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Case report

Spontaneous rupture of trachea treated conservatively: A case report

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ABSTRACT

Introduction and importance: Spontaneous rupture of the trachea is a rare, life-threatening condition. Spontaneous rupture associated with corticosteroid use has been rarely reported in the literature.
Case presentation: We report a case of a 17-year-old male, a known case of nephrotic syndrome managed by corticosteroid treatment, who presented with diffuse neck and chest swelling after forceful coughing resulting in a spontaneous rupture of the trachea. The diagnosis was established using radiological imaging. The patient was managed conservatively with significant improvement and was discharged shortly.
Clinical discussion: Prolonged use of corticosteroids may lead to spontaneous rupture of the trachea due to tracheal wall weakness. Radiological imaging followed by bronchoscopy can be used to confirm the diagnosis. Management can either be conservative or surgical, depending on the case.
Conclusion: Conservative treatment by pain relief, intravenous fluids, and antibiotics should be considered an alternative to surgery in selected patients.

1. Introduction

Spontaneous rupture of the trachea is a rare, life-threatening condition reported in all age groups [1]. Tracheal rupture can either be spontaneous or traumatic due to direct trauma or iatrogenic trauma after intubation [2]. Several risk factors have been described, including corticosteroid use, COPD, and old age [2,3]. The prompt diagnosis and appropriate management of those patients are crucial. Diagnosis depends on the clinical and radiological picture of the patient. Bronchoscopy is a recommended modality for confirming the diagnosis [1]. The management of tracheal rupture can be conservative or surgical, depending on the case [3]. Spontaneous rupture associated with corticosteroid use has been rarely reported in the literature. We report a case of spontaneous tracheal rupture with long-term use of corticosteroids that was treated conservatively. This work has been reported in line with the SCARE criteria 2020 [4].

2. Case report

A 17-year-old male, a known case of nephrotic syndrome managed by corticosteroid treatment for 5 years, presented to the emergency department with an acute history of choking and forceful coughing during eating followed by diffuse neck and upper chest swelling with retrosternal pain and hoarseness. The patient denied any history of trauma to the chest or neck.

Upon presentation, the patient was conscious and oriented but complained of chest pain. Physical examination of the patient revealed surgical emphysema all over the neck, otherwise unremarkable. The patient's initial management was to keep him nil per os (NPO) and start him on intravenous fluids along with prophylactic intravenous antibiotics. Lab investigations revealed normal white blood cell count values and normal arterial blood gases results. Chest x-ray showed pneumomediastinum and surgical emphysema in the neck and chest wall (Figs. 1, 2). In addition, a computed tomography (CT) was done, which revealed multiple small defects in the tracheal wall on both the left and right side with significant pneumomediastinum and subcutaneous emphysema (Figs. 3 and 4).

There were no signs of esophageal perforation, pleural effusion, or pneumothorax. Based on the clinical presentation and the previous clear radiological findings, the patient was diagnosed with spontaneous tracheal rupture. He was admitted to the intensive care unit for observation and was kept NPO on antibiotic therapy prophylactically for mediastinitis. Since the patient's clinical picture was stable, the thoracic surgery team decided to continue conservative management, and the patient was monitored regularly with daily physical examination and chest X-rays.

The patient improved significantly over the following 3 days and was started on oral feeding, which he tolerated well. After 6 days of

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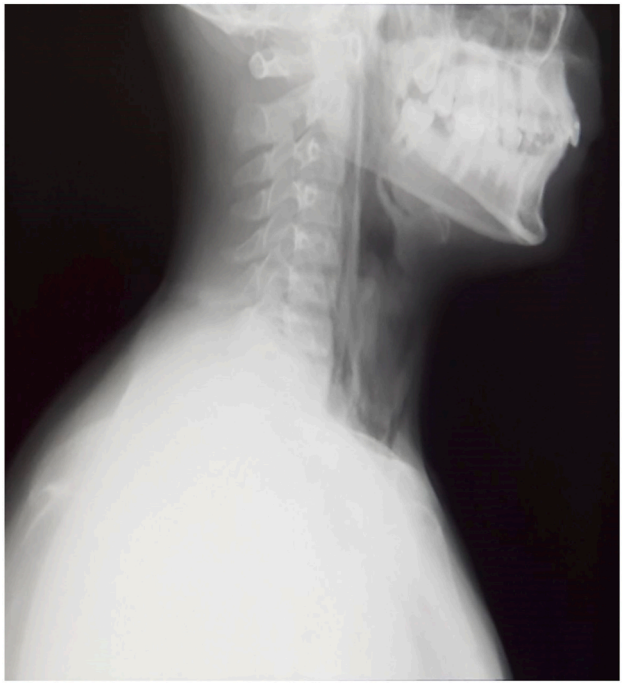

Fig. 1. Neck x-ray showing neck surgical emphysema.

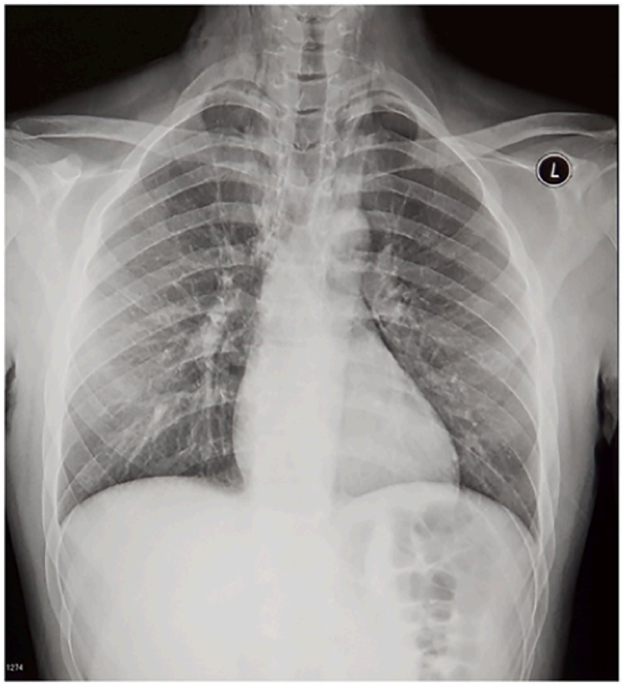

Fig. 2. Chest x-ray showing neck surgical emphysema.

admission, the patient completely recovered and was discharged in good condition.

3. Discussion

Tracheal rupture is a rare, life-threatening event that has been reported in the pediatric and adult populations [1]. It can be caused by a spontaneous rupture, traumatic injury, or post endotracheal intubation [2]. The case we presented had a subsequent spontaneous rupture of the trachea due to forceful coughing. The sudden increase in tracheal

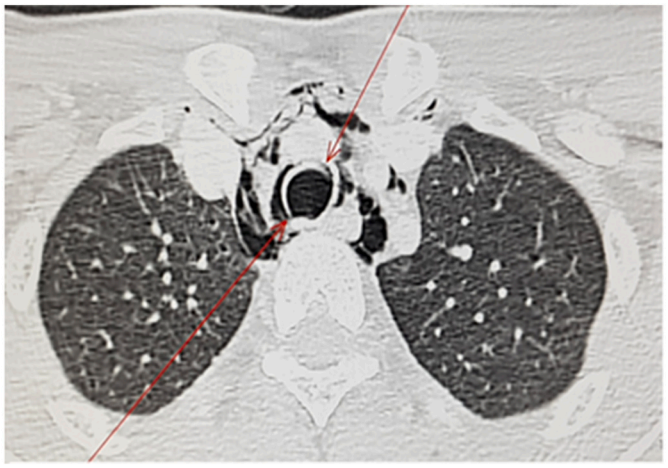

Fig. 3. Axial section of CT chest demonstrating a tracheal wall defect (arrows).

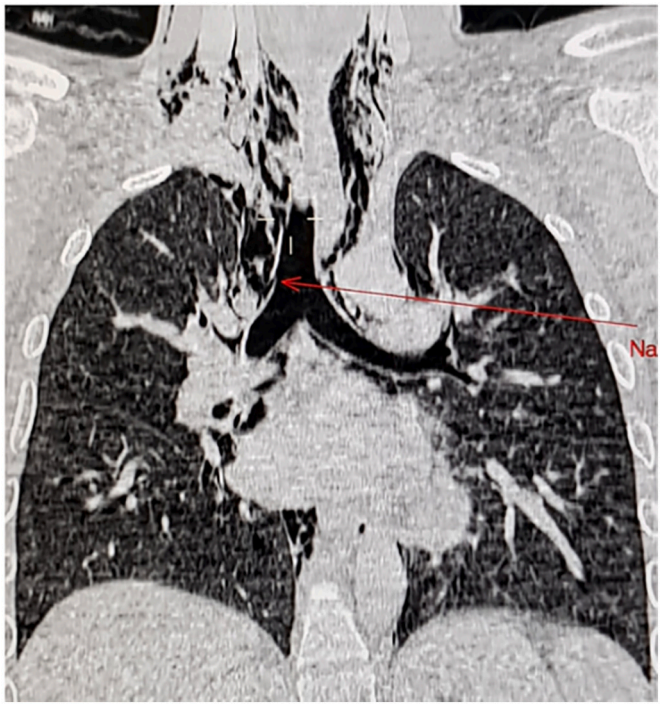

Fig. 4. Coronal section of CT chest demonstrating a tracheal wall defect (arrow).

pressure upon closure of the glottis may be the underlying mechanism of the spontaneous rupture of the trachea [1]. A similar case has been reported in a pediatric patient following paroxysmal coughing, with a rupture in the posterior membrane of the trachea occurring, which is considered the weakest point in the laryngeal-tracheal complex [1].

Several risk factors may predispose to the spontaneous rupture of the trachea, such as tracheal wall weakness due to the effect of corticosteroids on the connective tissue, chronic obstructive pulmonary disease, tracheobronchial malacia, and old age [2]. Patients with tracheal rupture may present with dyspnea, cervical and thoracic emphysema, sternal tenderness, cough, vocal change, and hemoptysis [1,3].

The diagnostic workup includes chest x-rays and CT scans. Findings of pneumomediastinum and cervical emphysema in the absence of pneumothorax should raise high suspicion of tracheal rupture [1,2]. CT can also show the site of tracheal injury, which manifests as the loss of tracheal wall circumference, a deformed tracheal contour, or an

abnormal connection to mediastinal structures [5]. Bronchoscopy can be used to confirm the diagnosis and to properly assess the site and extent of the tracheal rupture, especially when the CT fails to locate the tear in the tracheal wall [2]. The injury to the trachea usually occurs in the posterior membrane of the tracheal wall or at the junction of the cartilaginous ring with the posterior wall [2]. Severe complications can result in the death of such patients who fail to be diagnosed at the initial presentation [2]. Those complications include mediastinitis, sepsis, and lifelong pulmonary impairment due to airway stenosis [2]. In our case, there was a clear radiological tracheal wall defect that confirmed the diagnosis of a tracheal rupture. There was no need to proceed with flexible bronchoscopy as this may risk further damage and will not change the diagnosis.

Tracheal rupture can be managed either conservatively or surgically depending on the clinical status of the patient and the characteristics of the tracheal involvement [3]. Conservative treatment of a tracheal rupture can be considered if all the following conditions were met: the laceration length is less than 3 cm with partial involvement of the tracheal wall thickness, an endotracheal tube (EET) can be used as a stent to the tracheal tear, the surgical emphysema and pneumomediastinum are improving, there is no consistent air leak, and the patient is breathing spontaneously [1,3].

On the other hand, surgical management is recommended in the presence of respiratory distress with no evidence of pneumothorax, pneumothorax with continuous air leak, increasing neck and chest emphysema, evidence of transmural rupture involving the paracarinal region, and a finding of an esophageal wall prolapse into the tracheal lumen [6]. Trans-cervical or cervical collar incision and a right posterolateral thoracotomy are the two main surgical approaches used for tracheal repair [3]. An ETT placement using bronchoscopy can be used as a bridging measure for patients with large tears who are not fit for surgery as it is a simple and effective way to prompt early healing [7]. An ETT is used as a stent to cover the tracheal gap and stop the air from leaking [1]. However, an ETT tube usage in hemodynamically unstable patients requiring intubation carries a risk of tube penetration through the tracheal wall defect [1]. An appropriate intervention is a crucial factor in the survival of patients with tracheal rupture.

4. Conclusion

Spontaneous tracheal rupture is a rare condition that may result from forceful coughing, and the chronic use of steroids can predispose it. The diagnosis of such cases depends on the clinical presentation and radiological imaging. Conservative treatment by pain relief, intravenous fluids, and antibiotics should be considered an alternative to surgery in selected patients.

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Ethical approval

The study is exempt from ethical approval at our institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Research registration

Not applicable.

Guarantor

Dr. Mohammad Alamassi and Dr. Esraa Arabi accept full responsibility for the work, had access to the data, and controlled the decision to publish.

CRediT authorship contribution statement

Dr. Mohammad Alamassi: data collection, interpretation, writing the paper.

Dr. Esraa Arabi: writing and editing the paper, process of publishing.

Declaration of competing interest

No conflict of interest.

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