

## **Difficult endotracheal intubation caused by head and neck burn**

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### **I. Introduction:**

Burns over the head and neck form a major fraction of the many burns patients encountered in everyday anaesthesia practice. The distorted anatomy, inaccessible veins, presence of raw areas and contractures especially over the face and neck, complicate the various steps of anaesthetic management.

Difficult airway, is a usual presentation in such cases, and its management forms the basis of the anaesthetic management planned.

### **II. Case Series:**

Presented below is a series of four cases, wherein patients having head and neck burns, were managed using different airway devices, as per their individual requirements.

#### **Case 1:**

A 24 yr old female with burns over the face, neck and upper part of chest sustained two months ago was scheduled for skin grafting. She had no other comorbid pathology. On the operation table, i.v. line was established and monitoring started. For induction of anaesthesia with a face mask, the difficulty was raw area all over the face except a small patch of normal skin over the chin. Placement of a face mask would further damage the tissues, causing bleeding and soil the mask too.

An alternative to face mask was hence planned which has never been described in this situation before. The patient was fully explained about the procedure. Oropharyngeal anaesthesia was achieved with 10% xylocaine spray supplemented with i.v. midazolam 1mg. patient was asked to open the mouth and size 3 LMA was placed with cuff semi inflated. She tolerated this without any gagging, coughing or bucking. The correct placement confirmed by spontaneous efforts communicated into the reservoir bag after connecting to Bain's circuit and LMA cuff inflated to 60 cms H<sub>2</sub>O. The patient was anaesthetized with i.v. thiopentone 200mg, after confirming the LMA placement by manual squeeze, auscultation and recording of capnograph. She was paralysed with inj. Vecuronium 4mg i.v. inj. Pethidine 40 mg was given for intraoperative analgesia. The surgery was completed successfully without any difficulty. At the conclusion of surgery, the LMA was removed when the patient was fully awake with full neuromuscular recovery. On post operative questioning the patient reported that she was very comfortable with the LMA.

#### **Case 2:**

A 21 yr old female having contracture neck and upper limbs following stove burns 4 months back was planned for contracture release surgery. Her history and routine investigations unremarkable. On examination she revealed severe contracture neck with restricted neck extension (fig 1), however her MPG was grade II and mouth opening was adequate. Patient received oral premedication in the form of tab. Ranitidine 150mg, tab. Alprazolam 0.25mg a night before and 2hrs prior to surgery. Tab. Perinorm 10mg was given 2 hrs before surgery. Patient was counselled for awake fiberoptic intubation, but she refused for the same. In the operating room, she was given inj. Glycopyrrolate 0.2mg and preoxygenated for 5 mins with 100% oxygen using Bain's circuit. Bag and mask ventilation was possible though difficult. She was anaesthetized with inj. Propofol 100mg and increasing concentrations of sevoflurane (upto 6%) & N<sub>2</sub>O 67% in 33% oxygen. Direct laryngoscopy was then attempted but laryngeal inlet could not be visualized even with OLEM. After OLEM tip of epiglottis was barely seen. Pt. ventilated with 100% oxygen and sevoflurane again and size 3 ILMA was introduced. Owing to contracture, it negotiated through the oral cavity with difficulty. It was connected to the Bain's circuit and its position confirmed by reservoir bag movements, auscultation and capnography. As ventilation was satisfactory, a reinforced cuffed silicon (ILMA TT) with i.d. 7mm was navigated through the ILMA into the trachea in first attempt. Its position was confirmed and inj. Vecuronium bromide 4mg given i.v. The ILMA was subsequently removed gently over the tracheal tube and tube fixed in place. Anaesthesia was maintained with sevoflurane (1-2%) & 67% N<sub>2</sub>O in 33% oxygen and inj. Pethidine 30mg given for intraoperative analgesia. At the end of surgery, residual neuromuscular blockade was reversed with inj. Neostigmine 2.5mg and inj. Glycopyrrolate 0.4mg, and patient extubated when fully awake. Patient was comfortable in the post operative period.

**Case 3:**

A 56 yr old male patient, having six month old facial burns with microstomia and ectropion was planned for contracture release surgery. He had no other positive history or finding. On examination his mouth opening was restricted with MPG grade III (Fig 2).

In view of the microstomia an awake fibreoptic intubation was planned. The procedure was fully explained to the patient to which he consented. Oral cavity was topicalized with lignocaine gargles and lignocaine with adrenaline pledgets were used to anaesthetize the nasal cavity half an hour before surgery. On the operation table, i. v. line was established and monitors for SPO<sub>2</sub>, ECG and NIBP were attached. Vitals were noted to be within normal limits. Inj. Glycopyrrolate 0.2mg and inj. Midazolam 1mg were given i.v. Thereafter, superior laryngeal and transtracheal nerve blocks were given using 4ml of 2% lignocaine. A portex cuffed endotracheal tube (I.D. 7.5mm) was introduced through the right nostril after lubricating with lignocaine jelly. After it reached the nasopharynx, a fibroscope was introduced through the endotracheal tube and the laryngeal inlet was identified without much difficulty. The fibroscope was advanced further into the trachea under vision with intermittent spraying of lignocaine 2ml. After visualising the carina, tube was railroaded over the fibroscope into the trachea. The position of the tube was confirmed by capnography. Further anaesthesia was induced using standard anaesthesia technique with Inj. Vecuronium bromide 6mg and sevoflurane. The intraoperative and post operative course was smooth and uneventful.

**Case 4:**

A 25 yr old girl was posted for skin grafting. She had burns on face, neck and upper part of chest due to accidental fall of hot oil lantern. She had no other significant positive history. On examination she had contracture of the neck and both axilla. Neck movements were restricted in all directions with extension being maximally limited. Her Mallampatti grading was grade III and mouth opening limited. Her respiratory and cardiovascular systemic examination as well as routine investigations were within normal limits.

Burns over the face and neck were likely to make mask holding difficult. Moreover, grafting was to be done all over her neck. Preoperatively patient was anxious and refused for an awake fibreoptic intubation. She was premedicated with tab. Ranitidine 150mg and tab. Alprazolam 0.25mg a night prior and on the day of surgery. On the operating table, monitors were attached for ECG, SPO<sub>2</sub> and NIBP and baseline vitals noted. An i.v. line was secured with an 18G canula and inj. Glycopyrrolate 0.2mg was administered. Induction was done with inj. Propofol 100mg and sevoflurane in oxygen. After assessing the adequacy of mask ventilation, i.v. rocuronium 45mg was given. With due course of time, as the granular tissue at the angle of jaw and in submandibular region started bleeding and the jaw itself was relatively immobile following burns; the mask holding became increasingly difficult. Hence, a nasopharyngeal airway was introduced. This improved the ventilation markedly and was left in-situ anticipating a similar condition in the post operative period.

On conventional direct laryngoscopy done through midline approach using a Macintosh blade, a Cormack and Lehane grade IV view was observed, which did not improve on OLEM. Laryngoscopy was repeated using the left molar approach. The grade of view now improved to IIb. A portex cuffed ETT of I.D. 7mm was introduced into the trachea with the help of a stylet from the right angle of the mouth (fig 3). Its position was confirmed by capnography. Maintenance of anaesthesia was done with isoflurane and rocuronium. The intraoperative course was smooth and patient was comfortable postoperatively too.

### **III. Discussion**

Post burn neck contractures cause difficulties for endotracheal intubation especially, when cervical hyperextension and lifting of mandible are impaired. The presence of a rigid scar tissue which obscures the mandibular and laryngeal anatomy, and the presence of microstomia following retraction of the scar tissue, makes the use of alternative techniques to direct laryngoscopy difficult. Thus, the airway of patients with head, neck and facial burns may not only be difficult to maintain, but may present tricky intubations with little prior warning (1).

Usually i.v. ketamine is the preferred choice for short and minor procedures (1,2,3). However, surgeries requiring a longer operative time, demand a more secure airway for maintaining proper depth of anaesthesia. Presence of raw areas over the face & neck disturb the mask holding. Contractures and altered anatomy complicate the intubation by limiting the head and neck mobility. History of burns restrict the use of suxamethonium. In other words, routine methods of induction and intubation do not seem to suffice here. The available alternatives include awake fibreoptic intubation, blind nasal intubation, blind oral intubation via Augustine guide, LMA, combitube and cricothyrotomy in emergency situations (4).

**In case 1**, raw area over face made mask holding difficult. Oral local anaesthetic spray, facilitated a comfortable LMA insertion, while the LMA itself, secured the airway following which the patient could be anaesthetized. Another advantage was that, oxygen could be provided through the LMA in situ

postoperatively, till the patient was fully awake, avoiding postoperative mask holding again. Hence awake placement of LMA provided an atraumatic and safe method of airway management in a patient of facial burns, which has never been described in such condition before.

Anticipating the longer operative time and frequent position change, intubation was required in the next three cases.

**In case 2**, severe neck contracture restricted the neck movements especially extension. As mask ventilation was adequate, intubation was planned under anaesthesia with inj. Propofol and sevoflurane. Eventhough direct laryngoscopy showed a Cormack and Lahene grade III view, the mouth opening was adequate, which proved to be an advantage and allowed the use of an ILMA in this situation. This facilitated the intubation and provided a smooth induction(4). Awake fiberoptic intubation would have been ideal here, had the patient cooperated. Fibroscope was kept ready in case the ILMA failed.

**In Case 3**, the neck movements were adequate but patient had microstomia. This not only restricted the possibility of introducing an LMA & ILMA but also an ordinary laryngoscope(1). Hence awake fiberoptic intubation was planned in this case. Local anaesthetic packing, lignocaine spray and laryngeal nerve blocks provided a well prepared nasopharynx and made negotiation of the scope as well as tube comfortable. Contracture release at the angle of the mouth under ketamine followed by direct laryngoscopy and intubation, was an alternative available in the absence of a fibroscope(1,2,3).

**In case 4**, patient did not agree for an awake fiberoptic intubation. Here facial burns interfered with mask holding. The use of a nasopharyngeal airway markedly improved the ventilation prior to laryngoscopy as the depth of anaesthesia increased(5). Neck contracture as well as the edematous wounds, restricted the neck movements particularly extension, and the ongoing fibrosis decreased the mobility of midline structures. All this made direct laryngoscopy difficult and inconclusive. The left molar approach improved the laryngoscopic view and facilitated intubation thus, securing the airway. The molar approach improves the laryngeal view as compared to midline approach, as it reduces the incisor to larynx distance and prevents intrusion of maxillary structures into the line of view(6). Moreover it does not require any special equipment and hence useful when resources are limited. Intubation via ILMA was planned next had this approach failed.

#### **IV. Conclusion**

Thus, we conclude that each burns patient presents with a unique combination of a variety of problems, as seen in these cases. Patients require a detailed history taking and a thorough examination. Their management should be meticulously planned in view of the individual problems of the patient, anticipation of surgical duration, efficiency of the surgeon and available resources with the anaesthesiologists.

Secondly, eventhough ketamine helps to conduct short procedures, one must comfortably opt for using LMA or intubation to secure the airway whenever a long surgery requiring frequent change of position is anticipated.

#### **References:**

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#### **LEGENDS:**

- [6]. Figure 1: X-ray showing flexion deformity as a result of severe neck contracture.
- [7]. Figure 2: Microstomia following burns.
- [8]. Figure 3: Patient with neck contracture, with severe bleeding from angle of mandible and neck after induction of anaesthesia. It also shows a nasopharyngeal airway and an endotracheal tube in situ.