Submental intubation in a case of panfacial fractures in a paediatric patient: A case report.

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Abstract

Maxillofacial fractures can pose a challenge to the anaesthesiologist especially in securing the airway. The oral route of endotracheal intubation is unsuitable in surgical treatment requiring intraoperative maxillomandibular fixation and temporary occlusion of teeth. The nasal route may also pose a problem or may be contraindicated. Tracheostomy is an alternative, though it has a high likelihood of complications. Submental intubation offers an easy, rapid, and efficient substitute for oral and nasal tracheal intubation or tracheostomy in such patients. It does not interfere with the surgical field, provides simultaneous access to the nasal and oral airways, good dental occlusion with minimal morbidity.

Glossary of terms and abbreviations.

Panfacial fractures: Fractures involving cranium, midface and the mandible

POGO score: Percentage of glottis opening score

MMF: Maxillomandibular fixation

IMF: Intermaxillary fixation

Keywords: submental intubation, panfacial fractures, tracheostomy, paediatric patient
Introduction
Maxillofacial trauma poses a unique challenge to the anaesthesiologist in securing the airway. Surgical management of maxillofacial fractures warrants the use of dental occlusion and maxillomandibular fixation (MMF) which requires access to an unobstructed surgical field, making the orotracheal route of intubation inappropriate.\(^1\)\(^2\)\(^3\) Due to concomitant nose or skull base fractures, nasotracheal intubation may be contraindicated.\(^1\)\(^4\)\(^5\)\(^6\) An elective tracheostomy is traditionally performed though it bears a significant risk of complications, especially in the paediatric population.\(^1\)\(^4\)\(^6\)\(^7\) Submental endotracheal intubation provides appropriate airway protection with minimal morbidity along with unhindered access.\(^1\)\(^3\)\(^6\)\(^7\)

Case report
Our patient was a 12-year-old boy weighing 25 kg with an alleged history of fall from a tractor one month back with nasal and oral bleeding. The CT scan revealed extensive fractures involving the bilateral maxilla, zygoma, mandible, and nasal bone with no evidence of intracranial haemorrhage. (Fig 1) The child was posted for open reduction and internal fixation of panfacial fractures. On examination, there was limited mouth opening owing to intermaxillary fixation (IMF) done in the form of an arch bar. (Fig 2A) On the release of the arch bar wiring, airway assessment revealed a mouth opening of one and a half finger breadths, Mallampati IV, and normal neck movements. (Fig 2B) A sub-mental technique for endotracheal intubation was planned. On the day of the surgery, informed written consent was taken, nil per oral status was confirmed, standard ASA monitors were attached and an intravenous cannula was secured. The patient was preoxygenated with 100% FiO2, IV Fentanyl citrate 2 µg/kg and IV Propofol 2mg/kg was administered in titrated doses.
After loss of response to verbal commands, ventilation was checked, and check laryngoscopy was done using a CMAC C blade which revealed a POGO score of 50%, Cormack Lehane (CL) grade IIa IV. Vecuronium bromide 0.1mg/kg was administered and ventilation continued. The patient was intubated with a 6.5 ID cuffed oral flexometallic endotracheal tube (ETT) with the help of a stylet, fixed at 16 cm, and the position was confirmed with capnography and auscultation. General anaesthesia was maintained with oxygen – nitrous oxide – isoflurane. Under aseptic precautions and after local infiltration, a 1.5 cm horizontal incision was made just below the mentum in the

Figure 1. Xray facial bones showing the extent of the fractures
midline. The deflated pilot tube cuff and the ETT were brought out extraorally through the submental incision using a curved haemostat. The tube was attached to the breathing circuit and secured using sutures after confirming its position. (Fig 3) A throat pack was inserted and documented. The maxillofacial surgical team manipulated the mandibular fractures to satisfactory occlusion and fixation was done using continuous plates. Blood loss was adequately replaced with crystalloids and one unit packed red blood cells. Stable haemodynamics, normothermia, euglycemia, normocapnia, and adequate analgesia were ensured. At the end of the surgery, the tube was brought out intraorally and the submental incision was sutured. The patient was administered neostigmine 0.05 mg/kg and glycopyrrolate 0.008 mg/kg and extubated over an airway exchange catheter after confirming the return of protective airway reflexes. The patient was monitored in the PACU and subsequently shifted to the ward.

**Figure 2A.** No mouth opening owing to intermaxillary fixation (IMF) done in the form of an arch bar. **Figure 2B.** Limited mouth opening following the release of the arch bar.
Submental intubation

Discussion

The challenge in maxillofacial trauma is to establish a safe, secure, and acceptable route of endotracheal intubation. Panfacial fracture patients invariably need perioperative maxillomandibular fixation to confirm adequate occlusion, hence they are often unsuitable candidates for orotracheal intubation. Nasotracheal intubation in the presence of midfacial and basilar skull fractures carries the risk of epistaxis, pharyngeal trauma, sinusitis, iatrogenic meningitis, cerebrospinal fluid leak, and inadvertent cranial intubation.1,3,9

Figure 3

Figure 3. Secured submental tube
Tracheostomy, the most frequently described technique can cause complications like haemorrhage, subcutaneous or mediastinal emphysema, pneumothorax, laryngeal nerve injury, acute pulmonary edema, tracheal stenosis, tracheomalacia, tracheoesophageal fistula, and unsightly scars.\textsuperscript{1,2} Besides, the technique is challenging in the paediatric population.\textsuperscript{8} The retromolar intubation technique has been suggested, however it is more time-consuming since it involves bone resection and also increases damage to the lingual nerve.\textsuperscript{7} Submental intubation enables unhindered intraoperative access for fixation of panfacial fractures.\textsuperscript{1,4,6} Submental intubation was initially reported and proposed by Hernandez Altemir in 1986.\textsuperscript{1,2,10} It involves making a submental incision of 2 cm, approximately one-third of the distance between the symphysis and the angle of the jaw, medial to the lower border of the mandible and then guiding the tube extra orally by blunt dissection through subcutaneous tissue, platysma, deep cervical fascia, and mylohyoid muscle using a curved hemostat.\textsuperscript{7,10} This route eliminates the risks associated with nasotracheal intubation and tracheostomy. It can be safely employed in patients with possible base of skull fractures, Le Fort osteotomies or orthognathic surgery of the mandible and rhinoplasty, with the added benefit of concealing the scar in the submental area. Infection, harm to submandibular and sublingual glands, sublingual duct, and lingual nerve, oro-cutaneous fistula, and scarring are probable side effects, though the incidence is very low.\textsuperscript{6,7,8} Flexometallic endotracheal tubes are chosen due to their ability to maintain lumen patency.\textsuperscript{8} Prior to the procedure, the universal connector of the armoured tube should be removed with the help of mosquito forceps. Disconnecting the ETT during submental intubation causes the patients to experience a period of apnea and hence the patient must be given 100% oxygen before disconnection.\textsuperscript{8} Accidental dislodgement can
be avoided by anchoring the tube in the oropharynx with the tip of the anesthesiologist's index finger as the tube is being pulled extraorally. Intraoperatively, continuous monitoring of endtidal capnography, pulse oximetry and airway pressures is essential to diagnose endotracheal tube disconnection, endobronchial migration and accidental extubation. At the end of the procedure, the ETT must be brought back orally and the submental incision sutured. Extubation should be considered once the patient is fully awake, with minimal airway oedema, and access to airway is guaranteed. In our case, surgery could be completed without any interference with no airway compromise or hypoxic episodes.

**Conclusion**

Submental tracheal intubation is safe and effective in managing the airway in maxillofacial trauma with minimal morbidity. It enables unfettered manipulation of the fractured components, successful dental occlusion and maxillomandibular fixation when oral and nasal routes are not feasible. It is a useful technique for paediatric children with panfacial fractures who do not require prolonged ventilatory support postoperatively.

**References**


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