

CASE REPORT

Submandibular intubation

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1. INTRODUCTION

Sharing the airway is a major concern for both anaesthetist and surgeon because the security of the airway may be jeopardized and the tracheal tube might impede the surgical field. This is seen typically in maxillofacial and ENT surgeries. Nasal intubation is widely exercised by anaesthetists in maxillofacial surgery but difficulties arise with panfacial fractures when an unobstructed surgical field is required to provide good occlusion, jaw wiring, nasal manipulation and maxillo-mandibular fixation in the same procedure.

Submandibular intubation is an atypical method of establishing a definitive airway as it does not use the usual anatomic paths to secure the airway. The method was invented by a Spanish maxillofacial surgeon, Francisco Hernandez Altemir, who described the technique of submental intubation in his original work published in 1986¹ as an alternative to tracheostomy and keeping away from the field of surgery. The technique of submental intubation had been modified to the submandibular approach²; in both of these approaches the technique is straightforward and simple.

2. CASE PRESENTATION

The technique of submandibular intubation approach was first put into practice in our facility in March 2011 for the construction of panfacial injured patients. During one year we had six young patients (five males and one female) sustain severe trauma, which included panfacial injuries, who underwent extensive facial re-construction utilizing the submandibular route of establishing an airway.

All six patients were scheduled for elective open reduction and internal fixations of their mid and lower face fractures, after they had been hemodynamically stabilized.

Three of the patients had a polyvinyl chloride (PVC) endotracheal tube in place at the time of surgery and were switched to an armoured (reinforced) tube.



Figure 1. Showing the reinforced endotracheal tube and the site of incision.



Figure 2. Endotracheal tube secured to the skin.

Post-operatively only one patient had the tracheal tube left in place for elective ventilation for 48 h due to lung contusion. The other three patients were intubated in the operating theatre, in which one patient had his tracheal tube left in the submandibular route post-operatively for elective ventilation for 72 h.

2.1 Technique

A reinforced tracheal tube is preferable but there are reports of using an RAE tube instead.³ Subsequently, a 1.5 cm incision is made through the skin in the right or left anterior submandibular region (Figure 1) and (Figure 3), parallel to the inferior border of the mandible – this is to avoid injury to the marginal mandibular branch of the facial nerve. In this case we prefer the anterior submandibular approach over the submental approach because, potentially, the endotracheal tube might push the tongue upward blocking the surgical field. This approach also improves the visualization of the tracheal tube during laryngoscopy – and so, we prefer the right side approach. Next, a blunt dissection is performed through the platysma, the deep cervical fascia and mylohyoid muscle; this creates a tunnel in close proximity to the lingual cortex of the mandible to prevent injury to the ducts of the lingual and submandibular salivary glands. The pilot balloon is pulled out first, then the proximal end of the orotracheal tube is grasped, exteriorized and secured to skin (Figure 2).

There are three recommendations here: 1) ensure that the tracheal tube mount is loosened so it can be removed easily and reconnected after the tube has been exteriorized, 2) switch to 100% oxygen for a few minutes prior to the phase of disconnection to increase the margin of safety, and 3) we found that it is easier to have the pilot balloon out first, before the tracheal tube. The time required to accomplish the procedure has been calculated to be less than 10 min, which is another

reason why it is considered as an advantage over a tracheostomy.

Complications associated with submandibular intubation include localized infection, scarring, post-operative salivary fistula, mucocele formation on the floor of the mouth and paresthesia of the lingual nerve. In our patients there were no complications related to this procedure and the patients were satisfied overall in terms of aesthetic results.

2.2 Discussion

Airway management in panfacial reconstruction surgery has gone through major breakthroughs since the application of this procedure. The major indication for these approaches, i.e. submental (S-MEN) and submandibular (S-MAN), is when there is a need for fixation of the middle and lower face fractures, i.e. mandible or maxilla (Le Fort I, II and III) fractures' combined with nasal or naso-ethmoidal bone fracture to ensure a good occlusion.

The procedure underwent modification(s)³⁻⁵ and is considered one of the indications when a nasal route is



Figure 3. Left submandibular approach.

inadvisable due to a fractured base of the skull with a possible fracture of the cribriform plate fearing cranial insertion of the tube.^{6,7} It is well known that fractures of the midface (Le Fort II or III) are frequently associated with skull base fractures, involving the cribriform plate of the ethmoid, potentially creating a communication between the nasal cavity and the anterior cranial fossa with cerebrospinal fluid leakage.

This procedure could also be used when there is a need for repair of major facial fractures that makes tracheostomy the only option.⁸⁻¹¹ There are some cases reported of using this method when nasal intubation is not successful or technically difficult,¹² or due to a distorted anatomy because of a congenital disease with contraindicated oral intubation¹³ which makes nasal intubation impossible.

Upon reviewing the literature, perioperative complications of tracheostomy include loss of airway, arterial desaturation, hemorrhage, subcutaneous emphysema, pneumomediastinum, pneumothorax, and recurrent laryngeal nerve damage, with incidences ranging from 6-8%. Late complications, including stomal and respiratory tract infections, tracheal stenosis, tracheo-esophageal fistula, and unaesthetic scar can reach an incidence as high as 60%. The role of tracheostomy was questioned in cases of re-construction of panfacial injury and has been replaced by S-MEN/S-MAN intubation and/or if the expected postoperative period of ventilation is less than one week.^{14,15} This procedure was recently evaluated and has been found to be a

simple technique and one of choice that is favoured by maxillofacial surgeons, superseding tracheostomy, due to the fewer complications.^{16,17}

In general the endotracheal tube placed through this route is recommended to be kept for 72 h or less due to the fear of laryngeal damage or pneumonia,¹⁷ however, the evidence and the discussion provided by the authors is difficult to analyze because of the small number of patients worldwide that have had this procedure. It is hard to determine the duration of keeping in the tracheal tube but it is recommended to switch the tube to the oral route at the end of the procedure because the major concern is easy accessibility to the airway in the post-operative period.

This procedure is cost-effective due to fewer complications, shorter duration of hospital stay and reduces the need for a high dependency unit caring for the tracheostomy tube. The other benefit of using this approach is aesthetic; the scar left by the S-MEN/S-MAN incision is much less obvious than that from tracheostomy.^{11,16,18,19}

In conclusion, this technique has changed the way of establishing an airway in complex types of facial surgeries; it is simple, almost devoid of complications in comparison with tracheostomy, has a better aesthetic outcome and is certainly recommended.

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