

Submental Intubation with LMAFastrach™ Endotracheal Tube in Maxillofacial Trauma: A Case Report

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Abstract

Securing a definitive airway in patients who require surgical fixation of complex maxillofacial fractures is an integral part of their perioperative management. For the ease of surgical access, an orotracheal tube is usually not preferred by surgeons. The presence of a base of skull or nasal bone fractures would also contraindicate nasotracheal intubation. Therefore, a tracheostomy may be the only option left to secure the airway in these patients who require surgical fixation. Submental intubation has been used as a safe and effective alternative method in patients who require intubation for maxillofacial reconstruction since it was first reported by Hernandez Altemir F in 1986. Many modifications to the original technique have been documented over the years, but there has been no consensus to support the use of a single method or device. In this case report, we described our experience with submental intubation using an LMAFastrach™ endotracheal tube (ETT) to facilitate the surgical fixation of bilateral Le Fort II fractures. We conclude that the LMAFastrach™ ETT is a suitable device for submental intubation. This technique should be included in airway workshops and courses for anaesthesia residents as it is a simple yet secure alternative to tracheostomy in the intraoperative airway management of maxillofacial trauma.

Keywords

Submental Intubation, LMAFastrach™, Maxillofacial Trauma

1. Introduction

The submental route for endotracheal intubation was first described in 1986 [1]

as an alternative airway maneuver for maxillofacial procedures. This technique involves exteriorizing the endotracheal tube (ETT) from the oral cavity into the submental space, thereby allowing the surgeons unhindered access to the oral cavity. It also eliminates the risks associated with nasotracheal intubation, and avoids a tracheostomy which would otherwise be the conventional method of airway control [2]. Since its first description by Altemir, several case studies have been published reporting the efficacy of this approach [3] [4]. The LMAFastrach™ ETT has been reported to be an ideal device for this technique in view of certain unique design features [5]. In this case report, we document a successful submental intubation using the LMAFastrach™ ETT.

2. Case Report

The patient was a 34-year-old, 65 kg male who required surgical fixation of bilateral Le Fort II facial fractures, which he sustained from an unwitnessed fall. There was no radiological evidence of brain or cervical spine injuries. He had no other significant medical history.

In view of his Le Fort II facial fractures, nasotracheal intubation was contraindicated. Besides a marginally reduced mouth opening, the patient otherwise displayed no signs of a difficult airway. A decision was then made with the surgeon to perform a submental intubation in order to avoid a tracheostomy.

A rapid sequence induction was performed after all standard monitors were applied. A C-MAC video laryngoscope was used, revealing a Grade 1 laryngoscopic view. The patient was intubated easily with a 7.0 mm internal diameter reinforced Mallinkrodt (Covidien) cuffed ETT. A submental tract was then created under general anaesthesia. First, a 2.5 cm left submental incision was made, followed by blunt dissection to the oral mucosa, then a 1cm mucosa incision. The tract was then further dilated using a #8.0 nasopharyngeal airway.

We proceeded to detach the connector of the reinforced Mallinkrodt ETT but realized that the connector was fixed to the tube. Decision was then made to change to a Fastrach™ ETT by railroading it over a Bougie, after ensuring that the connector of the Fastrach™ ETT was easily detachable. A direct laryngoscopy was done subsequently to ensure that the cuff was beyond the vocal cords. Tube placement was confirmed with capnography and equal bilateral breaths sounds. The pilot balloon was first brought out through the submental tunnel by a pair of artery forceps. The connector of the Fastrach™ ETT was then removed and the tube was exteriorized. After reconnection, endotracheal position reconfirmed with capnography and patency of the ETT was ensured by smooth passage of a suction catheter. Anaesthesia was initially maintained with 100% oxygen and Desflurane until submental intubation was completed. Subsequently, the fraction of inspired oxygen (FiO₂) was kept at 0.3.

The marking seen at the submental skin incision was initially at 26 cm. However, a leak was subsequently noted. This was resolved with advancement of the ETT to the point where the connector was (**Figure 1**). Direct laryngoscopy was

repeated to confirm that the position of the cuff was beyond the vocal cords, before the ETT was finally secured to the skin with sutures.

Throughout the surgery, there were multiple episodes of air leak from the mouth despite adequate cuff pressure. The leak improved each time by advancing the ETT deeper into the patient's oral cavity or closing the patient's jaw. At the end of the surgery, we noticed that fluid from the surgical field had entered the space between the connector and the interior wall of the tube, most likely due to the fact that the connector was inside the submental tunnel throughout the surgery. This made the detachment of the connector, which was a necessary step for conversion back to orotracheal intubation, very challenging. Using a pair of artery forceps, we eventually managed to detach the connector. The patient maintained excellent oxygenation despite this unforeseen difficulty.

After mucosal and submental skin closure, the patient was extubated awake. He was monitored in the postanesthesia care unit, followed by transfer to the high dependency ward. He was discharged four days later. An examination of the submental wound on postoperative day (POD) eight showed no signs of infection (**Figure 2**). The patient subsequently defaulted follow up.

3. Discussion

Submental intubation has been described as a safe and effective technique for intraoperative airway control for surgical fixation of complex panfacial fractures, as it avoids the risks and complications of nasotracheal intubation, and tracheostomy [6].



Figure 1. Submental intubation completed. Universal connector was embedded in submental tunnel.



Figure 2. Submental wound at POD 8.

Since 1986, several publications have attested to the efficacy and low morbidity of this technique. In a study involving 25 patients [7], two patients had endobronchial intubation, and one patient suffered infection at the submental incision site. Another study involving 13 maxillofacial surgical patients [8] reported two patients with endobronchial migration which was readily detected and corrected, as well as two patients with superficial wound infection which responded well to local treatment. Other major complications have been proven to be uncommon based on trials conducted over the past 30 years [9].

However, it is not uncommon to find that patients with complex facial fractures often have concomitant neurological deficits or a compromised pulmonary status, which makes postoperative mechanical ventilation necessary. In such patients, a tracheostomy would be the preferred choice [10]. Submental intubation was suitable in our patient as he only required intraoperative airway management.

Majority of the cases reported in the literature [9] chose a reinforced ETT for its flexibility. However, as illustrated in our case, it is crucial to confirm the ability to remove the universal connector before commencing, as not all armoured tubes come with a freely detachable connector. Fewer reports documented success with a non-reinforced ETT, as these standard tubes are usually prone to kinking and associated with increased peak airway pressures [11]. Altemir also went on to describe the use of the Combitube SA in two patients, with no complications reported [12]. Unfortunately, no large-scale studies supporting the use of a particular technique or device have been published so far.

The structural design of the Fastrach™ ETT confers many benefits in submental intubation [13]. On top of being a wire-reinforced tube that allows it to be positioned in acute angles without kinking, the connector is intended to be easily detached and reattached without damaging the tube. It is designed to withstand the shearing forces when being pulled through the airway tube of the intubating LMA, hence the pilot balloon and its connecting tubing are described to be tougher than that of a conventional ETT [13], making it less prone to damage during exteriorization.

Use of an unsuitable ETT due to our lack of experience could have resulted in the loss of airway and hypoxic consequences. We also faced another problem where there was insufficient length of the tube beyond the exit point due to the need for repeated advancement of the ETT into the patient's mouth to circumvent an air leak. Dislodgement was excluded with laryngoscopy and the pilot balloon was not leaking. We postulated that our problem occurred because the Fastrach™ ETT is shorter in length when compared to the Mallinkrodt reinforced tube of the same diameter, and we did not exclude coiling of the ETT intraorally before fixing the tube [7]. This resulted in the universal connector being embedded in the submental tunnel throughout surgery, rendering it difficult to remove at the end of the procedure.

A literature review [9] done on submental intubation reported a procedure time averaging at 9.9 minutes. Success rate was 100%. Minor complications oc-

curred in merely 7% of patients. No major complications associated with submental intubation have been reported, and none of the studies demonstrated hypoxia during disconnection of the ETT. Besides the consensus among reports that the complications are minimal and minor, submental intubation also requires no specialized equipment, and results in an aesthetically better tolerated scar [9] than a tracheostomy. Elective use of submental intubation has also been described as a valuable maneuver in elective orthognathic surgery [14] and transfacial cranial base surgery [15].

4. Conclusion

Although the level of evidence is low, we conclude that submental intubation is an effective yet underutilized technique for establishing a definitive airway while providing uninhibited intraoral surgical access during maxillofacial reconstructive surgery. We recommend the use of the LMAFastrach™ ETT for this technique in view of certain design features. In order to further improve its safety profile, we also believe that more emphasis should be given to this simple procedure during airway workshops for residents, with the aim to avoid the pitfalls we faced due to the lack of experience.

Informed Consent

Informed consent was obtained from the patient for their anonymized information to be published in this article.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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