

Case Report

Postintubation Tracheal Rupture – A Case Report

Rajib Hasan^{1*}, Md Motiul Islam², Tarikul Hamid³, Mohammad Rabiul Halim³, Kazi Nuruddin Ahmed³, AHM Hafizur Rahman⁴, Shakera Binte Hassan⁵, Md Mazharul Hoque⁵, Faisal Mohammed Abdul Karim⁶
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Abstract:

Iatrogenic tracheal rupture is a rare but recognized complication after endotracheal intubation. Although rare, it carries high morbidity and mortality. Seemingly uneventful intubations can result in injury to the trachea requiring prompt diagnosis and management. Here, we report a patient of post intubation tracheal rupture who was successfully treated by conservative management.

Keywords: Endotracheal intubation, tracheal rupture, subcutaneous emphysema.

Introduction:

Following endotracheal intubation, tracheal rupture is a rare, but a serious complication.¹ In the last decade, the estimated incidence of tracheal injury after endotracheal intubation was 0.05-0.37% and increased to 15% in rapid sequence intubation.² The incidence is higher in double lumen intubation, approximately 0.5-1%.³ This incident can lead to an early adverse outcome, including respiratory failure, airway obstruction, tension pneumothorax, or late development of airway stenosis and recurrent pulmonary infections. Prompt diagnosis is crucial for the survival of these patients. As the cases are rare, a high index of suspicion is necessary. The diagnostic delay for cases like these is 25.7 ± 22.9 hours (range, 3-72 hours).⁴ Treatment of these patients is highly challenging. It is essentially surgical or conservative. But there is no clear consensus regarding this.

Case report:

A 44 years old lady, who had no previous comorbidities, underwent laparoscopic cholecystectomy under general anesthesia in a local hospital. The procedure was completed uneventfully. Following successful reversal from anesthesia

she was extubated and was transferred from operating room to post-operative ward. After a few hours patient started to develop swelling of face and neck along with chest discomfort. She was immediately transferred from that facility to a tertiary care hospital emergency department. At emergency room, patient was found fully conscious, oriented, and hemodynamically stable but tachycardic, tachypneic requiring 4L/min supplemental oxygen through low flow nasal cannula to maintain a SpO₂ of 94%. Patient had profuse swelling of face, neck and upper chest suggestive of subcutaneous emphysema. An HRCT scan of chest (Fig:1) was done which showed perforation of lower trachea with pneumothorax, pneumomediastinum and soft tissue emphysema. Patient was immediately transferred to intensive care unit (ICU) for imminent respiratory failure. Patient was thoroughly evaluated and other than type I respiratory failure in arterial blood gas analysis, all other lab reports were unremarkable. Her symptoms were not progressive and soft tissue emphysema was not increasing. But her oxygen requirement increased up to 6L/min through face mask and her SpO₂ remained stable with that. High flow nasal oxygen was intentionally avoided considering its positive pressure effect. Decision was taken to treat the patient conservatively. In the following days, patient's respiratory distress gradually decreased along with her subcutaneous emphysema and oxygen requirement. After 6 days, a repeat chest scan (Fig:2) was done which showed resolution of her pneumothorax, pneumomediastinum and soft tissue emphysema. A tracheoscopy was advised on day 7 before discharge but patient denied the procedure. She was finally discharged home on day 8 of her admission in a fully stable condition and with no complaints.

1. Jr Consultant, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
2. Consultant, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
3. Associate Consultant, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
4. Associate Consultant, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
5. Associate Consultant, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
6. Specialist, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
7. Clinical Staff, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
8. Clinical Staff, ICU, Asgar Ali Hospital, Dhaka, Bangladesh.
9. Sr Clinical Staff, ICU, Asgar Ali Hospital, Gandaria, Dhaka-1204, Bangladesh.

*Corresponding Author:

Dr. Rajib Hasan
Jr Consultant
Asgar Ali Hospital, 111/1/A, Distillery Road, Gandaria
Dhaka-1204, Bangladesh
E-mail: dr.rajib.icu@gmail.com

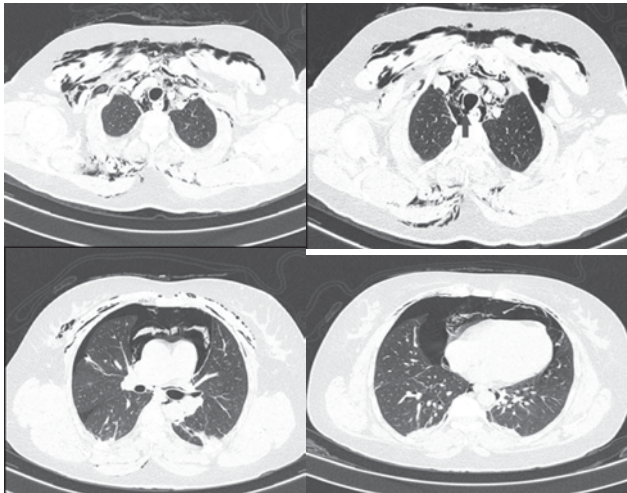


Fig1: HRCT chest done at ER. Blue arrow showing rupture of lower part of posterior tracheal wall along with pneumomediastinum, pneumothorax and soft tissue emphysema

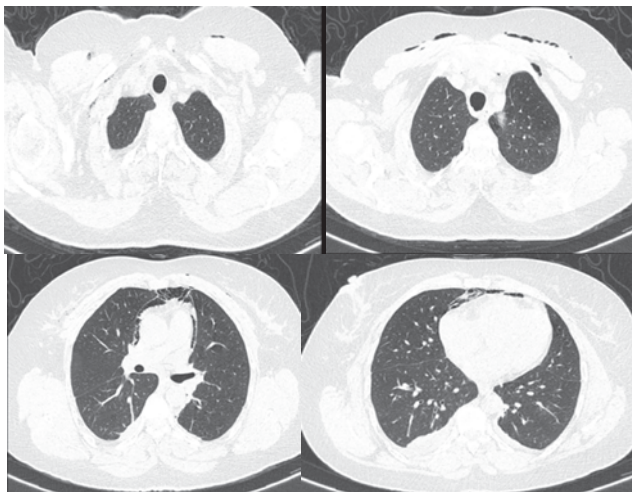


Fig 2: HRCT chest done on day 6 of admission showing almost complete resolution

Discussion:

Orotracheal intubation is a routine procedure that is performed in large numbers every day. Although rare, it has many potential complications including throat pain, laryngitis, glottic edema, and mucosal ulceration, to laryngeal or tracheal stenosis, necrosis of the tracheal wall, fistulas, aspiration, esophageal intubation, bronchial intubation, atelectasis, and tracheal rupture.⁵ Among these complications post intubation tracheal rupture (PiTR) is a rare one and the first reported case series was not published until 1995.¹

The exact mechanism underlying this complication is unknown. But there are risk factors that contribute to PiTR; these factors may be divided into mechanical and anatomical (table 1)

Table 1: Risk factors for PiTR^{1,6-9}

Mechanical risk factors	Anatomical risk factors
Multiple forced attempts at intubation	Congenital tracheal abnormalities
Inexperience of the health professional	Weakness of the pars membranosa of the trachea
Endotracheal tube introducers that protrude beyond the tip of the tube	Chronic obstructive pulmonary disease and other inflammatory lesions of the tracheobronchial tree
Over inflation of the cuff	Diseases that alter the position of the trachea (mediastinal collections, lymph nodes, or tumors)
Incorrect position of the tip of the tube	Chronic use of steroids
Repositioning the tube without deflation of the cuff	Advanced age
Inappropriate size of the tube	Female sex
Excessive movements of the head and neck while the patient is intubated	Significant cough

The most common clinical manifestations of PiTR are subcutaneous emphysema, mediastinal emphysema, and pneumothorax. Other signs include dyspnea, dysphonia, cough, hemoptysis, and pneumoperitoneum.¹⁰⁻¹² These signs often develop immediately or soon after extubation, though they can take several days to appear. This time course can lead to delays in diagnosis. The onset of subcutaneous emphysema is not only the most common symptom, it is also a protective factor, as its presence alerts to the possible existence of tracheal rupture, accelerating the procedures for its definitive diagnosis and the initiation of the correct treatment.¹³ Clinical suspicion must be followed by diagnostic confirmation which includes HRCT scan of chest or by direct visualization by tracheoscopy. Tracheal rupture is usually longitudinal and is most frequently located in the pars membranosa, the posterior part of the trachea that lacks cartilaginous support.¹⁴

There is no clear consensus on the management of PiTR. Early surgical repair has traditionally been the mainstay of treatment.^{1,15,16} Its supporters consider that it offers good results and that the prognosis will generally depend on the underlying disease rather than on the tracheal damage itself.⁵ However, there are even more authors who opt for conservative treatment in patients with small ruptures, less than 2 cm.^{10,11}

Analysis of the two types of treatment has been one of the objectives of many meta-analysis, as all recommendations published to date are based on personal experience with small groups of patients.¹³ However, surgical repair led to a two-fold rise in the risk of death in those patients in whom the PiTR was detected late.¹³ So, conservative management is often considered to be the treatment of choice¹⁷ particularly in certain group of patients (Table 2).

Table 2: Indication of conservative management in PiTR¹⁸

Conservative management of PiTR if patient is:

1. Clinically stable
2. In spontaneous respiration
3. No esophageal damage
4. Minimal mediastinal collections
5. No signs of clinical progression (emphysema or pneumomediastinum)
6. No symptoms of infection
7. On mechanical ventilation to treat an underlying respiratory problem

Conservative management includes,

- intubation with the cuff distal to the area of rupture,
- continuous tracheal aspiration,
- use of a pleural drain if required, and
- appropriate empirical antibiotic therapy, if required.¹

The options for surgical repair are multiple. The surgical technique will depend on the type and extension of the lesion. End-to-end anastomosis is usually the option.

Conclusion:

In summary, PiTR is a rare but well recognized complication which carries much mortality and morbidity. Care must be taken about the mechanical and anatomical risk factors during orotracheal intubation. Early diagnosis is the main factor influencing prognosis. Appearance of subcutaneous emphysema is a protective factor as it favors early diagnosis and the rapid initiation of the appropriate treatment. Treatment is controversial, although conservative management seems to be associated with a better outcome. Better training of medical personnel who perform orotracheal intubation is the key component to decrease the overall incidence of PiTR. Further research is needed for a clear consensus on treatment options.

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