

# Nasogastric tube insertion difficulty in a patient with a large goiter: A case report

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[journals.sagepub.com/home/imr](https://journals.sagepub.com/home/imr)**Ana Cho , Seokhyung Hong and Jinyoung So**

## Abstract

Airway management under anesthesia is given special attention in patients who have large goiters. Nasogastric tube insertion may be difficult in intubated patients with large goiters. Several methods have been proposed to facilitate the insertion of nasogastric tubes in patients with endotracheal intubation; however, a standard insertion method has not been established. A 33-year-old man was admitted to our otolaryngology department for right thyroid lobectomy to remove a larger goiter. A thyroid computed tomography scan revealed a huge cystic mass with tracheal displacement. Although difficult intubation was expected, endotracheal intubation was performed successfully. An anesthesiologist attempted nasogastric tube insertion via the right nostril; however, this was not successful. Next, an angiography catheter was placed in a nasogastric tube, and the nasogastric tube was gently inserted with the patient's neck in mild flexion. This attempt also failed. Finally, the nasogastric tube was gently inserted via anterior displacement of the cricoid cartilage. The nasogastric tube advanced up to 60 cm. Surgery was performed, and the patient was discharged with no complications on postoperative day 8.

## Keywords

Thyroid surgery, goiter, intratracheal intubation, gastrointestinal intubation, nasogastric tube, anesthesia

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## Introduction

Airway management has special importance for patients with large goiters. When a nasogastric tube is required for surgery, insertion of the nasogastric tube can be difficult in patients with large goiters. In general, nasogastric tube insertion is less successful in unconscious patients with endotracheal intubation than in conscious patients. Unlike conscious patients,

Department of Anesthesiology & Pain Medicine,  
Soonchunhyang University Hospital Bucheon, Bucheon,  
Republic of Korea

### Corresponding author:

Ana Cho, Department of Anesthesiology & Pain Medicine,  
Soonchunhyang University Hospital Bucheon, 170 Jomaru-  
ro, Bucheon, Gyeonggi-do 14584, Republic of Korea.  
Email: [anaanani@gmail.com](mailto:anaanani@gmail.com)



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unconscious intubated patients cannot follow instructions regarding swallowing and cannot facilitate successful insertion of the nasogastric tube. Although numerous techniques to perform nasogastric tube insertion have been described, there is no consensus on a standard approach.<sup>1</sup>

## **Case presentation**

A 33-year-old man was admitted to the otolaryngology unit of our hospital for surgical removal of a large goiter. The patient had initially noticed a small swelling 6 years previously, but it had rapidly grown to the present size during the previous 1 year. He had no dysphagia, cough, noisy breathing, or hoarseness. The patient had hypertension that was controlled without medication. His blood pressure was maintained within a normal range. The patient was 177.4 cm tall and weighed 121.7 kg, and his body mass index was 38.7 kg/m<sup>2</sup>. The patient's neck flexion and rotation were minimal because of the large goiter; however, he had adequate mouth opening, and his Mallampati score was 3. The preoperative examination showed increased concentrations of aspartate aminotransferase (54 IU/L) and alanine aminotransferase (71 IU/L). His blood count, renal profile, and arterial blood gases were normal. His thyroid function test result was also normal. A thyroid computed tomography scan revealed a 10- × 10-cm cystic mass with inner calcification in the right thyroid lobe and tracheal displacement. Pathological findings from preoperative ultrasonography-guided fine needle aspiration showed a benign follicular nodule. A right thyroid lobectomy was planned to remove the large goiter. Because of the patient's obesity and large goiter, difficult endotracheal intubation was expected, and anesthesia was prepared accordingly.

On the day of surgery, the patient was premedicated with an intramuscular

injection of glycopyrrolate 0.2 mg. He had an initial blood pressure reading of 139/87 mmHg, heart rate of 91 beats per minute, temperature of 36.3°C, and respiratory rate of 18 breaths per minute. His oxygen saturation on room air was 98% in the operating room. The patient was taken to the operating room and standard anesthetic monitoring was performed. After intravenous administration of 150 mg of propofol and 60 mg of rocuronium, endotracheal intubation was performed using a video laryngoscope with an electromyography tube. Electromyography tubes were used for nerve integrity monitoring during the intraoperative period. Anesthesia maintenance was performed using sevoflurane inhalation anesthetics after endotracheal intubation.

The surgeon required nasogastric tube insertion to facilitate surgical resection. An anesthesiologist attempted to insert a 14-French nasogastric tube (Sewoon Medical, Cheonan, South Korea) using a video laryngoscope via the right nostril; however, this attempt failed because the tip of the nasogastric tube became kinked in the oral cavity. Next, a 6-French sterile angiography catheter (Medtronic, Minneapolis, MN, USA) was placed in a 14-French nasogastric tube. This nasogastric tube was then lubricated with 2% lidocaine jelly and gently inserted through the right nostril with the patient's neck in mild flexion. However, this attempt failed as well. Finally, the nasogastric tube was gently inserted through the right nostril via anterior displacement of the cricoid cartilage, and the nasogastric tube passed the larynx and advanced up to 60 cm. The assistant then removed the angiography catheter. The patient's vital signs and pulse oxygen saturation remained stable without significant changes while the nasogastric tube was inserted. Auscultation was performed with insufflation of air through the nasogastric tube from the upper abdomen, and the nasogastric tube

was fixed at 60 cm. The operation progressed and the patient's vital signs remained stable. After the operation, the electromyography tube was removed, airway maintenance was confirmed, and the patient was transferred to the intensive care unit. The estimated bleeding volume during surgery was approximately 50 mL. The patient was transferred to the general ward after nasogastric tube removal 1 day after surgery and was discharged without complications at 8 days after surgery.

Written informed consent was obtained from the patient for publication of this report. Institutional review board approval was not required because of the nature of this study (case report).

## Discussion

Head and neck surgery often requires nasogastric tube insertion. Insertion of a nasogastric tube in an awake patient is always advantageous because of the patient's assistance and cooperation by swallowing. However, insertion of a nasogastric tube is uncomfortable and often painful. To avoid the discomfort of nasogastric tube insertion, the tube is usually inserted under general anesthesia; however, this has a higher failure rate. Nasogastric tube insertion is often an arduous task in intubated patients, with first-attempt failure rates as high as 50%.<sup>2</sup>

In general, if patients are conscious, nasogastric tube insertion is performed with the cooperation of the patient and the operator. After the nasogastric tube has advanced through the nasal cavity to the oropharyngeal pharynx, the nasogastric tube can safely enter the esophagus and reach the stomach without kinks by advancing it according to the patient's swallowing movements. In anesthetized patients, however, such cooperation is impossible. Consequently, the nasogastric tube is inserted using the external force

that the anesthesiologist applies to the tube through the nostril. However, it is impossible to control the direction of the thin flexible nasogastric tube from the outside. In addition, when the end of the tube meets resistance, folding and twisting of the flexible tube cannot be avoided.<sup>3</sup>

Insertion of a nasogastric tube into an anesthetized patient is usually difficult. In recent years, nasogastric tube insertion has become even more difficult because of the use of more flexible silicone nasogastric tubes that reduce patient discomfort. In addition to the effects of the presence of the tracheal tube, the neuromuscular effects of general anesthesia on relaxing the soft palate, tongue base, epiglottis, and posterior pharyngeal wall can create further difficulties in nasogastric tube insertion.<sup>4</sup>

After several unsuccessful insertions, the incidence of nasal mucosal bleeding<sup>3,4</sup> and unstable vital signs (hypertension, tachycardia, and arrhythmias) usually increases.<sup>5</sup> After a failed passage, the nasogastric tube is warmed by body heat and becomes softer and more likely to coil during the next attempt. In addition, non-opposing lateral openings are present on the distal part of a common nasogastric tube. These openings result in an incomplete caliber because they serve as weak points on the distal end. Moreover, curving of the nasogastric tube (when it is in the packet) promotes coiling in the mouth.<sup>6</sup>

Nasogastric tube placement failure can be caused by anatomical issues or the nasogastric tube itself, or it may be related to the operator. Ozer and Benumof<sup>2</sup> demonstrated that the most common sites of resistance during passage of orogastric and nasogastric tubes are the arytenoid cartilages and piriform sinuses.

If the patient's consciousness is reduced and the patient cannot swallow, the nasogastric tube cannot enter the esophagus and becomes twisted in the oral cavity, making it difficult to insert properly. Improper

insertion into the lungs through the trachea can sometimes occur, which causes severe sequelae such as pneumothorax, hemothorax, and pneumomediastinum.<sup>7-9</sup>

Many techniques to facilitate nasogastric tube insertion have been proposed, including forward displacement of the larynx, use of a split endotracheal tube, immersion of the nasogastric tube in ice water, and flexing the neck forward.<sup>10-13</sup> Thus, adopting maneuvers to slide the nasogastric tube along the posterior pharyngeal wall would facilitate smoother entry into the esophagus.<sup>2</sup>

When the first insertion failed in this case, a 6-French angiography catheter was inserted into the nasogastric tube and neck flexion was performed. We used an angiography catheter as a stylet to strengthen the nasogastric tube. However, our second attempt failed as well. We then performed anterior displacement of the cricoid cartilage; this is called the reverse Sellick maneuver.<sup>14</sup> Nasogastric tube insertion was successful using this method. Notably, forward displacement of the larynx occasionally causes bradycardia via the vasovagal reflex because of compression of the bilateral carotid arteries.<sup>15</sup> Although numerous techniques to perform nasogastric tube insertion have been described, there is no consensus on a standard approach.<sup>1</sup> Therefore, further research is needed to establish an appropriate standard method for achieving nasogastric tube insertion in patients with endotracheal intubation.

In this case, we expected to experience difficulty with airway management during general anesthesia because of the patient's large goiter. Although endotracheal intubation was successful on the first attempt, we experienced difficulty inserting the nasogastric tube. Anesthesiologists should be familiar with different methods of nasogastric tube insertion under general anesthesia. In addition, further studies are needed to establish a standard method for inserting a nasogastric tube in intubated patients.

## Author contributions

Ana Cho was the patient's anesthesiologist, reviewed the literature, and contributed to the manuscript drafting. Seokhyung Hong reviewed the literature and contributed to the manuscript drafting. Jinyoung So reviewed the literature and contributed to the manuscript drafting.


## Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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## ORCID iD

Ana Cho  <https://orcid.org/0000-0002-6490-0353>

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