

Title: Submental intubation in maxillofacial trauma patients: Our Early experience and lessons learned

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Abstract

Introduction

Trauma is the most common cause of mortality in productive age group across the world children. Complicated maxillofacial injury averting nasal intubation & requiring maxilla mandibular fixation pose a significant challenge with regards to airway access management. The aim of this retrospective analysis of our maxillofacial trauma patient is to present the results of submental intubation and to discuss the indications and result of this procedure.

Material & methods

A retrospective study, involving maxillofacial trauma patients of the single maxillofacial unit over a one year period from July 2015 to June 2016. The study included all patients with maxillofacial trauma requiring submental intubation during surgery for maxillofacial trauma. Data were collected from patient's records for age, gender, mode of injury, type of maxillofacial trauma, associated trauma, intraoperative and postoperative complications regarding submental intubation.

Results

A total of 11 patients with maxillofacial trauma admitted during the study . Submental intubation was successfully performed in 10 patients. Mean disconnection time in other patients was 1.2 ± 0.63 minutes. The mean procedure time was 9.6 ± 3.34 minutes. None of the patients had any motor or sensory disturbance or any complaints regarding salivary gland or duct damage. One patient with diabetes mellitus and uncontrolled blood sugar level developed a post-operative wound infection.

Conclusion

Submental intubation offers an adequate, easy and minimally invasive alternative for polytrauma patients though patients with co-morbidities should be screened to avoid complications.

Key Words:

Submental intubation, maxillofacial trauma, wound infection, polytrauma

Introduction

Trauma is the most common cause of mortality in productive age group across the world children [1]. In Asia and other developing countries, the true incidence is not known and trauma constitutes a major but neglected public health problem. With upcoming trauma care facilities in different parts of India, now a better care of such patients is possible. Patients with complex maxillofacial trauma are an important group requiring a multidisciplinary team effort for their management. Complicated maxillofacial injury averting nasal intubation & requiring maxilla mandibular fixation pose a significant challenge with regards to airway access management. Classically the airway in these patients is secured by means of tracheostomy which is the gold standard. But tracheostomy is usually associated with significant morbidity. Further, the achievement of necessary occlusion in these patients is not possible with conventional oral intubation since the tube interferes with the occluding teeth. In 1986, Hernandez Altemir described sub mental intubation as an alternative to the classic methods after which several authors have reported its utility with minimal complications [2]. We have been using sub mental intubation in at our trauma center for management of patients with complex maxillofacial injuries. The aim of this retrospective analysis of our maxillofacial trauma patient is to present the results of sub mental intubation and to discuss the indications and result of this procedure.

Material & methods

This was a retrospective study involving maxillofacial trauma patients of the single maxillofacial unit over a one year period from July 2015 to June 2016. The study included all patients with maxillofacial trauma requiring submental intubation during surgery for maxillofacial trauma. Data were collected from patient's records for age, gender, mode of injury, type of maxillofacial trauma, associated trauma, intra operative and postoperative complications regarding sub mental intubation.

Technique of sub mental intubation

In all our cases standard oroendotracheal intubation is performed following which a 2 cm skin incision is given in right or left the paramedian sub mental region. The subcutaneous tissue (with platysma) and myelohyoid muscle are dissected using curved hemo-static forceps by keeping it in over the lingual cortex of mandible (with a curve towards lingula cortex).

A tunnel is created by opening the forceps and pushing it lingually on the floor of the mouth. The oro endotracheal tube is then disconnected from the ventilator. The hub of the tube is disconnected at its distal end and the tube is pulled through the incision by grasping it with the hemostatic forceps. Then the tube is re-connected to a ventilator and it's fixation to skin with sutures is performed. At the end of surgery, the reversion is performed by pulling the tube into the oral cavity and the wound is closed in layers.

Results

We scrutinized a total of 11 patients with maxillofacial trauma admitted during the study period [Table 1]. Out of the assessed patients, 8 (72.7%) were male patients and 3 (27.2%) were female patients. Patient age ranged from 16-70 year with a mean age of 34.0 ± 17.67 year. Road traffic accident was the most common mode of injury with most patients having complex injuries with a combination of multiple fractures of lower, mid and upper part of the face. Out of 11 patients, 7 (63.6%) had associated injuries. Most common associated injuries were head injuries and abdominal injuries. Sub mental intubation was successfully performed in 10 patients. One patient, a 70 year male with bilateral wheeze and a long history of smoking developed rapid desaturation immediately after disconnection from ventilator even after adequate pre-oxygenation. His baseline saturation throughout the procedure varied between 85-90%. Mean disconnection time in other patients was 1.2 ± 0.63 minutes. The mean procedure time was 9.6 ± 3.34 minutes. None of the patients had any motor or sensory disturbance or any complaints regarding salivary gland or duct damage. One patient with diabetes mellitus and uncontrolled blood sugar level developed a post-operative wound infection. The wound was laid open and was allowed to heal by secondary intention. Later the patient developed pus discharge from surgical site which led

to the removal of fixating plates. Minimal scarring was observed, without any complaints in all other patients.

Discussion:

Since the introduction of sub mental intubation in 1986 several reports have been published highlighting its utility in different clinical scenarios. This technique paved for a secure airway with an unobstructed intraoral surgical field allowing maxilla-mandibular fixation with excellent ease. Further, this technique also avoided the drawbacks and complications of naso-tracheal intubation and tracheostomy [3]. Excellent results have been reported in the literature with minimal or no motor or sensory deficit, normal healing of the mucosal floor, and preservation of the salivary ducts and saliva production [4-5].

As opposed to the classical description by Hernández Altemir, dissection was performed just over the periosteum and not below it. This avoided an excessive peri-osteal section of bone fragments that may already have compromised vascularity. This modification has been used by other authors previously [6-7]

Though sub mental intubation has these advantages, it is not free of adverse effects and complications. The most critical part is the passage of the endotracheal tube through the incision from the interior of mouth to the exterior. It may be difficult to pass the tube through the incision as in one of our cases which developed rapid de-saturation. None of the other authors have reported this scenario but the difficult passage of tube can be overcome by Green and Moore's modification to the original technique [8]. They used two endotracheal tubes in their technique. They first conventionally secured the airway with an oral tracheal tube. This was followed by passage of another endotracheal tube from exterior to the interior through the sub mental incision. The original oral tube is then withdrawn and reinforced tube substituted. The process may be reversed at the end of the procedure. This technique has another advantage that it precludes the removal of the connector which may not be easy in a lot of conditions or is not possible with some manufacturer's design [9]. However, this technique has been criticised as too aggressive for patients and traumatic to the pharyngeal and laryngeal mucosa of patients [10].

Other complications with sub mental intubations are oral floor abscesses and occurrence of hypertrophic scar formation [2]. But most reports agree that the complications are minimal and that patients are overall very satisfied with the lack of scarring. It has been hypothesized that high pressure due to acute angulation of the tube causes higher chances of complication [3]. In one of our patients, the risk factor was uncontrolled post-operative blood sugars level. In addition to the obvious benefits of sub mental endotracheal intubation in maxillofacial trauma procedures, elective use of this manoeuvre has been described as efficacious in procedures where an unobstructed oral or nasal cavity is beneficial to the surgeons, such as orthognathic surgery and even trans-facial cranial base surgery [11]

Conclusion

In conclusion, the sub mental intubation offers an adequate, easy and minimally invasive alternative for poly-trauma patients though patients with co-morbidities should be screened carefully before endeavouring the procedure to avoid unnecessary complications.

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Legend:

1. Table 1: Details of patients included in the study

S. No	Age	Gender	Mode of trauma	Fracture	Associated injury	Complications
1.	45 years	Male	Head on collision from truck	LefortI, Zygomatic complex fracture, mandible parasymphysis fracture	Head injury, abdominal trauma	None
2.	16 years	Male	Fall from bike	Maxillary dentoalveolar	Head injury	None

				fracture, mandiblar parasymphysis and subcondyle fracture		
3.	35 years	Male	Assault	Zygomatic complexfracture, nasal bone fracture, maxillary dentoalveolar fracture	None	None
4.	32 years	Female	Fall from bike	Mandibular dentoalveolar fracture,mandibu lar symhysis fracture, nasal bone fracture	Musculosk eletal injury	None
5.	29 years	Male	Car accident	Bimaxillary dentoalveolar fracture,mandibu lar dentoalveolar fracture, Zygomatic complexfracture, nasal bone fracture	Musculosk eletal injury	None
6.	12 years	Male	Motor bike accident	Mandibuar parasymphysis fracture, Zygomatic	None	None

				complex fracture		
7.	22 years	Female	Car accident	Lefort II fracture, Mandibular dentoalveolar fracture	Head injury, abdominal trauma	None
8.	19 years	Male	Auto rickshaw accident	Bimaxillary dentoalveolar fracture mandibular angle fracture	None	None
9.	38 years	Female	Fall from bike	Lefort I fracture, mandibular parasymphysis fracture	Head injury	None
10.	56 years	Male	Car accident	Nasal bone fracture, lefort I, mandibular dentoalveolar fracture	Head injury	Wound infection with secondary healing
11.	70 years	Male	Fall from stairs	Lefort II fracture, bimaxillary dentoalveolar fracture	None	Failed submental intubation

1. Table 1: Details of patients included in the study
2. Fig 1: Instrument tray for submental intubation

Fig 2



Fig 2: Patient with Sub-mental intubation

