

CASE REPORT

Nagoya J. Med. Sci. **81**. 687–691, 2019
doi:10.18999/nagjms.81.4.687

Unique presentation of cricoid cartilage fracture causing intermittent dyspnea without preceding trauma

Yuichiro Matsuo¹, Toru Yamada^{1,2}, and Eiji Hiraoka¹

¹Department of Internal Medicine, Tokyo Bay Urayasu Ichikawa Medical Center, Urayasu, Japan

²Department of General Medicine/Family and Community Medicine, Nagoya University Graduate School of Medicine, Nagoya, Japan

ABSTRACT

Cricoid cartilage fracture is generally caused by significant neck trauma and causes continuous dyspnea, neck pain, or hoarseness developing immediately after the traumatic episode. A 69-year-old woman without any history of trauma was admitted to our hospital with intermittent dyspnea. Six months before admission she had started to complain of dyspnea occurring several times a month without warning, improving spontaneously within a few hours without treatment. Her primary care doctor diagnosed asthma and she was treated with inhaled short-acting beta agonists and glucocorticoids, without improvement. On initial evaluation at our hospital, the cause of dyspnea was unclear. Laryngoscopy was performed, which excluded vocal cord dysfunction. A further attack of dyspnea occurred on the fourth admission day. Stridor was evident during the attack, and bronchoscopy revealed subglottic narrowing of the trachea on both inspiration and expiration with no mass or foreign objects. Computed tomography (CT) of the neck revealed cricoid cartilage fracture causing airway narrowing and dyspnea. She was orally intubated, and tracheostomy was performed 2 weeks later to maintain her airway, which resolved her dyspnea. This patient's presentation was unique in two aspects. First, there was no history of trauma that may cause her cricoid cartilage fracture. Second, her symptoms of dyspnea were intermittent rather than continuous. These aspects led to suspicions of other diseases such as asthma or vocal cord dysfunction, thus delaying the diagnosis. Cricoid cartilage fracture should be considered in patients with dyspnea of unknown cause, irrespective of continuous or intermittent symptoms and preceding traumatic episodes.

Keywords: cricoid cartilage, cartilage fractures, paroxysmal dyspnea

Abbreviation:

CT: Computed Tomography

This is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

INTRODUCTION

Cricoid cartilage fracture is generally caused by significant neck trauma such as automobile injuries.¹ To date, there have been no previous reports of non-traumatic cricoid cartilage fracture. Typical symptoms of cricoid cartilage fracture are continuous dyspnea, neck pain, or hoarseness

Received: December 28, 2018; accepted: March 1, 2019

Corresponding Author: Toru Yamada, MD

Department of Internal Medicine, Tokyo Bay Urayasu Ichikawa Medical Center, 3-4-32, Todaijima, Urayasu, Chiba, 2790001, Japan

Tel: +81-47-351-3101, Fax: +81-47-352-6237, E-mail: makky0118@yahoo.co.jp

developing immediately after the traumatic episode.^{1,2} We report a patient with cricoid cartilage fracture without preceding traumatic episodes, presenting with intermittent symptoms of dyspnea, thus making the diagnosis challenging.

CASE PRESENTATION

A 69-year-old woman was admitted to our hospital with intermittent dyspnea. She had a 32-year history of diabetes mellitus, and had been receiving dialysis due to diabetic nephropathy for 12 years. Six months before admission she had started to complain of dyspnea occurring several times a month without warning, improving spontaneously within a few hours without treatment. Her primary care doctor diagnosed asthma and she was treated with inhaled short-acting beta agonists and glucocorticoids, without improvement. Two days before admission, she experienced dyspnea again and was referred to our hospital. During the event, respiratory function test was performed and revealed an upper airway obstruction pattern. Her dyspnea episodes were not typical for asthma and she underwent laryngoscopy by an otolaryngologist, which excluded vocal cord dysfunction. However, the subglottic space was not examined. Her dyspnea recovered within a few hours spontaneously. She was admitted for further investigations, and a further attack of dyspnea occurred on the fourth admission day. Stridor was evident during the attack, and bronchoscopy revealed subglottic narrowing of the trachea on both inspiration and expiration with no mass or foreign objects (Fig. 1A). Computed tomography (CT) of the neck revealed cricoid cartilage fracture (Fig. 2A) causing airway narrowing and dyspnea. A prior neck CT performed as part of a whole-body CT scan during an episode of fever 8 months previously was reviewed and revealed no sign of cricoid cartilage fracture (Fig. 2B). She had no history of neck trauma during the intervening 8 months. Oral intubation was performed to maintain her airway and tracheotomy was performed 2 weeks later. Dyspnea episodes no longer occurred after the intubation and tracheotomy. Surgical cricoid cartilage repair was not attempted because of her comorbidity. She was discharged with a permanent tracheostomy.

DISCUSSION

Cricoid cartilage fracture is generally caused by significant neck trauma, including automobile injuries, and usually occurs together with fracture of other laryngeal cartilages, such as the thyroid cartilage, while isolated cricoid cartilage fracture is rare.^{1,3} Anterior force to the neck is thought to be the cause of laryngeal cartilage fracture by compressing the larynx between the external object and the cervical spine.¹

Isolated cricoid cartilage fractures have reportedly been caused by minor neck trauma, such as intubation.^{4,5} Manoeuvres such as cricoid pressure and external laryngeal manipulation are considered to have caused the fracture. There have been no previous reports of non-traumatic cricoid cartilage fracture, but several reports of thyroid cartilage fracture after a vigorous coughing or sneezing episode.⁶⁻⁸ Possible risk factors for laryngeal cartilage fracture following minor trauma or with non-traumatic causes include underlying weakness of the laryngeal cartilage, e.g. due to past injury, steroid use, or congenital abnormality.^{4,8} The typical symptoms of cricoid cartilage fracture are continuous dyspnea, neck pain, or hoarseness developing immediately after the traumatic episode,^{1,2} and intermittent dyspnea, as in our case, is rare.⁵ The apparent cause of the fracture in our case was unclear. Her cricoid cartilage appeared normal on CT 8 months earlier, with no subsequent history of neck trauma or intubation. However, although her chronic

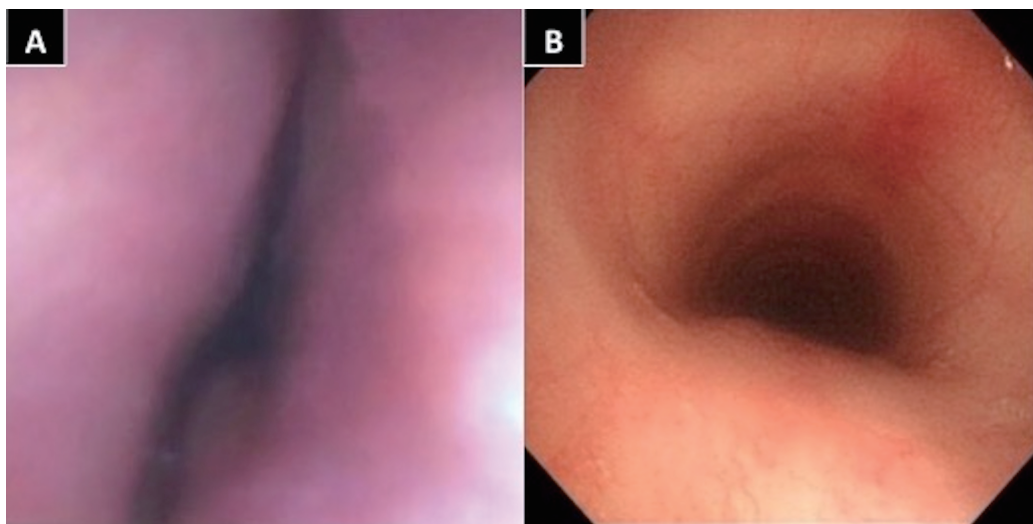


Fig. 1 Bronchoscopy

Fig. 1A: Bronchoscopy performed during the dyspnea attack showing subglottic narrowing of the trachea.
Fig. 1B: Normal bronchoscopic view of the subglottic space in a healthy individual.

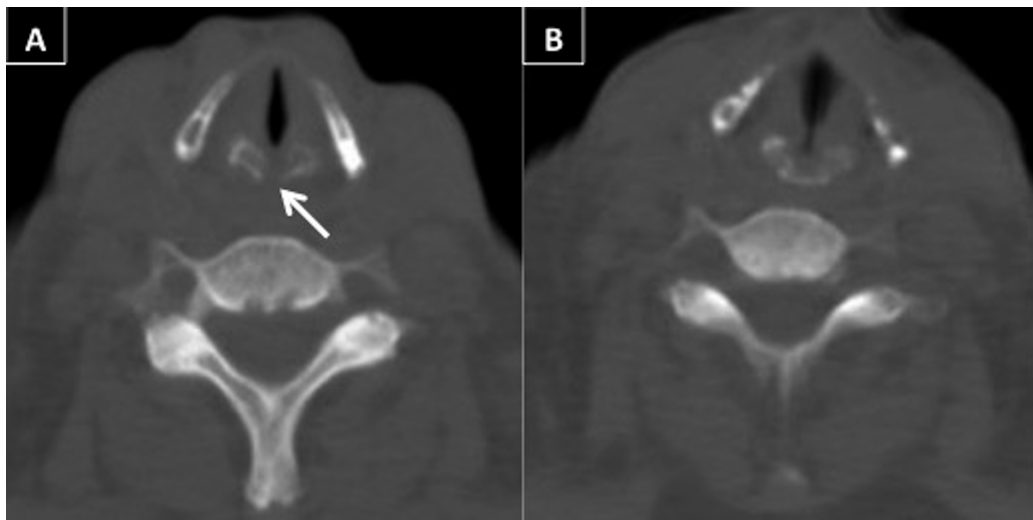


Fig. 2 Neck CT

Fig. 2A: Neck CT performed during the admission showing fracture of the lamina of the cricoid cartilage (white arrow).
Fig. 2B: Neck CT performed 8 months previously. No sign of cricoid cartilage fracture.

kidney disease-mineral bone disorder was appropriately managed (pre-dialysis laboratory data on admission: corrected serum calcium 8.5 mg/dL, phosphorus 4.8 mg/dL, intact parathyroid hormone 174.6 pg/mL), she was elderly and undergoing dialysis, and thus at increased risk of fractures.⁹ She had no history of fragility fracture and bone mineral density test has never been performed, but slight force to the neck, such as by coughing or sneezing, might thus have caused

the fracture. Her intermittent symptoms led to suspicions of other diseases such as asthma or vocal cord dysfunction, thus delaying the diagnosis.

Management of laryngeal cartilage fracture including cricoid cartilage fracture ranges from conservative management to surgical repair. As laryngeal cartilage fracture is rare, management is based on past case series or on expert recommendations, and no treatment algorithm is generally accepted.¹⁰ The main concerns in the management of laryngeal cartilage fracture are airway preservation and maintenance of voice function and deglutition. If the fracture results in airway obstruction as in our case, surgical repair is generally performed.¹ However our patient was a high-risk surgical candidate with multiple comorbidities including end stage renal disease requiring dialysis, lower limb amputation due to critical limb ischemia and chronic heart failure. Taking into account the risk of surgical intervention and the estimated poor prognosis of this patient, she was managed conservatively with permanent tracheostomy.

CONCLUSION

Cricoid cartilage fracture should be considered in patients with dyspnea of unknown cause, irrespective of continuous or intermittent symptoms and preceding traumatic episodes. When laryngeal cartilage fracture is suspected, CT scan will play a central role in diagnosis.

ACKNOWLEDGEMENTS

The authors thank Edanz Group (www.edanzediting.com/ac) for the manuscript proofreading.

DECLARATIONS OF INTEREST

The authors have no conflicts of interest to declare.

SOURCE OF FUNDING

The authors received no specific funding for this article.

REFERENCES

- 1) Jalisi S, Zoccoli M. Management of laryngeal fractures: a 10-year experience. *J Voice*. 2011;25(4):473–479.
- 2) Vassiliu P, Baker J, Henderson S, Alo K, Velmahos G, Demetriades D. Aerodigestive injuries of the neck. *The Am Surg*. 2001;67(1):75–79.
- 3) Standlee AG, Rogers DJ. Novel management of an isolated comminuted cricoid cartilage fracture. *Ear Nose Throat J*. 2016;95(10–11):452–453.
- 4) Heath KJ, Palmer M, Fletcher SJ. Fracture of the cricoid cartilage after Sellick's manoeuvre. *Br J Anaesth*. 1996;76(6):877–878.
- 5) Daniel SJ, Mujica-Mota M. Successful cricoid fracture reduction using a balloon dilator. *Int J Pediatr Otorhinolaryngol*. 2012;76(9):1382–1384.
- 6) Quinlan PT. Fracture of thyroid cartilage during a sneezing attack. *Br Med J*. 1950;1(4661):1052.
- 7) Alexander VR, Toynton S. Spontaneous fracture of the larynx after coughing. *Otolaryngol Head Neck Surg*. 2012;147(4):801–802.
- 8) Fenig M, Strasberg S, Cohen JC, Almadi R, Gold M. Laryngeal fracture after coughing. *Am J Emerg Med*.

Non-traumatic cricoid cartilage fracture

- 2013;31(9):1421.e1421–1423.
- 9) Alem AM, Sherrard DJ, Gillen DL, et al. Increased risk of hip fracture among patients with end-stage renal disease. *Kidney Int.* 2000;58(1):396–399.
 - 10) Schaefer SD. Management of acute blunt and penetrating external laryngeal trauma. *Laryngoscope.* 2014;124(1):233–244.