Management of a Late Presentation of Bear Mauling with a Complex Maxillofacial Defect in a Tertiary Care Hospital - A Case Report

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Abstract

Rationale: Bear mauling is the most common wild animal-inflicted injury in India. Ideally, these injuries should be managed early with fracture fixation, wound debridement, and appropriate coverage. Delay may lead to devascularization and a more severe deformity, which needs complex and multi-staged procedures for optimal outcome. Patient Concerns: Facial deformity in bear mauling is upsetting to the patient. Apart from facial aesthetics, the victim has difficulties in speech, eating, and respiration when the midface is involved. Diagnosis and Treatment: Patients require proper assessment of the soft tissue and bony defects by clinical assessment and imaging before planning any reconstruction. Outcome: The complex defect was managed in stages by both microsurgical and nonmicrosurgical methods including debridement, fracture fixation, local flaps, free flap, and prosthesis. Take-away Lessons: Systematic approach in categorizing each component of the problem, finding the best possible solution for each of them, and inter-departmental collaboration are important.

Keywords: Injuries, maxillary prosthesis, maxillofacial injury, microsurgical free flaps, palatal obturator

Introduction

Reconstruction of complex maxillofacial defects is challenging. Apart from aesthetic value, the face is the entry passage for the aero-digestive tract. Road traffic accidents, onco-resection defects, and animal attacks are major causes of midfacial defects. Among the wild animal-inflicted injuries, bear mauling is the most common in India. Bear mauling patients require multiple surgeries, including debridement, flaps, skeletal fixation, and prosthetics for proper rehabilitation.

We describe delayed reconstruction of a significant midfacial deformity in a case of a bear mauling that happened to a young adult male. The patient required multiple debridements, maxillofacial fixation, forehead flap, free osteocutaneous fibula flap, and prosthetic rehabilitation. The patient was discharged with a good functional outcome and satisfactory aesthetic results.

Case Report

The patient presented with a composite defect of the upper and middle third of the nose, difficulty in feeding and speech with foul-smelling discharge from the nose and poor cosmetic appearance [Figure 1].

Background

The patient sustained midfacial injury following bear mauling in a rural area. After preliminary management at a primary health centre, he was shifted to a multispecialty hospital three days after the injury, where bony fixation of the maxillofacial fractures with forehead flap cover of the nasal defect was done. Following discharge from the facility, he developed dehiscence of the wound over the upper half of the nose with foul-smelling discharge and...
loss of distal part of the forehead flap. He was readmitted to the same hospital three months after the primary surgery, where extraction of maggots and wound toileting was done. After that, the patient was referred to our institute for further management.

Computed tomography scan [Figure 1] was suggestive of the following:

- Fracture of nasal bones, maxillary antral walls, medial and inferior orbital wall, zygomatic arch, and hard palate with fixation plates in situ
- Absent nasal septum.

After discussion with the ENT and Head and Neck Surgery and Maxillofacial Surgery, the entire premaxilla and major part of the hard palate was removed en bloc as a single dead segment along with infected plates and tissues [Figure 2]. Post debridement, the following observations were made and tabularized in Table 1.

After carefully evaluating the pros and cons of each option, the following surgical procedures were performed:

### Outer coverage for the nose

The left side paramedian forehead flap was elevated and transposed to cover the outer skin defect of the upper and mid parts of the nose [Figure 4b].

### Table 1: Postdebridement deficits and available options

| Unit absent                  | Difficulty to patient | Options available                                      |
|------------------------------|-----------------------|--------------------------------------------------------|
| Hard palate                  | Nasal regurgitation   | Obturator                                              |
|                              |                       | Local mucosal, myomucosal or tongue flaps               |
|                              |                       | Skin paddle of osteocutaneous fibula                   |
| Alveolar arch                | Chewing               | Obturator                                              |
|                              |                       | Bone segment of osteocutaneous fibula                  |
| Inner lining of nasal cavity | Raw area leading to contraction, bleeding, recurrent ulceration | Leave it as raw area |
|                              |                       | Skin graft                                             |
|                              |                       | Turnover of the previously done remaining right forehead flap |
| Outer lining of nasal defect | Difficulty in breathing | Left forehead flap                                      |
| Nasal septum (cartilage and bony septum) | Saddle nose deformity | Free flap reconstruction with RAFF                      |
| Right lower eyelid ectropion | Incomplete closure of eye | Cartilage graft                                        |
|                              |                       | Bony dorsal augmentation                               |
| RAFF                         |                       | Ectropion release at the time of surgery                |

**Figure 1:** Preoperative images and computed tomography film

**Figure 2:** Status post debridement

**Figure 3:** Free fibula osteocutaneous flap forming alveolus and neo-palate

**Figure 4:**

*Figure 4a: Proximal viable part of previous forehead flap re-elevated and turned over to provide inner lining for the roof of the nasal cavity.*
Nasal septum
The wound was deemed not suitable for primary cartilage graft or structural reconstruction of nasal framework. Hence, it was deferred.

Right lower lid ectropion
After release and re-elevation of the previous right-sided forehead flap, the right lower eyelid ectropion got corrected. Postoperatively, the patient had mild residual ectropion; however, he was able to close his eyes.

The postoperative period was uneventful. A nasendoscopy was performed to assess and confirm complete separation of the nasal and oral cavities. The patient had significant improvement in speech and deglutition with no regurgitation of food or liquids.

The forehead flap was divided on day 14 [Figure 4c]. The patient was advised further surgery for reconstruction of the nasal framework, but he declined any further surgery stating his satisfaction with his current appearance [Figure 5]. The entire timeline of the management and surgical procedure is summarized in Table 2.

DISCUSSION
Injury in bear mauling is due to powerful slap with sharp curved claws of the bear, which causes a combination of crushing, penetrating, and cutting injuries.[2] The most commonly involved injury site is usually the face (80%), followed by the head.[3] Bear mauling rarely causes death, with a reported incidence of 2.39%. However, the morbidity from maxillofacial injuries is quite significant.[4]

Soft-tissue laceration is managed by debridement, tissue rearrangement, and suturing. Tissue loss requires loco-regional or free flaps depending on the availability of the tissue and reconstructive needs.[5]

Maxillofacial fractures are common, ranging from 27% to 95%.[6] The fractures require open reduction and internal fixation. Reconstruction of palatomaxillary defects requires assessment of the size of the defect and the remaining segment. In the past, management of the maxillectomy defect was to let the defect epithelialize

Table 2: Timeline of management

| Deformity/problem addressed                          | Time since injury | Surgical procedure undertaken                                      | Comments                                                                 |
|------------------------------------------------------|------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------|
| Maxillofacial fractures, midface soft tissue injuries| 3 days           | Fracture fixation by miniplates, right paramedian forehead flap   | Patient discharged after flap division and suture removal 8 weeks after surgery |
| Wound over the upper nose due to flap necrosis and dehiscence, maggots in the wound | 13 weeks         | Maggot extraction, debridement of the necrosed flap               | Patient was admitted for 4 days and then was attached to OPD for follow-up |
| Dead premaxilla bone with foul-smelling discharge    | 18 weeks         | Tracheostomy, debridement and removal of necrosed premaxillary bones, infected plates and screws under general anaesthesia | Obturator was placed in the immediate postoperative period as the patient was pain free and comfortable. However, due to lack of secure retention, it was discontinued after 2 weeks of trial |
| Large anterior alveolar defect with oro-nasal communicating cavity | 21 weeks         | Free fibula osteocutaneous flap for maxillary alveolar arch reconstruction and palatal fistula closure | Well-settled fibula flap achieved adequate palatal closure |
| Upper and mid-nasal composite defect                 | 27 weeks         | Bilateral nasal stenting with endoscopic nasal synechiae release with forehead flap cover | Patency was checked in the postoperative period with nasendoscopy |
| Forehead flap in situ                               | 29 weeks         | Forehead flap division and inset                                  | Patient was discharged after suture removal; 30 weeks after primary injury |

OPD=Outpatient department

Figure 4: (a) Forehead flap for lining. (b) Cover. (c) After division

Figure 5: Follow-up
spontaneously or by split skin grafting followed by obturator placement.

Autologous reconstruction is considered superior to prosthetic rehabilitation in maxillary defects in terms of prosthesis stability, patient’s quality of life, and functionality. As the size of the defect increases, patient acceptability to the obturator is decreased, the reason being leakage of oral contents into the nasal cavity along with pain and soreness in the mouth. Large maxillary defects are deemed unsuitable for prosthetic rehabilitation, and composite free tissue transfer is preferred. [7]

Okay et al. suggested that palatomaxillary defects involving more than half the palate or the premaxilla and both the canines are poor candidates for a prosthesis. According to their classification [Table 3], the defect in our case was class III, which constitutes a loss of tooth-bearing maxilla with both the canines. They have advocated a surgical reconstruction with an osteofasciocutaneous flap for such defects. [8]

The forehead flap has long been the workhorse flap for nasal reconstruction. [9] A staged forehead flap is usually done in two or three stages. A cartilage framework can be inserted in the primary surgery or second stage. Flap thinning and reshaping of the cartilage can be done in subsequent stages. [10]

In our case, two paramedian forehead flaps were used to reconstruct the nose. Primary cartilage graft was deferred because of the doubtful vascularity of the bed.

The challenge in our case was the delayed presentation. Kar et al. reported a 6–30 h delay in primary presentation owing to the remote locations where these injuries take place. [5] Although mammalian bite wounds in the facial region are relatively resilient to infections due to the rich blood supply of the face, a delay of more than 6–12 h significantly increases the chance of infection and leads to a poorer prognosis. [11] In our patient, the initial delay of 3 days for proper surgical management played a role in the outcome. Delayed reduction and fixation of the facial fractures might have led to vascular compromise and subsequent bony necrosis.

**Conclusion**

Bear attacks are common in remote areas fringing on the forests, and significant delay occurs before surgical management is undertaken. Delay in fracture fixation and infection may result in ischaemia and necrosis of tissues, as was found in our case. Easier options such as the use of prosthetics may not be feasible in all cases, and complex staged reconstruction is the only option in such cases. While microsurgical free tissue transfer was the procedure of choice that provided alveolar continuity, projection, and separation of oro-nasal cavities, careful preservation and utilization of whatever local tissue was available played a significant role in the reconstruction.

**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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