Isolated cricoid fracture associated with blunt neck trauma

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A 32-year-old woman without a remarkable history presented at the emergency department with strangulation of the neck. CT scans of the neck revealed a displaced cricoid fracture. Six days after admission to hospital, hoarseness and dyspnoea disappeared. On the 10th day, the patient was discharged without complications. The traditional treatment guidelines for laryngeal trauma have recommended an early surgical intervention after immediate tracheotomy in cases of displaced fractures of the cricoid cartilage. The patient could be treated successfully through continuous monitoring of airway obstruction without surgical management.

Laryngeal trauma, a rare injury, occurs in <1% of all victims of blunt trauma.¹ In particular, cricoid injury is reported to occupy <50% of laryngeal traumas.

Although airway management is most important in patients with neck trauma, the diagnosis of cricoid fractures is frequently missed, owing to its extremely low prevalence. Moreover, most patients with neck trauma are not properly treated, even though they are diagnosed as having a cricoid fracture. We report herein a case of isolated cricoid fracture that developed after blunt neck trauma.

CASE REPORT

A 32-year-old woman, with blunt neck trauma after being strangled by her acquaintance for 5 min, was referred to our emergency department (Chung-Ang University Hospital, Seoul, Korea) by a regional hospital. She was drowsy, probably due to intravenous administration of benzodiazepine at the regional hospital. Her blood pressure was 100/70 mm Hg, pulse rate 92 beats/min and respiratory rate 20 breaths/min. She had dyspnoea and hoarseness. Her arterial oxygen saturation value was 98%, as estimated by pulse oximetry, while oxygen was administered at a rate of 4 l/min. Ecchymosis was noted in the face and neck areas. Multiple scratch wounds were observed in the neck area, but there was no tracheal deviation or subcutaneous emphysema. There was no abnormality in the chest area, and breath sounds, except for stridor, were normal in both lungs.

Simple radiographs of the cervical spine exhibited no fracture lines. However, her hoarseness and dyspnoea aggravated with time, and CT scans of the neck were performed to rule out laryngeal trauma. The CT scans showed

a displaced fracture of the left cricoid cartilage and a swelling in the left vocal cord region (fig 1). Direct fiberoptic laryngoscopic examination showed mild swelling and congestion in the epiglottis, and swelling and haemorrhage in the left vocal cord. Her arterial oxygen saturation value was maintained at $\geq 99\%$ by administration of oxygen at a rate of 10 l/min through the mask. As fiberoptic laryngoscopic examination at 6, 9 and 12 h after admission revealed that the swelling did not progress further, tracheotomy was not performed. Dyspnoea and hoarseness disappeared on the sixth day after admission, and she was discharged on the 10th day.

DISCUSSION

As it is protected by the mandible, sternum and sternocleidomastoid muscle, the larynx is rarely injured, but may sustain airway obstruction from trauma due to its anatomical location in the superior part of the neck. A high

index of suspicion is the most important factor for the diagnosis of laryngeal injury. The American College of Surgeons' Advanced Trauma Life Support protocol suggests three clinical findings indicating laryngeal fractures: hoarseness, subcutaneous emphysema and palpable fracture.² Fuhrman *et al*¹ have reported that the most common symptoms in laryngeal trauma are tenderness and subcutaneous emphysema, and that the patient's inability to tolerate the supine position, which is commonly noticed in severely injured patients, can be an important symptom with which we should consider immediate tracheotomy without performing laryngoscopic examination. Tracheotomy has been recommended as a measure of airway control because orotracheal intubation can lead to iatrogenic complications in patients with fracture of the larynx.³ However, as emergency tracheotomy is a difficult surgical procedure that requires much time and causes massive bleeding, orotracheal intubation can be performed, and cricothyroidotomy can also be considered as a lifesaving option in patients with a totally obstructed airway or severe respiratory distress.

The diagnosis of tracheolaryngeal injury can be established on the basis of the identification of bony fractures and the examination of clinical findings such as oedema, tear and haematoma in the airway mucosa. CT scans offer a clinical advantage in the identification of bony fractures, and endoscopic examination has an advantage in the examination of clinical findings in the airway mucosa. Endoscopic findings can be obtained by direct or indirect laryngoscopy, flexible nasopharyngoscopy, bronchoscopy and oesophagoscopy. Among them, indirect laryngoscopy and flexible nasopharyngoscopy are easily feasible at the emergency department. However, indirect laryngoscopy requires the patient's co-operation, and thus has the disadvantage of being difficult to perform in patients with multiple facial trauma. Schaefer³ has suggested that tracheotomy and panendoscopy are required in both patients with displaced fractures and patients with non-displaced fractures on CT images. With significant advances in direct fiberoptic laryngoscopy, simple and accurate examination has recently been made feasible, avoiding unnecessary operations. However, in cases of massive oedema, mucosal tear, exposed cartilage, cord immobility and displaced or multiple fractures, early surgical intervention can help achieve a superior

Figure 1 Axial CT showing a displaced fracture of the left anterior arch of the cricoid cartilage. The white arrow indicates a fracture line of the cricoid cartilage.

outcome and decreased incidence of complications.⁴

In our case, symptoms other than dyspnoea and hoarseness were not observed, but there was evidence of blunt neck trauma. The patient underwent early CT scans of the neck because her airway was well maintained. She could be successfully treated without complications such as voice change only with supportive care, including continuous monitoring of clinical symptoms and changes in upper airway swelling through repeated direct fiberoptic laryngoscopic examinations at short intervals.

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