

*Case Report*

## Submental Intubation: A Case Report

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### ABSTRACT

In maxillofacial injuries, a choice often has 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 a complex maxillofacial trauma patient. The technique consists of diverting the proximal end of an oro-tracheal tube through the floor of the mouth and sub-mental region. This technique provides an unconventional method for maintaining airway with minimal complications and greater margin of safety. The alternative methods of airway management in such cases along with their merits and demerits are also discussed.

**Keywords:** Le Forte fracture, Retromolar intubation, Submental, Tracheostomy.

### INTRODUCTION

Maxillofacial surgical procedures for pan-facial trauma pose a unique set of problems both to surgeon and anaesthesiologist. Achieving dental occlusion frequently during these procedures is one of the fundamental aims of most of maxillo-facial procedures. In 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. [1-4] Conversely, an orotracheal tube interferes with maxillomandibular fixation, compromising the reduction and stabilization of maxillary and mandibular fractures. [5] Often neither

nasal nor orotracheal intubation is suitable for transfacial approaches to the cranial base. [6] In fact, during transmaxillary approaches the orotracheal tube can obstruct the downward retraction of the maxilla after a Le Fort I osteotomy, limiting the exposure of the cranial base. [6] The tube can also get clamped between the teeth, reducing the airway lumen. [6] At the end of surgery, restoring an individual occlusion may not be tested and, if needed, intermaxillary fixation cannot be performed. In these situations, which require teamwork from several disciplines, tracheostomy is considered the technique of choice for airway control by many anaesthesiologists and surgeons. [1-6] An alternative method first devised by Sir Hernandez Altemir in 1986, is to introduce an endotracheal tube

via a sub-mental incision. [7] Sub-mental intubation is a safe and convenient alternative airway provision as a substitute for naso-tracheal intubation or tracheostomy. The technique consists of diverting the proximal end of an oro-tracheal tube through the floor of the mouth and sub-mental region. This technique provides an unconventional method for maintaining airway with minimal complications and greater margin of safety.

### **CASE REPORT**

A 26 year old male patient was posted for open reduction and internal fixation of bilateral fracture Le Forte type II with right frontozygomatic arch fracture and fracture anterior and lateral walls of right maxillary sinus. The patient had a history of road traffic accident 3 days back with unconsciousness for 3 hours following the accident. The CT scan of brain was normal and the neurophysician had given his clearance for the surgery.

On examination, the patient had a mouth opening of one and half fingers, Mallampati grade IV and nasal patency decreased on right side. All other routine investigations and systemic examination were within normal limits.

After discussion with maxillofacial surgeon, a sub-mental approach for endotracheal intubation was planned to avoid tracheostomy with its associated complications. Naso-tracheal intubation was contraindicated because of fracture of nasal bones. Oral endotracheal intubation was not an option because the surgical procedure involved intra-operative maxillo-mandibular fixation to check proper occlusion. Informed written consent was taken from the patient and his relatives, explaining the procedure in native language of the patient. Airway accessories and equipments were kept ready for a difficult airway.

In the operation theatre, the patients consent, investigations and NBM were confirmed. Pulsoximeter, noninvasive BP monitoring and chest leads for cardiac monitoring were connected. Two IV cannulas were connected each of 20 Gz on each hand. After preoxygenation for 5 minutes, patient was induced with Inj, propofol 2mg/kg. After confirmation of mask ventilation, the patient was given inj. Succinylcholine 2mg/kg to facilitate endotracheal intubation. Then orotracheal intubation was done under direct laryngoscopic vision with flexometallic ETT no. 7.5 and tube was fixed with tape. General anaesthesia was maintained with N<sub>2</sub>O, O<sub>2</sub>, Sevoflurane with controlled ventilation on Dragger workstation and vecuronium as muscle relaxant.

The OMFS surgeon painted and draped the patients face and neck as well as the ETT. A small horizontal incision was taken approximately 2 cm just below the mentum in the midline. Blunt dissection through the superficial fascia, platysma and deep fascia was done. Floor of mouth was further dissected between anterior belly of digastric and mylohyoid muscle. Bellies of genohyoid and genoglossus muscle were separated. Tract was further dissected through mucosa between the sub-mandibular duct papilla into the mouth. An artery forceps was then introduced through the tract from outside and the tract was widened, at that moment the tracheal tube was disconnected from the circuit and its connector was removed. First the pilot balloon was grasped by the artery forceps and then the tip of the tube which were taken inside from the mouth, through the track, outside the neck. Oral cavity was suctioned again for any blood and throat was packed with gauze. Tube position was checked again and mark on the tube was noted. The tube was fixed with the stay

sutures with ethilon no.2 over the skin to prevent accidental extubation.

At the end of surgery, the stay sutures were removed. The tube with pilot balloon was pulled back in the oral cavity and brought out through the mouth. The submental incision was sutured. Patient was given neostigmine 0.05mg/kg and glycopyrrolate 0.008mg/kg and extubated on the table after regaining protective reflexes and consciousness. He was shifted to ICU in a vitally stable condition. Besides being highly convenient for surgeon to check the frequent occlusion by inter-maxillary fixation, there were no anesthesia associated problems.



Fig. 1. Submental Incision



Fig. 2. Shifting Tube from mouth to Submental Tract



Fig. 3. Submental Intubation

## DISCUSSION

Sir Hernandez Altemir [7] in 1986 first described the technique of sub-mental intubation. Indications for sub-mental intubation include mid-facial and pan-facial fractures, with base of skull involvement, orthognathic surgery, facial aesthetic surgery and rhinoplasty. [8] In our case, the reason for sub-mental intubation technique was inter-mandibular fixation in order to sustain occlusion which would have not been possible intraoperatively with the orotracheal intubation technique. Nasal intubation was avoided to prevent tube going into the cranium because of fracture of naso-ethmoid complex and further to prevent complications such as meningitis, sepsis and cerebrospinal fluid leakage. [1-4]

This technique of intubation was found to be suitable and easy as compared to tracheostomy, which could be an alternative technique. Advantages of sub-mental technique over tracheostomy are:

1. Early extubation after operation.
2. Avoiding the cumbersome task of post-operative tracheostomy tube care. There are problems like accumulation of secretions and blockage of the tracheostomy tube as the patient cannot cough.
3. Avoidance of possible known complications of tracheostomy tube,

such as tracheal stenosis, subcutaneous emphysema, hemorrhage, pneumomediastinum, pneumothorax, tracheal erosions, damage to the laryngeal nerves, infection, tracheoesophageal fistula, recurrent laryngeal nerve damage, dysphagia, problems with decanulation and excessive scarring. [8]

Sub-mental intubation technique takes less time to be performed than tracheostomy, is very easy, risk of damage to the structures such as the sub-maxillary and sub-mandibular glands, lingual nerve, Wharton's duct and structures of the floor of the mouth is very low. [9]

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. [10] 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 naso-orbitoethmoid 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. [1-4] 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 [11] 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.

Anesthetic modifications have been given by several authors. Green and Moore [12] 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. Various complications may, however, arise during the switching of tubes like desaturation, spasm, rupture of the cuff of ETT. Again insertion of second tube will require another laryngoscopy which is associated with rise of the heart rate and BP. According to Altamir and Montero [13] laryngeal mask can be used with the technique in patients with laryngeal trauma, unstable cervical fracture, and in voice professionals. But as we all know, risk of aspiration will always remain with the LMA. Shaik Mastan Saheb et al [14] performed the submental intubation by a novel method using the Seldinger technique and Percutaneous Dilatational Tracheostomy Kit (PDTK). But even this method looks cumbersome and requires special equipments. Joseph I, Tripathy K et al [15] have made use of A RAE tube that comes with a preformed curve. But the shape, the angle of the curve and the length of the curve are made up in such a way so as to be suitable for oral or nasal intubation which further complicates the exteriorization of the oral tube through the submental tract. Besides that the RAE tubes aren't non-kinkable. So, an armoured tube would be the best choice for the procedure.

Anatomical modification includes the variation in path of exit of the ETT. Two types of incisions can be taken below the mandible, median and paramedian. 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 Taglietela et al. [18]

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 maxillamandibular 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 [19] 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 and transfacial cranial base surgery. In orthognathic surgery, [20] 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, [9] 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.

Sub-mental endotracheal intubation is not completely free of complications. [21] There is always a risk of arterial desaturation during the conversion of oral intubation to sub-mental intubation and vice versa. Pilot balloon can also get damaged during the tube transfer or there may be difficulty in passing the tube through the incision or reattaching the connector to the endotracheal tube. Complications like accidental extubation, tube obstruction and tube leaking are more difficult to manage in sub-mental route. Other potential complication are infection of the sub-mental wound, trauma to the submandibular and sublingual glands and ducts, damage to the lingual nerve, fistula formation, development of mucocele and facial scarring. However attention to details of the technique, careful blunt dissection and a good knowledge of anatomy can help prevent above mentioned complications. According to Gadre and Kushte [22] 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. In our cases no such complications occurred during intubation, tube transfer or re-transfer and after the extubation.

## CONCLUSION

Sub-mental intubation is a reliable and safe method of alternative airway management in maxillofacial surgery. This technique is simple, safe and quick to

perform. The incidence of complications is very low as compared to tracheostomy. This technique should be considered by both the anaesthetists and the maxillofacial surgeons in challenging cases, where an alternative technique is required.

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