Submental Intubation: An Alternative and Cost-Effective Technique for Complex Maxillofacial Surgeries

Chiradip Kar · Srijon Mukherjee

Received: 13 August 2009 / Accepted: 13 April 2010 / Published online: 7 December 2010
© Association of Oral and Maxillofacial Surgeons of India 2010

Abstract

Introduction Management of airway is a significant issue especially in cases of complex maxillofacial trauma like panfacial fractures or concomitant nasoethmoidal injuries, where the nasotracheal intubation is contraindicated or possess a significant problem. In these cases the only other alternative is tracheostomy. Submental intubation is an alternative to tracheostomy and it can be easily performed with little or lesser post-operative complications. This method involves lesser expenses as it does away with longer post-operative stay in the hospital as required by tracheostomy patients.

Technique The patient is orally intubated with a reinforced armoured tube with a detachable plastic gas connector. An incision is made in the submental area of the patient and a tunnel is prepared from this region to the floor of the mouth through which the proximal end of the tube is diverted. Thus the occlusion of the patient can be checked intraoperatively. After completion of the surgery the proximal end is reintroduced onto the oral cavity and the patient is extubated orally.

Discussion Originally proposed by Altemir in 1986, this method cannot be used in all cases as it is not without limitations. In spite of these, submental intubation can be a useful alternative to tracheostomy, especially in regions where cost cutting is a major factor in health infrastructure.

Conclusion Maxillofacial surgeons addressing major facial trauma surgery may have this procedure in mind before opting for tracheostomy. It avoids a lot of complications associated with tracheostomy.

Keywords Submental intubation · Maxillofacial surgery · Tracheostomy · Nasoethmoidal injury

Introduction

Management of the airways in the presence of midfacial or panfacial injuries with mandibular involvement requires special consideration. Treatment requires reduction and stabilization of maxillary and mandibular fractures by placing the patient's teeth in proper occlusion. Oral intubation significantly impedes this [11]. Usually, nasotracheal intubation would be an ideal alternative for airway management. However, in cases of complex situations like base of skull fracture, nasoethmoidal fracture, etc. This technique gives rise to potential complications [6, 12].

Tracheostomy remains an excellent procedure for establishing a formal surgical airway although this procedure may involve a significant risk of iatrogenic complications, such as tracheal stenosis, internal emphysema, damage to laryngeal nerves, tracheoesophageal fistula, and scarring [1, 13]. However, this technique involves very meticulous and professional post operative care, and thus prolonged stay in the hospital is required [14].

An alternative to tracheostomy is the submental route for tracheal intubation. The technique is comparatively simple and consists of diverting the proximal end of the oro-tracheal tube through the floor of the mouth out from an opening in the submental region. This allows free intra-operative access to the dental occlusion and

C. Kar (✉)
Department of Oral and Maxillofacial Surgery, Haldia Institute of Dental Sciences and Research, Banbishnupur, Balughata, Purba Medenipur, Haldia 721645, West Bengal, India
e-mail: chiradip.kar@gmail.com

S. Mukherjee
Calcutta Institute of Maxillofacial Surgery and Research, Kolkata 700078, West Bengal, India

naso-ethmoidal region without endangering patients with skull base trauma, and at the same time avoids transtracheal dissection and associated complications [4, 5, 7].

A 32 year old male patient reported with bilateral Le Fort II fracture and right side Le Fort I nasoethmoidal communication. Emergency treatments were provided by the neurosurgeons for the first 72 hours and then brought for maxillofacial treatment.

Technique

The technique used for submental intubation was in accordance with the general principles laid down by Hernandez Altemir in 1986 [7]. The planned treatment consisted of submental intubation followed by ORIF. The nasal repair would consist of closed reduction and POP cast for nasal bridge (Fig. 1).

Signed consent was got from the patient and general anesthesia was given by IV infusion of sodium pentothal. The patient was orally intubated after muscle relaxation with armoured/metal reinforced NG tube (Nos. 7–8.5 usually) that has a detachable connector. Prior to intubation the connector was loosened to facilitate quick removal during the re-routing through the submental path.

A 1.5–2 cm incision was made in the median region of the submental area directly adjacent to the lower border of mandible (Fig. 2). The muscular layers (platysma and mylohyoid muscles) are transversed by blunt dissection using artery forceps that was always in contact with the lingual cortex of the mandible. The mucosal layer on the floor of the mouth was incised over distal end of the

Fig. 1 Profile picture

Fig. 2 Submental incision

forceps, located in front of the sublingual caruncle and the forceps are then opened, creating a tunnel (Fig. 3). During the dissection it was important that the width of the submental access should be sufficient to pass the tube without any interference.

After the surgical access was made, the tube was first decuffed and the balloon was first introduced into the mouth, being passed through the tunnel with the forceps (Figs. 4, 5).

A blood oxygen saturation of 99–100% was now achieved by administering 100% oxygen for a period of 3–4 min. The tube was then disconnected, the plastic connector removed and the proximal end of the tube was now routed through the submental tunnel with the help of artery forceps. The total time spent in this manoeuvre did not exceed 3 min (Figs. 6, 7). The plastic connector was immediately reattached with the tube and the ventilation re-established. The cuff was inflated again and the tube was now secured with the help of stay sutures in the submental area (Figs. 8, 9).

Fig. 3 Through-and-through incision into the floor of the mouth by blunt dissection from the submental incision close to the lingual cortex of mandible

Fig. 4 The deflated balloon is taken out through the submental incision

Fig. 7 The tube taken out through the submental route and immediately connected

Fig. 5 The balloon coming out of the incision

Fig. 8 The tube is secured with stay sutures and the intraoral position of the tube is clearly shown in this diagram

Fig. 6 The tube is now being taken out through the incision

Fig. 9 Occlusion can now be corrected without interference from the endotracheal tube

After the completion of the surgery the stay sutures were removed and after achieving 99–100% oxygen saturation the tube was again disconnected, the connector removed and the proximal end of it was pulled inside the mouth after the cuff balloon. The submental incision was sutured taking deep bites. The patient was now extubated from the mouth.

Discussion

Submental intubation was first described as alternative route for oral or nasal intubation, especially in cases of major facial trauma, by Altemir [7]. Since the first

application of this technique, a little more than 20 years ago, many authors have studied the clinical use of this procedure. Very low rates of complications have been reported. Many trials have shown the submental route to be simple, quick and safe approach to airway management [1, 4, 5, 7].

This procedure 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 risk of iatrogenic meningitis or trauma of the anterior skull base after nasotracheal intubation, as well as complications such as tracheal stenosis, injury to cervical vessels or the thyroid gland, associated with tracheostomy [10].

The limitation of this procedure is for patients who also present a neurological deficit or thoracic trauma and need more than 7–14 days of postoperative ventilator support and patients expected to need repeated operations. In such cases a tracheostomy is a safer procedure than endotracheal intubation [3].

Caubi et al. reported a case of intra-operative complication after an increase in tracheal pressure that probably could have been prevented by the use of smaller tube than the one they used [2]. We recommend the use of metal reinforced NG tubes (No. 7–8.5) as there are less chances of kinking resulting in a compromised airway [9].

Although other authors recommend use of lateral incision through the body of mandible [8] we have used the method used by Caubi et al. for two reasons: first, in this area only a few anatomic structures are present and there is a minimum risk of nerve or vascular damage; second, the scar is less visible behind the symphyseal region [2].

Previous studies have no record of salivary fistula, bleeding or infection. Scar formation is a disadvantage, however, it is by far less visible than a tracheostomy scar and is well tolerated according to these studies [2]. We have had a similar experience with all the seven cases that we have operated upon.

Although the cost of reinforced tracheal tubes may seem to be expensive [9] but considering the cost of extended post operative stay in the hospital as an alternative this minor rise in the inventory actually reduces the total cost. Moreover, the post operative care of tracheostomy requires high dependency care in many cases. Tracheostomy tube and attachments cost around Rs 5,000 and disposable tracheal suction catheters are required in large number in the post operative stage. Many extra rounds of care in the days after surgery are required for just the tracheostomy. All these have been found to add up to the treatment cost considerably. This unnecessary expenditure can be avoided in those selective cases of submental intubation where prolonged post-operative ventilation can be ruled out safely.

Conclusion

Submental intubation in selected cases of craniomaxillofacial injuries is a useful alternative technique as it avoids some of complications associated with nasal intubation and tracheostomy. It also avoids the need of longer post operative care needed in cases of tracheostomy and thus does away with associated risk of complications. This technique can be easily carried out even in hospital setups with limited resources.

References

1. Amin M, Dill-Russel P, Manisali M, Lee R, Sinton I (2002) Facial fractures, submental tracheal intubation. *Anaesthesia* 57(12):1195–1199
2. Caubi AF, Vasconcelos BCE, Vasconcelos RJH, Morais HHAM, Rocha NS (2008) Submental intubation in oral maxillofacial surgery: review of literature and analysis of 13 cases. *Med Oral Patol Oral Cir Bucal* 13(3):E197–E200
3. 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
4. Green JD, Moore UJ (1996) A modification of submental intubation. *Br J Anaesth* 77(6):789–791
5. Haddock AR, Barnard NA (1993) Maintaining the airway during treatment of severe facial injuries. *Br Dent J* 174(2):56–57
6. Hall D (1989) Nasotracheal intubation with facial fractures. *JAMA* 261:1198
7. Hernandez Altermir F (1986) The submental route for endotracheal intubation. A new technique. *J Maxillofac Surg* 14(1): 64–65
8. Honig JF, Braun U (1993) Laterosubmental tracheal intubation. An alternative method to nasal nasal-oral intubation or tracheostomy in single step treatment of panfacial multiple fractures or osteotomies. *Anaesthesist* 42(4):256–258
9. Kihara S, Komatsuzaki T, Brimacombe JR, Yaguchi Y, Taguchi N, Watanabe S (2003) A silicone-based wire-reinforced tracheal tube with a hemispherical bevel reduces nasal morbidity for nasotracheal intubation. *Anesth Analg* 97(5):1488–1491
10. MacInnis E, Baig M (1999) A modified submental approach for oroendotracheal intubation. *Int J Oral Maxillofac Surg* 28(5): 344–346
11. Paetkau D, Strand M, Onc B (2000) Submental orotracheal intubation for maxillofacial surgery. *Anaesthesiology* 92: 912–914
12. Rungta N (2007) Technique of retromolar, submental intubation in facio-maxillary trauma patients. *Ind J Trauma Anaesth Crit Care* 8(1):573–575
13. Taicher S, Givol N, Peleg M, Ardekian L (1996) Changing indications for tracheostomy in maxillofacial trauma. *J Oral Maxillofac Surg* 54(3):292–295
14. Veenith T, Ganeshamoorthy S, Standley T, Carter J, Young P (2008) Intensive care unit tracheostomy: a snapshot of UK practice. *Int Arch Med* 1(1):21