A Simple and Reliable Submental Intubation Technique for Maxillofacial Fractures

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Abstract: In 1986, Altemir first reported the use of submental intubation to avoid tracheotomy in patients with panfacial and midfacial fractures for whom intermaxillary fixation is necessary, but orotracheal and nasotracheal intubations are not recommended. This novel technique allowed intraoperative access to perform dental occlusion and reconstruction of the nasal pyramid in patients with skull base fractures. Herein, we describe a refined technique based on Altemir’s original procedure. Seven male patients with panfacial fractures underwent submental intubation using our refined technique. The technique was developed after encountering a technical error with Altemir’s original procedure. In this new technique, we employed a 2-0 silk suture guide to allow the passage of both the endotracheal and cuff-inflation tubes through the same tunnel created from the oral cavity to the submental area. The success rate of the refined technique was 100%, and there were no intraoperative or postoperative complications. There was 20 seconds of ventilation outage time in total. Endotracheal and cuff-inflation tubes were easily and quickly passed through the same submental tunnel. Our refined technique is simple, easy, safe, fast, inexpensive, and does not require specific materials. Submental scars were smaller and relatively inconspicuous in this study, compared to those reportedly associated with other modified techniques.

Key Words: Intubation, nasal, panfacial fracture, submental, tracheotomy

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METHODS

Seven patients underwent submental intubation using our refined technique at our institution between May 2016 and April 2017, and the technique was performed by 5 different plastic surgeons. All patients had panfacial fractures, and neither oral nor nasal intubation was applicable due to their maxillary and/or mandibular fractures in conjunction with nasal or basal skull fractures. All patients were male and were 16 to 75 years of age (mean 42.5 years). Written informed consent to undergo the procedure was provided.

TABLE 1. The 2 Types of Complications During Submental Intubation

| Group                          | Complication                          |
|-------------------------------|---------------------------------------|
| Wound                         | Hypertrophic scar                      |
|                               | Infection                              |
|                               | Bleeding                               |
|                               | Orectaneous fistula                    |
|                               | Transient lingual nerve paresthesia    |
|                               | Mucocele                               |
| Endotracheal/cuff-inflation tube | Tube damage                           |
|                               | Right mainstem intubation              |
|                               | Endotracheal tube obstruction          |
|                               | Accidental extubation                  |
|                               | Erroneous passage of the tubes         |
prior to undergoing open reduction and internal fixation simultaneously with intermaxillary fixation (Table 2). An anesthesiologist induced general anesthesia for basic oral intubation and extubation in all cases. The vital functions of all patients were monitored and the patients’ breathing was managed during surgery.

**Refined Submental Intubation Technique**

After basic oral intubation, temporary draping of the mid and lower face was performed. A skin incision of approximately 2 cm was made centrally approximately 3 cm caudal to the inferior border of the mandible in the submental region down to the platysma. Using a pair of curved artery forceps (Medical U&A, Japan), the submental tunnel was bluntly made from the platysma to the mylohyoid muscle, and then to the mucosa of the oral floor. After the forceps reached the oral floor, the mucosa was incised from the oral cavity. The submental tunnel was then bluntly enlarged to the width of the endotracheal tube using the same forceps, and a 2-0 silk suture (Alfresa Pharma, Osaka, Japan) was grasped by the forceps and passed caudally through the tunnel. Next, the caudal part of the same suture was grasped by 2 pairs of curved artery forceps, with a distance of approximately 10 cm between the 2 pairs of forceps (Fig. 1A-B). After pulling the suture from the oral cavity, the first pair of forceps was passed through the tunnel. The cuff-inflation tube was grasped by the same pair of forceps and pulled out through the tunnel (Fig. 1C). The suture was pulled again, and the second pair of forceps was passed through the tunnel until the oral floor was reached. The endotracheal tube was then detached from the part connected to the ventilator and was grasped by the second pair of forceps and pulled out through the same tunnel (Fig. 1D) (rendering of our refined technique, which was described in Fig. 1A-D, is in Supplemental Digital Content, Video, http://links.lww.com/SCS/A357). The endotracheal tube was immediately attached to the connector and the ventilator and was fixed to the submental skin via a 2-0 silk suture (Fig. 1E).

![FIGURE 1.](image-url) (A) A 2-0 silk suture (and arrows) was passed through the submental tunnel. Two pairs of forceps were then attached to the suture with a distance of approximately 10 cm between them, on the submental side. (B) Schematic diagram of the photograph shown in (A). (C) The cuff-inflation tube was grasped with a pair of forceps and pulled through the tunnel. (D) The endotracheal tube was grasped by a second pair of forceps and pulled out through the same tunnel. (E) The endotracheal tube was fixed to the submental skin via a 2-0 silk suture.

**RESULTS**

In the first case, we pulled out the inflation tube and then pulled out the endotracheal tube using curved artery forceps in accordance with the original submental intubation technique. However, we could not fully inflate the cuff to achieve sufficient ventilation because of a technical error, wherein the endotracheal and cuff-inflation tubes went through different passages in the submental tissue, which created a loop in the inflation tube within the incision (Fig. 2A-B).

We then modified the original method using a 2-0 silk suture, as described earlier, and successfully pulled out the 2 tubes easily through the same route. This technique was successfully utilized in 6 subsequent cases by 5 different plastic surgeons, thereby facilitating submental intubation. There were no intraoperative or postoperative complications associated with the procedure. The mean duration of the procedures, excluding the initial case, was approximately 6 minutes (minimum 3 minutes, maximum 9 minutes). The average outage time of ventilation was approximately 20 seconds.
Submental intubation requires a learning curve for the plastic surgeon. For this reason, we cannot directly compare the outcomes reported herein with those derived from other institutions and plastic surgeons. Notably, 5 different plastic surgeons used our refined technique in the current study, and, in all cases, only a few minutes were required to achieve submental intubation.

**CONCLUSION**

Submental intubation requires superior technical skills, particularly when passing the endotracheal and cuff-inflation tubes from the oral cavity to the submental area. Our refined technique reduces the likelihood of complications associated with submental intubation. As well as being safer, it is simpler, easier, and faster than other techniques, it does not require any specialized equipment, and it is not costly. Submental scarring associated with the technique is lower than that associated with other techniques.

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