Case Report

Vol. 6, No. 2, 68-71
https://doi.org/10.15280/jlm.2016.6.2.68

Journal of Lifestyle Medicine

Submental Intubation in Patients with Complex Maxillofacial Injuries

Yuseon Cheong[1], Seong Sik Kang[1], Minsoo Kim[1,*], Hee Jeong Son[1], Jaewoo Park[1], Jeong-Mo Kim[2]

[1]Department of Anesthesiology and Pain Medicine, Kangwon National University Hospital, Chuncheon, [2]Department of Oral and Maxillofacial Surgery, Kangwon National University Hospital, Chuncheon, Korea

Airway management in patients with complex maxillofacial injuries is a challenge to anesthesiologists. Submental intubation is a useful technique that is less invasive than tracheostomy in securing the airways where orotracheal and nasotracheal intubation cannot be performed. This procedure avoids the use of tracheostomy and bypasses its associated morbidities. A flexible and kink-resistant reinforced endotracheal tube with detachable universal connector is commonly used for submental intubation. Herein, we report cases involving submental intubation using a reinforced endotracheal tube with a non-detachable universal connector in patients with complex maxillofacial injuries.

Key Words: Intubation, Submental, Maxillofacial injuries

INTRODUCTION

Patients with complex maxillofacial injuries usually require general anesthesia for surgical reduction of fractures. Orotracheal intubation is not suitable for assessing the dental relationship and occlusion, and nasotracheal intubation is contraindicated in patients with nasoorbitoethmoidal fractures or fractures of the base of the skull owing to potential complications such as cerebrospinal fluid leakage and meningitis. Tracheostomy provides an alternative, surgical intervention, but can be associated with increased post-operative care, complication rates, and morbidity. Submental intubation was first introduced to avoid tracheostomy in 1986 and has some advantages. We present two cases of submental intubation using a reinforced endotracheal tube with non-detachable universal connector in patients with complex maxillofacial trauma. The indications, contraindications, advantages, and complications of submental intubation are discussed.

Received: June 15, 2016, Accepted: July 21, 2016

*Corresponding author: Minsoo Kim
Department of Anesthesiology and Pain Medicine, Kangwon National University Hospital, 156 Baengnyeong-ro, Chuncheon, Gangwon-do 24289, Republic of Korea
Tel: 82-33-258-9423, Fax: 82-33-258-9099
E-mail: patho77@naver.com

CASE REPORT

1. Case 1

An 18-year-old male patient (60 kg, 170 cm) was scheduled for open reduction and internal fixation of a nasoorbitoethmoidal fracture (Fig. 1). Preliminary investigations indicated that he was otherwise healthy, with preanesthetic evaluation being unremarkable except for signs of sinus bradycardia (41 bpm). As intra-operative assessment of dental occlusion was required, orotracheal intubation was not indicated, with nasotracheal intubation also being inappropriate due to his nasoorbitoethmoidal fracture. In order to avoid tracheostomy, submental intubation was planned.

Fig. 1. Three-dimensional reconstructed image of the patient in case 1.

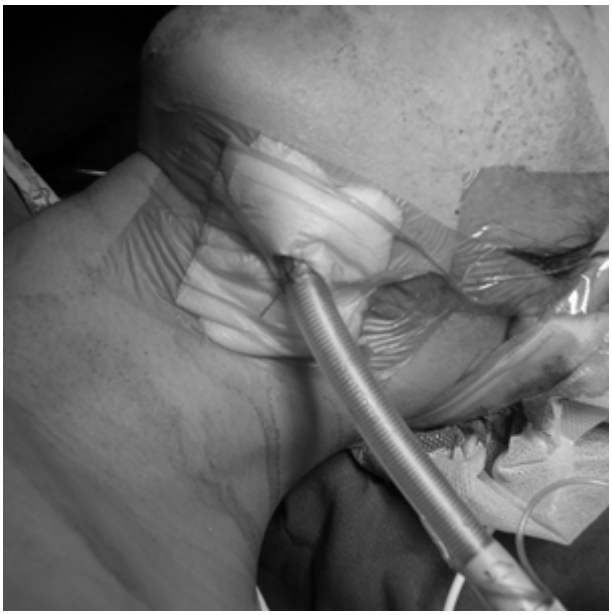

Fig. 2. The patient with submental intubation.

The patient was monitored with pulse oximetry, electrocardiography, and noninvasive blood pressure measurements. Before anesthetic induction, atropine (0.5 mg) was given intravenously. After preoxygenation with 100% oxygen for 3 minutes, anesthesia was induced with propofol (100 mg) and fentanyl (100 μg). After successful ventilation with a facial mask, rocuronium (50 mg) was administered intravenously. Prior to intubation, the universal connector of a reinforced endotracheal tube (ETT) was detached gently from the tube and reattached so that it could be easily disconnected during the procedure (Fig. 2). Orotracheal intubation was performed using a 7.5-mm-internal diameter reinforced ETT (Lo-Contour Oral/Nasal Tracheal Tube Cuffed, Mallinckrodt, Ireland). Anesthesia was maintained with sevoflurane and 100% oxygen to increase the apneic reservoir during the procedure. Approximately 3 cm lateral to the mandibular midline, a submental horizontal incision (of 1.5 cm) was placed a fingerbreadth below the mandibular inferior border. Blunt dissection toward the mouth floor was performed using a thin mosquito hemostat, forming an orocutaneous tunnel. A Kelly forceps was then introduced through the tunnel from the outside to widen it. At that moment, the ETT was disconnected from the ventilator circuit, and its connector was removed. The ETT was

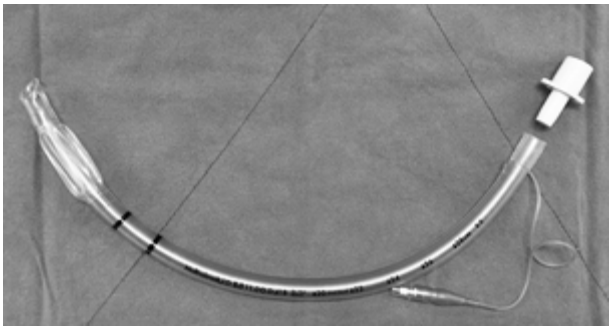

Fig. 3. Reinforced endotracheal tube with detached universal connector.

then grasped by the tip of the Kelly forceps and pulled out through the tunnel of the sub-mental incision, followed by the pilot balloon. After the ETT was shifted, the connecter was then reattached, and the tube was reconnected to the ventilator. Then, the ETT was repositioned using Magill forceps, and a stay suture was applied with silk in order to fix the tube to the skin to prevent accidental extubation (Fig. 3).

At the end of the surgery, the stay suture was removed, and the ETT with a pilot balloon was retracted from the oral cavity, removed via the mouth, and brought back to the orotracheal position. The submental incision was lay-

er-sutured, and wet gauze dressing was applied at the site of the wound at the mouth floor to facilitate secondary healing. Following the procedure, extubation was performed, and the patient was transferred to the post-anesthetic care unit. The post-operative period was unremarkable, and there was negligible submental scarring at two months post-operation.

2. Case 2

A 48-year-old male patient (65 kg, 175 cm) sustained bilateral orbital wall and maxillary fractures with a skull-base fracture after a motor vehicle accident. He was scheduled to undergo surgical intervention for the fractures. He had undergone brain surgery for epidural hematoma removal 11 days prior. As his level of consciousness was alert, intubation following the operation was unnecessary. As an alternative to tracheostomy, submental intubation was planned.

The patient was monitored with pulse oximetry, electrocardiography, and noninvasive blood pressure measurements. After preoxygenation with 100% oxygen for 3 minutes, anesthesia was induced with propofol (80 mg) and rocuronium (50 mg). Following orotracheal intubation with a reinforced ETT (internal diameter, 7.5 mm), the tube was removed through the submental area using the aforementioned method.

After the operation, the patient was transferred to the intensive care unit and was extubated at post-operative day 1.

DISCUSSION

Airway management in patients with complex maxillofacial injuries is a challenge to anesthesiologists. Although orotracheal intubation is the most frequently used route in securing the airway, it interferes with the surgical field and disturbs intra-operative assessment of dental occlusion. As an alternative to orotracheal intubation, nasotracheal intubation is commonly used in oral and maxillofacial surgeries. However, nasotracheal intubation is contraindicated in cases of skull-base trauma due to the incidence of accidental intracranial placement [1], possible cerebral spinal fluid leakage, and/or meningitis [2].

Tracheostomy is a good route to secure the airway in patients with complex maxillofacial injuries, particularly for those who need prolonged intubation. However, the procedure is associated with the risk of hemorrhage, pneumothorax, infection, and tracheal stenosis [3,4].

Submental intubation was first described by Hernandez Altemir [5] in 1986. Since its introduction, it has been used as an attractive option for intra-operative airway control in specific, complex maxillofacial injuries. Maxillofacial trauma is the most common indication for submental intubation [6]. Submental intubation is also applied to bimaxillary orthognathic surgeries with simultaneous rhinoplasty or orthognathic surgeries in patients with large pharyngeal flaps or other anatomic anomalies precluding nasotracheal intubation [7,8]. Other possible indications for this technique are certain base of skull procedures [9] or cancrum oris [10]. Submental intubation is contraindicated in patients who have severe neurological defects or those who require long-term airway support and maintenance [7,8]. In these cases, tracheostomy should be considered. In patients with a history of severe keloid formation, this technique can be contraindicated. In the first case, endotracheal intubation was not indicated because of circumstances that prevented the intra-operative assessment of dental occlusion, with nasotracheal intubation also being inappropriate due to his nasoorbitoethmoidal fracture. As he was healthy, with the exception of his nasoorbitoethmoidal fracture, and did not require prolonged ventilatory support, the decision to choose submental intubation over tracheostomy had greater significance. In the second case, the patient had a traumatic epidural hematoma. Nevertheless, submental intubation was chosen because of his alert mental status in addition to his unrequired use of long-term airway support.

Flexible and kink-resistant ETT is required to maintain airway patency despite the acute angle of the airway, particularly in the submental route. Ball et al. [11] reported submental intubation using the flexible tracheal tube supplied with the intubating laryngeal mask (ILM, Intavent, UK). This tube has an advantage that its connector is easy to detach and reattach. However, it is rare in the market and expensive compared to our reinforced tube (Lo-Contour Oral/Nasal Tracheal Tube Cuffed, Mallinkrodt, Ireland). The universal connector of a standard reinforced ETT, which we used, is bounded firmly to the tube to prevent

accidental detachment. Prior to intubation, it is important to detach and reattach the connector gently from ETT using mosquito forceps so that it can be easily disconnected during the procedure.

A major advantage of submental intubation is the avoidance of tracheostomy-related complications. As discussed, tracheostomy is associated with increased postoperative care, complication rate, and morbidity. In comparison, the complications associated with submental intubation are less severe and lower in frequency. With respect to surgery, submental intubation has advantages that assist in the surgical procedure. It allows for intra-operative assessment of dental occlusion throughout the operation. As maxillofacial trauma can often result in dental disarrangement, dental occlusion becomes clinically important. Submental intubation removes the ETT from the surgical field, thereby providing a clear surgical field that also assists in preventing injuries of the ETT. Additional advantages of submental intubation include its minimally invasive nature and the more esthetically acceptable nature of the resulting scar.

There are some reported complications associated with submental intubation. The most serious complication is accidental extubation [12]; however, this can be prevented via a stay suture, as used in our cases. Other complications are superficial skin infections, damage to the ETT, tube dislodgement or obstruction, transient lingual nerve paresthesia, venous bleeding, and submental scarring [6].

The submental intubation technique is a reliable alternative to tracheostomy in patients undergoing complex maxillofacial surgeries who do not require prolonged ventilatory support. It has minimal morbidity, a low complication rate, and avoids the potential complications associated with tracheostomy.

REFERENCES

1. Marlow TJ, Goltra DD, Jr., Schabel SI. Intracranial placement of a nasotracheal tube after facial fracture: a rare complication. *J Emerg Med* 1997;15:187-91.
2. Rhee KJ, Muntz CB, Donald PJ, Yamada JM. Does nasotracheal intubation increase complications in patients with skull base fractures? *Ann Emerg Med* 1993; 22:1145-7.
3. Waldron J, Padgham ND, Hurley SE. Complications of emergency and elective tracheostomy: a retrospective study of 150 consecutive cases. *Ann R Coll Surg Engl* 1990;72:218-20.
4. Gilyoma JM, Balumuka DD, Chalya PL. Ten-year experiences with Tracheostomy at a University teaching hospital in Northwestern Tanzania: A retrospective review of 214 cases. *World J Emerg Surg* 2011;6:38.
5. Hernandez Altemir F. The submental route for endotracheal intubation. A new technique. *J Maxillofac Surg* 1986;14:64-5.
6. Jundt JS, Cattano D, Hagberg CA, Wilson JW. Submental intubation: a literature review. *Int J Oral Maxillofac Surg* 2012;41:46-54.
7. Eisemann B, Eisemann M, Rizvi M, Urata MM, Lypka MA. Defining the role for submental intubation. *J Clin Anesth* 2014;26:238-42.
8. Prakash VJ, Chakravarthy C, Attar AH. Submental/ Transmylohyoid route for endotracheal intubation in maxillofacial surgical procedures: a review. *J Int Oral Health* 2014;6:125-8.
9. Biglioli F, Mortini P, Goisis M, Bardazzi A, Boari N. Submental Orotracheal Intubation: An Alternative to Tracheotomy in Transfacial Cranial Base Surgery. *Skull Base* 2003;13:189-95.
10. Eipe N, Neuhoefer ES, La Rosee G, Choudhrie R, Samman N, Kreusch T. Submental intubation for cancrum oris: a case report. *Paediatr Anaesth* 2005;15: 1009-12.
11. Ball DR, Clark M, Jefferson P, Stewart T. Improved submental intubation. *Anaesthesia* 2003;58:189.
12. Amin M, Dill-Russell P, Manisali M, Lee R, Sinton I. Facial fractures and submental tracheal intubation. *Anaesthesia* 2002;57:1195-9.