Submental intubation: our experience

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Abstract

Introduction Airway management for patients who suffered midfacial fractures is complicated. In maxillofacial injuries, a choice has often to be made between different ways of intubation when surgical access to both the nasal and oral cavities is necessary. Submental intubation technique is an alternative to nasotracheal intubation and tracheostomy in the management of patients with severe midfacial fractures. This procedure is simple to do and has a low morbidity.

Material Submental intubation-paramedian technique has been used in 15 cases from May 2005–April 2007 in Hosmat Hospital, Bangalore. All patients had fractures disturbing the dental occlusion plus either an associated fracture of the skull base or a displaced nasal fracture.

Results Average duration of procedure was 7 minutes. Average duration of tube in vitro after surgery was 20 hours. There were 2 postoperative complications of tube obstruction which were successfully managed.

Conclusion Submental intubation demands certain technical skills but it is simple, rapid and may avoid tracheostomy in selected patients.

Keywords Midfacial fractures • Submental intubation • Maxillofacial injuries

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Introduction

Various different methods of intubation are suitable for maxillofacial trauma cases. Sometimes, the two most frequent methods are orotracheal and nasotracheal intubation. The first is not advisable when the surgeon has to have an intraoperative control of dental occlusion. The second is contraindicated when the facial fractures involve the nasal pyramid or irradiate towards the base of the skull.

The standard solution consists of carrying out a tracheostomy, adding a significant risk of iatrogenic complications. Another solution is to change the position of tube during the operation, which involves a supplementary anaesthetic risk [2]. Hernandez Altemir (1986) proposed submental intubation as an alternative to these classic methods. This technique consists of passing the tube through the anterior floor of mouth and allows free intraoperative access to the dental occlusion and to the nasal pyramid without endangering patients with skull

base trauma [9]. We present our experience with 15 patients and emphasize certain technical details that make this intubation easier.

Indications

1. Patients in whom nasal intubation is contraindicated in the presence of CSF rhinorrhoea, epistaxis and fracture of nasal bone and oral intubation not possible where intraoperative control of dental occlusion is required.
2. Patient with minimal neurological deficit.
3. Combined craniomaxillary surgery and rhinoplasty.
4. Both jaw orthognathic surgery and where nasal intubation not possible.

Contraindications

1. Patients with a severe neurological deficit.

2. Patients with multisystem trauma.
3. Longterm airway support and maintenance required.
4. Known severe keloid formers.
5. Multiple wounds involving the floor of the mouth [5,6,11,12].

Advantages

1. Avoids complications inherent to nasal intubation and tracheostomy
2. Simple procedure
3. Does not interfere with surgical intra-oral manipulation and intermaxillary fixation
4. Leaves an aesthetic scar
5. Patient undergoing elective orthognathic surgery with presence of nasal obstruction

Methods

15 patients with craniofacial trauma at HOSMAT Hospital, Bangalore during the period of May 2005 to April 2007. All

Submental Intubation — Paramedian technique operative procedure

Fig. 1 Orotracheal intubation done

Fig. 2 Submental paramedian incision placed

Fig. 3 Submental tunneling done

Fig. 4, 5, 6 Endotracheal tube withdrawal through submental tunnel

Fig. 7 Endotracheal tube connected to ane

Fig. 8 First month postoperative

Fig. 9 Seven months postoperative

patients had a combination of fractures, one disturbing the dental occlusion (midfacial fractures of the Lefort 1 type, mandibular or alveolar fractures), another affecting either the anterior skull base (Lefort 2 or 3 fractures) or the nasal pyramid. The most frequent association was Lefort 2 fracture with nasal fracture, 8 out of the 15 patients had CSF rhinorrhoea.

The current technique, we used for submental intubation is the paramedian technique described by Hernandez Altemir (1986) [9].

Armamentarium

Cuffed flexometallic tube with detachable connector.

Curved artery forceps
No: 15 BP blade with handle
4-0 silk suture material
4-0 ethilon suture material

Operative procedure

1. After standard orotracheal intubation, temporary draping of mouth and chin was carried out (Fig. 1).

2. Subsequently a 2cm skin incision was made in the submental paramedian region, directly adjacent to the lower border of mandible (Fig. 2).
3. The muscular layers (platysma and mylohyoid muscles) were traversed using a pair of curved artery forceps that were always in contact with the lingual cortex of the mandible. The mucosal layer in the floor of the mouth was incised over the distal end of the forceps, located in front of the sublingual caruncle and the forceps were then opened, creating a tunnel (Fig. 3).

Table 1 Fracture sustained by patients, CSF rhinorrhoea, duration of procedure, duration of tube in vitro

No.	Lefort I #	Lefort II #	Lefort III #	NOE #	Mandible #	CSF rhinorrhoea	Duration of procedure	Duration of tube in vitro
1		X		X		X	5min	6hrs
2			X	X	X	X	6min	48hrs
3		X		X		X	5min	24hrs
4		X			X		7min	4hrs
5			X	X		X	6min	24hrs
6				X			8min	24hrs
7	X		X	X		X	8min	10hrs
8		X			X		5min	2hrs
9		X		X		X	6min	24hrs
10			X	X	X		8min	6hrs
11		X			X	X	7min	4hrs
12				X	X		6min	6hrs
13		X		X	X	X	8min	48hrs
14	X	X		X			10min	24hrs
15		X		X	X		10min	36hrs
Total	2	9	4	12	8	8	7min	20 hrs

- The tube was then passed in two steps: the tube cuff was first introduced into the mouth being passed through the tunnel with forceps. The same maneuver was then carried out with the proximal end of the tube itself, after disconnection from the ventilator and the connection tube (Figs. 4, 5 and 6).
- After the tube was positioned, the connection tube was restored and the circuit re-established. The tube was secured onto the skin in the submental region (Fig. 7).

At the end of surgery, two modes of extubation were used.

Mode 1

The submental intubation was converted to an orotracheal intubation by replacing the tube in the mouth and carrying out the extubation in a classic manner.

Mode 2

The submental intubation was maintained during patient's recovery and extubation was carried out by pulling the tube through the skin and finally placing the sutures [2,9].

Results

Submental intubation has always achieved its goal by allowing simultaneous treatment of all the fractures without changing the method of intubation and without any interference from the tube during the operation.

The intubation method itself had not led to any intra-operative complications. There was no difficulty in passing the tube through floor of the mouth and the average duration of the submental intubation was 7 minutes. The mean duration of postoperative ventilation was 20 hours. There were 2 postoperative complications of tube obstruction (13%) which were managed by pulling out the tube through the skin.

Discussion

In cases of craniofacial trauma involving nasal pyramid or anterior skull base and intra-operative control of the occlusion, classical endotracheal intubation is not possible.

Nasotracheal intubation is a contraindication in cases of trauma of the skull base (Arrowsmith et al. 1998, Marlow et al. 1997, Rhee et al. 1993) [1,10,12,13] because of possibility of iatrogenic meningitis, difficult intubation and difficulty in performing treatment of fractures of the nasal pyramid at the same time (Smoot et al. 1997) [15,16,18].

Tracheostomy is currently the standard procedure in cases of such craniofacial trauma but may be tiresome and may lead to many complications (Smoot et al. 1997 [16], Chandu et al. 2000 [3,4], Braun and Honig 1993) [7], tracheal stenosis, severe hemorrhage secondary to intra-operative injury of cervical vessels or the thyroid gland, tracheostomy wound infections and unsightly scars have been reported.

It is therefore difficult to propose it to patients suffering from an isolated facial

trauma and who will not require prolonged airway management (Goldenberg et al. 2002) [7]. On the other hand, tracheostomy is known to be safer than endotracheal intubation in patients suffering from polytrauma or from severe craniofacial trauma whenever the need for more than 8–14 days of ventilatory support is anticipated.

In all the other cases, submental intubation constitutes an attractive alternative. It combines the advantages of the nasotracheal intubation (access to the interdental occlusion) and orotracheal intubation (access to the nasal pyramid) is possible when there are injuries to the skull base and avoids the complications of tracheostomy. Finally, extubation is very simple, the postoperative comfort of the patient is satisfactory and the cosmetic results are acceptable (Fig. 8,9). The inconvenience related to the method of intubation is twofold. Firstly the difficulty of placing a gastric tube (if this tube is a requirement) in case of intermaxillary fixation and nasal splinting.

Scar formation is another theoretical disadvantage but is less visible than tracheostomy scar but well tolerated by our patients.

Risk of postoperative salivary fistula has reported in literature in cases of prolonged ventilation (Gordon and Tolstunov 1995, Altemir FH 1986, Andlabbe et al. 1998) [8,9] was not encountered in this study.

The risk of sepsis in submental tunnel is real and is related to the possibility of contaminated balloon during extubation.

Fracture of the symphyseal region of mandible is not a contraindication. Finally

concerning the procedure, it should not be attempted to intubate the second tube directly through the submental tube even under the cover of a temporary orotracheal intubation as the 180 degree curve of the pathway imposed by the direction of the tunnel and the tongue will be so difficult to negotiate that it make intubation and ventilation of patient impossible [2].

Conclusion

Submental intubation is a safe procedure for intraoperative airway control in patients who present with purely maxillofacial trauma. It allows operative occlusion correction and enables surgery for associated nasal fracture in the event of concomitant skull based trauma and avoids the dangers of classical endotracheal intubation. In our view, the contraindication to this method of intubation are those patients who require a long period of assisted ventilation (i.e.) multi trauma patients with severe neurological damage, major thoracic trauma patients for whom repeated surgeries are anticipated, in these cases tracheostomy should remain in the standard procedure. The same applies to patient presenting with severe trauma wound of the floor of the mouth [2,6]. Submental intubation should be chosen whenever possible, as is easy, takes little time and follow-up is simple. This makes it a very good alternative to tracheostomy in the conditions mentioned.

References

1. Arrowsmith JE, Robertshaw HJ, Boyd JD (1998) Nasotracheal intubation in the presence of frontobasal skull fracture. *Can J Anaesth* 45(1): 71–75
2. Meyer C, Valfrey J, Kjartansdottir T, Wilk A, Barrière P (2003) Indication for and technical refinements of submental intubation in oral and maxillofacial surgery. *J Craniomaxillofac Surg* 31(6): 383–388
3. Chandu A, Smith AC, Gebert R (2000) Submental intubation: an alternative to short-term tracheostomy. *Anaesth Intensive Care* 28(2): 193–195
4. Paetkau DJ, Stranc MF, Ong BY (2000) Sub mental orotracheal intubation for maxillofacial surgery. *Anesthesiology* 92(3): 912
5. Lanza DC, Parnes SM, Koltai PJ, Fortune JB (1990) Early complications of airway management in head-injured patients. *Laryngoscope* 100(9): 958–961
6. MacInnis E, Baig M (1999) A modified submental approach for oral endotracheal intubation. *Int J Oral Maxillofac Surg* 28(5): 344–346
7. Goldenberg D, Golz A, Netzer A, Joachims HZ (2002) Tracheotomy changing indications and a review of 1130 cases. *J Otolaryngol* 31(4): 211–215
8. Gordon NC, Tolstunov L (1995) Submental approach to oroendotracheal intubation in patients with midfacial fractures. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 79(3): 269–272
9. Hernandez Altemir F (1986) The submental route for endotracheal intubation. A new technique. *J Maxillofac Surg* 14(1): 64–65
10. Marlow TJ, Goltra DD, Schabel SI (1997) Intracranial placement of a nasotracheal tube after facial fracture: a rare complication. *J Emerg Med* 15(2): 187–191
11. Malhotra N, Bhardwaj N, Chari T (2002) Submental endotracheal intubation: A useful alternative to tracheostomy. *Indian J Anaesthesiology* 46(5): 400–402
12. Mak PH, Ooi RG (2002) Submental intubation in a patient with beta-thalassaemia major undergoing elective maxillary & mandibular osteotomies. *Br J Anaesth* 88(2): 288–291
13. Rhee KJ, Muntz CB, Donald PJ, Yamada JM (1993) Does nasotracheal intubation increase complications in patients with skull base fractures? *Ann Emerg Med* 22(7): 1145–1147
14. Mahmood S, Lello GE (2002) Oral Endotracheal intubation: Median submental(Retrogenial) approach. *J Oral Maxillofac Surg* 60(4): 473–474
15. Taicher S, Givol N, Peleg M, Ardekian L (1996) Changing indications for tracheostomy in maxillofacial trauma. *J Oral Maxillofac Surg* 54(3): 292–295
16. Smoot EC, Jernigan JR, Kinsley E, Rey RM Jr (1997) A survey of operative airway management practices for midface fractures. *J Craniofac Surg* 8(3): 201–207
17. Nyarady Z, Sari F, Olasz L, Nyarady J (2004) Modified submental intubation endotracheal intubation in concurrent orthognathic surgery. *Mund Kiefer Gesichtschir* 8(6): 387–389
18. Nyarady Z, Sari F, Olasz L, Nyarady J (2006) Submental endotracheal intubation in concurrent orthognathic surgery: A technical note. *J Craniomaxillofac Surg* 34(6): 362–365

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