Case Report

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Isolated Cricoid Cartilage Fracture After Blunt Thoracocervical Trauma: A Case Report

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Abstract

Although cricoid cartilage fracture is rare because of the firm and stable structure of the cricoid cartilage, it can cause fatal complications. Prompt diagnosis and rapid airway safety are incredibly vital. A 24-year-old male patient was admitted to the emergency department due to blunt trauma to the thoracocervical region. The computed tomography taken after the first interventions detected a displaced fracture of the cricoid cartilage. In light of the patient's clinical findings, the patient was treated conservatively and non-surgically with close follow-up of the airway safety.

Keywords: Cricoid fracture, subcutaneous emphysema, larynx trauma, thoracocervical blunt trauma, conservative treatment

Introduction

Laryngeal traumas are rare but potentially fatal, and ensuring emergency airway safety is essential (1). The frequency of laryngeal trauma exhibits variations contingent upon the demographic under examination. Among adults, the estimated population incidence of external laryngeal trauma is 1 in 137,000, with blunt trauma prevailing over penetrating trauma, particularly in developing nations (2). The occurrence of laryngeal trauma is estimated to fall within the range of 1 in 5,000 to 1 in 137,000 emergency room admissions in the United States. The principal etiology of airway trauma often stems from the application of blunt force to the anterior neck. Simultaneously, instances of penetrating injuries to the neck contribute to laryngeal trauma, underscoring the critical necessity for prompt airway management. This urgency is underscored by the typically more extensive tissue damage associated with penetrating injuries as compared to blunt force impacts (3). Fractures of the cricoid cartilage carry noteworthy clinical ramifications, manifesting as dyspnea, neck pain, and hoarseness. They merit consideration in cases where patients present with unexplained dyspnea, irrespective of the persistence or intermittence of symptoms (4). Blunt trauma directed to the anterior neck has the potential to induce fractures in the cricoid cartilage, culminating in compromised integrity of vital structures and subsequent constriction of the airway (5).The cricoid cartilage is a significant anatomical landmark, pivotal in preserving airway patency and producing sound (6).A thorough comprehension of the developmental embryology, anatomy, and injury patterns related to cricoid cartilage fractures is crucial for precise diagnosis and proper management (7). In cricoid fractures, tracheotomy is the preferred method primarily to protect the airway. Still, after the airway stabilization, there are various methods, from the conservative close follow-up to follow-up with tracheostomy or surgical restoration (8-10). In this case, the patient with an isolated cricoid fracture was treated conservatively without sequelae.

Case Report

A 24-year-old male patient was admitted to the emergency department due to a blunt blow to the thoracic and cervical region due to the work vehicle hitting his back and then falling on a hard floor. The patient's vital signs were typical, with complaints of sore throat, bloody cough, and pressure on the throat at the initial evaluation. Ecchymous, bruise areas on the neck on inspection; tenderness in the neck and crepitations indicating subcutaneous emphysema were detected on palpation. In the patient's thorax, computed tomography (CT), mild hemothorax, atelectasis, mild contusion areas in the parenchyma, and free air densities in the mediastinum are more prominent on the left, were observed in both hemithorax. In neck CT, fracture in the posterior part of the cricoid cartilage (Figure 1a), submucosal hematoma in the right vocal cord (Figure 1b) and right aryepiglottic fold (Figure 2a), diffuse air densities in the cervical region, under the skin, between the neck

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fascia, in the supraclavicular and axillary region (Figure 2a-2b) was observed. In this case, unlike similar cases, the initial safety of the airway was primarily provided by orotracheal intubation instead of tracheotomy. Extubation was performed because the patient's saturation was good. In the fiberoptic laryngoscopic examination at the diagnosis stage, post-cricoid hyperemia with hematoma in the mucosa of the right arytenoid-aryepiglottic structures, hyperemia, and increased vascularity in the bilateral vocal cord and left arytenoid mucosa was present in both inspiration (a) and phonation (b). Bilateral vocal cords were mobile, but there was limited patency due to oedema of the rima glottis (Figure 3a-3b). in the fiberoptic laryngoscopic examination during the first week of the follow-up, the right arytenoid mucosa was mildly edematous in both inspiration (a) and phonation (b). At the same time,oedema, hematoma, and vascularity increased in the postcricoid region, and vocal cords were completely regressed (Figure 4a-4b). The fiberoptic laryngoscopic examination during the first month of the follow-up showed mild edema in the right arytenoid in both inspirations (a) and phonation (b). In contrast,edema, hematoma, and vascularity increased in the postcricoid region, and vocal cords were wholly regressed. When the rima glottis opening was optimal, polypoid tissue was in the subglottic area at the level of the posterior commissure (Figure 5a-5b).

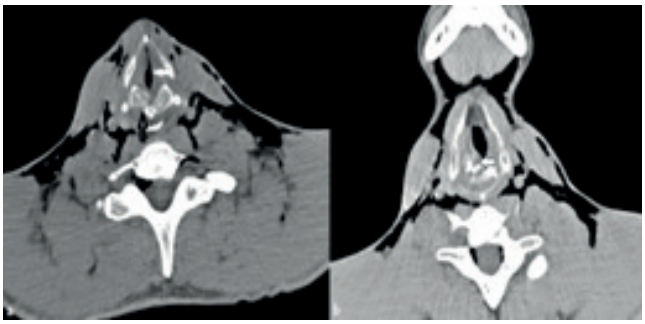

Figure 1. On CT images of the neck, the cricoid cartilage is fractured posteriorly (black arrow) and anteriorly displaced in the axial section bone window. At this level, the air passage (white arrow) is significantly narrowed (a). In the image in the axial section soft tissue window, thickening compatible with submucosal hematoma is observed in the right vocal cord (white arrow) (b).

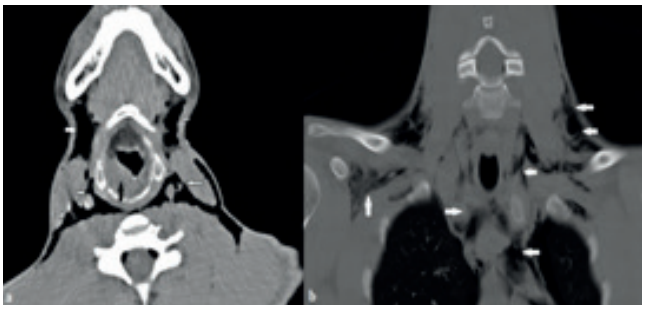

Figure 2. In the image viewed in the axial section bone window, thickening compatible with submucosal hematoma in the right aryepiglottic fold (black arrow) and air densities (white arrows) under the skin and between the neck fascia in the cervical region are observed. (a). Air densities (white arrows) are kept in the supraclavicular, axillary area, paratracheal, paratracheal levels, and mediastinum in the image in the coronal section bone window (b).

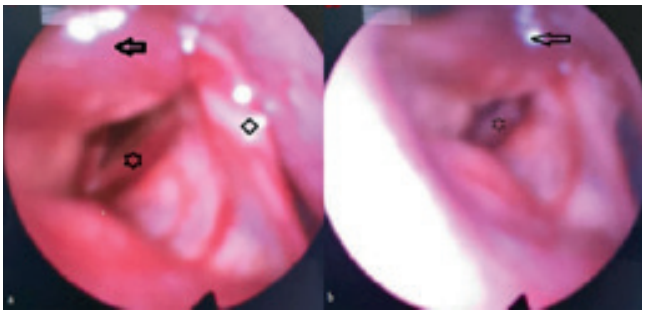

Figure 3. In the fiberoptic laryngoscopic examination at the diagnosis stage, post cricoid hyperemia with hematoma in the mucosa of the suitable arytenoid-aryepiglottic structures, hyperemia and increased vascularity in the bilateral vocal cord and left arytenoid mucosa were present in both inspiration (A) and phonation (B), Bilateral The vocal cords were mobile, but there was limited opening due to oedema of the rima glottis. (Arrow; Right arytenoid mucosa, Square; Left arytenoid, Star; Left vocal cord).

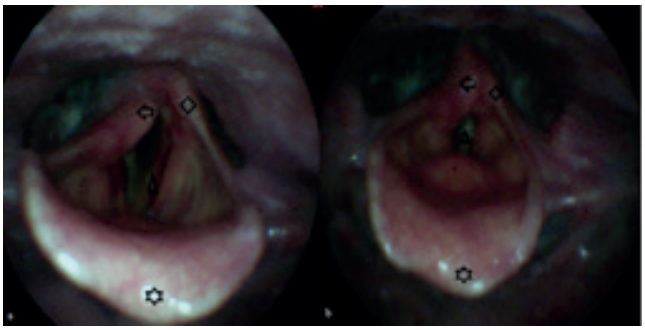

Figure 4. In the fiberoptic laryngoscopic examination at the first week of the follow-up, the right arytenoid mucosa was mildly edematous in both inspiration (A) and phonation (B), while edema, hematoma, and vascularity increased in the postcricoid region and vocal cords wholly regressed. (Arrow; Right arytenoid, Square; Left Arytenoid, Triangle; Left vocal cord, Star; Epiglottis).

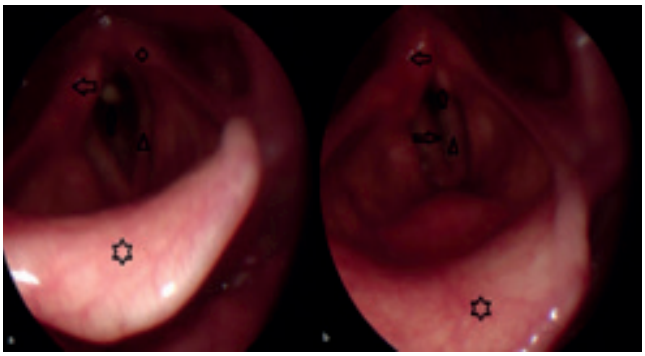

Figure 5. In the fiberoptic laryngoscopic examination at the first month of the follow-up, there is very mild edema in the right arytenoid in both the inspiration (A) and phonation (B), while edema, hematoma, and vascularity increase in the postcricoid region and cord vocals have completely regressed. When the rima glottis patency wasoptimal, polypoid tissue was in the subglottic area at the posterior commissure level. (Right Arrow; Right arytenoid, Upward-pointing arrow (A); Polypoid tissue, Left-facing arrow (B); Minimal opening in primal glottis closure, Upward-pointing arrow (B); Laceration in the mucosa of the left arytenoid medial wall, Square; Left Arytenoid, Triangle; Left vocal cord, Star; Epiglottis).

Discussion

The ring-shaped cricoid cartilage, located under the vocal cords, is the most muscular laryngeal structure and is essential in protecting the larynx from trauma. Fractures are rare since other external arrangements protect the cricoid cartilage (8,10). The diagnosis of cricoid cartilage fractures is made in the presence of clinical, radiological and endoscopic findings. Cricoid cartilage fracture and displacement can be detected on CT images. Subcutaneous emphysema and cervical, supraclavicular, axillary, mediastinal, and abdominal free air can also be observed on CT. Mucosal structures can be evaluated endoscopically. Findings in endoscopy can be obtained with a direct or indirect laryngoscope, flexible nasopharyngoscope, bronchoscope, and esophagoscope (11). The most crucial factor in diagnosis is the suspicion of the clinician or radiologist (10,11). In acute cricoid fracture, symptoms include dyspnea, hoarseness, vocal cord paralysis, airway obstruction, coarse voice, tenderness in the neck, pain, ecchymosis, subcutaneous emphysema, and hemoptysis may be present (8). Fuhrman et al., the most common finding in laryngeal traumas has been reported as neck tenderness, subcutaneous emphysema, and lack of tolerance to the supine position. In the presence of such symptoms, emergent tracheostomy should be considered before the laryngeal examination. Although iatrogenic complications of orotracheal intubation are more common than emergent tracheostomy in patients with laryngeal trauma, orotracheal intubation may also be preferred because emergent tracheotomy can cause surgically time-consuming and massive bleeding (11). In various case reports, there are cases in which airway safety was provided by emergent tracheotomy, tracheostomy, or cricotracheostomy after the first diagnosis. Still, there are cases where initial airway safety was achieved with orotracheal intubation (8-10). In this study, orotracheal intubation was preferred first to ensure airway safety. Afterwards, bronchoscopic and laryngoscopic evaluations were made. Although cricoid cartilage fractures are fatal complications due to acute obstruction of the upper respiratory tract, good algorithms for cricoid cartilage fractures are not available in the literature. Treatment management is based on a limited number of case reports or the recommendations of experts (4). The most important thing in managing cricoid fractures is to closely monitor the safety of the airway and the state of voice functions (4,10,11).Various treatment methods are tried to treat a cricoid fracture, from conservative treatment to surgical restoration. This patient was extubated and treated conservatively with close follow-up. In the two-case presentation of Je Hyeok et al., since the patients did not have symptoms such as hoarseness or dyspnea, airway safety was treated with direct fiberoptic laryngoscopy with close monitoring and short intervals without complications (11). Falcon et al. In the case report, although the patients had symptoms such as hoarseness and hemoptysis, airway safety was followed closely as extubated, and isolated displaced cricoid cartilage fracture was treated conservatively (12).

In cricoid injuries, the severity of the damage is essential in terms of treatment management and prognosis (8,11). How to ensure emergent airway safety in treating laryngeal traumas, classification of fractures, and surgical indications are still controversial (12). The literature shows that early surgical treatment is the method of choice, especially in cases of massive edema, mucosal tears, exposed cartilage, cord paralysis, or multiple displaced fractures (8,11,12). In our case, a displaced isolated cricoid fracture was observed, and since the patient did not have dyspnea or significant hoarseness, the airway was followed closely and extubated.

Although there is no generally accepted scheme in the conservative treatment approach, various patients were treated with intravenous steroids, non-steroidal anti-inflammatory, anti-reflux therapy, cold steam application, and absolute sound therapy (10-12).

Conclusion

In conclusion, fracture and the severity of the injury should be respiratory tract safety monitored closely in patients with cricoids determined clinically, radiologically, and endoscopically in this process. It should be remembered that treatment options range from conservative treatment to surgical restoration.

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