

Submental Intubation Technique: A Promising One in Complex Craniofacial Trauma

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ABSTRACT

Aim: To discuss the submental intubation technique as a suitable alternative to a short-term tracheostomy.

Summary: Maintenance of airway has always been a challenge and an essential part in the management of patients with poly trauma of the face or those undergoing multiple/complex facial osteotomies. In cases of pan facial trauma submental intubation is now-a-days gaining a wide spread acceptance over other intubation techniques. Submental intubation not only helps preventing potential complications associated with nasal intubation and tracheostomy and at the same time provides an unobstructed surgical field.

Keywords: Craniofacial trauma, Submental Intubation, Tracheostomy

conventional orotracheal intubation. The technique of submental intubation has been established as a suitable alternative to a short-term tracheostomy in such situations.⁴

SUBMENTAL INTUBATION TECHNIQUE

Submental intubation is useful for airway management during maxillofacial surgery when both nasal and orotracheal intubation are unsuitable and to avoid tracheostomy especially when long term ventilation is not required in the post operative period. The technique was originally described by Hernandez Altemir in 1986.⁵ Adequate mouth opening is pre-requisite requirement for this procedure. Submental intubation is always a second step after oral intubation is done. Oral endotracheal intubation is performed with cuffed flexometallic endotracheal tube. Taking all aseptic precaution of the skin of the neck, lower face and end of the tube, a 20 mm skin incision is made in paramedian submental region parallel and medial to inferior border of mandible (Fig. 1). By blunt dissection the incision is further extended intraorally through the mylohyoid muscles. During the dissection it is important that the width of the submental access should be sufficient to pass the tube without any interference. A good parameter is that the internal planes should be dissected in such a way as to ensure the same size of the skin incision.⁶ The muscular layer i.e platysma and mylohyoid muscles are traversed by Kelly forceps through submental incision, keeping the direction towards the floor of the mouth staying close to the inner aspect of the mandible to avoid damage of the sublingual gland, submandibular duct and lingual nerve.

INTRODUCTION

The anesthetic management of a patient with a compromised and traumatized airway presents the oral and maxillofacial surgeons with formidable challenges in the preoperative period. Maxillofacial trauma usually causes soft tissue damage, distortion in bony and soft tissue component of upper respiratory tract, often with little external evidence of deformation. Nasal intubation in these patients is controversial, particularly if performed without the benefits of a fiberoptic bronchoscope, because of potential complications.¹⁻³ Further, restoration of dental occlusion by means of intraoperative maxillomandibular fixation precludes



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Figure 1: Kelly forceps used to create submental tunnel.

The mucosal layer on the floor of the mouth is incised over the distal end of the forceps located in front of the sublingual caruncle and the forceps is then opened, creating a tunnel. The endotracheal tube is briefly disconnected from the breathing circuit and the tube connector is removed from the tube. Disconnection of the standard connector from the endotracheal tube facilitates easy passage of the endotracheal tube through the submental incision. To prevent any inadvertent pull being exerted on the tube from larynx, the tube is then manually stabilized and the tip of the endotracheal tube gently pulled out through the submental incision with the help of a curved haemostat. After confirmation of its adequate tracheal position by capnography and bilateral auscultation of the lungs, the tube is reconnected and secured to the skin of the submental area with 3-0 silk sutures.⁷ The distance marking on the endotracheal tube at the submental skin exit point is noted. It is usually 2 cm more than the oral fixation. This helps in checking the tube position intraoperatively.⁸ The tube connector is again attached and the endotracheal tube is reconnected to anesthesia breathing circuit (Fig. 2).



Figure 2: Submental intubation in situ.

DISCUSSION

Airway management of patients with pan facial fracture is complicated. Lines of treatment of fracture of facial bone such as maxilla or mandible are quite different because of the teeth present in them. Such cases not only require alignment of fractured fragments, but at the same time teeth are to be kept in proper occlusion. Thus, not only maintenance of the proper occlusion but its constant monitoring when the surgery is under progress is prerequisite in such cases. When only the mandible or maxilla is fractured, a nasal intubation suffices to achieve the goal. However, a panfacial fracture can present its problems with regard to occlusion.⁹ Nasal intubation can interfere with centralization and stabilization of nasal fractures. The presence of a nasal tube interferes with access to the surgical site particularly when trying to repair fractures of the nasoethmoid complex, intranasal mucosal lacerations and procedures using a coronal flap when the nasal skeleton must be fully exposed.¹⁰ An orotracheal

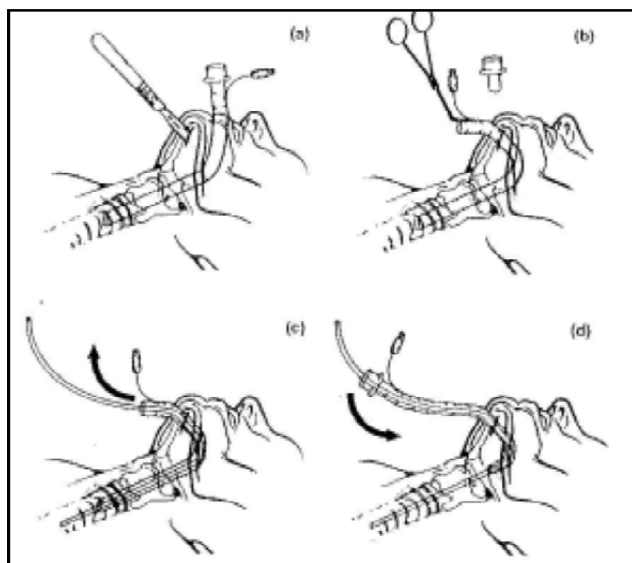


Figure 3: Steps showing procedure involved in submental intubation.

tube by interfering with occlusion may compromise the reduction and maintenance of panfacial fractures.¹¹ When neither nasotracheal nor orotracheal intubation is suitable, temporary tracheostomy is frequently the option of choice. This technique, however, is associated with significant morbidity. Complications include haemorrhage, recurrent laryngeal nerve damage, subcutaneous emphysema, tracheal stenosis, and a cosmetically undesirable scar.⁹ This is preferred particularly in the cases when postoperative maxillomandibular fixation (MMF) is required in a patient with a head injury and in patients who require intubation for an extended period. However, a tracheotomy is no longer required in many patients once the MMF is removed intraoperatively and might not be the best option when simpler techniques are available that have a lower morbidity and complication rate. Patients who receive a tracheostomy are left with a scar in an often obvious location, which can be depressed, hypertrophic or suboptimal in other regards. Later complications include tracheal stenosis, stomal and respiratory infections, and tracheoesophageal fistula. Although these complications are usually rare, they are completely eliminated with the use of submental intubation.¹¹

Various authors have reported less morbidity in case of submental intubation in comparison with a standard tracheostomy.¹²⁻¹⁵ They have described it as a useful, safe, and effective airway management technique during maxillofacial surgery, especially to avoid a short-term tracheostomy and its attending morbidity (Table 1).

Many modifications of the original technique are available.¹⁵⁻¹⁸ Although, adverse events and complications due to submental intubation are rare, but can occur while the endotracheal tube is passed through the incision from intraoral to extraoral. It may be difficult to pass the tube through the incision or reattaching the connector to endotracheal tube. These adverse events can be overcome by Green and Moore's

Table 1: Comparative analysis of tracheostomy, nasal intubation and submental intubation¹⁶

	Points in favour	Points against
Tracheostomy	<ul style="list-style-type: none"> Nasal route is avoided Allows maintaining proper occlusion Long term ventilation can be easily maintained 	<ul style="list-style-type: none"> Most invasive technique Risks of haemorrhage, scarring and tracheal damage – stenosis, tracheomalacia, infection
Nasal intubation using fibrescope	<ul style="list-style-type: none"> Allows dental occlusion intraoperatively Surgical scars are absent Fiber-optic scope is required 	<ul style="list-style-type: none"> Not good for prolonged post operative ventilation Risks of nasal bleeding, sinusitis and possible meningitis
Submental intubation	<ul style="list-style-type: none"> Allows dental occlusion intra and postoperatively Technically easy Low complication rate Cosmetically acceptable scar 	<ul style="list-style-type: none"> Poor in prolonged ventilation and weaning Increased risk of tube movement Unfamiliarity of technique

modification to the original technique. They used two endotracheal tubes in their technique. They first secured the airway with conventionally placed oro-tracheal tube. Reinforced endotracheal tube was then drawn in from exterior to interior through the submental incision. The original oral tube was withdrawn and reinforced tube substituted. However, grasping and drawing the tracheal end of the endotracheal tube can damage the cuff.¹⁸ At the end of the procedure, the process may be reversed.¹⁹

The potential indications for submental intubation also extend beyond craniomaxillofacial trauma to include orthognathic surgery and elective craniomaxillofacial procedures in which reference to the dental occlusion is required. Because if a nasal tube alone is used, care must be taken not to sever the tube during the nasal septal osteotomy or inadvertently extubate the patient during the midfacial downfracture and disimpaction.

Submental intubation avoids the risks of iatrogenic meningitis or trauma of the anterior skull base after nasotracheal intubation, as well as complications, such as tracheal stenosis, injury to cervical vessels or the thyroid gland, related to tracheostomy even while maintaining occlusion intraoperatively.²⁰

CONCLUSION

Management of patients with polytrauma of the face or those undergoing multiple/complex facial osteotomies has always been a challenge, not only to maxillofacial surgeons but also to the anesthetists, as both specialists fight for the same anatomic territory. Submental intubation, however, allows both the surgeons and anesthetists to work in harmony with each other. Thus Submental intubation should be chosen whenever possible in cases of purely maxillofacial trauma. Although, it demands a certain surgical skill but it is simple, safe and quick to execute.

REFERENCES

- Junsanto T, Chira T. Perimortem intracranial orogastric tube in pediatric trauma patient with a basilar skull fracture. *J Trauma* 1997; 42: 746–7.
- Schade K, Borzotta A, Michaels A. Intracranial malposition of nasopharyngeal airway. *J Trauma* 2000; 49: 967–8.
- Zmyslowski WP, Maloney PL. Nasotracheal intubation in the presence of facial fractures. *JAMA* 1989; 262: 1327–8.
- Arya VK, Kumar A, Makkar SS, Sharma RK. Retrograde submental intubation by pharyngeal loop technique in a patient with faciomaxillary trauma and restricted mouth opening. *Anesth Analg* 2005; 100: 534–7.
- Hernández Altemir F. The submental route for endotracheal intubation. A new technique. *J Maxillofac Surg* 1986; 14: 64–5.
- Caubi AF, Vasconcelos BC, Vasconcelos RJ, de Moraes HH, Rocha NS. Submental intubation in oral maxillofacial surgery: Review of the literature and analysis of 13 cases. *Med Oral Patol Oral Cir Bucal* 2008; 13: E197–200.
- Shetty PM, Yadav SK, Upadya M. Submental intubation in patients with panfacial fractures: A prospective study. *Indian J Anesth* 2011; 55: 299–304.
- Malhotra N. General Anaesthesia for Dentistry. *Indian J Anaesth* 2008; 52: Suppl (5): 725–37.
- Babu I, Sagtani A, Jain N. Submental tracheal intubation in a case of panfacial trauma. *Kathmandu Univ Med J (KUMJ)*. 2008; 6: 102–4.
- Davis C. Submental intubation in complex craniofacial trauma. *ANZ J Surg* 2004; 74: 379–81.
- Paetkau DJ, Stranc MF, Ong BY. Submental orotracheal intubation for maxillofacial surgery. *Anesthesiology* 2000; 92: 912.
- Garg M, Rastogi B, Jain M, Chauhan H, Bansal V. Submental intubation in panfacial injuries: our experience. *Dent Traumatol* 2010; 26: 90–3.
- Caron G, Paquin R, Lessard MR, Trépanier CA, Landry PE. Submental endotracheal intubation: an alternative to tracheostomy in patients with midfacial and panfacial fractures. *J Trauma* 2000; 48: 235–40.
- Chandu A, Smith AC, Gebert R. Submental intubation: an alternative to short-term tracheostomy. *Anaesth Intensive Care* 2000; 28: 193–5.
- Amin M, Dill-Russell P, Manisali M, Lee R, Sinton I. Facial fractures and submental tracheal intubation. *Anaesthesia* 2002; 57: 1195–9.
- Damon K, Viki M. Tracheal tubes for maxillofacial and dental surgery. *Anaesthesia and intensive care medicine* 2005; 6: 17.b.
- Biglioli F, Mortini P, Goisis M, Bardazzi A, Boari N. Submental orotracheal intubation: an alternative to tracheotomy in transfacial cranial base surgery. *Skull Base* 2003; 13: 189–95.
- Green JD, Moore UJ. A modification of submental intubation. *Br J Anaesth* 1996; 77: 789–91.
- Malhotra N, Bhardwaj N, Chari P. submental endotracheal intubation: a useful alternative to tracheostomy. *Indian J Anaesth* 2002; 46: 400–2.
- MacInnis E, Baig M. A modified submental approach for oral endotracheal intubation. *Int J Oral Maxillofac Surg* 1999; 28: 344–6.