

Review Article

Submental Intubation in Complex Maxillofacial Trauma: An Overview

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Abstract:

Management of Airway in patients with complex maxillofacial trauma is challenging due to disruption of components of upper airway. Submental intubation is a simple, quick and effective alternative to oral and nasal intubation or tracheostomy. This provides a secure airway and allows unimpeded surgical access to the oral cavity and midface, whilst avoiding the potential complications associated with nasal intubation and tracheostomy. This article is an overview of the procedure and discusses the technique, scope, advantages, disadvantages and modifications of submental intubation.

Keywords: Airway management, Submental intubation, Tracheostomy

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INTRODUCTION:

Panfacial fractures refers to simultaneous fracture of multiple bones in the upper, middle and lower thirds of the face. The management of panfacial fracture is complex because of the lack of reliable landmarks. Early reconstruction and restoration of occlusion of patients with panfacial fractures by open reduction and rigid internal fixation is now the standard of care. However, maintenance of airway in patients with faciomaxillary injuries is challenging. Neither nasal nor orotracheal intubation is possible. Nasotracheal intubation in patients with nasal fractures can result in meningitis or the tube can be passed intracranially in patients with frontobasillar fractures.^{2,3} Orotracheal tube interferes with intraoperative intermaxillary fixation and thus cannot be used.⁴

Tracheostomy in such situations is conventional and time-tested; however, it has life-threatening complications, it needs special postoperative care, lengthens hospital stay, and adds to expenses. Submental intubation is an attractive alternative which overcomes the disadvantages of tracheostomy.

A Spanish faciomaxillary surgeon, Francisco Hernandez Altemir in 1986, first described "The submental route for endotracheal intubation".⁵ He proposed it as an alternative to short-term elective tracheostomy, where both oral and nasal route for endotracheal intubation were not feasible. This provides a secure airway and allows unimpeded surgical access to the oral cavity and midface, whilst avoiding the potential complications associated with nasal intubation and

tracheostomy. This article discusses the technique, scope, advantages, disadvantages and modifications of submental intubation.

TECHNIQUE:

The conventional submental intubation technique essentially involves creation of an orocutaneous tunnel and diverting the proximal end of the armoured ETT through anterior floor of the mouth.⁵ An appropriate-sized flexometallic ETTs is selected and made easily detachable from the universal connector. General anesthesia and intubation via the oral route is done with the armoured ETT in conventional way.

The entire submental region is scrubbed and prepared with 10% povidone iodine solution and is draped. The proposed site is infiltrated with 2% lignocaine with adrenaline. Skin incision measuring about 1.5cm is made in the right submental region parallel to the inferior border of the mandible. The advantage of right-sided incision is that it permits better visualization of the ETT orally by a left handed laryngoscopy. However, the side of incision may be altered based on the site of injury and mandible fracture. Blunt dissection is carried out with a medium-sized curved artery forceps along the lingual surface of the mandible through subcutaneous tissue, platysma, investing layer of deep cervical fascia, and the mylohyoid muscle. A paramedian oral incision is made over the tented mucosa created by the tip of the artery forceps. The patient is ventilated with 100% oxygen and 1% isoflurane for 5 min, after which the breathing circuit is disconnected and universal connector is detached from the tube. The tip of the pilot balloon cuff is first pulled through the submental incision followed by the distal end of the ETT in a similar fashion. The connector is reattached and the ETT reconnected with the breathing circuit. The position of the tube is confirmed by chest auscultation, and capnography. The ETT is secured to the skin using stay suture

with 2-0 heavy silk. A throat pack is placed during manipulation of the mandible. At the end of the surgery, the stay sutures are removed, followed by throat pack. Tracheal extubation is done through the submental route, when the patient is awake and maintaining airway reflexes. The submental incision is sutured using silk or nylon whereas the mucosal incision is left to heal by secondary intention. Skin sutures are removed after 5–7 days.

SCOPE:

Indications of submental intubation include panfacial fractures with associated fractures of nasal bone and skull base,⁶ repair of post cancerum oris defects,⁷ oronasal fistula,⁸ selected cleft lip and palate surgeries, repair of congenital malformations,⁹ skull base surgery,¹⁰ transfacial oncologic procedures of the cranial base, and pediculated craniofacial surgeries. The scope of this technique has extended far beyond the realm of faciomaxillary surgeries and it has been successfully used in orthognathic surgeries and elective aesthetic face surgeries as there is minimal distortion of the nasolabial soft tissue.¹¹ Submental intubation is contraindicated in patients who don't give consent, with bleeding diathesis, injury to laryngo-tracheal airway, history of keloid formation, long term airway maintenance desired and gunshot injuries in maxillofacial region.^{12,13}

ADVANTAGES:

Submental intubation combines the best features of both nasotracheal intubation and orotracheal intubation, and also avoids the complications associated with tracheostomy. This technique allows free intraoperative access to the dental occlusion and the nasal pyramid. It also allows adequate access to frontonasal fractures. Risk of iatrogenic meningitis or trauma of the anterior skull base as seen with naso-tracheal intubation are avoided.¹⁴ Complications associated with

tracheostomy such as tracheal stenosis, injury to cervical vessels or the thyroid gland are also avoided using this technique.¹⁵

DISADVANTAGES:

Disadvantages of submental intubation include accidental dislodgement of the tube during pulling of the tube end through the track,^{16,17} abscess formation in the floor of mouth, infection of the submental wound.^{18,19}

Formation of salivary fistula and development of mucocele have also been reported following submental intubation.^{20,21} Facial scarring is another disadvantage, as this is an extraoral procedure. However, by following proper surgical technique and placing the incision in the submandibular region scars can be concealed.²²

MODIFICATIONS:

After the first description of Submental intubation in 1986 by Altemir⁵, this technique has come a very long way. All modifications have been proposed with an expectation of improved outcome. Most authors are of the opinion that subperiosteal placement of the tube as described by Altemir is not necessary. In compound comminuted fractures of the mandible stripping of the periosteum for the placement of the tube can jeopardize blood supply.^{17,23,24}

Gadre and Waknis considered transmylohyoid as a more appropriate terminology, as in this technique the endotracheal tube passes through the mylohyoid muscle anywhere between the first mandibular molars of either side anterior to the masseter muscle.²⁴

Greene and Moore described the use of 2 endotracheal tubes (one anterograde and the other retrograde) as there is less chance of hypoxia if there is difficulty in retrieval and no need of detaching the connector.¹⁷

Nyarady et al suggested the "Rule of 2-2-2", wherein a 2 cm long incision is placed 2 cm away from the midline and 2 cm medial and parallel to the mandibular margin. They also proposed the use of a nylon guiding tube for

exteriorizing the ETT as this minimized the chance of injury to the associated structures.²⁵ Anwer et al suggested that placement of a 1.5-cm skin incision, 1 inch below and 0.5 inch anterior to the angle of the mandible is found to be more advantageous as posterior placement of the tube assures unobstructed surgical field.²⁶

Mahmood and Lello performed submental intubation using preformed Sheridan tube. The preformed curvature helps in positioning of the tube as it conforms to the anatomy of the region.²⁷ The use of Combitube SA (Tyco-Kendall, Mansfield, MA) through the wide submental incision or the external injury site makes provision for adequate dental occlusion, unimpeded surgical access, and ease of ventilation in severe maxillofacial injuries. Moreover, the inflated proximal balloon helps to allay pain and minimizes bleeding by spontaneous reduction of fracture fragments.²⁸

CONCLUSION:

Submental intubation serves as an attractive and adaptive option for intraoperative airway control in complex panfacial injuries. It combines the advantages of the nasotracheal and orotracheal intubation by allowing access to the interdental occlusion and nasal pyramid, respectively. It provides a safe and reliable route for airway management and avoids the difficulties and morbidity of nasotracheal intubation and tracheostomy. It presents a low incidence of operative and postoperative complications. The simplicity of the technique lies in the fact that no specialized equipment or technical expertise is required.

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