

Iatrogenic Post-intubation Tracheal Injury: An Emergency Room Presentation in a 17-year-old Girl

© Sadaf Sheikh, © Muhammad Akbar Baig

Department of Emergency Medicine, Aga Khan University Hospital, Karachi, Pakistan

Abstract

Iatrogenic tracheal injury is a rare complication after endotracheal intubation. Mucosal injury should be identified, and it is important to rule out pneumomediastinum and pneumothorax. The diagnosis is based on clinical and endoscopic findings and chest computed tomography. Broad-spectrum antibiotics should be given to avoid mediastinitis. We report a patient with a 5 mm tracheal laceration and significant subcutaneous emphysema after endotracheal intubation. The true incidence of this complication is unknown and early recognition warrants better outcomes.

Keywords: Tracheal injury, endotracheal intubation, bronchoscopy

Introduction

Iatrogenic tracheal injury has catastrophic consequences. In such a case, endotracheal tube (ETT) should be secured proximal to the defect with low volume ventilation. This will assist in reducing the stress on the tear. It is associated with female gender and mechanical factors such as incorrectly sized ETTs, cuff over-inflation, head movement or vigorous coughing. It causes longitudinal lacerations of the posterior membranous trachea (1).

Diagnostic validation is done by fiber-optic bronchoscopy, which will reveal the extent and location of the injury. The preferred treatment is early surgical repair for large lacerations, but conservative management may be a feasible substitute for patients with small lacerations or who are unfit for surgery. However, the criteria for both the managements are unclear (2).

Case Report

A 17-year-old girl with Tetralogy of Fallot presented to our emergency department with complaints of generalized tonic clonic seizures, fever, lethargy and respiratory distress.

On admission, she had two episodes of seizures followed by a deteriorated consciousness. She was tachycardic and she had post-ictal confusion. To maintain her airway, rapid sequence intubation was performed using a 7 millimeter (mm) diameter cuffed ETT with a stylet. Intravenous broad-spectrum antibiotics and anti-epileptics were given.

After 90 minutes of intubation, patient became hypoxic and the low-lying ETT was readjusted, but the hypoxia did not resolve. Crackling subcutaneous emphysema was the first clinical sign noticed in the cervical region and upper part of the chest suggesting tracheal injury, so patient was rushed to computed tomography (CT) scan. Head CT scan showed subarachnoid hemorrhage. A 5 mm tear was detected along the left lateral wall of the trachea in chest CT (Figure 1). This tear was complicated with significant emphysema in the neck extending along erector spinae muscles, bilateral axilla and lateral chest wall, causing pneumomediastinum, pneumopericardium and pneumoperitoneum. In addition, chest CT revealed pulmonary embolism and splenic infarcts and patient was given anti-coagulants and analgesics.



Corresponding Author: Sadaf Sheikh, Department of Emergency Medicine, Aga Khan University Hospital, Karachi, Pakistan

Phone: 0092214861196 **E-mail:** sadaf.sheikh@aku.edu **ORCID ID:** orcid.org/0000-0001-7457-0012

Cite this article as: Sheikh S, Akbar Baig M. Iatrogenic Post-intubation Tracheal Injury: An Emergency Room Presentation in a 17-year-old Girl. Eurasian J Emerg Med. 2019;18(2):112-4.

©Copyright 2019 by the Emergency Medicine Physicians' Association of Turkey
Eurasian Journal of Emergency Medicine published by Galenos Publishing House.

Received: 03.01.2019

Accepted: 10.05.2019



Figure 1. Computed tomographic image of tracheal tear along the left lateral wall measuring 5 mm

The patient was admitted to the intensive care unit, where she remained sedated and was kept on mechanical ventilation. Fiberoptic bronchoscopy showed evidence of a 5 mm laceration 4 cm away from the vocal cords in the membranous wall of the proximal third of the cervical trachea. There was no apparent active bleeding. Conservative treatment was chosen due to the acute neurological status of the patient. An orotracheal tube was inserted with its cuff positioned distally to the lesion, and antibiotic therapy effective on tracheobronchial tree pathogens was initiated. Subcutaneous emphysema was gradually decreased.

Cardiothoracic team consultation suggested managing conservatively as the patient was not stable enough for surgery due to multiple comorbidities. Empirical broad-spectrum antibiotic therapy was administered to prevent mediastinitis, chest physiotherapy was initiated, and mechanical ventilation settings were adjusted to low airway pressure and positive end-expiratory pressure. She remained stable and was weaned uneventfully. High-calorie diet was initiated and she was discharged in stable condition after drug optimization.

Discussion

Signs and symptoms of tracheal injury include subcutaneous emphysema, pneumothorax, dyspnea and hemoptysis. Diagnosis is made by tracheobronchoscopy, which reveals the location and extent of the lesion.

Diagnosis requires the identification of tracheal injury, its extent and depth. There is a controversy regarding surgical versus conservative management. The criteria for conservative management in selected cases include cardiovascular stability, the absence of sequelae such as progressive air leaks or sepsis, and no esophageal injury (3).

Supportive measures are essential in terms of avoiding mediastinitis in which early broad-spectrum antibiotics are indicated. A multidisciplinary approach is needed with risk stratification that permits conservative management even in large and non-bridgeable tears (4).

Early bronchoscopy is essential to confirm the diagnosis and to assess the injury. Conservative management is recommended in patients without rapidly progressing subcutaneous or mediastinal emphysema or mediastinitis (4). In our patient, laceration was approximately 5 mm and was complicated by subcutaneous emphysema. From this and other reported cases, we conclude that surgical repair is the best option for these patients, but patients with multiple comorbidities usually have an extremely high risk for surgery. Early surgical repair is preferred in patients with large lacerations, but conservative therapy can be used in patients with major medical problems.

Regarding treatment, very superficial lesions are usually treated conservatively and surgery is seen as a gold standard in which the lesions are repaired through right-sided posterolateral thoracotomy or a cervical approach (4). However, accumulating evidence challenges this conventional approach with more surgeons choose to adopt a medical approach to management. Yet, the criteria to guide which patients will benefit from medical treatment remain poorly defined and there is an increasing need for clear guidance. Selection criteria for conservative management are a matter of debate. Some authors stress the fact that there should be no evidence of respiratory or hemodynamic instability, while others consider the length or depth of the laceration as an important criterion (5).

Depending on the tracheal injury levels, the patients were managed either conservatively with medical treatment or surgically. Level I or II tracheal injuries should be managed non-surgically, provided that pneumothorax is promptly resolved, the patient has stable vital signs and an adequate respiratory status has been achieved (through either mechanical or spontaneous ventilation). Level IIIA tracheal injuries with adequate respiratory status can be managed conservatively in selected institutions only, because they represent high-risk tracheal lesions. Any tracheal injury associated with esophageal injury or mediastinitis (level IIIB) should be treated with open surgery as soon as possible (5).

The purpose of surgery is to achieve closure of the defect in order to restore effective ventilation, to prevent mediastinitis secondary to contamination from the airways and to reduce the risk of subsequent healing complications or long-term tracheal stenosis. The prevention of mediastinitis is a key goal of the physician dealing with such injuries. In this case report, we emphasized that prevention, early recognition and management

are the key features to deal with the dreaded complications of post-intubation tracheal injuries.

Ethics

Ethics Committee Approval: Aga Khan University Hospital, Karachi, Pakistan.

Informed Consent: Verbal consent taken by the patient.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.S., Concept: S.S., M.A.B., Design: S.S., Data Collection or Processing: S.S., Analysis or Interpretation: S.S., Literature Search: S.S., Writing: S.S.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Prunet B, Lacroix G, Asencio Y, Cathelinaud O, Avaro JP, Goutorbe P. Iatrogenic post-intubation tracheal rupture treated conservatively without intubation: a case report. *Cases J.* 2008;1:259.
2. Borasio P, Ardissonne F, Chiampo G. Post-intubation tracheal rupture. A report on ten cases. *Eur J Cardiothorac Surg.* 1997;12:98-100.
3. Grillo HC. Tracheal and Bronchial Trauma. In: Grillo HC, editor. *Surgery of the Trachea and Bronchi.* Lewiston: BC Decker; 2004.p.274-5.
4. Spaggiari L, Rusca M, Carbognani P, Solli P. Tracheobronchial laceration after double-lumen intubation for thoracic procedures. *Ann Thorac Surg.* 1998;65:1837-9.
5. Tapias LF, Mathisen DJ. Prevention and management of complications following tracheal resections-lessons learned at the Massachusetts General Hospital. *Ann Cardiothorac Surg.* 2018;7:237-43.