


CASE REPORT

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# Full-thickness tracheal laceration managed conservatively: a case report

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## Abstract

**Background** Tracheobronchial injuries, which are rare complications of intubation, can be overlooked without a high degree of clinical suspicion. While traditionally managed surgically, recent literature proposes nonoperative management for low-risk injuries.

Case presentation.

This case illustrates a 56-year old Caucasian Canadian female with a grade IIIA injury successfully treated conservatively using an endotracheal tube and medical therapy. Consequently, it suggests that nonoperative management may be suitable for patients meeting specific criteria indicative of clinical stability.

**Conclusion** These insights challenge the conventional surgical approach and emphasize the potential efficacy of conservative measures in selected cases of tracheobronchial injury.

**Keywords** Thoracic surgery, Airway management, Trauma, Case report

## Introduction

Tracheobronchial injuries, which are rare complications of endotracheal intubation (incidence: 0.005% with single-lumen intubation), have traditionally been treated surgically [1, 2]. Cardillo *et al.* [1] proposed a classification system to identify low-risk tracheobronchial injuries amenable to nonoperative management. Nonoperative options, such as fibrin glue installation and endoscopic stent placement, have been utilized for lower-grade injuries (I-IIIa) [3]. Despite controversy, criteria for selecting patients for conservative management of post-intubation tracheobronchial lacerations include shorter and superficial lacerations, clinical stability, spontaneous breathing,

the ability to bridge the lesion with an endotracheal tube, absence of mediastinitis, and lack of progressive subcutaneous emphysema [4–7]. This case highlights the successful conservative management of a 5-cm grade IIIA post-intubation tracheal laceration. Written informed consent was obtained from the patient for the publication of this case report.

## Implication statement

This case study challenges established guidelines by demonstrating the successful conservative management of a high-grade, iatrogenic, full-thickness tracheal laceration. The decision to forego surgery was based on the patient's clinical stability and the anatomic location of the injury. This work ultimately provides valuable insights that challenge the traditional surgical approach for such injuries.

## Case

A 56-year old Caucasian Canadian female with oligometastatic pancreatic cancer, who had completed 17 cycles of induction chemotherapy 3 weeks prior, underwent an elective laparoscopic distal pancreatectomy, splenectomy,

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cholecystectomy, and radiofrequency ablation of four liver lesions. Her comorbidities included non-insulin-dependent type 2 diabetes mellitus and hypertension. Her body mass index was 25 kg/m<sup>2</sup>. She received steroids with each chemotherapy treatment, and her last dose was 3 weeks prior to surgery.

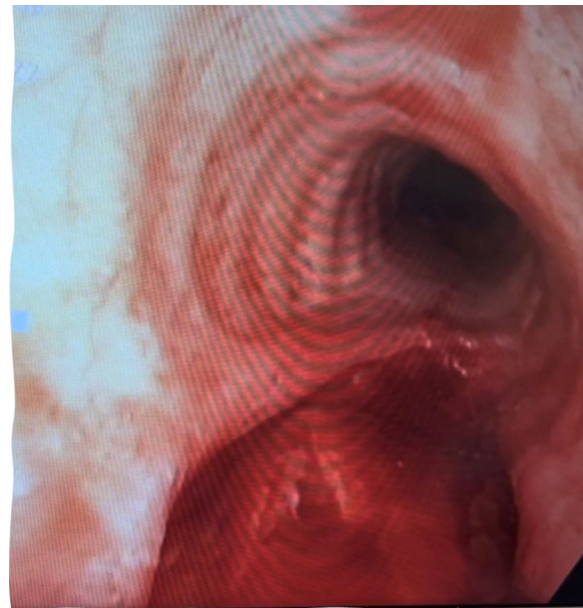
On preoperative evaluation by the anesthesiology team, she had normal neck range of motion, a normal thyromental distance, good temporomandibular joint mobility, a midline trachea, and adequate mouth opening. Her Mallampati score was III, and her American Society of Anesthesiologists score was III. Intubation was completed with a single-lumen endotracheal tube. No difficulties were encountered during intubation, and she was extubated with ease at the end of the procedure.

Subsequently, 1 hour after extubation, a routine postoperative chest x-ray was performed and identified a right pneumothorax with subcutaneous emphysema. The patient was clinically stable on 2 L/minute supplemental oxygen via nasal prongs, and the pneumothorax was thought to be secondary to central line insertion. It was first managed conservatively, but a thoracostomy tube was required after the patient began to experience progressive respiratory distress. Over the following 8 hours, oxygen requirements increased, 600 mL of frank blood drained from the chest tube, and the patient developed significant hemoptysis.

As she was still protecting her airway, additional imaging was ordered. A computed tomography (CT) scan of the thorax demonstrated a high-density focus in the posterior aspect of the trachea at the level of the thyroid, suggestive of arterial bleed. There was debris throughout the trachea and the bronchial tree. These findings were suggestive of a tracheal laceration. There was no pneumomediastinum, no signs of mediastinitis, and the subcutaneous emphysema was radiologically stable.

The patient was brought to the operating room and underwent an awake intubation, flexible bronchoscopy, and esophagogastroduodenoscopy (EGD). A full-thickness laceration of the membranous portion of the trachea, measuring 5 cm in length, from the level of the third tracheal ring to 6 cm above the carina, was identified (Fig. 1). The esophagus was herniating through the defect. There was no esophageal injury identified on EGD. The patient was normotensive without vasopressors and required minimal ventilator support. A chest tube was also inserted on the left side, and there was no air leak bilaterally. The subcutaneous emphysema was clinically stable.

Given the above reassuring clinical signs, and owing to the location of the laceration at the level of thoracic inlet (preventing good surgical exposure from both thoracic and cervical approaches), the decision was made to



**Fig. 1** Initial bronchoscopic appearance of tracheal laceration



**Fig. 2** Bronchoscopic appearance of tracheal laceration in intensive care unit

treat this patient conservatively. The lesion was bridged by inflating the 7.5 mm endotracheal tube cuff distally, the ventilator was set to a minimal positive end-expiratory pressure (PEEP), and broad-spectrum antibiotics were administered. The patient was taken to the critical care unit for close monitoring. She was kept intubated, sedated, and paralyzed.

The patient was surveyed closely in the critical care unit and was hemodynamically stable throughout her stay. A bronchoscopy was repeated on postoperative day (POD) 5, as demonstrated in Fig. 2. There was no sign of tracheoesophageal fistula (TEF) and no mediastinal fat visualized. There was mild bruising of the esophageal muscle but no frank hematoma. The nasogastric feeding

tube was removed, and an interventional radiology-guided percutaneous gastric feeding tube was inserted to minimize the risk of esophageal erosion, and subsequent TEF. Another bronchoscopy on POD 10 confirmed that the laceration was healing appropriately.

The patient was extubated on POD 12. She received 7 days of intravenous piperacillin tazobactam 3.375 g and 15 days of intravenous fluconazole 400 mg. Her total length of stay was 23 days. On surveillance bronchoscopy performed more than 6 months after the initial injury, the laceration was completely healed, as shown in Fig. 3. There was no stenosis.

## Discussion

Tracheobronchial injury secondary to traumatic intubation is rare, and as such, there is controversy regarding patient selection for conservative management. This case contributes a clinical experience to the literature regarding this rare entity.

Most guidelines, as well as reports, describe conservative management for small and superficial tracheal lacerations [3]. In this case, a 5-cm full-thickness laceration was successfully treated by bridging the defect with the endotracheal tube cuff inflated distally, and with medical therapy. The patient met all of the following criteria: clinical stability, no active air leak, no esophageal perforation, no signs of mediastinitis, no progressive subcutaneous emphysema, and no enlarging pneumothorax. Thus, similar to the conclusion of a case report recently published by Sanchez-Parez *et al.* [8], we concluded that conservative management may be acceptable in complex tracheal lacerations in carefully selected patients who demonstrate clinical stability. Notably, this is consistent with findings by Herrmann *et al.* [2], who found that

sepsis and mediastinitis were the only factors correlated with mortality in these patients.

However, Herrmann *et al.* [2] also demonstrated a much shorter length of stay with operative management of 10–14 days, compared with our patient, who was discharged on postoperative day 23. As such, operative management may provide a more definitive management strategy that shortens length of stay, compared with conservative management.

## Conclusion

Tracheobronchial injuries, though rare, demand heightened clinical suspicion for accurate diagnosis. While type IIIA and IIIB injuries typically pose higher risks, this case suggests a potential role for conservative management in clinically stable patients with type IIIA injuries who meet specific criteria. This challenges traditional notions and underscores the importance of individualized approaches in the management of tracheobronchial injuries. This case also emphasizes the importance of managing such injuries in a multidisciplinary manner, with the inputs of the surgical, anesthesiology, and critical care teams.

## Abbreviations

CT	Computed tomography
PEEP	Positive end-expiratory pressure
EGD	Esophagogastroduodenoscopy
POD	Postoperative day
TEF	Tracheo-esophageal fistula

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None.

## Author contributions

Arora: This author helped draft this case study and was involved in the conception/acquisition of this work. Rancourt: This author helped critically revise this case study and was involved in the conception/acquisition of this work. Nagappa: This author helped critically revise this case study. Qiabi: This author helped critically revise this case study and was involved in the conception/acquisition of this work.

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## Availability of data and materials

Not applicable.

## Declarations

### Ethical approval and consent to participate

Research ethics board (REB) approval was not required. Consent to participate was obtained.

### Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

### Competing interests

None.



**Fig. 3** Bronchoscopic appearance of tracheal laceration as outpatient

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