

# Airway Management in Patients with Difficult Mask Ventilation – 2 Case Reports

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**Abstract:** Facial injuries due to bear mauling or run-over accidents cause severe disfigurement of face requiring extensive reconstruction. While managing these injuries, close association with the airway and shared airway with the surgeon are important concerns for the anaesthesiologists. And airway management in such patients becomes a challenge for them because bony injuries and soft tissue deformities may pose difficulty in mask ventilation. Difficult mask ventilation may be life threatening to a patient if difficult intubation occurs. Here we report two cases of facial trauma having difficult mask ventilation, one due to bear mauling and another due to run-over accident. These patients of facial trauma were posted for surgical repair under anaesthesia. Anatomical distortion of face due to contused lacerated wounds, bulging out of eyeball, destruction of nostril and lips made mask seal inadequate and mask ventilation difficult. In both the cases, airway was secured successfully by preserving spontaneous respiration and doing oral endotracheal intubation by direct laryngoscopy and using bougie.

**Keywords:** difficult mask ventilation, airway management, direct laryngoscopy, bougie

## 1. Introduction

Bear maul injuries or run over accidents are, though rare causes of facial trauma, they cause serious soft tissue and bony injuries and deep lacerations involving eyes, nose and lips [1]-[3]. These facial injuries need reconstructive surgery to gain optimal functional and aesthetic outcomes in the long term [4]. 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 [5]. For facial trauma patients, rapid sequence intubation is preferred technique of airway management but it may be associated with oxygen desaturation [6]. Here we report airway management of two facial trauma patients having DMV.

## 2. Case Report

### 2.1 Case 1

A 35 year female was presented with history of bear attack a night prior. She had multiple lacerated wounds over face. Right side of the face including cheek, nostril and lips were destroyed. Right eyeball was completely bulged out [Fig. 1].



**Figure 1:** Bear bite injuries over face

Significant findings on airway examination were airway rent, mouth opening 2 fingers, single nostril (patency could not be checked), mandible protrusion test not possible due to pain, normal neck movements and thyromental distance 6.5 cm. Patient received antibiotics, tetanus toxoid and antirabies prophylaxis (Inj. Rabipur). Preoperatively forehead injury was sutured under local anaesthesia [Fig. 2].



**Figure 2:** Distortion of facial anatomy

Anaesthesia procedure including awake intubation and tracheostomy, if needed, was explained to the patient. Difficult airway trolley was kept ready. NBM status of the patient was confirmed and intravenous line was secured on left forearm with 18 G intracath. Routine monitors like pulse oximeter, ECG, NIBP and Capnograph were applied. Patient was premedicated with Inj. Atropine 0.6 mg intramuscularly and Inj. Ondansetron 4 mg intravenously. Due to airway rent present over cheek, it was very difficult to achieve complete seal over airway even with face mask of size 5. Patient's pharyngeal mucosa was anaesthetized with 2% Lignocaine Viscous Gargles and tracheal reflexes were obtunded with 2 ml of 4% Lignocaine Spray transtracheally. After oral preparation, patient received Inj. Fentanyl 25 µg i.v. and

direct laryngoscopy was attempted, but only epiglottis could be visualized. Patient was not co-operative.

Keeping in mind the risk of failed ventilation and intubation, airway rent was sealed with cotton pads and patient was induced with Sevoflurane (4%) mask and Inj. Propofol 60 mg i.v. in such a way that her spontaneous respiration would be preserved [Fig. 3].



**Figure 3:** Airway rent sealed with cotton pads

Direct laryngoscopy done, vocal cord were visualized with difficulty. Bougie passed through the cords and cuffed ETT no. 7.0 guided over the bougie [Fig. 4]. Intubation confirmed with ETCO<sub>2</sub> and chest auscultation. Throat packing was done to prevent aspiration of blood.



**Figure 4:** DL scopy and bougie insertion

Intraoperative period was uneventful and patient was maintained on oxygen and nitrous oxide (50:50), Sevoflurane (1.5-2%) and muscle relaxant (Atracurium). Postoperatively patient was reversed with Inj. Neostigmine (2.0 mg) and Inj. Glycopyrrolate (0.4 mg) intravenously. For the possibility of airway oedema and difficult intubation due to pedicle graft (Stage 1 repair) [Fig. 5], ETT was kept in situ for 24 hours and patient was maintained on spontaneous respiration. After positive air leak test, patient was extubated uneventfully.



**Figure 5:** Stage 1 repair (Pedicle graft)

Airway management of rest 2 surgeries (Stage 2 and Stage 3 repair) was done with the fiberoptic technique, as mouth opening was limited [Fig.6].



**Figure 6:** Difficult intubation (Stage 2 & 3 repair)

## 2.2 Case 2

A 45 year female was presented with facial lacerated wound for flap reconstruction under anaesthesia. Patient had some mental illness since 8 years, and she was not on any medication. She had left her home 8 days back and probably she got trauma 4 days back due to vehicular run-over on her face. Deep lacerated wounds were present over forehead and right side of face including cheek, nose and lips [Fig. 7].

Anaesthesia procedure was explained to the relatives. After confirming NBM status of the patient, monitors were applied and IV line was set up. Antiemesis prophylaxis (Ondansetron 4 mg, Metoclopramide 10 mg and Ranitidine 50 mg) was given. Patient was not allowing oxygenation with face mask or nasal catheter. Considering the mental status of the patient, she was sedated with Midazolam 2 mg, Fentanyl 100 mg and Propofol 40 mg intravenously. DL scopy done, vocal cords visualized, bougie passed through cords and cuffed ETT no. 7.0 guided over the bougie. Intubation confirmed with auscultation and ETCO<sub>2</sub>. Intraoperative period was uneventful. Surgical repair was done [Fig 8]. Extubation was scheduled 24 hours later in postoperative period because of airway oedema and for the fear of postnasal and oral bleeding..



**Figure 7:** Facial lacerated wound



**Figure 8:** Facial Anatomy after Reconstruction

### 3. Discussion

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 [7]. Mammalian bite injuries are usually on head neck region involving ear, nose, cheek, lip and scalp and mainly these are of avulsion type [8]. In facial trauma, associated injuries are most commonly seen with run overs [2]. In our both the cases facial injuries caused lacerations, loss of some soft tissue, tissue oedema and airway rent resulting into DMV and hence, difficult airway.

DMV, an underestimated problem of airway management than difficult intubation, may occur before attempting intubation or after intubation failure [9]. 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 [10]. Anaesthesiologists should have knowledge of difficult mask ventilation, predictive risk factors and alternative techniques when mask ventilation technique becomes difficult or impossible [11].

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 CO<sub>2</sub> and haemodynamic changes of hypoxia and hypercarbia [10].

In patients with maxillofacial trauma, airway can be secured by nasal intubation with direct visualization of cords, oral intubation, fiberoptic bronchoscopic intubation or surgical airway [5]. Rapid sequence intubation followed by DL scopy is an effective airway management approach in emergency. Unanticipated instances of simultaneous difficulty with mask ventilation and tracheal intubation are better dealt with LMA [12]. Gum elastic bougie - assisted laryngoscopy allows successful intubation in cases of difficult intubation occurring in prehospital settings [13]. In our case, we used bougie to facilitate difficult intubation in DMV. To preserve spontaneous respiration, we have not used muscle relaxant, instead local anaesthesia, sedation, inhalational agent made DL scopy and bougie assisted oral intubation successful without any procedural complication.

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 [14].

### 4. Conclusion

Difficult mask ventilation in facial injuries may due to deep lacerations, soft tissue oedema, and airway rent. Preserving spontaneous respiration and doing oral endotracheal tracheal

intubation by DL scopy and using bougie can be effective alternative technique when mask ventilation becomes difficult or impossible.

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