

## **Tracheo-esophageal fistula secondary to tracheostomy, delayed diagnosis**

Bulent Altinsoy

Department of Pulmonary Medicine, Afyon Chest Diseases Hospital, Turkey.

Email: altinsoyb@ymail.com

### **Abstract**

Persistent air leak is not a common problem in patients who are under mechanical ventilation support; however, it can be encountered in intensive care unit (ICU). It is often due to nonuniform contact between the cuff and the tracheal wall caused by insufficient cuff pressure or malposition of the tube. Tracheostomy is commonly applied and is a relatively safe invasive procedure in ICU. We report a case of tracheoesophageal fistula (TEF), secondary to tracheostomy, initially manifested with persistent air leak under mechanical ventilation in ICU. Consequently, TEF should be considered in patients with unexplained upper airway leaks.

**Keywords:** Trachea-oesophageal fistula, Persistent air leak, Tracheal cannula.

### **Introduction**

Malignancy is the most common reason for TEF in adults. Trauma, infections, ruptured diverticula and iatrogenic reasons can also result in TEF.<sup>1</sup> Iatrogenic TEF can be due to intubation, rigid bronchoscopy, or tracheostomy. TEF is noticed in half of patients during the procedure at once whereas in the other half it takes up to 72 hours.<sup>2</sup> TEF is suggested in a patient by mediastinal and/or subcutaneous emphysema, haemoptysis, pneumothorax, and pneumoperitoneum.<sup>2</sup> Also, persistent air leak is cautiously interpreted in the meaning of TEF. In most of the cases reported previously, albeit rare, oro- or nasopharyngeal intubation was responsible for the clinical presentation, resulting in delay in the diagnosis of TEF due to unexplained persistent air leak. We hereby report a

patient with persistent air leak who was given mechanical ventilation support through tracheostomy cannula, diagnosed as TEF.

### Case Report

A 66-year-old male patient with COPD who had been intubated in the emergency room secondary to hypercapnic respiratory failure and sepsis was admitted to our intensive care unit (ICU). The patient's condition was not stabilized despite respiratory and circulatory support. To prevent postintubational tracheal stenosis, tracheostomy was planned and uneventful percutaneous tracheostomy was performed by the consultant surgeon. Mechanical ventilation was continued through the tracheal cannula. Ventilator signaled low tidal volume and air leak alert 2 hours later after intervention. There was not any problem in ventilator connections. Given the fact

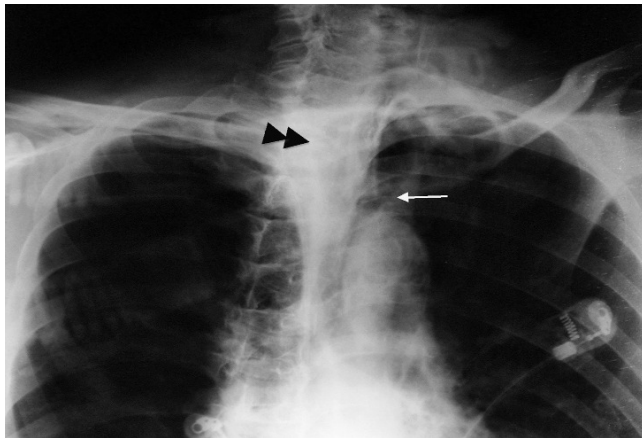


Figure-1: Chest X-ray showed oval shaped air density 4 cm in diameter (arrowheads) surrounding tracheal cannula (white arrow).

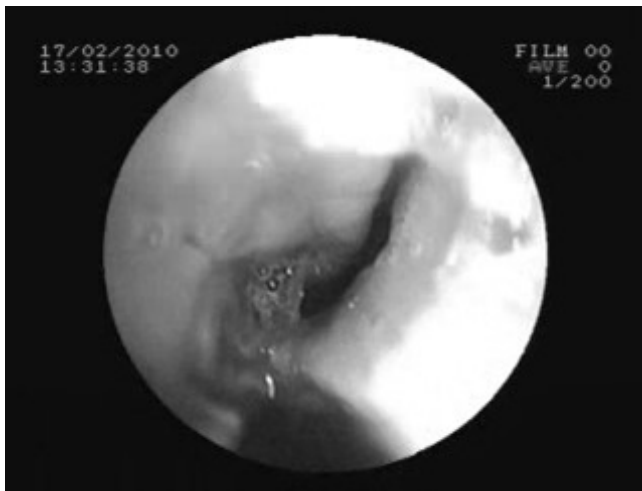


Figure-2: Bronchoscopy revealed TEF in the posterior tracheal wall.

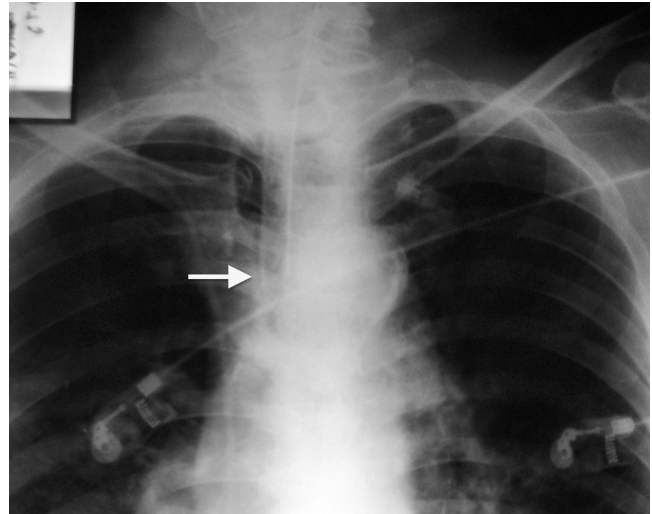


Figure-3: Endotracheal tube (white arrow) moved beyond the TEF.

that the problem was as a result of tracheal cannula (pilot balloon disruption or faulty function of a 1-way valve or nonuniform contact between the cuff and the tracheal wall), tracheal cannula was changed with next larger size. However the problem was not solved and we investigated tracheobronchial tree with fiberoptic bronchoscopy (FOB) through tracheal cannula, which did not show any pathological appearance. Also, air leak decreased markedly with changing the position of patient by elevating the head of the bed to 45 degrees. Ten hours later, a marked non positional air leak and frothy secretions from mouth developed and ventilation was inadequate. There were oesophagus originated air bubbles in laryngoscopy examination and cuff pressure was increased to suppress the air bubbles. However this attempt had no effect, and the air leak and frothy secretions from mouth persisted. The chest X-ray showed an oval shaped air density 4 cm in diameter behind the tracheal air column (Figure-1). Given the radiological findings and unsuccessful attempts to eliminate the air leak, it was determined that the most likely explanation was the presence of a tracheo-esophageal fistula (TEF) FOB was planned again. The examination was followed by removal of the tracheal cannula and fiberoptic bronchoscopy revealed a defect (TEF) in the posterior wall of the trachea (Figure-2). The airway was controlled by using a size 8 endotracheal tube (ETT) with its tip inserted via the tracheostomy stoma to just above the carina (Figure-3). Ventilatory parameters improved. Surgical repair was postponed till after the weaning process. Unfortunately, we lost the patient at the third week of intubation as a consequence of disseminated intravascular coagulation.

## Discussion

Iatrogenic tracheoesophageal fistula is a rare but serious complication of airway instrumentation.<sup>3</sup> It is observed in less than 1% of the patients undergoing endotracheal intubation or tracheostomy procedures.<sup>4</sup> Posterior wall perforation during the procedure or posterior wall erosion caused by excessive cuff pressures or abrasion by tip of the tracheostomy tube cannula are responsible for the formation of TEF.<sup>5</sup> Furthermore mucosal ischaemia due to systemic disorders in intubated patients facilitates the formation of TEF.

Brochoscopy is the gold standart for diagnosis of TEF. However, in our patient tracheal cannula concealed the fistula therefore the first bronchoscopy did not give any beneficial results. Pneumomediastinum, pneumothorax, subcutaneous emphysema on bedside radiographs of intubated patients should draw the attention for TEF. In our patient radiography was not performed because it was presumed that the, air leak was as a consequence of the cannula. Probably tube abrasion resulted in TEF in our patient. The fistula was very small and probably, radiography would not have shown TEF in the first instance and it was widened after the positive pressure effect of mechanical ventilation.

In our opinion, there were two reasons for the delayed diagnosis in our patient. Firstly, the air leak was not attributed to TEF since it started after two hours following the tracheostomy procedure, considering uneventful surgical intervention. Abrasion by tip of the tracheostomy tube cannula was not considered a potential

cause for TEF. Secondly, FOB was performed through the tracheal cannula so it concealed the TEF.

In considering, diagnostic challenge of persistent air leak and/or delayed diagnosis of TEF, similar clinical situations to this have been described although reports are extremely rare.<sup>3,6</sup>

Treatment is generally surgical repair however there are some cases who have spontaneous closure. Surgical repair is usually postponed till the weaning period considering secondary anastomosis due to positive airpressure and stenosis risk.<sup>4</sup>

## Conclusion

In conclusion, TEF should be considered in patients with unexplained persistent air leak who were given mechanical ventilation support through a tracheostomy cannula. FOB should be performed after removing the tracheal cannula.

## References

1. Sharma S, Duerksen D. Tracheoesophageal Fistula. (Online) (Cited 2012 Jan 12). Available from URL: <http://emedicine.medscape.com/article/186735-overview>.
2. Hofmann HS, Rettig G, Radke J, Neef H, Silber RE. Iatrogenic ruptures of the tracheobronchial tree. *Eur J Cardiothorac Surg* 2002; 21: 649-52.
3. Smith HM, Bacon DR, Sprung J. Difficulty assessing endotracheal tube placement in a patient with undiagnosed iatrogenic tracheoesophageal fistula. *J Cardiothorac Vasc Anesth* 2006; 20: 223-4.
4. Mooty RC, Rath P, Self M, Dunn E, Mangram A. Review of tracheoesophageal fistula associated with endotracheal intubation. *J Surg Educ* 2007; 64: 237-40.
5. Sue RD, Susanto I. Long-term complications of arti?cial airways. *Clin Chest Med* 2003; 24: 457-71.
6. Parker RJ, Rechner IJ, Parke TJ. Tracheo-oesophageal fistula and upper airway leak in the intensive care unit. *Br J Anaesth* 2008; 100: 139-40.