include absent or inadequate chest movements and / or breath sounds, auscultatory signs of severe obstruction, cyanosis, gastric air entry or dilatation, decreasing or inadequate oxygen saturation, absent or inadequate expired CO₂ and haemodynamic changes of hypoxia and hypercarbia.[15] Despite the most careful airway assessment, some patients with airway difficulty remain undetected and anaesthesiologists must always be prepared for variety of pre-formulated and practiced forms of airway management in the event of an unanticipated difficult airway.[17]

In our study for the management of patients, immediate focus done on oxygenation, prevention of aspiration, securing airway on spontaneous respiration and blood transfusion. One patients required mechanical ventilation after definite surgical repair. While some patients required multiple surgical interventions under general anesthesia to cover wound gap and disfigurement by flap surgery to achieve best possible near normal anatomical repair. All wounds were under category 3 of antirabies prophylaxis and treated with tetanus vaccination, antirabies vaccination and immunoglobulin prophylaxis.

The administration of rabies postexposure prophylaxis (PEP) during the incubation period of rabies is critical to prevent spread to the nerves, with fatal consequences. Standards for PEP have been clearly defined by the WHO expert committee on rabies. The most commonly encountered causes of the failure of PEP management include rabies immunoglobulin (RIG) not being administered, or being administered inadequately, low-potency vaccine or RIG, an exceptionally large viral load, an atypical strain of the virus that is not neutralised by the RIG, or by natural antibodies resulting from the vaccination and inadequate wound care.[18] Apart from these reasons for PEP failure, ketamine anaesthesia has been mentioned as an additional risk factor for treatment failure.[19] But when we looked up, an online text says it affects the efficacy of the vaccine especially ketamine and general anesthetic but no effect seen with neuraxial block.

Another study showed that an anaesthetised group of puppies that were vaccinated with rabies vaccine had significantly lower antibody titres compared with an unanaesthetised control group.[9] However, although there is concern regarding the vaccination of children requiring surgical procedures under anaesthesia, it is advised to vaccinate the patient when in doubt.[20]

Short *et al* [21], after their postal survey among practicing anaesthesiologists regarding anaesthesia and immunisation, recommended that elective surgery and anaesthesia should be postponed for one week after inactive vaccination, and for three weeks after live attenuated vaccination in children. But we guess on emergency basis it can't be helped, if the procedure can be done via neuraxial method then that would be more preferable. Epidural especially since it allows post surgical analgesia. Ahlers *et al* found that the intraoperative use of a thoracic epidural catheter reduced the stress response and prevented stress-induced perioperative impairment of proinflammatory lymphocyte function. Epidural analgesia for postoperative pain relief leads to reduced suppression of lymphocyte proliferation and an attenuated proinflammatory cytokine response when compared to the systemic administration of opiates.[22] Administration of epidural morphine has been found to be safe, without significant side effects.

5. Conclusion

In our case series, there was no mortality, the main challenges to anaesthesiologist were 'Emergency Airway Management, Blood and Fluid Resuscitation' either at casualty or in the operation theatre.

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