CASE REPORT

Le Fort I osteotomy facilitated nasotracheal intubation in a patient with concha bullosa and septal deviation: a case report

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Abstract

Introduction: Nasotracheal intubation (NTI) is preferred for general anesthesia in maxillofacial surgery. However, NTI is often traumatic or even unsuccessful, particularly in patients with a narrow nasal pathway. In this case report, we describe a less traumatic NTI approach using maxillary downfracture of Le Fort I osteotomy.

Case presentation: A 19-year-old woman was admitted with a skeletal Class III malocclusion and scheduled to undergo bimaxillary orthognathic surgery. A preoperative evaluation revealed no other medical history and abnormal laboratory findings. Preoperative computed tomography showed nasal septal deviation, concha bullosa, and turbinate hypertrophy. A nasal Ring-Adair-Elwyn endotracheal tube and a tube exchanger could not be inserted via NTI because of her narrow nasal cavity. An oral intubation was performed temporarily and surgery was started. After a maxillary downfracture was performed, which made the nasal cavity wider than before, NTI was successfully conducted without difficulty. The patient was ventilated without any problems, and the operation was continued. Postoperatively, the patient had no further complications and her vital parameters were all stable.

Conclusions: This case report suggests that NTI after maxillary downfracture of Le Fort I osteotomy can be a good alternative that can be successfully performed with less trauma in patients undergoing orthognathic surgery who are preoperatively evaluated as having a narrow nasal cavity.

Keywords
Nasotracheal intubation; Maxillary downfracture; Orthognathic surgery; Case report

1. Introduction

Nasotracheal intubation (NTI) is a technique in which an endotracheal tube is inserted into the larynx through the nostril, nasal cavity, and nasopharynx. NTI is used for general anesthesia in intraoral, oropharyngeal, and maxillofacial surgeries because it provides a good surgical approach and operative view [1]. Moreover, the patient’s occlusal state can be checked at any time during the operation. Despite these advantages, NTI is potentially more traumatic than orotracheal intubation and presents a higher risk of bleeding. It can also be more difficult, especially in patients with anatomical variations and turbinate hypertrophy that result in narrow nasal passages. Several methods have been reported to reduce the bleeding and trauma risk of NTI [2–7].

However, if all such methods fail, repeated unsuccessful NTI attempts to pass through narrow nasal cavity can increase the risk of damage and cause edema of nasal mucosa, putting nasal intubation procedure into a vicious cycle that makes it even more difficult. To help avoid this vicious cycle and perform intubation successfully, we suggest a new NTI approach using maxillary downfracture of Le Fort I osteotomy. This approach was successfully used in our patient who could not be intubated through both the nostrils by any other method because of a narrow nasal cavity.

2. Case presentation

A 19-year-old woman (height, 165 cm; weight, 54 kg) with a skeletal Class III malocclusion was scheduled to undergo bimaxillary orthognathic surgery including Le Fort I osteotomy, bilateral sagittal split ramus osteotomy, and genioplasty. A preoperative evaluation revealed that her American Society of Anesthesiologists (ASA) physical status was class I, with no other medical history and abnormal laboratory findings, except sinus arrhythmia on electrocardiography. She had no history of facial deformity or serious facial trauma or surgery. On physical examination, her airway evaluation including thyromental distance and neck circumference was unremarkable. She had no limitation of neck range of motion and mouth opening. A
dental cone beam computed tomography (CT) showed right-sided nasal septal deviation, concha bullosa of the left middle turbinate, and inferior turbinate hypertrophy (Fig. 1). A nasal endoscopy was not included in preoperative evaluation in this case.

In the operating room, standard monitoring devices were used including a pulse oximeter, electrocardiography device, and non-invasive blood pressure monitor. Preoxygenation was performed for 5 minutes using a face mask with 100% oxygen. Anesthesia was induced with intravenous fentanyl (100 mcg), 2% lidocaine (40 mg), and propofol (100 mg). Neuromuscular blockade was achieved by intravenous administration of rocuronium (40 mg), and manual bag-mask ventilation was easily accomplished.

Intubation was first attempted with a lubricated nasal Ring-Adair-Elwyn endotracheal tube (nasal RAE tube) with an internal diameter (ID) of 6 mm that had been softened in warm water. However, the intubation was unsuccessful because of nasal passage blockages on both sides. After further oxygenation, intubation was attempted again via the Seldinger technique using an endotracheal tube exchanger as a guide wire. A 14-Fr endotracheal tube exchanger was inserted through the patient’s nostril. Although the tube exchanger had a much smaller diameter (~4.67 mm) when compared to the nasal RAE tube, the patient’s nasal cavity was still too narrow for the tube exchanger to pass through. As a result, the second NTI attempt was also unsuccessful.

While maintaining ventilation by mask bagging with 100% oxygen and 5% sevoflurane, the anesthesiologist and operator decided to perform orotracheal intubation and re-approach the nasal cavity after the maxillary downfracture procedure, which is a part of Le Fort I osteotomy. As there were no other factors suggesting difficult intubation except the narrow nasal cavity shown in CT findings, oral intubation was performed easily with a reinforced tube with an ID of 7 mm, and anesthesia was maintained with 6% desflurane and a 50% O2/50% N2O mixture.

After 25 minutes, maxillary downfracture and additional partial removal of the nasal septum and concha crest were performed. As a result, the vertical dimension of the nasal passage increased. Oral and tracheal suctions were performed, and sufficient oxygenation was achieved before changing the endotracheal tube. A nasal RAE tube with an ID of 6 mm was passed through the right side of the widened nasal cavity without any difficulty. After securing the laryngoscopic view, the orotracheal tube was removed, and the nasal RAE tube was advanced through the vocal cord immediately (Fig. 2). After the procedure, tracheal suction through the tube showed minimal blood-tinged secretion. The patient was ventilated without any problems, and the operation was continued.

At the end of the surgery, sugammadex (200 mg) was administered for reversal of the rocuronium-induced neuromuscular block. Extubation was performed safely when the patient was fully awake and able to obey commands. The patient had no further complications and her vital parameters were all stable. She was postoperatively transferred to the general ward and discharged after 5 days without any sequelae. Institutional Review Board (IRB) of Chung-Ang University Hospital approved this case report (IRB number: 2101-011-19351). The patient provided written informed consent for the publication of this report.

3. Discussion

For orthognathic surgery, NTI is an essential choice for favorable surgical approach and better outcomes. However, intubation through the nasal cavity can lead to trauma including epistaxis, submucosal laceration, and turbinate avulsion [1, 8]. This is more likely to occur with the use of oversized tubes, use of excessive force, or repeated unsuccessful attempts. In consideration of the possibility of postoperative airway obstruction and dyspnea in patients undergoing orthognathic surgery, traumatic NTI should be avoided [9]. Furthermore, it may cause blood aspiration and airway edema in the postoperative period [1].

To perform a non-traumatic NTI, an understanding of the basic anatomy and identification of the patient’s anatomical variations of the nasal passage are essential. For assessing
rubber catheter to guide the advancement of a tube has been proposed to decrease trauma. However, this method is not free from infection issue, it needs to be implemented aseptically as much as possible. Because of the complexity of the suggested method, the clear communication and close cooperation between the anesthesiologist and surgeon are highly required.

One study that surveyed 378 patients who underwent bimaxillary orthognathic surgery reported that nasal congestion was the worst postoperative symptom that the patients complained of [14]. Disorganized and excessive NTI attempts may irritate the nasal mucosa and cause airway edema. It may worsen the patient’s nasal congestion and result in difficult postoperative airway management, especially in patients with narrow nasal cavities. To prevent deterioration in these patients, our new NTI approach using maxillary downfracture should be considered based on a preoperative evaluation of the patient’s nasal structure.
4. Conclusions

In conclusion, we recommend our NTI technique using maxillary downfracture of Le Fort I osteotomy, which results in less trauma, particularly in patients undergoing orthognathic surgery who have been evaluated as having a narrow nasal cavity. It can be a good alternative when other techniques are unsuccessful.

AUTHOR CONTRIBUTIONS

YHJ and YJC designed the study. JLL, HK, SHS, and YJC conducted investigation and analyzed the data. JLL, GJC wrote the original draft. JLL, GJC, CWB, and UL reviewed and revised the manuscript. YHJ supervised the study. All authors approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study has been approved by the Institutional Review Board of Chung-Ang University Hospital (IRB number: 2101-011-19351). Written informed consent was obtained from the patient for the publication of this case report.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES
