Case Report

Submental Intubation in Oral and Maxillofacial Surgery: When and How?

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Abstract

Achieving a secure airway is a crucial factor for the operative management of trauma in the facial region. Nasal and oral routes are sometimes not attainable, as in certain cases, it becomes a necessity to establish intermaxillary fixation initially. The submental route is a potent alternative to conventional intubation or tracheostomy in certain cases of maxillofacial injuries. This technique has shown nominal complications, and it also comes with the perks of better acceptability by patients and surgeons. Although it requires expert skill, it is simple and fast to execute.

Keywords: Conventional intubation, Maxillofacial injuries, Submental route, tracheostomy.

Introduction

A successful outcome in any surgery is dependent on unobstructed access and maintenance of a secure airway[1] Managing patients with pan facial trauma or those undergoing complex osteotomies have always been a challenge to maxillofacial surgeons as well as anesthetists.[2-4] Nasotracheal intubation has always been the desired route in maxillofacial surgery.[5]

Submental intubation has been used as an alternative to conventional intubation in since its introduction by Altemir in 1986.[6] It was introduced with the intention of avoiding tracheostomies in selected oral and maxillofacial cases.[5] Submental intubation provides a secure airway and allows unimpeded access to the oral cavity and midface while avoiding the potential complications associated with nasal intubation and tracheostomy.[7]

The procedure consists of manifesting an oral endotracheal tube (ETT) through the floor of the mouth and submental triangle.[8] Adequate mouth opening is a prerequisite for all the techniques described for submental Intubation, as the initial step is orotracheal intubation. Hence, this procedure has never been reported in a patient with the inability to open the mouth.[9]

Indications for this route are trauma – most common indication, elective facial osteotomy, trans axillary cranial base tumors, cancrum oris, minimal neurologic deficits, short-term intraoperative intermaxillary fixation, large pharyngeal flaps, combined bimaxillary orthognathic surgeries with simultaneous rhinoplasty, cleft lip and palate, rhinoplasty and rhytidectomy, alveolar bone grafting, upper lip hemangioma, patient with a history of epistaxis, and cerebrospinal fluid leakage.[8,10]

Contraindications include patient's with multisystem trauma, when long-term airway maintenance support is required, severe keloid, severe neurological deficits, major thoracic trauma, severe traumatic wounds on the floor of the mouth, bleeding diathesis, submental infection, gunshot injuries, and tumor ablation.[10,11]

Complications from the procedures have also been reported. They are damage to the lingual nerve, marginal mandibular nerve, Wharton's duct, sublingual gland, formation of salivary fistulae, skin infections, etc.[12]

Technique

This technique is relevant only where anatomy is likely to become normal postoperatively, and long-term ventilation or airway protection is not anticipated. The conventional

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submental intubation technique essentially involves the creation of a percutaneous tunnel and diverting the proximal end of the armored ETT through the anterior floor of the mouth.[2]

Steps

Broad-spectrum antibiotic, amoxicillin and clavulanic acid, was given intravenously 1 h before the procedure. In patients resistant to penicillin, the first-generation cephalosporin was prescribed. Antisialogogue and aspiration prophylaxis should be considered.

The armamentarium required is shown in Figure 1. The tight seal of the appropriate sized flexometallic ETTs was made easily detachable from the universal connector. Measures to tackle any emergent situation (e.g. cricothyrotomy and transtracheal jet ventilation) were kept ready, especially for those patients who cannot withstand a brief period of cessation of ventilation. There are certain modifications of the classic technique that allows ventilation during tube transfer. Refinements such as the double tube method or airway exchanger technique lessen the time between a detachment of the circuit and reattachment. General anesthesia and orotracheal intubation with appropriate sized armored ETT was done in a conventional way. The area around the planned site of the incision was prepared with 10% povidone-iodine solution and was draped with sterile dressings. After local infiltration of the skin and soft tissue of the proposed site with 2% lignocaine with adrenaline, a skin incision was made in the right submental region parallel to the inferior border of the corresponding mandible. Diagrammatic representation is shown in Figure 2. Approximately 1.5 cm incision was good enough for easy passage of ETT up to 7.5 mm size, and 2 cm incision is required for ETT of larger diameter. The right-sided incision is always advantageous as it permits better visualization of the intraoral part of the ETT by left-handed laryngoscopy. However, selection of the side is usually made so as to avoid the site of injury and mandibular fracture.

Blunt dissection was carried out with a medium-sized curved artery forceps or Kelly clamp along the lingual surface of the mandible through subcutaneous tissue, platysma, investing layer of deep cervical fascia, and mylohyoid muscle in between the two heads of digastric muscles to sublingual mucosa. A paramedian oral incision was made over the tented mucosa created by the tip of the artery forceps. The tongue was retracted on the other side for better access. Required exposure of the oral cavity was maintained with a gag. The tunnel created was widened by separating two blades of the artery forceps. The use of two artery forceps facilitated exposure better than a single one. The patient was ventilated with 100% O_2 and 1% isoflurane for 5 min before replacing the tube through the incision to stand the period of ventilatory pause. After denitrogenation, the breathing circuit was disconnected, and the universal connector was detached. The tip of the pilot balloon cuff was pulled through the submental incision first.

Then, the tip of the artery forceps was again introduced through the incision to take out the distal end of the ETT in a similar fashion, and the ETT was placed in the sulcus between the tongue and the mandible in the floor of the mouth. While pulling, the intraoral part of the flexometallic ETT was kept steady with a Magill's forceps or assistant's index finger. The connector was reattached, and the ETT reconnected with the breathing circuit. The position of the tube was confirmed by direct laryngoscopy, chest auscultation, and capnography. The skin exit point of the ETT was marked with permanent ink.

The ETT was secured to the skin using a stay suture with 2-0 heavy silk shown in Figure 3. Additional fixation by placing a tied suture between the ETT and the universal connector can be done for further safety. Adhesive dressing (transparent) was applied over the skin to avoid displacement while manipulation of the mandible and also to visualize the ink mark. Throat pack was applied if required.[2]

Discussion

Submental intubation was first described by Altemir back in 1986.[6] It has undergone several modifications and found new indications. Submental intubation is indicated in patients with midface or pan facial fractures with a possible base of skull fractures, patients undergoing elective Le Fort osteotomies, and patients undergoing simultaneous elective mandibular osteotomies and rhinoplasty.[8]

The technique of submental intubation is a solution for most of the problems. The advantages of this technique are appreciated by all members of the team. It offers a secure airway to the anesthetist and to the surgeon, an optimal operating field and the chance to check the occlusion and to the patient, minimal risk.[7]

Paetkau *et al*.[13] located the skin incision midway between the angle of the mandible and the symphysis and just medial to the lower border of the mandible. However, care must be taken to avoid injury to the lingual nerve, submandibular duct, and sublingual gland, which are located medial to this proposed incision site. Amin *et al*.[14] suggested locating the incision one-third of the way from the symphysis to the angle of the mandible and emphasized the need to stay close to the lingual surface of the mandible to avoid damaging these structures.[14]

Uncontrolled bleeding is sometimes encountered with the paramedian approach due to injury to the submental vessels. MacInnis and Baig suggested the use of the midline incision to avoid this.[15] A midline incision would assure that no injury occurs to the lingual nerve, Wharton's duct, and sublingual gland. The relatively avascular plane in between the two bellies of the mylohyoid and the anterior bellies of the digastric has been suggested as another advantage of the midline technique. The midline incision heals almost indistinguishably and hence is suggested to be cosmetically superior.[8]

Hanamoto *et al*.[16] used a sterile polypropylene cylinder of the 10 ml syringe through the submental incision into the oral cavity. Drolet *et al*.[17] suggested the use of a tube exchanger to exchange a damaged ETT through the submental route.

Figure 1: Armamentarium for submental intubation

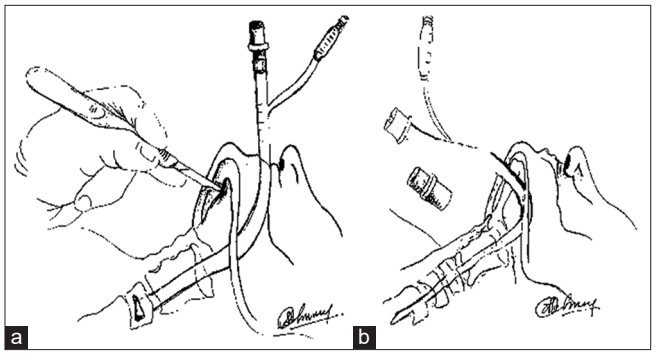

Figure 2: Diagrammatic representation. (a) Incision over submental region. (b) Passing ET tube submentally

Figure 3: Clinical picture of submental intubation done in a patient

Mahmood and Lello[18] performed submental intubation using a preformed Sheridan tube. The preformed curvature helps in the positioning of the tube as it conforms to the anatomy of that region. Lima *et al*.,[19] in their study, utilized surgical glove finger to cover the proximal end of the ETT, which helped in the prevention of entry of blood and soft tissue during its passage through orocutaneous tunnel. In the same manner, Adeyemo *et al*.[20] used a nylon tube sac to cover the open end of the tube during transfer through the tunnel.

The submental intubation technique, apart from securing the airway, provides an unobstructed intraoral surgical field, avoids intraoperative and post-operative complications of tracheostomy, and overcomes the disadvantages of NTI. Schutz and Hamed, in their comparative study between submental intubation and tracheostomy, concluded that submental intubation is associated with low morbidity and can replace tracheostomy in selected cases of maxillofacial trauma.[21]

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, also complications, such as tracheal stenosis, injury to cervical vessels, or the thyroid gland, related to tracheotomy. The submental intubation technique is contraindicated in patients requiring a long 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.[7]

The complete procedure takes <4 min and the disconnection time of the ETT is <10 s. This technique is recommended not only for trauma but also for carefully selected orthognathic cases.[3]

MacInnis and Baig[22] had reported their experience with standard technique as described by Altemir[6] as below satisfying because of bleeding, difficult tube passage, and sublingual gland involvement. In place of slight lateral exit wound submentally, that is, parallel to the submandibular ducts taking care to avoid the lingual nerve by keeping the incision anterior to the first mandibular molar, they modified the technique to a strict midline approach in 15 patients with satisfactory results.

Gadre and Waknis suggested transmylohyoid as a better terminology, as here the ETT can pass through the mylohyoid muscle anywhere between the first mandibular molars of either side anterior to the masseter muscle, instead of limiting it to the submental triangle.[23]

Conclusion

Submental intubation seems to be a better option for intraoperative airway control in selected complex craniofacial injuries. This technique has the advantages of both orotracheal and nasotracheal intubations at the same time. Better cosmesis, minimal complication, and lesser expenses are added advantages.

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