Anaesthetic and airway management of a post-burn contracture neck patient with microstomia and distorted nasal anatomy

INTRODUCTION

The reported incidence of difficult intubation is 5.85%, cannot intubate situation is 0.35% and cannot ventilate - cannot intubate situation is 0.02% and these can be major causes of anaesthesia-related morbidity and mortality.[1] Orofacial and anterior neck burns are challenging because of frequent fibroses of nose and external nares, restricted mouth opening, decreased oropharyngeal space, and reduced submandibular space compliance. Fibrosed neck contractures limit atlanto-occipital joint extension and inevitably lead to difficult airway. We report the successful management of a patient with distorted nasal anatomy, microstomia, neck contracture and

fixed flexion deformity by monitored and balanced use of intravenous, inhalational and local anaesthetic agents, muscle relaxants and fibreoptic intubation aided by bronchoscope airway.

CASE REPORT

A 15-year-old female patient presented with post-burn contracture (PBC) of neck and microstomia from acid burns affecting face, neck, chest and leg at the age of five. American Society of Anaesthesiologist physical status I on examination, she had a contracture band extending from bilateral nasal alae involving upper and lower lip, neck, trunk and abdomen extending till umbilicus on the right side. This resulted in complete obliteration of left nostril and partial obliteration of the right nostril with just lower lip mucosa being visible and mouth opening being inaccessible [Figure 1]. Contracture band was 42.6 cm long and 13.4 cm wide at neck leading to a fixed flexion deformity with no possible atlanto-occipital extension [Figure 1]. The head and neck X-ray (lateral view) showed crowding of teeth, decreased oropharyngeal spaces, decreased atlanto-occipital gap (3 mm), and decreased maxillo-pharyngeal angle (86°) [Figure 2].

Release of contracture and correction of microstomia was planned. In the operating room, two intravenous lines were secured with 20 gauge cannulae. Monitoring included standard 5 lead electrocardiogram, non-invasive blood pressure, oxygen saturation and capnography. The surgeon was alerted for possible emergency tracheostomy if needed during release of contracture. Intravenous glycopyrrolate 0.2 mg was administered followed by pre-oxygenation for 5 min with oxygen at 8 l/min by face mask kept closely over mouth opening. Intravenous ketamine 30 mg andpropofol 30 mg were administered over 4–5 min in small aliquots, while ensuring spontaneous ventilation. Release of the contracture band for assessment of mouth opening, oral cavity and securing the airway was performed after local infiltration of 2% lignocaine with adrenaline. Upon release of contracture, mouth opening was found to be less than one finger breadth because of microstomia. Laryngoscopy, laryngeal mask airway (LMA) insertion or awake fibreoptic bronchoscopy (FOB) were deemed impossible.

Labial commissures release was planned with inhalational anaesthesia using halothane at 1.0 MAC through 4.0 mm uncuffed endotracheal tube (ET) inserted through partially obliterated right nostril

Figure 1: Photograph of the patient showing the extent of burns over face, neck and trunk with inaccessible mouth opening lateral view head and neck showing decreased maxillopharyngeal angle

Figure 2: Fixed flexion deformity due to contracture neck with no possible atlanto-occipital extension

and connected with the Mapleson's circuit with side stream carbon dioxide sampling line attached. The decreased atlanto-occipital extension and decreased maxillopharyngeal angle precluded laryngoscopy or LMA insertion. An adult size bronchoscope airway was inserted and an intubating bronchoscope with 7.0 mm ET (Portex©) threaded on it was advanced through this into the oral cavity. The epiglottis was not visible due to local fibrosis. The glottic opening became visible and further, tracheal lumen was confirmed by visualising the tracheal rings and carina. For fear of displacement of precariously placed bronchoscope by gag reflex, the patient was paralysed using 50 mg of intravenous succinylcholine. The ET was advanced into the trachea under direct vision. Mechanical ventilation and anaesthesia was initiated and maintained with a combination of oxygen, nitrous oxide and halothane. Atracurium in a dose of 0.5 mg/kg was used for muscle relaxation. Intravenous fentanyl (2 mcg/kg) was used for analgesia. Intra-operative period was uneventful

and the patient was extubated over an airway exchange catheter when awake and breathing spontaneously after reversal of neuromuscular blockade.

DISCUSSION

Post-burn contracture patients can be operated by both regional (local) and general anaesthetic technique depending on the burn/scar area, age and weight of the patient, presence of any concomitant disease, skills and preference of operating surgeon, patient's consent and resources availability. Tumescent anaesthesia, though an established technique is not suitable for raw area more than 10% and for patients under 18 years of age. The possible side-effects of large dose of local anaesthetic may cause toxicity.[2] Three basic considerations before induction of general anaesthesia are, whether to use awake intubation, a percutaneous technique, or maintain spontaneous ventilation.[3] Airway examination described by el-Ganzouri *et al*.[4] is rapidly performed and quantifiable, however becomes out of question in patients such as ours. A prospective study of 148 patients found that when the maxillo-pharyngeal angle is <90°, the difficulty in direct laryngoscopy was comparable to Cormack and Lehane classification Grades III and IV.[5] Moreover, the decrease in atlanto-occipital distance has long been an established indicator of difficult intubation.[6] Lateral cervical radiographic assessment is used to predict the difficult laryngoscopy. FOB has been the gold standard for difficult intubations[7] with the significant advantage of being flexible and steerable, allowing continuous visualization of structures and a high success rate,[8,9] reducing the incidence of intubation trauma and post-operative upper airway oedema in patients with anticipated difficult intubation. In patients in whom awake FOB is impossible or those who will not tolerate awake FOB, sedation or general anaesthesia may be necessary. Though inhalational anaesthesia has major advantage of maintaining spontaneous ventilation, while changes in the depth of anaesthesia and associated respiratory and cardiovascular effects occur steadily, there is risk of hypoventilation, upper airway obstruction, and hypoxemia.

In our patient, the nasal route of fibreoptic intubation was unavailable due to fibrosed nostrils and oral FOB is also reported to be technically more difficult.[10] Furthermore, the gag reflex is more troublesome with the oral than with the nasal route. Various tubular oropharyngeal airways help to keep the FOB in the midline and deliver its tip to the laryngopharynx, prevent the patient from biting the FOB and have a patent airway. VBM Bronchoscope Airway™ intubator allows passage of an ET directly through its anterior channel into the glottis and can be removed by slipping it over the tracheal tube.

CONCLUSION

Successful anaesthetic management when the airway is inaccessible and distorted by PBCs and fibrosis mandates planned approach for securing airway, including use of FOB aided by a suitable oral intubating airway customised to the need of individual patients. Rigid protocols may not be the best choice in view of variations in extent and severity of contractures.

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