

Life-threatening nasotracheal tube obstruction by a blood clot: a case report

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The nasotracheal tube (NTT) is frequently used in oral and maxillofacial surgery and is generally considered a safe means of protecting the airway while ensuring an adequate surgical field. The most common complication associated with NTT is epistaxis, and only a few cases of foreign body obstruction have been reported. In this case report, the authors aimed to highlight the potential for NTT obstruction following surgery. A 24-year-old female patient, who underwent mandibuloplasty and rhinoplasty at a local clinic, was referred to our hospital patient due to dyspnea and edema on her right mandibular angle. Even with NTT, patient continued to experience mild dyspnea and tachypnea, so a T-piece was applied. However, tachycardia accompanied by a sudden worsening of dyspnea was observed, and bag-valve-mask ventilation was initiated promptly. But oxygen saturation remained unimproved, so an emergency cricothyroidotomy was performed. After 4 hours, the patient's condition stabilized. Upon examination, the previously inserted NTT was identified, and a blood clot approximately 10 cm long at the NTT tip was discovered, causing lumen obstruction. The obstructions of NTT can lead to serious or life-threatening consequences if left unobserved or ignored. Therefore, when a patient with an NTT complains of dyspnea, clinicians should promptly investigate the possibility of partial NTT obstruction to ensure the airway's security.

Keywords: Nasotracheal tube; Cricothyroidotomy; Airway; Thrombus; Case reports

INTRODUCTION

Nasotracheal intubation is a commonly employed method of anesthesia in maxillofacial surgery. This approach is straightforward to apply and is well-tolerated by patients, effectively reducing discomfort and pain even in those who are alert [1,2]. However, complications can arise, including epistaxis, bacteremia, and nasotracheal tube (NTT) obstruction. While NTT obstruction

has been infrequently documented, this condition can present considerable dangers to airway protection and respiratory support [3].

In this case report, the authors sought to highlight the potential for postoperative NTT obstruction, which is often attributed to hematoma or perioperative bleeding. Patients reporting dyspnea should be closely observed, even if their oxygen saturation (SpO₂) levels are normal.

CASE REPORT

A 24-year-old Thai woman underwent mandibuloplasty and rhinoplasty at a local clinic before being referred to our hospital. For surgery, bilateral mucosal incisions were made, followed by curved osteotomy of the mandibular angle. Perioperative bleeding was observed, with an estimated volume of approximately 400 to 500 mL; however, no significant bleeding was noted after hemostasis was achieved. Upon emerging from anesthesia, the patient experienced sudden dyspnea and developed edema at the right mandibular angle. An NTT was again inserted, and she was promptly transferred to the emergency department (ED).

Upon arrival at the ED, the patient's vital signs were as follows: a blood pressure of 102/67 mmHg, a pulse rate of 114 beats/min, a respiratory rate (RR) of 24 breaths/min, and an SpO₂ level of 97% on room air. Bilateral Jackson-Pratt (JP) drains were placed at the angles of the mandible, but these collected less than 20 mL of fluid. The patient continued to experience mild dyspnea and tachypnea, although her breath sounds were generally clear, without wheezing, crackles, or stridor. Bilateral submandibular swelling was present but not pronounced. To evaluate for active bleeding and to characterize any tracheal obstruction due to edema or hematoma, immediate neck computed tomography (CT) angiography was conducted. This imaging showed no significant active bleeding, but it did reveal hemorrhagic fluid in the bilateral maxillary sinuses along with hematoma in the oral cavity and the naso-oropharynx (Fig. 1). A chest x-ray displayed no meaningful abnormalities. The patient's initial hemoglobin level was 11.7 g/dL, and it remained stable for subsequent measurements. Initial arterial blood gas analysis (ABGA) indicated a pH of 7.25, a pCO₂ of 30 mmHg, a pO₂ of

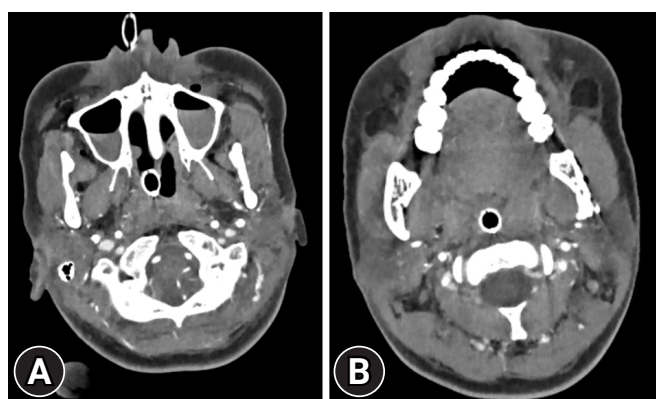


Fig. 1. Computed tomographic angiography of the neck revealed no significant active bleeding but did show hemorrhagic fluid in the bilateral maxillary sinuses, along with hematoma in (A) the oral cavity (B) and naso-oropharynx.

79 mmHg, a bicarbonate (HCO₃⁻) level of 13.2 mEq/L, and an SpO₂ of 93.2%. The base excess was -14.7, and the initial lactate level was 7.2 mg/dL. Consequently, the patient was admitted to the intensive care unit (ICU) for close observation.

Upon admission to the ICU, the patient continued to exhibit tachypnea with an RR of 25 breaths/min, and her SpO₂ was recorded at 91%. In response, she was administered oxygen through a T-piece at a flow rate of 6 L/min, which restored her SpO₂ levels, although she continued to experience dyspnea. Approximately 2 hours later, the tachypnea resolved, with the patient's RR stabilizing at 15 to 17 breaths/min and her SpO₂ reaching 99%. Despite these improvements, the dyspnea persisted. Subsequent ABGA revealed a pH of 7.31, a pCO₂ of 28 mmHg, a pO₂ of 197 mmHg, an HCO₃⁻ level of 14.1 mEq/L, and an SpO₂ of 99.6%. The base excess had improved to -12.2 compared to the initial reading of -14.6, and the lactate level was measured at 4.7 mg/dL.

Around 30 minutes later, the patient developed tachycardia and a sudden exacerbation of dyspnea, leading to severe respiratory distress and a drop in SpO₂ to below 80%. Immediate bag-valve-mask (BVM) ventilation was initiated, but considerable resistance was encountered. Follow-up ABGA revealed a pH of 7.0, a pCO₂ of 150 mmHg, and a pO₂ of 172 mmHg. Attempts to insert a suction tip were thwarted by the resistance encountered. Even after the patient was connected to a ventilator, the tidal volume remained below 100 mL, despite an increase in positive end-expiratory pressure from 10 to 15 cmH₂O. BVM ventilation was reapplied, but the patient's SpO₂ did not improve. An emergency cricothyroidotomy was performed, and the patient was connected to a ventilator in pressure support ventilation mode, with a minimum tidal volume exceeding 400 mL.

Upon examination, the previously inserted NTT was located, and the clinician discovered a blood clot measuring approximately 10 cm in length at the tip of the NTT, obstructing the lumen (Fig. 2). By 4 hours after removal of this clot, the patient's condition had stabilized, and she was breathing more easily, even as the fraction of inspired oxygen was lowered from 50% to 25%. Follow-up ABGA indicated a pH of 7.27, a pCO₂ of 36 mmHg, a pO₂ of 109 mmHg, a base excess of -10.4, and a lactate level of 2.9 mg/dL. As before, a chest x-ray revealed no significant abnormalities. The following day, the cricothyroidotomy tube was replaced, and 2 days after surgery, the JP drain was removed. Neck CT demonstrated a decrease in the amount of hemorrhagic fluid within the sinonasal cavity. On the same day as JP drain removal, the cricothyroidotomy tube was also removed, and the patient continued to breathe comfortably. The next day, she was trans-

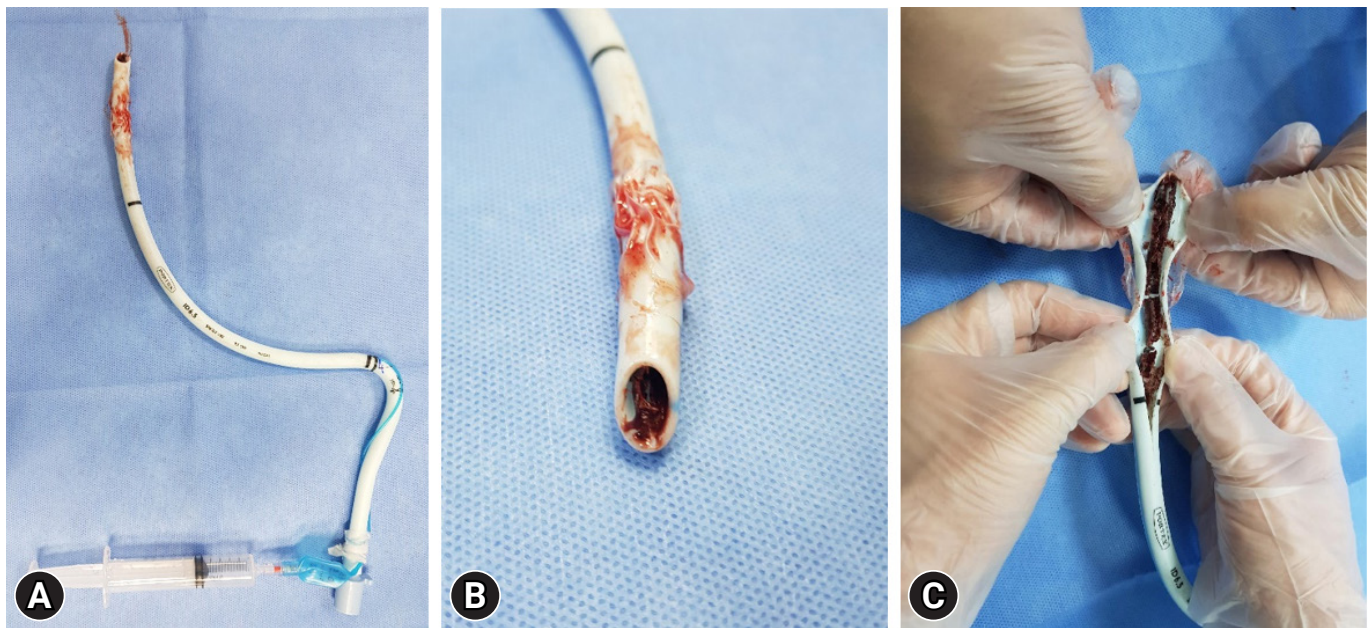


Fig. 2. Nasotracheal tube images after removal. (A) Removal of the nasotracheal tube after emergency cricothyroidotomy. (B) Occlusion of the distal opening of the nasotracheal tube. (C) Occlusion of the distal lumen of the nasotracheal tube by a blood clot approximately.

ferred to a local clinic for wound care. The final ABGA after cricothyroidotomy, with the patient breathing room air, revealed a pH of 7.40, a pCO₂ of 35 mmHg, a pO₂ of 103 mmHg, a base excess of -3.1, and a lactate level of 0.6 mg/dL.

Ethics statement

Written informed consent for publication of the research details and clinical images was obtained from the patient.

DISCUSSION

Nasotracheal intubation is a widely used method of anesthesia in oral and maxillofacial surgery, as the NTT does not interfere with the surgical field (that is, the oral cavity), unlike other intubation methods that traverse this space [1,4]. NTT placement is particularly advantageous for patients undergoing maxillofacial or orthognathic surgery, as in the present case [5]. The most common NTT-associated complication is epistaxis, followed by bacteremia, with the latter caused by the introduction of bacteria from the nasal cavity to other areas due to traumatic injury during insertion. In rare cases, the retropharynx, soft palate, or piriform sinus may be perforated [6]. Consequently, basal skull fracture is recognized as a contraindication for NTT insertion. Partial or complete tube obstruction, while also relatively rare, has been documented in a limited number of case reports [1]. These arti-

cles have described tube obstruction caused by avulsed polyps [7], avulsed inferior turbinates [8,9], and even teeth [10]. In instances of partial obstruction, such as the present case, symptoms may not appear immediately, and monitoring end-tidal carbon dioxide levels can be crucial for recognizing impending respiratory failure [1,2]. At Detroit General Hospital (Detroit, MI, USA), out of 71 nasotracheal intubations, 15 resulted in mild bleeding, while seven led to severe bleeding and retropharyngeal perforation [11]. Blood accumulation within the tube can lead to hematoma formation, posing a risk of airway obstruction.

While NTT intubation is generally regarded as safe, life-threatening obstruction can occur in rare instances, as demonstrated in this case. Consequently, if a patient presents with dyspnea but does not exhibit a substantial initial decrease in SpO₂ clinicians should consider the possibility of partial NTT obstruction. In such scenarios, close monitoring is strongly recommended.

ARTICLE INFORMATION

Author contributions

Conceptualization: CYP; Formal analysis: all authors; Methodology: DL, CYP; Project administration: CYP; Writing–original draft: CYP; Writing–review & editing: DL, SWK. All authors read and approved the final manuscript.

Conflicts of interest

Chan Yong Park is an Editorial Board member of the *Journal of Trauma and Injury*, but was not involved in the peer reviewer selection, evaluation, or decision process of this article. The authors have no other conflicts of interest to declare.

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Data availability

Data sharing is not applicable as no new data were created or analyzed in this study.

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