

Submental orotracheal intubation: Our experience and review

Access this article online

Website:
www.amsjournal.com

DOI:
10.4103/2231-0746.83154

Quick Response Code:



Ramakrishna S. Shenoj, Samprati J. Badjate, Nilima J. Budhreja
Department of Oral and Maxillofacial Surgery, V.S.P.M's Dental College and Research,
Nagpur, Maharashtra, India

Address for correspondence:

Dr. S. R. Shenoj, Department of Oral and Maxillofacial Surgery,
V.S.P.M's Dental College and Research, Nagpur, Maharashtra, India.
E-mail: ramakrishna.shenoj@gmail.com

ABSTRACT

Introduction: In maxillofacial injuries, a choice has often to be made between different ways of intubation when surgical access to fractured nasal bone and simultaneous establishment of occlusion are required. We report our experience with submental intubation in the airway management of complex maxillofacial trauma patients. **Aims:** To evaluate the outcome of airway management in patients with complex maxillofacial fracture by submental intubation, time required for intubation, accidental extubation, postoperative complications, and to discuss indications, contraindications, advantages and disadvantages of submental intubation. **Settings and Design:** A retrospective study is designed. **Materials and Methods:** The medical records of seven patients who underwent submental intubation from December 2008 to June 2010 were reviewed and no statistical analysis was used. **Results:** At the end of the procedure all seven patients were extubated without any complications. Postoperatively only one patient presented with superficial infection of the submental wound. **Conclusions:** Submental endotracheal intubation is a simple technique with very low morbidity and can be used as an alternative to tracheostomy in selected cases of maxillofacial trauma.

Keywords: Panfacial trauma, submental orotracheal intubation, tracheostomy, transmylohyoid intubation

INTRODUCTION

The submental approach for intubation allows an unhindered reduction and fixation of the complex maxillofacial fractures in which simultaneous access to nasal pyramid fractures is required and thereby avoiding the need for tracheostomy.

Submental intubation was first described by Altimir.^[1] The term transmylohyoid intubation was given by Gadre and Kushte^[2] since the path of exit of the endotracheal tube is across the mylohyoid muscle and not restricted to the submental triangle.

We present a study of seven cases with review of literature, emphasizing on technical details, indications, contraindications, advantages, disadvantages, and complications of this technique.

MATERIALS AND METHODS

Patients having maxillofacial trauma in whom submental intubation was used were reviewed retrospectively from December 2008 to June 2010. Data recorded included personal details, type of maxillofacial fracture, time required for intubation, and intraoperative and postoperative complications related to the use of submental intubation. A total of seven patients had undergone submental intubation for management of complex craniomaxillofacial or panfacial fractures.

Anesthesia technique

All preparations for difficult airway were carried out. The patient was premedicated with atropine, ranitidine and ondansetron, preoxygenated and anesthesia induced with pethidine and propofol. Mask ventilation was possible after insertion of an oropharyngeal airway. 100 mg of suxamethonium chloride was

administered. Prior to intubation it is important to detach and reattach the sealed universal connector gently from the proximal end of the flexometallic endotracheal tube (ETT) (Portex, Smiths Medical ASD, Inc., USA) so that it can be easily disconnected during the procedure. Flexometallic ETT is preferred since it is reinforced with a metallic spring material which has a shape memory and thus the tube is flexible, kink-resistant and retains patency despite the acute angle of the airway, particularly at the submental route. Initially standard orotracheal intubation was carried out and ETT is connected to the breathing circuit. The orotracheal intubation is then transformed into the submental intubation using the following surgical technique. A standard extubation procedure was carried out after completion of the anticipated procedure.

Surgical technique

A temporary draping of the mouth and chin was carried out after standard skin preparation with 10% povidone-iodine solution. Subsequently, a 1.5–2 cm skin incision was made in the paramedian submental region, directly adjacent to the medial aspect of the lower border of the mandible [Figure 1]. The muscular layers, i.e. platysma and mylohyoid muscles were traversed using a pair of curved artery forceps that were always in contact with the lingual cortex of the mandible. The

mucosal layer in the floor of the mouth was incised over the distal end of the forceps and the forceps were then opened, creating a wide tunnel so that the tube can be drawn easily [Figure 2].

We prefer to pass the tube in two steps. The tube cuff was first introduced into the mouth. After its deflation, a closed curved artery forceps was inserted intraorally through the surgically-created tunnel, then the tube cuff was grasped with curved artery forceps and pulled inferiorly to pass through the tunnel and emerge through the incision in the submental skin. The same maneuver was then carried out with the proximal end of the ETT tube itself, after disconnection from the circuit and detachment of the connector. It should be noted that the patient is ventilated with 100% oxygen for around 3 min to prevent oxygen desaturation during the period of ventilator interruption while passing the ETT across the floor of mouth. After the ETT tube has emerged extraorally through the tunnel, the connector was reattached and the circuit was re-established. Auscultation was used to confirm the final position of ETT. At this point, the position of the ETT tube was reassessed and adjustments of the ETT were made so that there is equal bilateral air entry. A pharyngeal pack was then inserted to seal the pharynx from blood and debris during surgery.



Figure 1: Incision for submental intubation



Figure 2: Mucosal layer incised



Figure 3: Endotracheal tube secured at the end of the procedure



Figure 4: Minimal postoperative submental scar

Stay sutures with 3-0 silk were placed round the ETT to secure it, thus minimizing the perioperative movement and prevent accidental extubation [Figure 3]. The tube crossed the oral mucous membrane of the floor of the mouth, submucosa, mylohyoid muscle, deep cervical fascia, platysma, subcutaneous tissue, and skin of the paramedian submental region. After completion of submental intubation the anticipated procedure was carried out. At the end of the procedure, the stay sutures around the ETT were removed and the deflated pilot tube cuff and the ETT were pulled in reverse order from the tunnel to the oral cavity and thus submental intubation transformed into orotracheal intubation. The skin wound was closed with simple interrupted sutures using 3-0 prolene while intraoral wound was left to heal secondarily.

RESULTS

Submental orotracheal intubation was completed successfully in seven male patients with ages ranged from 18 to 32 years. No accidental extubation or tube injuries occurred. The mean time required for the procedure was 10 min. Disconnection time from the ventilator was approximately 2 min and there was no significant oxygen desaturation in any patient during the procedure. No major complications such as hemorrhage, injury to the sublingual glands, Wharton's duct, lingual nerve, or orocutaneous fistula were observed. No motor or sensory nerve disturbance was recorded. Postoperative scarring of the submental wound was detectable only upon close inspection with the neck hyperextended [Figure 4]. None of the cases showed keloid or hypertrophic scars. However, we experienced one case of superficial infection of the submental wound, which got resolved after systemic antibiotics and debridement.

DISCUSSION

Difficulty in securing an airway is often associated with the management of complex maxillofacial trauma. When neither nasotracheal nor orotracheal intubation is suitable, tracheostomy is a traditional method favored by some surgeons and anesthesiologists. However, this procedure is associated with complications such as hemorrhage, subcutaneous emphysema pneumomediastinum, blockage of tracheostomy cannula, tracheitis, cellulitis, pulmonary atelectasis, tracheoesophageal fistula, tracheocutaneous fistula, pneumothorax, recurrent laryngeal nerve damage, stomal and respiratory tract infection, tracheal stenosis, tracheal erosions, dysphagia, problems with decanulation, excessive scarring and requires careful surgical and perioperative management.^[3-6]

Different alternatives to tracheostomy have been proposed in the literature. In maxillofacial trauma, which requires maxillomandibular fixation and simultaneous nasal fracture reduction, switching an ETT from the nasal route to the oral route without extubation was proposed by Werther *et al.*^[7] However, sterility of the surgical field is interfered by this switch method. The reason for avoidance of nasotracheal intubation (NTI) in panfacial fracture, skull base fracture, and nasoorbitoethmoid complex fracture is the danger of accidental passage of the tracheal tube into the cranial cavity during nasal intubation, this can lead to major complications such as meningitis, sepsis,

and cerebrospinal fluid leakage.^[8,9] NTI is frequently avoided in nasal bone fractures, which cannot be properly managed in the presence of a nasal tube and is also avoided in patients with a deviated nasal septum, polyposis, or other intranasal pathologic conditions.

Martinez-Lage *et al.*^[10] performed 'Retromolar intubation' for securing airway in the management of patients with complex maxillofacial trauma and in patients requiring a cranial base approach. In this procedure, a semilunar osteotomy is done in the retromolar space. Thus, in the prepared retromolar area the orotracheal tube is placed below the occlusal plane. However, there are disadvantages of this technique as well. Bone anatomy is altered to prepare space for the tube, damage to lingual nerve, the procedure requires a mean of 25 min to perform and there is always a risk of dislodgement of the orotracheal tube.

Submental intubation is now a known alternative to tracheostomy to secure airway in the management of severe maxillofacial injuries. It is a versatile technique which allows intubation of patients in the presence of polytrauma and allows maxillomandibular fixation along with simultaneous access to nasal pyramid fractures. The submental intubation technique apart from securing airway provides an unobstructed intraoral surgical field, avoids intraoperative and postoperative complications of tracheostomy, and overcomes disadvantages of NTI. Schutz and Hamed^[11] in their comparative study between submental intubation and tracheostomy concluded that the submental intubation is associated with low morbidity and can replace tracheostomy in selected cases of maxillofacial trauma.

Other indications of submental intubation are simultaneous orthognathic surgery with rhinoplasty^[12,13] and transfacial cranial base surgery.^[14] In orthognathic surgery, submental intubation allows a simultaneous rhinoplasty procedure without any interference and allows better assessment of soft tissue changes in nose and lip. According to Biglioli *et al.*,^[14] submental intubation can be performed during transmaxillary approaches for the exposure of the clivus in which if orotracheal intubation is performed, the orotracheal tube can obstruct the downward retraction of the maxilla after a Le Fort I osteotomy.

The submental intubation technique is contraindicated in patients who require a prolonged period of assisted ventilation, that is, polytrauma patients presenting with severe neurologic damage or major thoracic trauma and patients expected to need repeated surgical interventions.^[15]

A review of literature reveals that the Altemir's original technique^[1] which has been modified can be divided into anatomical and anesthetic modifications.

Anatomical modification includes the variation in path of exit of the ETT. Stoll *et al.*^[16] advocated the submandibular approach instead of the laterosubmental approach. MacInnis and Baig^[17] found the laterosubmental approach was less satisfactory because of difficulty in tube passage, bleeding, and sublingual gland injury and thus preferred the submental incision in the midline. However, the midline approach can traumatize the Wharton's ducts, interfere with attachment of the genioglossus

and geniohyoid muscles. Extraperiosteal dissection in close contact with lingual periosteum of the mandible instead of subperiosteal dissection has been the main modification suggested by Tagliatalata *et al.*^[18]

Anesthetic modifications have been given by several authors. Green and Moore^[19] first secured the airway with orotracheal intubation, then passed the reinforced ETT through the submental wound into the oral cavity and substituted the reinforced tube in place of the conventional oral tube after withdrawal of the oral tube. According to Altemir and Montero^[20] laryngeal mask can be used with the technique in patients with laryngeal trauma, unstable cervical fracture, and in voice professionals. Drolet *et al.*^[21] used a lubricated tube exchanger to replace the submental tracheal tube with a fresh re-enforced armoured one. Tube obstruction or damage is difficult to manage with submental route. To overcome these difficulties ETT exchanger is beneficial to replace the damaged ETT. Amin *et al.*^[22] used a 100% silicone wire-reinforced tube with a removable connector, originally designed for the use with the intubating laryngeal mask airway. Lim *et al.*^[23] suggested covering the proximal end of the ETT with a blue cup of thoracic catheter to facilitate externalization of the orotracheal tube and to prevent entering of blood and soft tissue during pulling of the tube through the submental canal. Retrograde intubation is recommended by Arya *et al.*^[24] in patients with restricted mouth opening.

In our patients, we opted to use single reinforced ETT, a paramedian submental approach. In all of our patients submental intubation permitted simultaneous reduction and fixation of all fractures and intraoperative control of dental occlusion without interference from the tube in the surgical field.

There are disadvantages of the submental intubation technique as well. It is an extraoral procedure and reported complications include detachment of pilot balloon or its damage during exteriorization,^[21,22] damage to the cuff of the tracheal tube,^[18] abscess formation in the floor of mouth, infection of the submental wound,^[18,25] salivary fistula,^[26] development of mucocele,^[27] and facial scarring. Complications associated with submental intubation are not as severe as seen in tracheostomy and can be avoided by following a proper surgical technique. According to Gadre and Kushte^[28] remaining in contact with the lingual cortex of the mandible, the protection of lingual nerve, the submandibular duct, and mandibular branch of the facial nerve is guaranteed. Also remaining anterior to the masseter muscle guarantees protection to the facial artery.

Rare complications are associated with submental intubation out of which we have encountered only one complication of superficial submental wound infection, which was managed by systemic antibiotic coverage and debridement.

CONCLUSION

According to the literature and our own experience, submental endotracheal intubation is a simple technique with low morbidity. The technique with no specialized equipment or technical expertise required gives unique advantage over other techniques used to avoid tracheostomy. It combines the advantages of

the NTI and orotracheal intubation by allowing access to the interdental occlusion and nasal pyramid, respectively. Submental intubation has proven effective in terms of both the result and surgical time required. It presents a low incidence of operative and postoperative complications and eliminates the risks and side effects of tracheostomy. Thus, it can be used as an alternative to tracheostomy in selected cases of maxillofacial trauma, where nasotracheal and orotracheal intubation is impossible or contraindicated and long-term ventilation support is not required.

REFERENCES

1. Altemir FH. The submental route for endotracheal intubation. *J Maxillofac Surg* 1986;14:64-5.
2. Gadre KS, Kushte D. Transmylohyoid oroendotracheal intubation: A novel method. *J Craniomaxillofac Surg* 1992;3:39-40.
3. Chew JY, Cantrell RW. Tracheostomy, complications and their management. *Arch Otolaryngol* 1972;96:538-45.
4. Walker DG. Complications of tracheostomy: Their prevention and treatment. *J Oral Surg* 1973;31:480-2.
5. Stauffer JL, Olson DE, Petty TL. Complications and consequences of endotracheal intubation and tracheotomy. *Am J Med* 1981;70:65-76.
6. Wood DE. Tracheostomy. *Chest Surg Clin N Am* 1996;6:749.
7. Werther JR, Richardson G, McIlwain MR. Nasal tube switch: Converting from a nasal to an oral endotracheal tube without extubation. *J Oral Maxillofac Surg* 1994;52:994-6.
8. Muzzi DM, Losasso TJ, Cucchiara RF. Complications from a nasopharyngeal airway in a patient with a basilar skull fractures. *Anesthesiology* 1991;74:366-72.
9. Marlow TJ, Goltra DD, Schabel SI. Intracranial placement of a nasotracheal tube after facial fracture: A rare complication. *J Emerg Med* 1997;5:187-91.
10. Martinez-Lage JL, Eslara JM, Cebrecos AI, Marcos O. Retromolar intubation. *J Oral Maxillofac Surg* 1998;56:302-6.
11. Schutz P, Hamed HH. Submental intubation versus tracheostomy in maxillofacial trauma patients. *J Oral Maxillofac Surg* 2008;66:1404-9.
12. Nyarady Z, Sari F, Olasz L, Nyarady J. Submental endotracheal intubation in concurrent orthognathic surgery: A technical note. *J Craniomaxillofac Surg* 2006;34:362-5.
13. Chandu A, Witherow H, Stewart A. Submental intubation in orthognathic surgery: Initial experience. *Br J Oral Maxillofac Surg* 2008;46:561-3.
14. Biglioli F, Mortini P, Goisis M. Submental orotracheal intubation: An alternative to tracheotomy in transfacial cranial base surgery. *Skull Base Surg* 2003;13:189-95.
15. Meyer C, Valfrey J, Kjartansdottir T. Indication for and technical refinements of submental intubation in oral and maxillofacial surgery. *J Craniomaxillofac Surg* 2003;31:383-8.
16. Stoll P, Galli C, Wachter R, Bahr W. Submandibular endotracheal intubation in panfacial fractures. *J Clin Anesth* 1994;6:83-6.
17. MacInnis E, Baig M. A modified submental approach for oral endotracheal intubation. *Int J Oral Maxillofac Surg* 1999;28:344-6.
18. Tagliatalata S, Maio G, Aliberti F. Submento-submandibular intubation: Is the subperiosteal passage essential? Experience in 107 consecutive cases. *Br J Maxillofac Surg* 2006;44:12-4.
19. Green JD, Moore UJ. A modification of sub-mental intubation. *Br J Anaesth* 1996;77:789-91.
20. Altemir FH, Montero SH. The submental route revisited using the laryngeal mask airway: A technical note. *J Craniomaxillofac Surg* 2000;28:343-4.
21. Drolet P, Girard M, Poirier J, Grenier Y. Facilitating submental endotracheal intubation with an endotracheal tube exchanger. *Anesth Analg* 2000;90:222-3.
22. Amin M, Dill-Russell P, Manisali M, Lee R, Sinton I. Facial fractures and submental tracheal intubation. *Anaesthesia* 2002;57:1195-9.
23. Lim HK, Kim IK, Han JU. Modified submental orotracheal intubation using the blue cap on the end of the thoracic catheter. *Yonsei Med J* 2003;44:919-22.
24. Arya VK, Kumar A, Makkar SS. Retrograde submental intubation by

- pharyngeal loop technique in a patient with faciomaxillary trauma and restricted mouth opening. *Anesth Analg* 2005;100:534-7.
25. Caron G, Paquin R, Lessard MR, Trepanier CA, Landry PE. Submental endotracheal intubation: An alternative to tracheotomy in patients with midfacial and panfacial fractures. *J Trauma* 2000;48:235-40.
 26. Gordon NC, Tolstunov L. Submental approach to oroendotracheal intubation in patient with midfacial fractures. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1995;79:269-72.
 27. Stranc MF, Skoracki R. A complication of submandibular intubation in a panfacial fracture patient. *J Oral Maxillofac Surg* 2001;29:174-6.
 28. Gadre KS, Wanknis PP. Transmylohyoid/Submental Intubation: Review, Analysis, and Refinements. *J Craniomaxillofac Surg* 2010;21:516-9.

Cite this article as: Shenoi RS, Badjate SJ, Budhreja NJ. Submental orotracheal intubation: Our experience and review. *Ann Maxillofac Surg* 2011;1:37-41.

Source of Support: Nil, **Conflict of Interest:** None declared.

Author Help: Online Submission of the Manuscripts

Articles can be submitted online from <http://www.journalonweb.com>. For online submission articles should be prepared in two files (first page file and article file). Images should be submitted separately.

- 1) **First Page File:**
Prepare the title page, covering letter, acknowledgement, etc., using a word processor program. All information which can reveal your identity should be here. Use text/rtf/doc/pdf files. Do not zip the files.
- 2) **Article file:**
The main text of the article, beginning from Abstract till References (including tables) should be in this file. Do not include any information (such as acknowledgement, your names in page headers, etc.) in this file. Use text/rtf/doc/pdf files. Do not zip the files. Limit the file size to 1 MB. Do not incorporate images in the file. If file size is large, graphs can be submitted as images separately without incorporating them in the article file to reduce the size of the file.
- 3) **Images:**
Submit good quality color images. Each image should be less than **4096 kb (4 MB)** in size. Size of the image can be reduced by decreasing the actual height and width of the images (keep up to about 6 inches and up to about 1200 pixels) or by reducing the quality of image. JPEG is the most suitable file format. The image quality should be good enough to judge the scientific value of the image. Always retain a good quality, high resolution image for print purpose. This high resolution image should be sent to the editorial office at the time of sending a revised article.
- 4) **Legends:**
Legends for the figures/images should be included at the end of the article file.