

# Acute airway obstruction by a mucus plug in a patient with a 12-year history of inserting a double cannula tracheostomy tube: A case report

SAGE Open Medical Case Reports  
Volume 10: 1–4  
© The Author(s) 2022  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/2050313X221100874  
journals.sagepub.com/home/sco



Jun Miyata<sup>1,2</sup> , Kaname Dateoka<sup>1,2</sup> and Tetsuya Yoshioka<sup>1,2</sup>

## Abstract

Acute airway obstruction long after tracheostomy has rarely been reported. An 81-year-old Japanese woman with a tracheostomy tube for 12 years developed a 2-day history of coughing-up sputum with difficulty, foreign body sensation, and mild dyspnea. Dyspnea worsened immediately after computed tomography, showing soft tissue opacity between the tip of the tracheostomy tube and the bronchi. A movable mass in the trachea, identified as mucus by pathological examination, was removed using bronchoscopy. Acute airway obstruction by a mucus plug potentially occurred with a long history of insertion of a tracheostomy tube. Emergency imaging studies and bronchoscopy were useful for management.

## Keywords

Airway obstruction, bronchoscopy, mucus plug, patient safety, tracheostomy

Date received: 8 September 2021; accepted: 27 April 2022

## Introduction

Tracheostomy, which is a surgical procedure for upper airway obstruction or prolonged intubation, has many potential complications.<sup>1,2</sup> Airway obstruction is well known as an early and life-threatening complication that occurs within a few weeks of tracheostomy placement;<sup>1,3–5</sup> however, cases of airway obstruction long after tracheostomy has rarely been reported. Here, we report a case of acute airway obstruction caused by a mucus plug in a patient with a 12-year history of inserting a double cannula tracheostomy tube. Emergency computed tomography (CT) and bronchoscopy are useful in diagnosing and managing this fatal condition.

## Case presentation

An 81-year-old Japanese woman with a double cannula tracheostomy tube (Koken Tracheal Cannula PP Double-Tube Type; Koken Co., Ltd., Bunkyo, Tokyo, Japan), which was exchanged by family physician at 2-week intervals developed a 2-day history of foreign body sensation and mild dyspnea associated with difficulty coughing-up sputum. She visited the emergency department of our hospital following her family physician's referral. She reported no history of fever, nasal discharge, pharyngalgia, or worsening of cough. Although she experienced paresis of her right leg and needed

a walker due to cerebral infarction 17 years ago, she was independent in her daily activities at home without cognitive impairment and frailty. She had undergone total thyroidectomy for papillary adenocarcinoma and surgical tracheostomy owing to persistent recurrent nerve paralysis 12 years before. A double cannula tube allowed patients themselves to remove, clean, and re-insert inner cannula easily while outer cannula keeps the airway opening.<sup>2</sup> The inner cannula had been washed regularly; however, tube suctioning had been performed only upon excessive sputum production, and no heat moisture exchanger was used.

On physical examination, she had a body temperature of 36.5°C, heart rate of 95 beats/min, blood pressure of 155/75 mmHg, respiratory rate of 27 breaths/min, and SpO<sub>2</sub> of 98% on room air. Physical examination, including respiratory sounds, was unremarkable. The chest radiograph showed no abnormalities (Supplemental Figure S1), whereas

<sup>1</sup>Department of Family Medicine, Medical Center for the Entire Family, Keiju Medical Center, Nanao, Japan

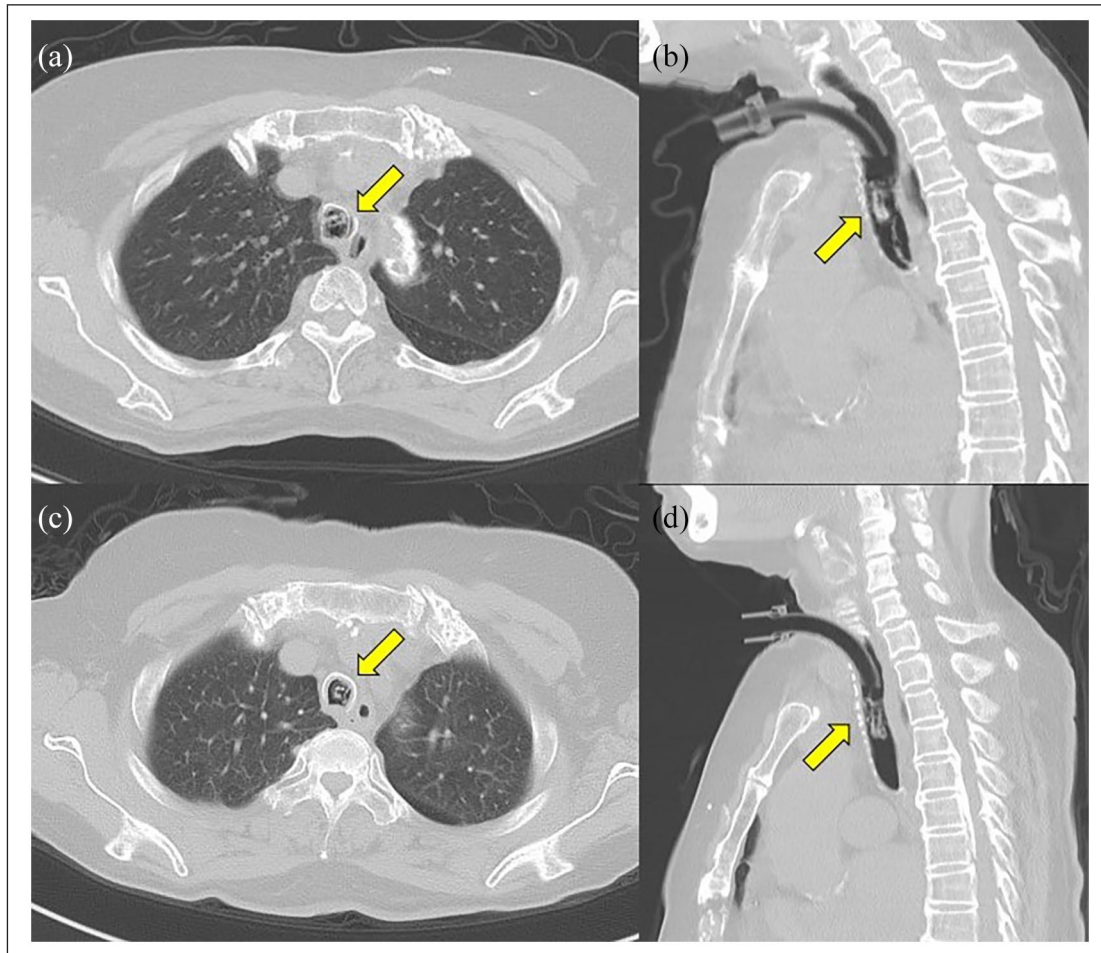
<sup>2</sup>Keiju Laurel Clinic, Nanao, Japan

### Corresponding Author:

Jun Miyata, Department of Family Medicine, Medical Center for the Entire Family, Keiju Medical Center, 94 Tomiokacho, Nanao, Ishikawa 926-8605, Japan.

Email: j-miyata@umin.ac.jp





**Figure 1.** A soft tissue opacity (arrow) seen between the tip of the tracheostomy tube and the bronchi on the computed tomography scan: (a) axial view on the admission day, (b) sagittal view on the admission day, (c) axial view on Day 8, and (d) sagittal view on Day 8.

the axial CT scan showed soft tissue opacity between the tip of the tracheostomy tube and the bronchi (Figure 1(a) and (b)). She was diagnosed with dropped tracheal granuloma or tracheobronchial foreign body and was scheduled to undergo bronchoscopic extraction.

In the emergency department immediately after the CT scan, dyspnea worsened alongside tachypnea, stridor, choking signs, and sudden fall in SpO<sub>2</sub>. Tube suction with oxygen therapy was initiated immediately; however, this was unsuccessful. Bedside portable bronchoscopy via a tracheostoma was subsequently performed. It revealed a movable mass, which was removed by bronchoscopic suction. Pathological examination of the mass, which was reported 3 days later, revealed a mucus substance with inflammatory exudates and bacterial colonies of cocci without epithelioid cells, not consistent with granuloma (Supplemental Figure S2). She was admitted for close observation.

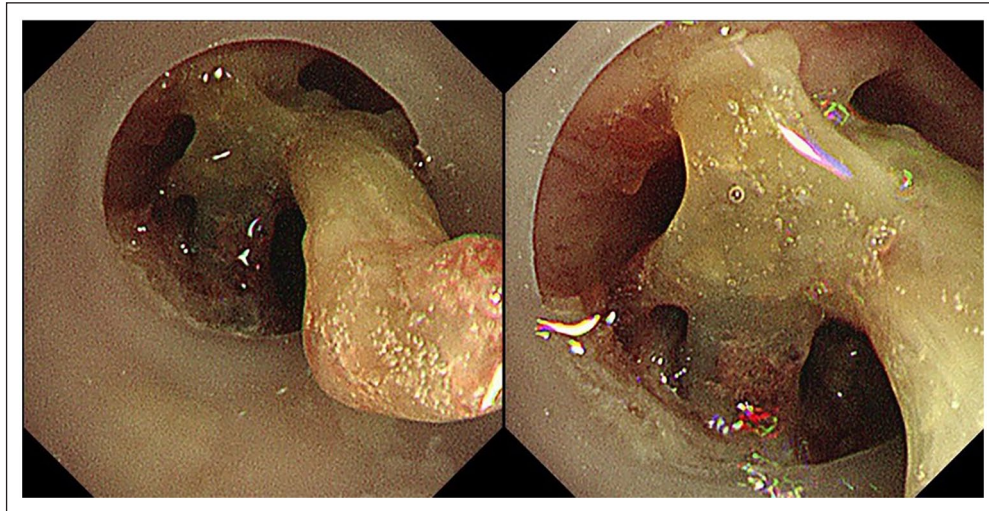
After admission, she reported mild dyspnea, with her monitored SpO<sub>2</sub> decreasing repeatedly and sputum occasionally getting stuck in the tracheostomy tube, despite constant

tube suction. On Day 8, she developed difficulty in sputum expectoration and a foreign body sensation. The tube suction was ineffective. A similar opacity between the tip of the tracheostomy tube and the bronchi was seen on axial CT (Figure 1(c) and (d)), and mucus was removed by bronchoscopy (Figure 2). Subsequently, a heat moisture exchanger was attached to the cannula, and oral carbocysteine (500 mg) was commenced thrice a day after each meal. Her sputum gradually decreased, and she was discharged 17 days after admission. No recurrence was observed thereafter.

## Discussion

This case highlights two important clinical issues. Acute airway obstruction by a mucus plug could present with a long history of inserting a double cannula tracheostomy tube. An emergency imaging study and bronchoscopy were useful in diagnosing and managing this fatal condition.

First, acute airway obstruction by a mucus plug could occur in a patient with a long history of insertion of a double



**Figure 2.** Stuck mucus revealed by bronchoscopy on Day 8.

**Table 1.** Cases of airway obstruction caused by mucus plug within a tracheostomy tube.

Patient age (years), sex	Past medical history	Onset	Symptoms	Findings	Outcome	Reference
69, male	Locally invasive vocal cord squamous cell carcinoma	1 hour after tracheostomy	Respiratory difficulty	A hemorrhagic mucus plug in the tracheostomy tube	Improvement after tracheostomy tube suctioning	Kumar et al. <sup>3</sup>
70, male	Chronic obstructive lung disease and obstructive sleep apnea	Not reported	Respiratory difficulty	Thick mucus secretions obstructing the tracheostomy tube	Cardiopulmonary arrest and death	Rowe et al. <sup>6</sup>
70, male	Laryngeal carcinoma	Not reported	Respiratory difficulty	Inspissated sputum and concretions at the base of the tracheostomy tube	Improvement after removing the tracheostomy tube	Rowe et al. <sup>6</sup>
59, female	Throat carcinoma	Not reported	Respiratory difficulty	Thick mucus secretions obstructing the tracheostomy tube	Improvement after removing the tracheostomy tube	Rowe et al. <sup>6</sup>

cannula tracheostomy tube, even if the patient had washed the inner cannula occasionally. To the best of our knowledge, four cases of airway obstruction by a mucus plug have been reported (Table 1),<sup>3,6</sup> whereas the onset was 1 h after tracheostomy placement in one case<sup>3</sup> and unreported in the other cases.<sup>6</sup> A retrospective case series study of 162 patients who underwent percutaneous dilatational tracheostomy revealed that one patient developed airway obstruction due to mucus.<sup>4</sup> Another retrospective case series study revealed that one episode of mucus plugging occurred in 204 patients receiving standard tracheostomies.<sup>5</sup> There may be many more latent cases because patients with a tracheostomy cannula could be encountered in all medical settings.<sup>7</sup> It is important to recognize the risk of acute airway obstruction caused by mucus plugs in a patient with a tracheostomy tube for patient safety, even if no complication is observed long after tracheostomy.

Second, an emergency imaging study and bronchoscopy were useful in diagnosing and managing fatal airway obstruction. This case indicated that active surveillance and proper management were advisable to prevent fatal conditions if the patient presented with difficulty in sputum expectoration and foreign body sensation suggestive of airway obstruction. This life-threatening risk should be considered until an appropriate imaging study is performed. A chest radiograph was of limited diagnostic assistance in our case. Regarding diagnostic accuracy, a CT scan is much better for identifying potential airway objects than a chest radiograph, which may not detect radiolucent airway objects.<sup>8</sup> Although a CT scan was conducted for the diagnosis in this case, ultrasonography may have the potential for quick diagnosis.<sup>9</sup> Emergency bronchoscopy should be performed to prevent fatal conditions immediately after the diagnosis.

It is unclear why the airway obstruction by a mucus plug occurred for the first time, 12 years after tracheostomy. The patient reported no respiratory symptoms other than sputum that could involve excessive sputum production before or after the admission. She might have developed partial airway obstruction that was removed naturally or by tube suctioning unknowingly before.

## Conclusion

In conclusion, acute airway obstruction by a mucus plug could occur in a patient with a long history of inserting a double cannula tracheostomy tube, and an emergency imaging study and bronchoscopy were useful for the diagnosis and management of this fatal condition. Therefore, there is a need to be aware of the risk of acute airway obstruction. Further studies should be conducted to ensure patient safety. An emergency imaging study and bronchoscopy should be performed to prevent fatal conditions if the patient presents with symptoms suggestive of airway obstruction.

## Acknowledgements

The authors are grateful to Dr. Takahiro Kyuno (Department of Gastrointestinal Surgery, Keiju Medical Center, Nanao, Japan) for valuable comments on tracheostomy.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Informed consent

Written informed consent was obtained from the patient for the anonymized information of this case report and accompanying images to be published in this article.

## ORCID iD

Jun Miyata  <https://orcid.org/0000-0002-7943-4930>

## Supplemental material

Supplemental material for this article is available online.

## References

1. Fernandez-Bussy S, Mahajan B, Folch E, et al. Tracheostomy tube placement: early and late complications. *J Bronchology Interv Pulmonol* 2015; 22(4): 357–364.
2. Hess DR and Altobelli NP. Tracheostomy tubes. *Respir Care* 2014; 59(6): 956–973.
3. Kumar D, O'Hare B, Timon C, et al. Bilateral pneumothoraces and pulmonary oedema following tracheostomy induced by acute tracheal obstruction. *BMJ Case Rep* 2012; 2012: bcr2012006557.
4. Fernandez L, Norwood S, Roettger R, et al. Bedside percutaneous tracheostomy with bronchoscopic guidance in critically ill patients. *Arch Surg* 1996; 131(2): 129–132.
5. Wease GL, Frikker M, Villalba M, et al. Bedside tracheostomy in the intensive care unit. *Arch Surg* 1996; 131(5): 552–555.
6. Rowe BH, Rampton J and Bota GW. Life-threatening luminal obstruction due to mucous plugging in chronic tracheostomies: three case reports and a review of the literature. *J Emerg Med* 1996; 14(5): 565–567.
7. Cheung NH and Napolitano LM. Tracheostomy: epidemiology, indications, timing, technique, and outcomes. *Respir Care* 2014; 59(6): 895–915; discussion 916–919.
8. Lund ME. Foreign body removal. In: Ernst A and Herth FJ (eds) *Principles and practice of interventional pulmonology*. Cham: Springer, 2013, pp. 477–488.
9. Kristensen MS. Ultrasonography in the management of the airway. *Acta Anaesthesiol Scand* 2011; 55(10): 1155–1173.