

Submental Intubation - An alternative airway control

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ABSTRACT

Objectives:

In patients who require intubation for maxillofacial reconstruction, submental intubation is an alternative to a traditional tracheostomy. Various different methods of intubation are suitable for facial trauma cases. A choice often has to be made between orotracheal and nasotracheal intubation when surgical access to the nasal or oral cavity is necessary. This work presents our current experience using submental intubation in the airway management of facial trauma patients. Submental intubation provides intraoperative airway control, avoids use of nasal route, with minimal complications. Submental intubation allows intraoperative dental occlusion and is an acceptable option, especially when long term postoperative ventilation is not planned.

Materials & Methods:

From July 2015 to February 2017, 13 patients from craniomaxillofacial trauma benefited from submental intubation. All the patients were males and the ages ranged from 19 to 35 years (mean, 27 years).

Results: In all the patients, the submental intubation permitted simultaneous reduction and fixation of all fractures and intraoperative control of the dental occlusion without interference from the tube during the operation. There was no intra-operative complication. No post-operative complications were reported. The intraoral and submental accesses healed with minimal scarring in all patients

Conclusion: Submental intubation is a simple, secure and effective procedure for operative airway control in major maxillofacial surgeries

Keywords: Intubation, submental, maxillofacial injury, operative complications

INTRODUCTION

Airway management in complex craniomaxillofacial trauma and in oncological cranial base surgery is often difficult. The choice of intubation technique requires good assessment

from a multidisciplinary team that includes maxillofacial surgeons and neurosurgeons as well as good communication between the surgeons and anaesthesiologist.¹In many conditions such as craniomaxillofacial trauma, neither nasal nor orotracheal intubation is possible. In fact, nasotracheal intubation precludes the treatment of nasal fractures. It can result in meningitis or the tube can be passed intracranially in patients with frontobasilar fractures.²⁻⁶ Conversely, an orotracheal tube interferes with maxillomandibular fixation, compromising the reduction and stabilization of maxillary and mandibular fractures.⁷

Often neither nasal nor orotracheal intubation is suitable for transfacial approaches to the cranial base.⁸In these situations, which require teamwork from several disciplines, tracheostomy is considered the technique of choice for airway control by many anaesthesiologists and surgeons.⁹ In such cases tracheostomy is the choice for airway management for anaesthesiologists. An alternative for tracheostomy was first described by Hernandez Altemir in 1986. The submental route for endotracheal intubation consists of pulling the free end of an endotracheal tube (universal connector removed) through a submental incision, after a usual orotracheal intubation has been performed.^{7,10} The use of submental intubation with Altemir's technique and its modifications has been used in a large number of patients with maxillofacial injuries.^{1,7,10-13} The term transmylohyoid intubation was given by Gadre and Kushte, since the path of exit of the endotracheal tube is across the mylohyoid muscle and not restricted to the submental triangle. Many studies have compared the disadvantages and risks of tracheostomy and submental intubation for the treatment of facial fractures.¹⁰⁻¹⁴

Technique:

From July 2015 to February 2017, 13 patients benefited from submental intubation. All the patients were males and ages ranged from 19 to 35 years (mean 27 years). All patients were victims of facial trauma. Most of the facial injuries were a combination of fractures affecting the dental occlusion (maxillary fractures of Le Fort I type, mandibular fractures or alveolar fractures) and associated with another fracture dislocating either the anterior skull base (Le Fort II or III fractures) or the nasal pyramid (nasoorbitethmoidal fractures).

To perform this technique, the patient's trachea is intubated orally using a cuffed flexometallic endotracheal tube. Prior to this the universal connector must be removed or cut off and replaced with a removable connector to allow easy detachment. Using an aseptic technique, the skin of the neck, lower face and the end of the tracheal tube are cleaned with an appropriate antiseptic solution. Care must be taken not to dislodge the tube at this stage. A 1.5-cm skin crease incision is made in the submental region, just medial to the lower border of the mandible, approximately one third of the way from the symphysis to the angle of the mandible. The side of the mandible that is used may be dictated by the presence of a concurrent mandibular fracture. [Figure 1&2]

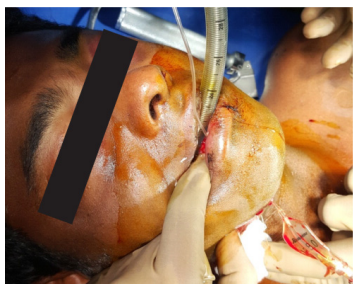


Fig 1: Guiding the pilot tube through submental incision



Fig 2: Pilot tube brought extra orally

Mouth opening is maintained using a gag, orodental prop and the tongue is retracted, exposing the floor of the mouth. A medium sized curved artery forceps is then introduced into the submental incision and blunt dissection is carried out towards the floor of the mouth, staying as close as possible to the inner (lingual) aspect of the mandible to avoid damaging the sublingual gland, submandibular duct and lingual nerve. The tissue layers encountered are subcutaneous fat, platysma, investing layer of deep cervical fascia and mylohyoid muscle until the tip of the artery forceps tents the mucosa of the floor of the mouth, at the junction of the attached lingual mucosa. The tented oral mucosa is then incised allowing easy delivery of the tip of the artery forceps into the oral cavity. The blades of the forceps are then separated to a distance equating the diameter of the tube and gently passed in an oral-to-skin direction to reduce any soft tissue resistance for subsequent passage of the tube.

The patient's lungs are then ventilated with 100% oxygen for 3 minutes, hemodynamic stability is confirmed and the tracheal tube briefly disconnected from the breathing circuit. Then universal connector is removed and the pilot tube cuff (deflated) is grasped by the artery forcep and pulled through the passage in the floor of the mouth. Then a trocar is quickly inserted through the submental incision to grasp the end of the tracheal tube, which is also pulled through in a similar way. The connector is then re-attached, the cuff reinflated, ET tube suction done to remove any blood aspirate and the tracheal tube reconnected to the breathing circuit. The tracheal tube then lies in the sulcus in the floor of the mouth between the tongue and the mandible. The position of the tracheal tube is checked using capnography and chest auscultation and a careful note made of the distance marking on the tube at the skin exit site. The tube is then secured to the skin of the submental region with adhesive tape circumferentially applied to the tube and a heavy (2 / 0) black silk suture. The elastoplast in addition prevents accidental inward displacement of the tube during manipulation of the mandible. [Figure 3&4]

A throat pack can then be inserted if required. At the end of the operation the procedure is reversed. The skin sutures are cut and the tracheal tube is briefly disconnected from the breathing circuit. The universal connector is then removed and the deflated pilot cuff is pulled back through the passage in the floor of the mouth, followed by the tracheal tube. The connection is then re-established and the tube is secured. The submental incision is closed using 3-0 silk sutures that are removed after 10 days. Intraoral sutures were not taken and the site was allowed to heal by secondary healing.



Fig 3: Submentally intubated patient

Fig 4: Patient with full orofacial access

DISCUSSION

The treatment of oncological and traumatic diseases through cranio maxillofacial surgery often implies problems with intraoperative airway management. When neither

nasotracheal nor orotracheal intubation is suitable, temporary tracheostomy is frequently the option of choice.⁷ This technique however is associated with significant morbidity. Complications include hemorrhage, recurrent laryngeal nerve damage, subcutaneous emphysema, tracheal stenosis, and a cosmetically undesirable scar.^{1,12,14-17} Different solutions have been proposed as an alternative to tracheostomy. In panmaxillofacial trauma, which requires maxillomandibular fixation and nasal fracture reduction, switching an endotracheal tube from the nasal route to the oral route without extubation can be a good option.^{1,18,19} This maneuver can be completed in less than 10 minutes.¹⁵⁻¹⁶ The conversion can also be completed more rapidly with the use of tube exchangers.^{12,20}

Nevertheless, in patients with frontobasilar fractures associated with maxillofacial trauma, the nasotracheal intubation can lead to major complications such as meningitis, sepsis, and cerebrospinal fluid leakage. Furthermore, the nasal tube can be introduced intracranially, causing significant brain damage.⁴⁻⁵ Retromolar intubation has been advocated as a simple way to avoid nasotracheal intubation as well as interference with dental occlusion. In this technique, a semilunar osteotomy is made in the retromolar area of the mandible to gain necessary space. Retromolar intubation without this additional surgical intervention, which is considered objectionable, is feasible only rarely and in short, uncomplicated procedures. In patients with multiple facial fractures, the presence of the oral tube is awkward and there is always a risk of dislodgement, especially if a change in head position is required during surgery.¹⁶ Submental intubation was first described as an alternative route for oral or nasal intubation, especially in cases of major facial trauma.

Other indications, such as systemic pathology or cases of simultaneous orthognathic and plastic surgery are reported¹⁷ since the first application of this technique, less than twenty years ago, many authors have studied the clinical use of this procedure. Very low rates of complications have been reported. Many trials have shown the submental route to be a simple, quick and safe approach to airway management. 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 nasotracheal intubation.

Schutz and Hamed²² 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. Submental intubation combines the advantages of nasotracheal intubation, which allows the mobilization of the dental occlusion, and those of orotracheal intubation, which allows access to frontonasal fractures. It also 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 tracheotomy. 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.¹⁹ It is an extraoral procedure and reported some complications in literature. They are as mentioned below:

- Infection
- Endotracheal tube damage
- Orocutaneous fistula
- Right mainstem bronchus intubation/obstruction
- Hypertrophic scarring
- Accidental extubation (Paediatric)
- Venous bleeding
- Excessive bronchial flexion
- Transient lingual nerve paresthesia
- Throat pack sticker dislodged
- Mucocele formation

Accidental extubation, tube obstruction and damaged tube (tube kinking, cuff leak) are more difficult to manage in submental intubation. However endotracheal tube exchanger can be used successfully to replace the damaged endotracheal tube by the submental approach.

CONCLUSION

Submental intubation should be chosen whenever possible in cases of purely maxillofacial trauma. It demands a certain surgical skill, but it is simple, safe and quick to execute. Communication between the surgeon and anaesthesiologist is paramount. It also allows operative control of the dental occlusion and concomitant surgery of the nasal pyramid in major maxillofacial traumas and avoids iatrogenic placement of the tube in skull base fractures. Finally, it presents a low incidence of operative and postoperative complications and eliminates the risks and side effects of tracheotomy. Additional research is necessary to compare tracheostomy to submental intubation and larger studies are required to validate new modifications reported in the literature.

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