



## CASE REPORT

# Delayed presentation of an isolated tracheal injury following direct blunt anterior neck trauma

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## Introduction

Blunt injuries to the cervical trachea are rare but if present, are usually associated with either a direct impact the neck or acceleration–deceleration injuries. Patients with tracheal lacerations or ruptures tend to present acutely with signs of airway embarrassment. Such injuries are associated with concomitant injuries to the cervical structures. This particular type of injury thus presents a diagnostic and therapeutic challenge to emergency physicians, anaesthetists and surgeons alike. We present a case which is extremely rare in its clinical presentation. In addition, we propose a possible alternative way to manage a delayed anterior cervical trachea laceration.

## Case report

A 58-year-old deaf and mute gentleman, who was otherwise healthy with no past medical history, presented to his general practitioner with the chief complaints of haemoptysis and progressive facial swelling 5 days after being hit in the anterior neck and upper chest while at work by a forklift.

Post-injury, he had bruising over the anterior neck with no penetrating wounds. He had minimal pain and had no obvious respiratory distress. However, he was concerned about the facial swelling which was affecting his vision. There was no associated fever, neck pain or chest pain. There was no

dysphagia or odynophagia. He was able to go about his daily activities as per normal.

His general practitioner referred him to the emergency department on the suspicion of angio-oedema secondary to medication given to him by his company doctor.

At the emergency department, physical examination revealed him to be alert and not in respiratory distress. Vital signs were normal. Blood pressure was 165/85 mmHg, heart rate was 80 min<sup>-1</sup>, respiratory rate was 16 min<sup>-1</sup>, pulse-oximetry was 98% on room air, and he was afebrile. There was no stridor. His face, eyes, neck, and upper limbs were markedly swollen. Palpation revealed extensive subcutaneous crepitus of the above regions. Some bruising was seen just above the sternoclavicular notch on the anterior surface of the neck. All the cutaneous tissues were intact with no penetrating wounds. There were no other injuries.

Initial chest X-ray (CXR) revealed massive subcutaneous emphysema with no evidence of pneumothorax or mediastinal air (Fig. 1). Clinical impression at that time was tracheo-bronchial injury because of the severity of subcutaneous emphysema.

The diagnosis was confirmed by computer tomography (CT) of the neck and thorax. There was extensive subcutaneous emphysema and a pneumomediastinum on the scan. A small focal defect in the anterior aspect of the proximal trachea, inferior to the thyroid cartilage was detected. This was highly suspicious for a tracheal tear (Fig. 2).

The patient was brought to the operating room. A decision was then made for awake fiberoptic bronchoscopy-assisted intubation and exploration of the neck.

Bronchoscopic findings were that of severe swelling of the oro-pharyngeal tissue resulting in the distortion of the

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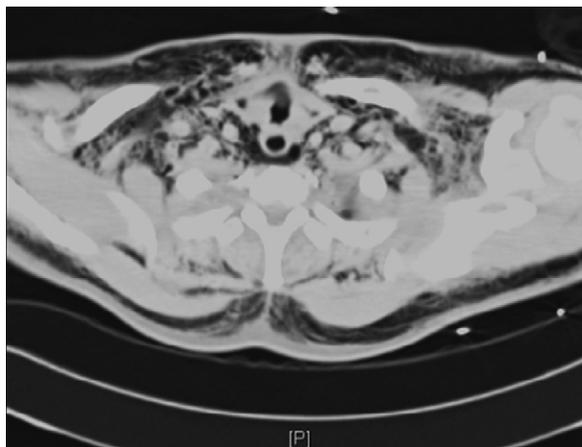
**Figure 1** CXR showing extensive subcutaneous emphysema.

oro-pharyngeal anatomy. A defect was seen ~2 cm inferior to the larynx, with tracheal flap causing partial obstruction of the tracheal passage.

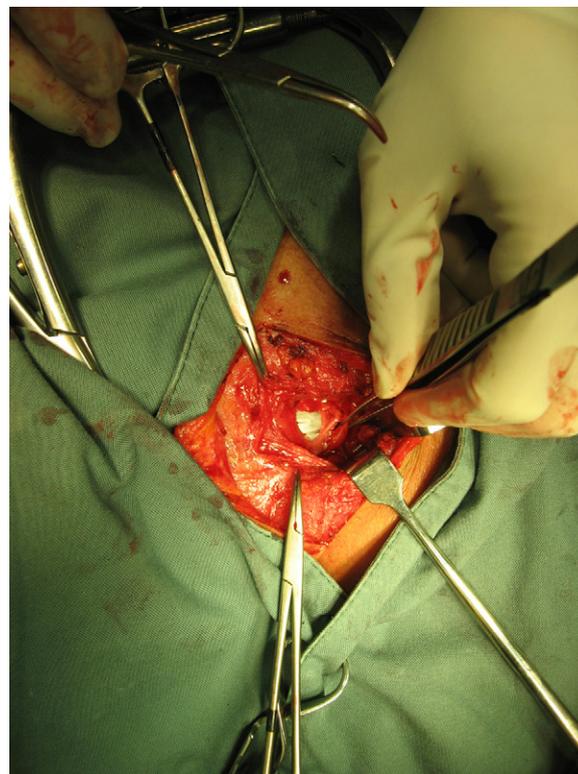
Under general anaesthesia, exploration of the anterior neck was carried out via a transverse collar skin crease incision over the area of suspected injury. The anterior tracheal defect was visualized. The cricoid and the thyroid cartilages were fractured and the crico-thyroid membrane was ruptured. The oval shaped defect measured 2.5 cm × 1.5 cm (Pic 1). The tracheal tissue and the surrounding soft tissue around the tracheal defect were macerated and very oedematous, secondary to the delayed presentation.

Primary repair or a muscle pedicle flap was considered. However, the tissue was deemed unhealthy due to the delayed (5 days post-injury) presentation. The decision was then made to perform a tracheostomy. The defect was fashioned into a tracheostomy site after limited debridement of unhealthy tissues.

The patient was sent to the Surgical Intensive Care Unit for post-operative management. He was stable and was taken off



**Figure 2** Anterior tracheal defect on CT scan.



**Pic 1**

the ventilator on post-operative day 1. He was subsequently managed in the surgical high dependency unit for 2 days. The patient recovered well and was subsequently weaned off tracheostomy.

A repeat bronchoscopy was done 3 weeks post-surgery and no evidence of tracheal stenosis was seen.

The patient was subsequently followed up in the specialist outpatient clinic. He was asymptomatic for respiratory complications.

## Discussion

Cervical tracheal disruption or laceration from blunt trauma is rare and usually results from high-energy trauma or direct impact. Majority of patients present early with symptoms ranging from subcutaneous emphysema to frank airway compromise.<sup>4,5</sup>

A delayed presentation, as in our patient, is an extremely rare occurrence.

However, the principle of acute management for both acute and delayed presentation is the same. Resuscitation of such patients will follow the Advanced Trauma Life Support (ATLS) protocol, with securing a patent airway as the main priority. A careful and detailed head to toe examination is essential to identify any concomitant injuries, especially of the neck and cervical spine.<sup>4</sup> A multi-disciplinary team approach involving trauma surgeons and the anaesthetist is needed for the management of such patients.

The vast majority of these patients suffer from concomitant injuries of other systems as a result of the high-energy trauma. A high index of suspicion, constant reviews and close monitoring of the patient are of utmost importance. Persistent or worsening subcutaneous emphysema, pneumothorax

or pneumomediastinum despite appropriate treatment should raise one's suspicion of a tracheal bronchial tree injury and the need for surgical intervention.

The most common investigations to confirm the diagnosis are bronchoscopy and CT scan. Direct visualization via bronchoscopy remains the gold standard of investigation for diagnosing tracheal injuries. However, the recent advances in the technology and imaging reconstruction techniques, such as high resolution CT and reconstruction, have allowed us to have an alternative noninvasive investigation modality.<sup>3,6</sup> A CT scan with three-dimensional reconstruction facilitates the identification of the specific site of cervical tracheal injury and planning of definitive surgical repair.<sup>3,6</sup> It has been shown that the results are comparable, not only in detection, but also to confirm the site and size of the tracheal defects.

An awake bronchoscopic intubation was done in this patient has not only did it confirm the diagnosis of a tracheal disruption, but also aided in its localization and facilitated the intubation of a potentially difficult airway. We thus, recommend that should a bronchoscopic evaluation of any tracheo-bronchial injury be attempted, it should be done with the intent of attempting a bronchoscopic intubation. In addition, the trauma surgeon should be ready to perform a surgical airway during the bronchoscopic evaluation.

Majority of tracheal or bronchial injuries can be repaired primarily or with a muscle flap to buttress the defect.<sup>2</sup> This is especially true for patients who present acutely.<sup>1,4,5</sup> However, in our patient, in view of the delayed presentation and intra-operative findings of oedematous tracheal tissue and surrounding soft tissues, a primary repair would have had a high chance of breakdown and infection. Furthermore, the defect was significantly large (2.5 cm × 1.5 cm) even before debridement, such that a primary repair may result in tracheal stenosis.

A muscle flap to buttress the defect was considered intra-operatively. However, the factors against that would be the high risk of infection of the muscle flap or any form of coverage for the defect in view of the delayed presentation.

The decision was thus made to debride the macerated soft tissue and the tracheal injury site. The tracheal defect was then converted into a tracheostomy with the insertion of a size 7 Sheily's tracheostomy.

Prophylactic antibiotics were required for this patient because of the high risk of infection of both the tracheostomy site and also mediastinitis due to the delayed presentation.

## Conclusion

Delayed presentation of traumatic tracheal rupture is extremely rare. The risk of airway compromise, concomitant injuries and mediastinitis are very high.

Whenever possible, during the bronchoscopic assessment of a potential trachio-bronchial injury, a bronchoscopic guided awake intubation should be considered with the trauma surgeon prepared to perform a surgical airway if required. This not only facilitates diagnosis but also safe intubation.

We suggest that in a patient with delayed presentation of a cervical tracheal tear, a primary repair or buttress flap repair of the cervical tracheal defect may not be advisable. We suggest that the preferred management be that of fashioning the cervical tracheal rupture site and converting it into a tracheostomy.

## References

1. Angood PB, Attia EL, Brown RA, Mulder DS. Extrinsic civilian trauma to the larynx and cervical trachea—important predictors of long-term morbidity. *J Trauma* 1986;26(October (10)):869–73.
2. Cassada DC, Muniykwa MP, Moniz MP, Dieter Jr RA, Schumann GF, Enderson BL. Acute injuries of the trachea and major bronchi: importance of early diagnosis. *Ann Thorac Surg* 2000;69(May (5)):1563–7.
3. Faure A, Flocard B, Pilleul F, Faure F, Badimand B, Menesson N, et al. Multiplanar reconstruction: a new method for the diagnosis of tracheobronchial rupture? *Intens Care Med* 2007;33(December (12)):2173–8 [August 8, Epub 2007].
4. Mattoux KL, Feliciano DV, Moore EE. Injury to the esophagus, trachea and bronchus. *Trauma*. 4th ed. 2000.
5. Reece GP, Shatney CH. Blunt injury to the cervical trachea: a review of 51 patients. *Southern Med J* 1988;81(December (12)): 1542–8.
6. Scaglione M, Romano S, Pinto A, Sparano A, Scialpi M, Rotando A. Acute tracheobronchial injuries: impact of imaging on diagnosis and management implications. *Eur J Radiol* 2006;59(September (3)):336–43 [June 19, Epub 2006].