



OPEN ACCESS

# Disruption of the internal jugular vein by subcutaneous emphysema

Saaya Ichiyama ,<sup>1</sup> Osamu Nomura,<sup>1</sup> Yoshiya Ishizawa<sup>2</sup>

<sup>1</sup>Department of Emergency and Disaster Medicine, Hirosaki University, Hirosaki, Aomori, Japan

<sup>2</sup>Emergency and Critical Care Center, Aomori Prefectural Central Hospital, Aomori, Aomori, Japan

## Correspondence to

Dr Saaya Ichiyama;  
myway.isotm.ny22@gmail.com

Accepted 21 November 2023

## SUMMARY

A woman in her 80s was taken to the hospital after falling off a ladder and underwent a contrast-enhanced CT scan, which revealed disruption of the contrast effect in the right internal jugular vein, with multiple rib fractures and haemopneumothorax. Following reduction of the subcutaneous emphysema with treatment, the diameter of her right internal jugular vein enlarged over time, becoming equal to that on the contralateral side. It is important to diagnose compression of the internal jugular vein due to subcutaneous emphysema, because the treatment strategy varies according to the aetiology.

## CASE PRESENTATION

A woman in her 80s was taken to a community hospital after falling off a ladder while farming. She was diagnosed with multiple rib fractures and traumatic haemopneumothorax (figures 1–3) and back pain, and her right neck and shoulder area was swollen; physical examination indicated subcutaneous emphysema. She underwent a contrast-enhanced CT scan, which revealed disruption of the contrast effect in the right internal jugular vein (figures 4 and 5). She was also diagnosed with right haemothorax, right multiple rib fractures, right clavicle fracture, right fifth thoracic transverse process fracture and first lumbar vertebral body compression fracture.

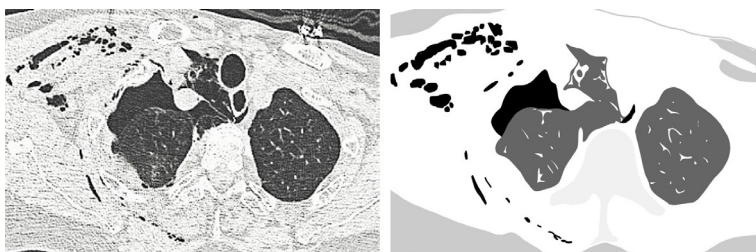
## BACKGROUND

When the internal jugular vein is disrupted after trauma, the first consideration is generally direct injury of the vein. Although there have been reports of airway narrowing due to subcutaneous emphysema of the neck secondary to trauma, there have been no reports of disruption of the internal jugular vein due to traumatic subcutaneous emphysema.

We describe a case in which the internal jugular vein was disrupted on imaging due to its compression by subcutaneous emphysema in the cervical region.

## OUTCOME AND FOLLOW-UP

On the day of the injury, her right internal jugular vein was disrupted, but the next day, her vein was visible, and blood flow was confirmed by ultrasonography. With drainage-induced reduction of subcutaneous emphysema, the diameter of her right internal jugular vein enlarged over 3 days and became equal to that on the contralateral side (figures 6 and 7). No thrombus was observed during hospitalisation. She had a thoracic drain removed on the fifth

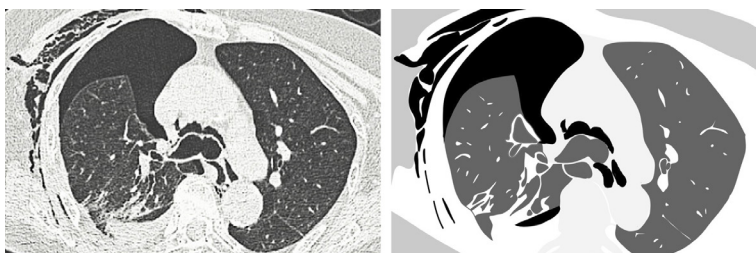


**Figure 1** Plain CT images and diagrams of the neck to chest. The images show multiple rib fractures and extensive traumatic haemopneumothorax.

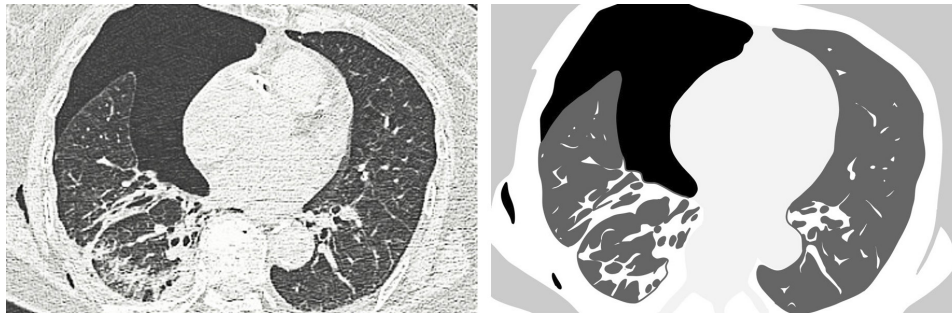


© BMJ Publishing Group Limited 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

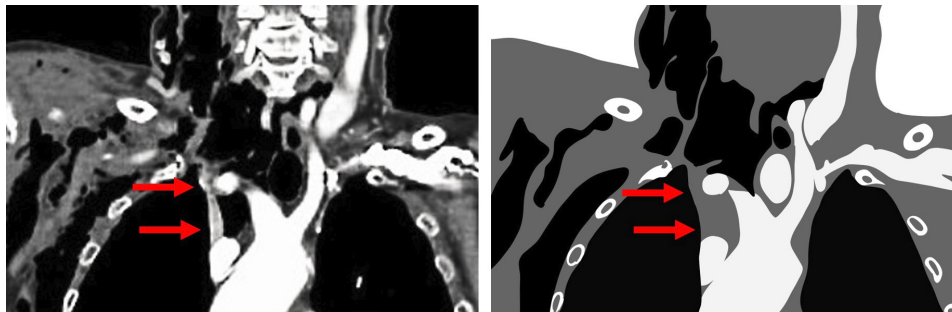
**To cite:** Ichiyama S, Nomura O, Ishizawa Y. *BMJ Case Rep* 2023;**16**:e253066. doi:10.1136/bcr-2022-253066



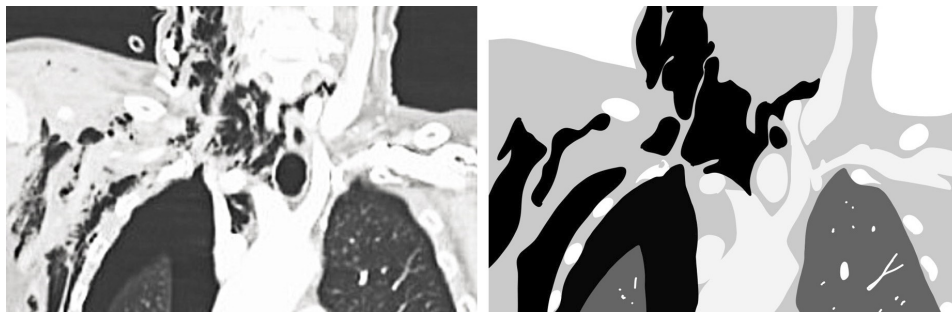
**Figure 2** Plain CT images and diagrams of the neck to chest. The images show multiple rib fractures and extensive traumatic haemopneumothorax.



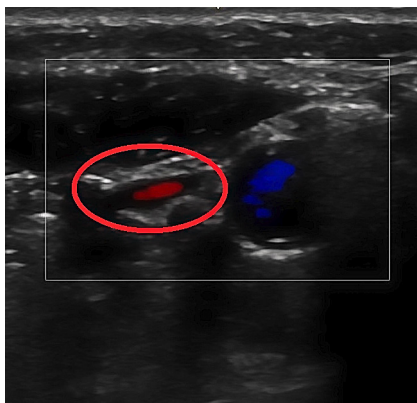
**Figure 3** Plain CT images and diagrams of the neck to chest. The images show multiple rib fractures and extensive traumatic haemopneumothorax.



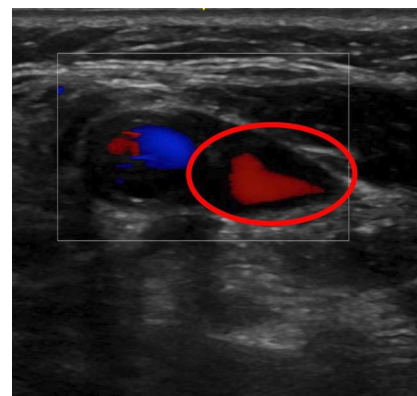
**Figure 4** Contrast-enhanced CT images and diagrams of the neck to chest. The right internal jugular vein gradually narrows in the thorax and is disrupted in the neck (arrow).



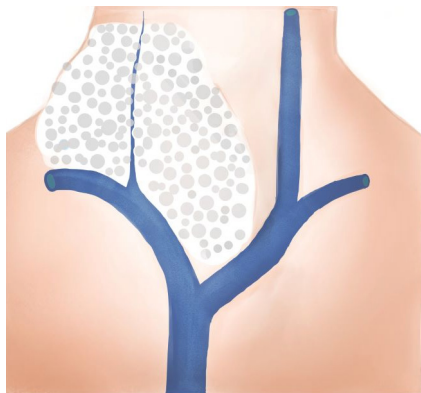
**Figure 5** Contrast-enhanced CT images and diagrams of the neck to chest. The right internal jugular vein gradually narrows in the thorax and is disrupted in the neck (arrow).



**Figure 6** Cervical ultrasonography image. On the day of injury, the right internal jugular vein (IJV) could not be visualised. The following day, the right internal jugular vein was visible, although it was smaller than that on the contralateral side. Blood flow through the vein was confirmed.



**Figure 7** Cervical ultrasonography image. We identified a normal left internal jugular vein on ultrasound.



**Figure 8** This visual representation elucidates the compression of the internal jugular vein (blue line) caused by subcutaneous emphysema (bubble), creating the semblance of interrupted blood flow.

day of admission and was transferred to the rehabilitation hospital on the eighth day.

## DISCUSSION

When the internal jugular vein is disrupted following trauma, the primary consideration is frequent venous injury. Nevertheless, in the existing instance, the disruption of the internal jugular vein solely resulted from subcutaneous emphysema, without any demonstrable venous injury (figure 8).

Traumatic injury to the internal jugular vein might require invasive treatment, such as repair or ligation of the vein, while its compression due to subcutaneous emphysema can be corrected by degassing alone. Hence, it is important to differentiate between the two causes of disruption of the vein. Although there have been several previous reports of airway narrowing caused by subcutaneous emphysema resulting from traumatic pneumothorax,<sup>1–5</sup> no mention has been made of compression of the internal jugular vein by subcutaneous emphysema, and hence, its epidemiology is unknown. The symptoms of internal jugular vein compression by subcutaneous emphysema might be similar to those of superior vena cava syndrome, with possible facial oedema, dyspnoea and cough.<sup>6</sup> While it is useful to identify the shape of the vessel wall and the presence of haematoma as a point of differentiation between the two conditions, venous injury is not always obvious in imaging.<sup>7</sup>

## Learning points

- ▶ Subcutaneous emphysema can cause compression of the internal jugular vein.
- ▶ The compression improves with drainage of the subcutaneous emphysema.
- ▶ The treatment strategy for internal jugular vein disruption identified by imaging depends on the differential diagnosis.

**Acknowledgements** We thank Mr. Yuta Shitakura for creating the illustrations in Figure 1, 2, 3, 4, 5, and 8.

**Contributors** SI took care of the patient and wrote this paper; YI and ON supervised the manuscript. All authors approved the manuscript.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent for publication** Consent obtained directly from patient(s).

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

## ORCID iD

Saaya Ichiyama <http://orcid.org/0000-0001-6490-5229>

## REFERENCES

- 1 Gibney RT, Finnegan B, FitzGerald MX, *et al.* Upper airway obstruction caused by massive subcutaneous emphysema. *Intensive Care Med* 1984;10:43–4.
- 2 Williams DJ, Jaggar SI, Morgan CJ. Upper airway obstruction as a result of massive subcutaneous emphysema following accidental removal of an Intercostal drain. *Br J Anaesth* 2005;94:390–2.
- 3 Olmstead D, Gelfand G, Anderson I, *et al.* A case report of acute airway compromise due to subcutaneous emphysema. *Case Rep Med* 2018.
- 4 Smith CT, Arshad W, Dillenkofer M, *et al.* Airway compromise from traumatic Pneumothorax with severe subcutaneous emphysema. *BMJ Case Rep* 2020;13:e235843.
- 5 Mitsusada K, Dote H, Tokutake M, *et al.* Airway obstruction caused by massive subcutaneous emphysema due to blunt chest trauma. *BMJ Case Rep* 2022;15:e251068.
- 6 Wan JF, Bezjak A. Superior vena cava syndrome. *Emerg Med Clin North Am* 2009;27:243–55.
- 7 Kumar SR, Weaver FA, Yellin AE. Cervical vascular injuries: carotid and jugular venous injuries. *Surg Clin North Am* 2001;81:1331–44.

Copyright 2023 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <https://www.bmj.com/company/products-services/rights-and-licensing/permissions/>  
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

### Customer Service

If you have any further queries about your subscription, please contact our customer services team on +44 (0) 207111 1105 or via email at [support@bmj.com](mailto:support@bmj.com).

Visit [casereports.bmj.com](http://casereports.bmj.com) for more articles like this and to become a Fellow