

## Management of Detachment of Pilot Balloon During Intraoral Repositioning of the Submental Endotracheal Tube

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Submental endotracheal intubation for surgery was used as an alternative to nasotracheal intubation in patients with craniomaxillofacial injury. Generally extubation was performed in the operation room by pulling the tube through the submental incision site. When extubation is not indicated, intraoral indwelling is preferred to submental intubation. We report a case of a 35-year-old male patient with multiple facial bone fractures. At the end of the surgery, we noticed the oropharyngeal edema, and so the submental intubation was converted into a standard orotracheal intubation. During that procedure, the pilot balloon was accidentally detached from the endotracheal tube. The situation was managed by cutting a pilot tube from a new, unused endotracheal tube and connecting it to the intubated tube using a needle connector.

**Key Words:** Submental intubation, maxillofacial injuries, endotracheal tube

Nasotracheal intubation after suffering a craniomaxillofacial injury may lead to severe complications.<sup>1-6</sup> Submental endotracheal intubation has been provided as an alternative technique.<sup>7-12</sup> In most previous reports, the tube was extubated in the operation room (OR) or in the postanesthetic care unit (PACU) by pulling it through the submental incision<sup>10</sup> or after conversion into a standard orotracheal intubation at the end of surgery.<sup>8,9,11,12</sup> When extubation is not indicated, intraoral indwelling is preferred rather than submental intubation.<sup>12</sup> We describe a case of an

accidental detachment of the pilot balloon from the endotracheal tube while pulling the submental tube intraorally through the incision.

A 35-yr-old male was presented for open reduction and internal fixation of multiple facial bone fractures. Because the injury to the maxillofacial structure was severe, nasotracheal intubation seemed to be difficult and dangerous, and submental intubation was planned.

Anesthesia was induced with 250 mg of thiopental sodium and 75 mg of succinylcholine intravenously to facilitate the tracheal intubation. After the conventional orotracheal intubation was performed with a soft-seal cuffed orotracheal tube (ID 7.5 mm, Portex Inc., Hythe, UK), anesthesia was maintained with oxygen, nitrous oxide, isoflurane and vecuronium. After a 2 cm submental incision and blunt dissection, a second reinforced endotracheal tube (ID 7.0 mm, Mallinckrodt, Inc., New York, NY, USA) was passed intraorally through the incision. Then, the first tube was removed, and the second tube was inserted into the trachea. The submental tube did not interfere with the operative procedures.

After the surgical procedures, there were signs of oropharyngeal edema and the patient showed limitations in the ability to open his mouth. Extubation was not indicated. Therefore, the tube was repositioned intraorally instead of keeping it submentally, and the tube was kept in place for a few days. The pilot balloon was first grabbed with a hemostat and pulled through the passage. While pulling the deflated pilot balloon through the incision, the balloon was accidentally detached from the endotracheal tube. The situation was managed by cutting a pilot tube from a new

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unused endotracheal tube and connecting it to the intubated tube using a 20G needle connector. Next, the endotracheal tube was briefly disconnected from the breathing circuit and the tube connector was separated from the endotracheal tube. The reinforced tube was pulled intraorally with the hemostat and was reconnected to the tube connector and to the anesthesia breathing circuit. After confirmation of its adequate tracheal position by bilateral auscultation of the lungs, the tube was fixed with tape.

The submental incision was sutured immediately after the surgery, and extubation was done on postoperative Day 2.

Patients with maxillofacial trauma often cannot be managed with standard orotracheal intubation because orotracheal intubation impedes surgical maneuver for the reduction and stabilization of the fractured bones. Thus nasotracheal intubation is the alternative for the maintenance of the airway.<sup>7,8</sup> On the other hand, nasotracheal intubation after craniomaxillofacial trauma may lead to severe complications, such as cranial intubation, epistaxis, otitis media, sinusitis, sepsis, and pharyngeal trauma.<sup>1-6</sup> Although the incidence of skull base fractures in patients with craniomaxillofacial trauma is low, the potential risk of cranial passage associated with nasopharyngeal intubation may cause additional injury to the central nervous system.<sup>1,4</sup>

The submental route for the endotracheal intubation is a new technique that was developed to avoid these complications. It was first described by Altemir in 1986.<sup>7</sup> After orotracheal intubation and the establishment of the submental tract, the free end of the endotracheal tube was pulled through a submental incision and was reconnected to the anesthetic circuit. Green and Moore noted that the above mentioned Altemir's technique had some technical problems and reported a modification to the original method.<sup>8</sup> These techniques are simple and allow a surgical approach to the fractured facial bones without impedance of the surgical field. These techniques have a very low morbidity from infections, injuries to adjacent submandibular and sublingual ducts, orocutaneous fistular, or scars.<sup>12</sup> However, with the submental route in the patient who needs ventilatory care or intubation, some more difficult



Fig. 1. Repositioned orotracheal intubation from the submental route. A new pilot balloon with a needle connector was connected to the accidentally detached endotracheal tube.

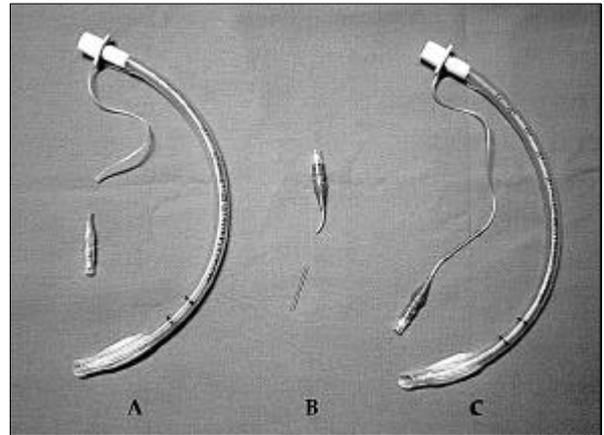


Fig. 2. Photograph shows a detached pilot balloon and endotracheal tube (A), a new pilot balloon and needle connector (B) and endotracheal tube connected with a new pilot balloon and needle connector (C).

problems such as tube obstruction, difficulty in insertion of suction catheter, leakage of the cuff, and accidental extubation can occur.<sup>12</sup>

We used the Green and Moore's modification technique,<sup>8</sup> and the operation was finished uneventfully. In recent reports, extubation was performed by pulling the tube through the incision site or after conversion into a standard orotracheal intubation in the OR or PACU. When the maintenance of intubation or mechanical ventilation was indicated, converting the submental intubation into a standard orotracheal intubation was required.<sup>12</sup> In our case, the maintenance of intuba-

tion was needed but a new orotracheal intubation was not considered because of oropharyngeal edema and limited mouth opening, so we decided to return to the process of orotracheal intubation. The order for repositioning suggested by Gorden et al.<sup>9</sup> is, after deflating the pilot balloon, the pilot tube is passed intraorally, and then the endotracheal tube is passed intraorally. During this procedure, the balloon was accidentally detached in our case and was salvaged by the method mentioned above. Therefore, when applying this procedure to other cases, reversing the order for repositioning should be considered.

Not only in a case of balloon detachment but also in similar instances such as tearing of the pilot balloon or the pilot tube during conventional orotracheal intubation may occur during the perioperative period and intensive care. The pilot tube could be disrupted through a fault by the manufacturer or surgeon, or by the patient biting in PACU or intensive care unit. In conclusion, careful manipulation is recommended when the submental tube and balloon are delivered intraorally, and the preparation of a new tube and needle connector may help for the security of the airway.

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