



Submental endotracheal intubation as an alternative to tracheostomy in selected cases of facial fracture: literature review and technique report

Seçili yüz kırığı olgularında trakeostomiye alternatif submental endotrakeal entübasyon: Literatür derlemesi ve teknik rapor

Joel Motta JUNIOR,¹ Leandro Eduardo KLUPPEL,²
Cecilia Luiz PEREIRA STABILE,¹ Glaykon Alex VITTI STABILE¹

Intermaxillary fixation (IMF) is an essential guide to optimize the reduction and fixation of most facial fractures associated with occlusal alterations. To allow IMF, nasotracheal intubation is used in most cases. When nasotracheal intubation is not possible, a tracheostomy may be indicated, but this carries significant morbidity. Submental endotracheal intubation allows IMF to be used without resorting to nasal intubation or tracheostomy, and it does not interfere with reduction and fixation of fractures in most cases. The purpose of this article is to describe the indications, contraindications and the technique of submental endotracheal intubation as performed in our service.

Key Words: Intubation; tracheostomy; submental endotracheal intubation.

Oklüzyon bozuklukları olan çoğu yüz kırıklarının redüksiyon ve fiksasyonunu optimize etmede intermaksiller fiksasyon (İMF) temel bir kılavuzdur. İMF'ye olanak tanımak için olguların çoğunda nazotrakeal entübasyon uygulanır. Nazotrakeal entübasyon mümkün olmadığında trakeotomi endike olabilir de önemli morbidite riski taşır. Submental endotrakeal entübasyon nazal entübasyon veya trakeostomiye başvurmadan İMF'nin kullanılmasına olanak tanıdığı gibi olguların çoğunda kırıkların redüksiyon ve fiksasyonunu olumsuz etkilememektedir. Bu yazıda submental endotrakeal entübasyonun endikasyonları, kontrendikasyonları ve tekniği anlatıldı.

Anahtar Sözcükler: Entübasyon; trakeostomi; submental endotrakeal entübasyon.

Orotracheal intubation is an easy and safe method for airway control during general anesthesia. However, procedures involving the oral cavity and establishment of dental occlusion may be hindered by the presence of the oro-tracheal tube. Nasotracheal intubation, on the other hand, allows most intraoral and extraoral approaches and leaves the oral cavity free of interferences for intermaxillary fixation (IMF).^[1] Some conditions, nonetheless, contraindicate the use of a nasotracheal tube,^[2-4] and for those cases, a tracheostomy is the most commonly used method for establishing an airway.^[5] In 1984, Spanish author Hernández-Altemir first described the use of a sub-

mental approach for oro-tracheal intubation. The technique was recommended for procedures requiring transoperative IMF, to avoid the tracheostomy and its possible complications.^[6,7] Since then, some authors have described modifications of the original technique.^[8-14] The most common indications and contraindications for submental endotracheal intubation are presented in Table 1.

The purpose of this article is to describe the indications, contraindications and the technique modifications adopted in our service for submental endotracheal intubation.

¹Department of Oral and Maxillofacial Surgery, State University of Londrina, Londrina-pr;

²Department of Anesthesiology, State University of Ponta Grossa, Ponta Grossa-pr, Brazil.

Londrina Eyalet Üniversitesi, Ağız ve Çene Cerrahisi Bölümü, Londrina;

Ponta Grossa Eyalet Üniversitesi, Anesteziyoloji Bölümü, Ponta Grossa Brezilya.

Table 1. Indications and contraindications for submental endotracheal intubation

Indications	Contraindications
Midface fractures with occlusal alterations	Need for long-term airway maintenance
Nasal fractures associated with occlusal alterations	Multiple mandibular fractures requiring submental or trans-cervical approaches
Panfacial fractures	Associated cranial base fractures
Intranasal pathologies	
Posterior nasal bleeding	
Le Fort II and III fractures	
Orthognathic surgery patients in whom conventional nasotracheal intubation or nasofibrosopic intubation is not possible	

Description of the technique

Prior to the orotracheal intubation, the endotracheal tube is prepared by removing the universal connector, so that the tube can be passed more easily through the submental approach. The connector is then repositioned so that the anesthesiologist can intubate the patient as usual and connect the tube to the ventilator. We prefer to do the submental reversion as a separate procedure, with a specific set of instruments, patient preparation and sterile drapes. After induction and conventional orotracheal intubation, intra and extra-oral antisepsis are performed and sterile drapes are positioned.

Surgical approach

Initially, 3 ml of local anesthetic with adrenaline (1:200.000) is injected subcutaneously. The incision line should be 1.5 cm long, and located about 2 cm lateral to the midline (Fig. 1a). Submandibular fat tissue, platysma muscle, mylohyoid muscle and the oral mucosa are bluntly dissected using a Kelly hemostatic forceps (Fig. 1b). Dissection should follow the lingual cortex of the mandible to avoid damage to the digastric muscle and submandibular and sublingual gland ducts. Intraoral palpation helps the surgeon in directing the forceps during dissection. Once the oral cavity is reached, the forceps should be opened to enlarge the approach and allow the endotracheal tube to be passed through.

Reversion of the tube

The reversion of the endotracheal tube starts with the surgeon passing the cuff through the submental approach, using the Kelly forceps to gently hold the cuff's initial portion and traction it extraorally. The opposite hand is used to guide the cuff through the approach (Fig. 1c).

The orotracheal tube is then disconnected from the ventilator, the universal connector is removed again, and a glove finger cut from a sterile surgical glove is used to protect the tube from fluids and blood (Fig. 1d). To be passed, the tube is gently held with a Kelly

forceps. To avoid dislocating the tube, it should be carefully held against the palate during the passing of its extremity through the approach. After the tube has been passed, the glove finger protection is removed, the universal connector is replaced, and the tube is reconnected to the ventilator. The tube stays over the floor of the mouth, covered by the tongue, and should be held in place with suspending sutures to the skin (Fig. 1e).

The surgical drapes are then removed. The anesthesiologist should auscultate the patient to check if the tube position is correct. The patient is then prepped and draped once more for the main surgical procedure. Once surgery is over, the universal connector is removed again, with the tube being held, and the tube and cuff are passed through the approach and reconnected to the ventilator. The extraoral wound is sutured with 3.0 mononylon. The intraoral wound does not require sutures and the postoperative bleed is minimal.

DISCUSSION

Submental reversion of an orotracheal tube is a simple and safe technique for transoperative airway maintenance, generally performed by the surgeon. It was described 20 years ago (Hernández-Altemir, 1984)^[15] and has been used in patients with contraindications for oral or nasotracheal intubation, such as the treatment of multiple facial fractures for which transoperative IMF is necessary, some cases of orthognathic surgery^[4] and skull base surgery.^[16]

About 2.5-4.4% of all facial fractures are associated with cranial base fractures.^[17,18] In these cases, nasotracheal intubation should be avoided due to the possibility of introduction of the endotracheal tube into the cranial fossa and consequent complications like epistaxis, posterior pharyngeal trauma, auditory tube injury, ethmoid sinus drainage alterations, brain damage, liquor fistula, and meningitis.^[13,20-25] These situations can be avoided by performing submental orotracheal intubation on selected cases.^[18,19]

Since its original publication in 1984, a few authors

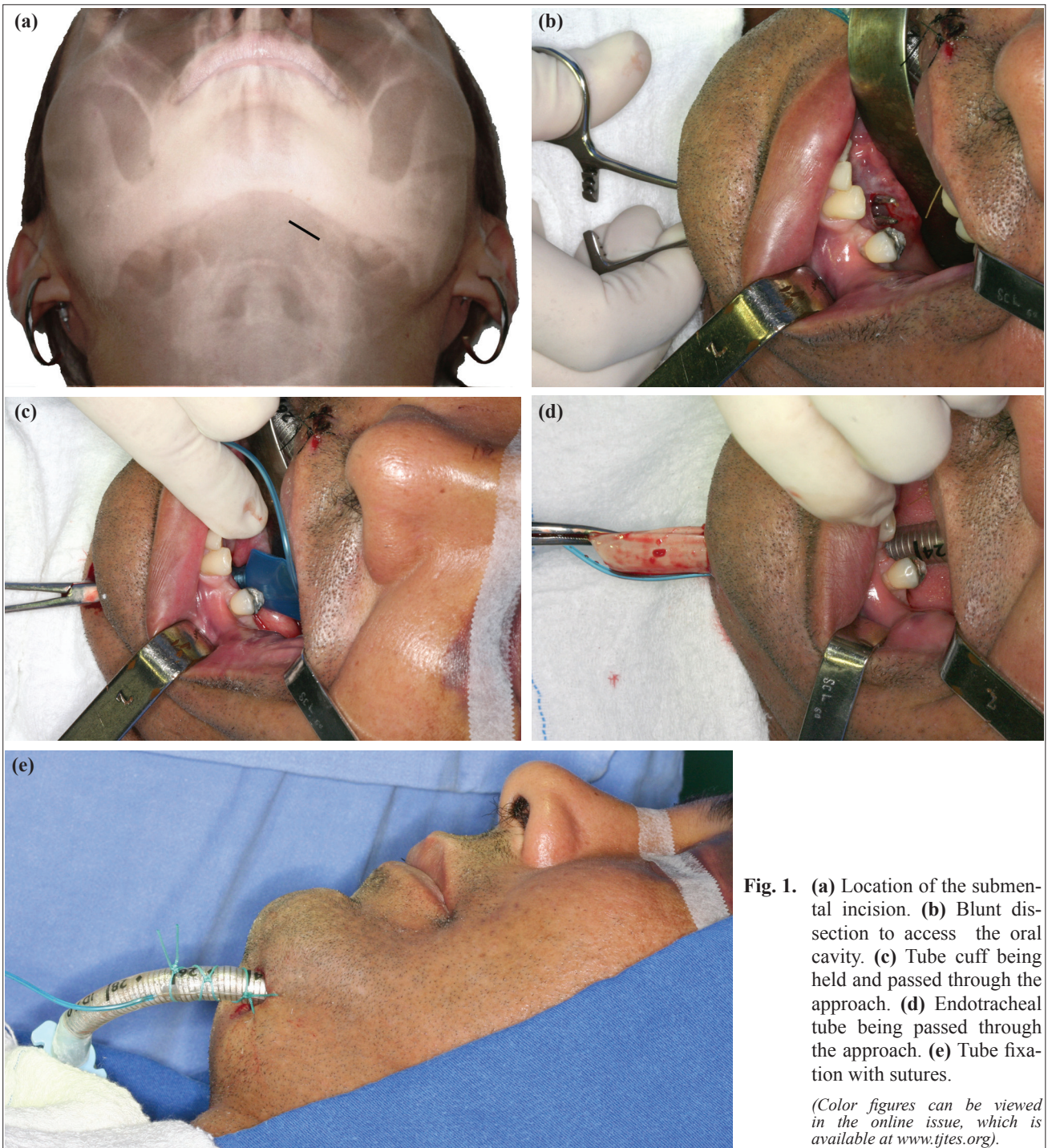


Fig. 1. (a) Location of the submental incision. (b) Blunt dissection to access the oral cavity. (c) Tube cuff being held and passed through the approach. (d) Endotracheal tube being passed through the approach. (e) Tube fixation with sutures.

(Color figures can be viewed in the online issue, which is available at www.tjtes.org).

have suggested modifications in the submental orotracheal technique. Green & Moore (1996) and Stranc & Skoracki (2001) used two endotracheal tubes, instead of passing the same tube through the approach after intubation. MacInnis & Baig (1999) used a midline approach and an incision on the floor of the mouth. Malhotra (2006) positioned the tube in the retromandibular region. In our service, reinforced endotracheal tubes have been preferred, to avoid the obstruction by inadvertent bending during surgery. We also prefer to do the submental reversion as a separate pro-

cedure to prevent contamination of the surgical field, even though it can demand more time since the patient needs to be prepped and draped again before the actual surgical procedure. This also allows the anesthesiologist to auscultate the patient and check the tube position before surgery. The use of a single tube avoids reintubation of the patient and possible laryngeal edema due to excessive manipulation.^[13]

Some factors may hinder submental reversion of the orotracheal intubation, such as patients with ret-

rogenia, limited mouth opening and large mandibular tori. In addition, the reduction and fixation of fractures of the mandibular symphysis or anterior mandible may be challenged by the submental orotracheal intubation, so careful evaluation and planning are recommended in those cases. A few complications of this technique are reported in the literature, like infection, fistula, bleeding, hypertrophic scarring, and mucocele formation, ranging between 0.24-7.13%.^[20] The complications presented are of lower gravity, especially if compared to the complications of tracheostomy.^[25]

Adequate communication between the surgeon and anesthesiologist is essential to perform this technique, because of the necessity of tube manipulation and system disconnection before and after the surgical procedure. During the reversion, the tube is disconnected, the patient remains in apnea and improper tube manipulation can cause tube damage. Extubation or dislocations with selective bronchial intubation are also possible, and the anesthesiologist should perform auscultation at the end of submental intubation and before the main surgical procedure.

The indication of submental endotracheal intubation must be evaluated in accordance with certain criteria. For patients that need mechanical ventilation postoperatively, the tracheostomy is a routine procedure. However, tracheostomy presents complication rates of 5-45% and an approximately 2% mortality has been reported,^[26,27] suggesting that potential risks should be considered, especially in elective procedures and whenever intubation is planned only transoperatively.

Based on the authors' experience and the existing literature, submental endotracheal intubation is a simple technique, with very low morbidity, that can be used in selected cases to avoid more invasive procedures such as the tracheostomy.

REFERENCES

- Hall CE, Shutt LE. Nasotracheal intubation for head and neck surgery. *Anaesthesia* 2003;58:249-56.
- Zmyslowski WP, Maloney PL. Nasotracheal intubation in the presence of facial fractures. *JAMA* 1989;262:1327-8.
- Gibbons AJ, Hope DA, Silvester KC. Oral endotracheal intubation in the management of midfacial fractures. *Br J Oral Maxillofac Surg* 2003;41:259-60.
- Nyárady Z, Sári F, Olasz L, Nyárady J. Submental endotracheal intubation in concurrent orthognathic surgery: a technical note. *J Craniomaxillofac Surg* 2006;34:362-5.
- Bernard AC, Kenady DE. Conventional surgical tracheostomy as the preferred method of airway management. *J Oral Maxillofac Surg* 1999;57:310-5.
- Schütz P, Hamed HH. Submental intubation versus tracheostomy in maxillofacial trauma patients. *J Oral Maxillofac Surg* 2008;66:1404-9.
- Dierks EJ. Tracheotomy: elective and emergent. *Oral Maxillofac Surg Clin North Am* 2008;20:513-20.
- Green JD, Moore UJ. A modification of sub-mental intubation. *Br J Anaesth* 1996;77:789-91.
- MacInnis E, Baig M. A modified submental approach for oral endotracheal intubation. *Int J Oral Maxillofac Surg* 1999;28:344-6.
- Drolet P, Girard M, Poirier J, Grenier Y. Facilitating submental endotracheal intubation with an endotracheal tube exchanger. *Anesth Analg* 2000;90:222-3.
- Meyer C, Valfrey J, Kjartansdottir T, Wilk A, Barrière P. Indication for and technical refinements of submental intubation in oral and maxillofacial surgery. *J Craniomaxillofac Surg* 2003;31:383-8.
- Saravanan P, Arrowsmith JE. Retrograde submental intubation after faciomaxillary trauma. *Anesth Analg* 2005;101:1892-4.
- Tagliatalata Scafati C, Maio G, Aliberti F, Tagliatalata Scafati S, Grimaldi PL. Submento-submandibular intubation: is the subperiosteal passage essential? Experience in 107 consecutive cases. *Br J Oral Maxillofac Surg* 2006;44:12-4.
- Malhotra N. Retromolar intubation--a simple alternative to submental intubation. *Anaesthesia* 2006;61:515-6.
- Hernández-Altemir F. Una nueva técnica de intubación endotraqueal (via submental). *Revista Iberoamericana de Cirugía Oral Y Maxilofacial* 1984;6:165.
- Biglioli F, Mortini P, Goisis M, Bardazzi A, Boari N. Submental Orotacheal Intubation: An Alternative to Tracheotomy in Transfacial Cranial Base Surgery. *Skull Base* 2003;13:189-195.
- Lim LH, Lam LK, Moore MH, Trott JA, David DJ. Associated injuries in facial fractures: review of 839 patients. *Br J Plast Surg* 1993;46:635-8.
- Haug RH, Adams JM, Conforti PJ, Likavec MJ. Cranial fractures associated with facial fractures: a review of mechanism, type, and severity of injury. *J Oral Maxillofac Surg* 1994;52:729-33.
- Lima SM Jr, Asprino L, Moreira RW, de Moraes M. A retrospective analysis of submental intubation in maxillofacial trauma patients. *J Oral Maxillofac Surg* 2011;69:2001-5.
- Jundt JS, Cattano D, Hagberg CA, Wilson JW. Submental intubation: a literature review. *Int J Oral Maxillofac Surg* 2011;Sep 17 [Epub ahead of print].
- Cameron D, Lupton BA. Inadvertent brain penetration during neonatal nasotracheal intubation. *Arch Dis Child* 1993;69:79-80.
- Goodisson DW, Shaw GM, Snape L. Intracranial intubation in patients with maxillofacial injuries associated with base of skull fractures? *J Trauma* 2001;50:363-6.
- Horellou MF, Mathe D, Feiss P. A hazard of naso-tracheal intubation. *Anaesthesia* 1978;33:73-4.
- Marlow TJ, Goltra DD Jr, Schabel SI. Intracranial placement of a nasotracheal tube after facial fracture: a rare complication. *J Emerg Med* 1997;15:187-91.
- Muzzi DA, Losasso TJ, Cucchiara RF. Complication from a nasopharyngeal airway in a patient with a basilar skull fracture. *Anesthesiology* 1991;74:366-8.
- Waldron J, Padgham ND, Hurley SE. Complications of emergency and elective tracheostomy: a retrospective study of 150 consecutive cases. *Ann R Coll Surg Engl* 1990;72:218-20.
- Taicher S, Givol N, Peleg M, Ardekian L. Changing indications for tracheostomy in maxillofacial trauma. *J Oral Maxillofac Surg* 1996;54:292-6.