Spontaneous tracheal perforation following a sneeze

Misirovs, Rasads; Hoey, Gary; Carruthers, Calum; Majumdar, Samit

Published in:
BMJ Case Reports

DOI:
10.1136/bcr-2023-255633

Publication date:
2023

BMJ Case Reports

TITLE OF CASE

Spontaneous tracheal perforation following a sneeze

DESCRIPTION

Spontaneous tracheal perforation is a rare, potentially life-threatening condition.[1-3] Only a few cases of spontaneous tracheal perforations have been reported.[2,4] More commonly tracheal perforations are caused by either iatrogenic or traumatic injuries: following a thyroidectomy, traumatic intubation, percutaneous tracheostomy procedure, insertion of an oesophageal stent, oesophageal corrosive injury, sharp and blunt trauma.[1,3,5-19] Tracheal perforations may be managed conservatively but often require surgical intervention. This may depend on whether a patient is haemodynamically stable or unstable – based on vital signs being within or outside of normal limits – as well as the site of the perforation.[4,5,7,9,10,16,17] Schneider et al. performed a retrospective analysis of 29 patients with iatrogenic tracheobronchial injuries.[20] They suggest surgical treatment in patients with insufficient mechanical ventilation, an open perforation into the pleural cavity, or progressive subcutaneous or mediastinal emphysema. Conservative treatment may be chosen in patients with the following positive features:

- a small (2-3 cm) tear (preferably of the cervical trachea),
- uncomplicated mechanical ventilation without any loss of tidal volume,
- a laceration sufficiently covered by the oesophagus,
- mild emphysema with no progress during ventilation.

We report a tracheal perforation following sneezing which, to our knowledge, has not been reported before. Normally, the pressure in the upper airways during sneezing is 1-2 kPa but if the mouth and nose are closed the pressure may increase by up to 20 times.[21,22]

A male in his 30s, with a background of allergic rhinitis, experienced severe neck pain immediately after an episode of sneezing when he stifled the sneezes by pinching his nose and closing his mouth. This took place while he was driving a car with a seat belt on. On attending the accident and emergency department he denied any dyspnoea, dysphonia, or dysphagia. On examination, his neck was swollen bilaterally, with mild crepitus on palpation and a reduced range of movement of the neck. There were no abnormal findings in the pharynx or larynx on direct visualisation with a flexible nasendoscope. Lateral soft tissue neck X-ray revealed surgical emphysema (Figure 1). Immediately following the X-ray, computed tomography (CT) of the neck and chest with contrast revealed a 2mm x 2mm x 5mm tracheal tear at the level between 3rd and 4th thoracic vertebrae, with pneumomediastinum, and surgical emphysema of the neck (Figure 2).

He was treated symptomatically for pain with 1 gram of paracetamol and 30 milligrams of codeine, as required. For allergic rhinitis and nasal congestion, he was prescribed 10 milligrams of cetirizine once a day, 200 micrograms of fluticasone propionate drops in each nostril twice a day and three drops of xylometazoline hydrochloride 0.1% in each nostril three times a day. No antibiotics were administered. The cardiothoracic surgeons were contacted for their opinion, and it was felt no surgical intervention was indicated as the patient was systemically well with

normal heart and respiratory rate, normal blood pressure, oxygen saturation, and body temperature. As a precaution, he was kept *nil by mouth* for the first night in case he deteriorated and required a general anaesthetic for intubation.

He remained as an inpatient on the ward for close observation for 48 hours. During this time, he did not require any additional treatment or interventions to those described above. This included no need for oxygen therapy nor admission to a high-dependency or intensive care unit as he remained clinically stable with normal vital signs during the inpatient stay.

He was discharged home with analgesia and long-term allergic rhinitis treatment with advice to avoid strenuous physical activities for two weeks and to avoid stifling sneezes by pinching the nose with the mouth closed. A follow-up CT scan of the neck and chest was performed five weeks later, revealing complete resolution of the surgical emphysema with no tracheal tear or any tracheal abnormality.

We suspect the trachea perforated due to a rapid build-up of pressure in the trachea while sneezing with a pinched nose and closed mouth.

LEARNING POINTS/TAKE HOME MESSAGES (2-3 bullet points)

- Everyone should be advised not to stifle sneezes by pinching the nose while keeping the mouth closed as it can result in tracheal perforation, as reported here.
- Lateral soft tissue neck X-ray is useful in detecting surgical emphysema but CT neck and chest with contrast is required to identify the location of the tracheal tear.
- Conservative management of tracheal tears is an option in clinically stable patients not requiring mechanical ventilation with small tracheal tears. The patients must be closely monitored as inpatients for 24-48 hours for any deterioration.

REFERENCES

1. Chen KC, Hsiao CH. Tracheal perforation in esophageal corrosive injury. *Ann Thorac Surg* 2013;96(5):1879. doi: 10.1016/j.athoracsur.2013.03.046
2. Lugg ST, Grudzinska F, Kalkat MS, et al. A rare case of spontaneous tracheal perforation. *BMJ Case Rep* 2017;2017 doi: 10.1136/bcr-2017-220731 [published Online First: 20170718]
3. Tan CK, Ko SC, Huang HC, et al. Tracheal perforation after tracheal intubation. *Resuscitation* 2007;73(2):174-5. doi: 10.1016/j.resuscitation.2006.10.006 [published Online First: 20070208]
4. Alamassi M, Arabi E. Spontaneous rupture of trachea treated conservatively: A case report. *Int J Surg Case Rep* 2022;90:106715. doi: 10.1016/j.ijscr.2021.106715 [published Online First: 20211221]
5. Stevens MN, Bolduan A, Gelbard A. Delayed Tracheal Perforation Following Total Thyroidectomy. *Laryngoscope* 2022;132(1):17-19. doi: 10.1002/lary.29534 [published Online First: 20210330]
6. De Boos J. Tracheal perforation from non-fatal manual strangulation. *J Forensic Leg Med* 2019;66:1-3. doi: 10.1016/j.jflm.2019.05.020 [published Online First: 20190530]
7. Kaneko Y, Nakazawa K, Yokoyama K, et al. Subcutaneous emphysema and pneumomediastinum after translaryngeal intubation: tracheal perforation due to unsuccessful fiberoptic tracheal intubation. *J Clin Anesth* 2006;18(2):135-7. doi: 10.1016/j.jclinane.2005.10.006
8. Keenan A, Browne W, Bhargava M. Diffuse Subcutaneous Emphysema after Tracheal Perforation. *Am J Respir Crit Care Med* 2017;195(10):1397-98. doi: 10.1164/rccm.201611-2394IM
9. Yu Y, Sambol JT, Shakir HA. Conservative Management of Large Tracheal Perforation due to Traumatic Intubation. *Am Surg* 2021:31348211061099. doi: 10.1177/00031348211061099 [published Online First: 20211202]

10. Akeely Y, Vilke GM, Alzahrani H, et al. Postintubation Tracheal Perforation While on Long-Term Steroid Therapy: A Case Report. *J Emerg Med* 2021;60(3):380-83. doi: 10.1016/j.jemermed.2020.11.001 [published Online First: 20201209]
11. Azar SS, Patel E, Evans LK, et al. Delayed Tracheal Perforation After Partial Thyroidectomy: A Case Report and Review of the Literature. *Ear Nose Throat J* 2021:1455613211019785. doi: 10.1177/01455613211019785 [published Online First: 20210524]
12. Trottier SJ, Hazard PB, Sakabu SA, et al. Posterior tracheal wall perforation during percutaneous dilational tracheostomy: an investigation into its mechanism and prevention. *Chest* 1999;115(5):1383-9. doi: 10.1378/chest.115.5.1383
13. Damrose EJ, Damrose JF. Delayed tracheal rupture following thyroidectomy. *Auris Nasus Larynx* 2009;36(1):113-5. doi: 10.1016/j.anl.2008.03.007 [published Online First: 20080519]
14. O'Callaghan J, Keh SM, D'Souza A. Management of closed tracheal perforation following blunt trauma. *Otolaryngol Head Neck Surg* 2009;141(5):661-2. doi: 10.1016/j.otohns.2009.05.007 [published Online First: 20090808]
15. Knoop H, Knoop U, Martini HC, et al. Tracheal perforation by an oesophageal stent. *Pneumologie* 2012;66(10):607-9. doi: 10.1055/s-0032-1325684 [published Online First: 20121010]
16. Redondo Martínez P, Gijón Herreros N, Delgado García DR, et al. Iatrogenic tracheal rupture in a patient with acute respiratory distress syndrome due to SARS-CoV-2 pneumonia. *Rev Esp Anestesiol Reanim (Engl Ed)* 2021;68(10):597-601. doi: 10.1016/j.redare.2020.10.009 [published Online First: 20211112]
17. Windon MJ, Dhillon V, Tufano RP. Case report: presentation of delayed tracheal perforation after hemithyroidectomy. *AME Case Rep* 2018;2:24. doi: 10.21037/acr.2018.05.03 [published Online First: 20180517]
18. Gosnell JE, Campbell P, Sidhu S, et al. Inadvertent tracheal perforation during thyroidectomy. *Br J Surg* 2006;93(1):55-6. doi: 10.1002/bjs.5136
19. Zuluaga-Gómez M, González-Arroyave D, Ardila CM. Conservative Medical Management of a Tracheal Perforation after Blunt Trauma in a Patient with SARS-CoV-2. *Case Rep Med* 2022;2022:7344476. doi: 10.1155/2022/7344476 [published Online First: 20220502]
20. Schneider T, Storz K, Dienemann H, et al. Management of iatrogenic tracheobronchial injuries: a retrospective analysis of 29 cases. *Ann Thorac Surg* 2007;83(6):1960-4. doi: 10.1016/j.athoracsur.2007.01.042
21. Setzen S, Platt M. The Dangers of Sneezing: A Review of Injuries. *Am J Rhinol Allergy* 2019;33(3):331-37. doi: 10.1177/1945892418823147 [published Online First: 20190108]
22. Rahiminejad M, Haghighi A, Dastan A, et al. Computer simulations of pressure and velocity fields in a human upper airway during sneezing. *Comput Biol Med* 2016;71:115-27. doi: 10.1016/j.compbiomed.2016.01.022 [published Online First: 20160202]

FIGURE/VIDEO CAPTIONS

Figure 1. Lateral soft tissue neck X-ray

A white arrow points at surgical emphysema in the superficial neck space. A black arrow points at surgical emphysema in the retropharyngeal space.

Figure 2. CT neck and thorax with contrast

A) Sagittal view. A white arrow points at the posterior tracheal tear at the level of the third and fourth thoracic vertebrae and yellow arrows point at surgical emphysema of the neck. B) Axial view. A white arrow points at the tracheal tear.

course of the their employment, on a worldwide basis to the BMJ Publishing Group Ltd ("BMJ") and its licensees, to permit this Work (as defined in the below licence), if accepted, to be published in BMJ Case Reports and any other BMJ products and to exploit all rights, as set out in our licence author licence.

Date: 05/11/2023

PLEASE SAVE YOUR TEMPLATE WITH THE FOLLOWING FORMAT:
Submitting author's last name and date of submission, e.g. Smith_April_2022.doc