

CASE REPORT

A Case Report of Massive Surgical Emphysema after Endotracheal Intubation

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ABSTRACT

In the management of a patient with respiratory compromise in the emergency department, airway patency and ventilatory support are of high importance. We describe a case of a 34 years old female patient who presented with severe lower airway obstruction secondary to exacerbation of bronchial asthma. She had severe dyspnea, confusion and ABG showed type 2 respiratory failure for which an urgent endotracheal intubation was performed. Later, the patient developed significant subcutaneous emphysema,

and was diagnosed with bilateral pneumothoraces, pneumomediastinum, pneumopericardium, and surgical emphysema. This was treated emergently with supplemental oxygen and bilateral chest drains. A CT scan demonstrated a tracheal laceration, which was managed conservatively in the critical care unit. The patient had a tracheostomy on day 5 to treat an ongoing air leak and later made a full recovery.

KEYWORDS

Emphysema, Respiratory failure,
Conservative Treatment

CASE SUMMARY

A female of 34-years-old, with a history of bronchial asthma, was admitted to the emergency department in UMMC because of exacerbation of bronchial asthma, she had severe dyspnea, confusion and ABG shows type 2 respiratory failure. In the emergency room, the patient was sedated, endotracheal tube size 7.5 is inserted successfully in the first attempt. Immediately after intubation and connecting to the ventilator and supported with mechanical ventilation, noticed that patient SPO₂ of 70%, BP 80/40 and HR of 110/minutes, chest examination shows right tension pneumothorax, needle thoracotomy immediately performed followed by a bilateral chest tube, oxygen saturation raised to 98%, BP 110/70 and HR 80/m, patient connected to the ventilator by anesthesia team, post-intubation chest X-Ray (fig.1) shows bilateral pneumothorax and massive surgical emphysema neck, chest, and upper abdomen. Post-intubation chest X-Ray (fig.1) shows bilateral pneumothorax and massive surgical emphysema neck, chest, and upper abdomen.

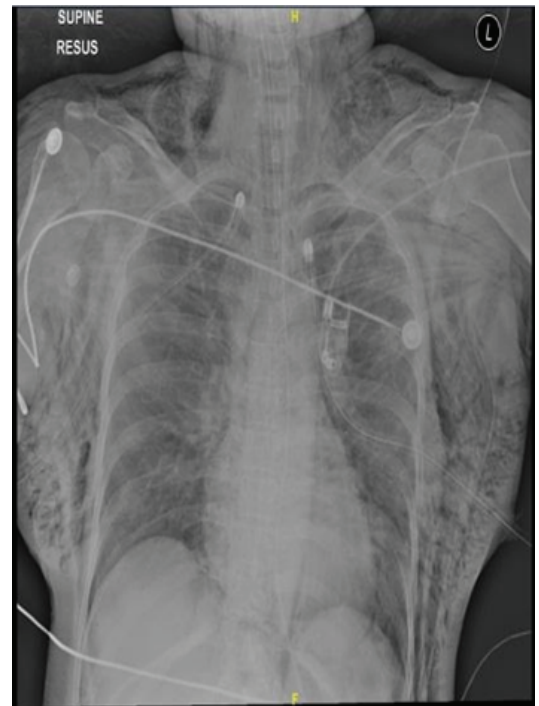


Fig.1. Chest XR and upper abdomen Bilateral pneumothorax and massive surgical emphysema neck, chest, and upper abdomen

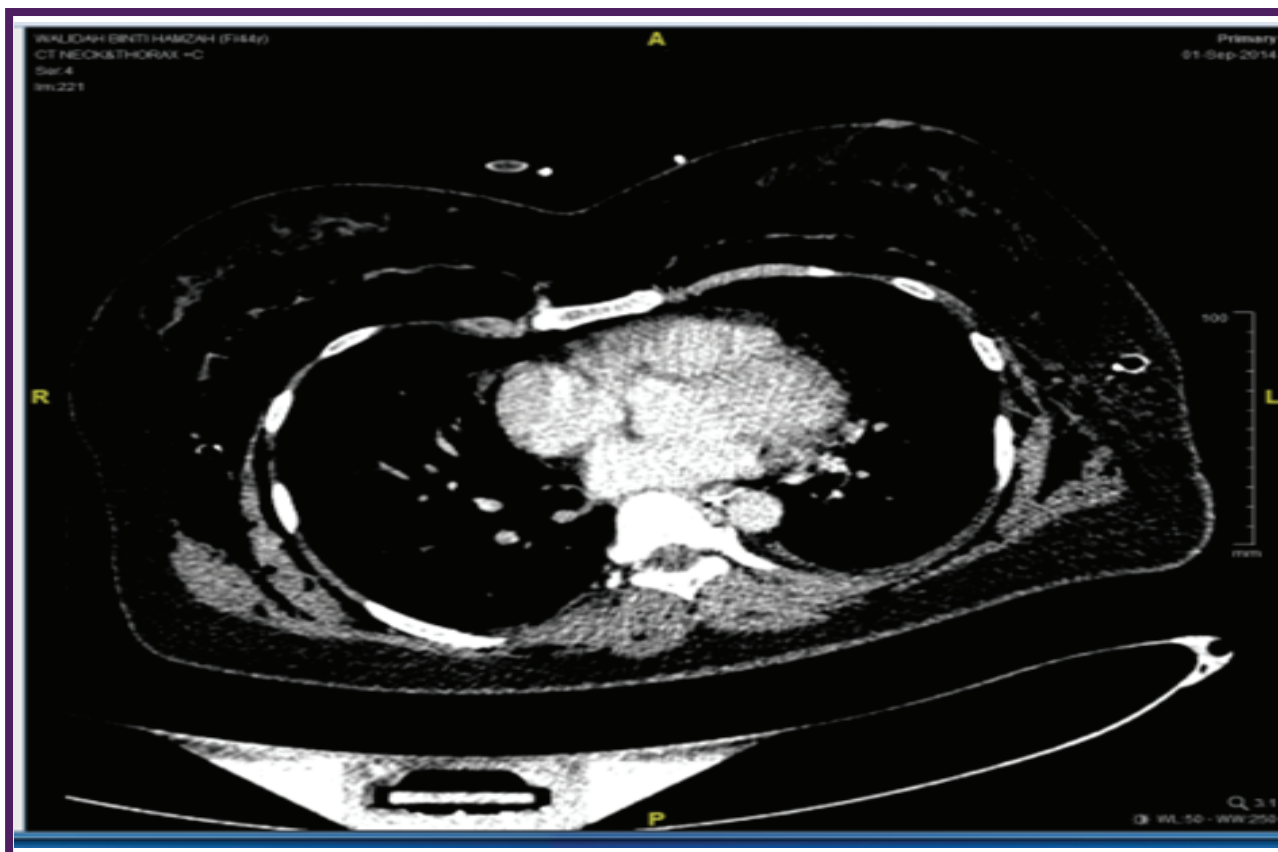


Fig.2. CT. Neck, chest, and abdomen requested after stabilizing the patient, it shows, break in the posterior part of the trachea at level T4 with posterior air tract indicate tracheal injury, massive surgical emphysema from the neck up to the upper abdominal wall, bilateral pneumothorax, pneumo-mediastinum, and pneumo- pericardium.

The patient was admitted to ICU and treated conservatively for 4 days then extubated and transferred to the chest ward and she stayed there for 4 days and was discharged to be seen in chest clinic after 1 month. Fig.3 shows resolving bilateral pneumothorax .

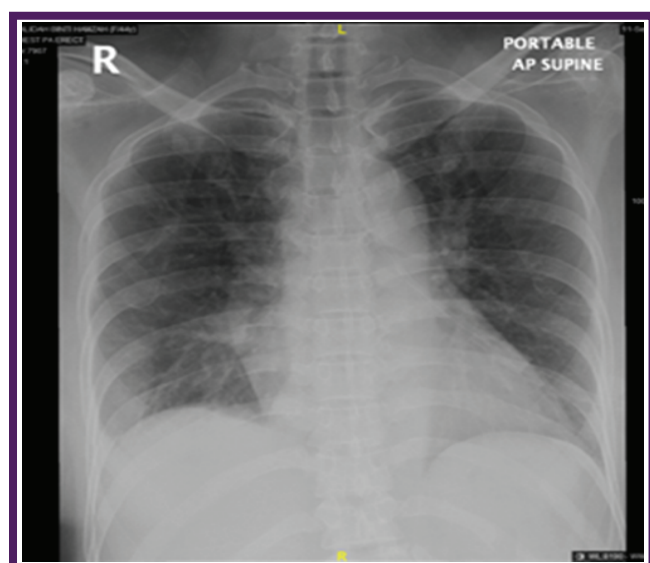


Fig.3. Chest XR showing resolving bilateral pneumothorax

DISCUSSION

Iatrogenic tracheal injury due to orotracheal intubation is considered a life-threatening condition if not treated in time, although it is rare it happens even in advanced medical center.⁽¹⁾

The incidence of tracheal injuries is around 0.005% when a single-lumen tube is used and it ranges from 0.05% to 0.19% when a double-lumen tube is used.⁽²⁾ The common site of injury is in the distal third of the trachea and the main bronchi, at the junction of the membranous and cartilaginous portions.⁽³⁾ When the overinflation cuff is the cause of injury the site of injury is usually in the proximal part of the trachea. It is most common in females, tracheal congenital malformation, the inflammatory disease leads to tracheal wall weakness and in patients on prolonged steroids therapy.

Patient factors	Mechanical factors	Anesthetic factors
<ul style="list-style-type: none"> • Female gender • Age >50 years • Tracheal wall weakness: steroids, malformation, COPD, tumors, tracheomalacia, and inflammation of tracheobronchial tree • <160 cm tall (some evidence) • Coughing against blocked ETT 	<ul style="list-style-type: none"> • Inappropriately large ETT size • Misuse of stylet/bougie • Cuff over-inflation • Endotracheal tube tip, stylet, or bougie impinging in a mucosal fold • Repositioning of ETT without deflating the cuff 	<ul style="list-style-type: none"> • Inexperience • Multiple vigorous attempts • Possible link to the use of nitrous oxide (N₂O) • Double lumen tubes • Intubation: emergency or predicted difficulty

Table 1: Common factors associated with tracheal lacerations

The main cause of tracheal injuries during intubation is the use of the inappropriate size of the endotracheal tube, overinflation of the tube cuff, difficult intubation with many attempts, blind intubation over tracheal tube inducer device (bougie) without the guidance and direct vision of the laryngoscope.⁽³⁾

Manipulating the endotracheal tube for adjustment in or out without completely deflating the tube is one of the common malpractices in intubated patients and might lead to tracheal injury.

In some cases which is orotracheal intubation is indicated, the use of double-lumen tubes is increasing the incidence of tracheal injury more than the single lumen tubes.

The clinical manifestations included subcutaneous emphysema in the chest and neck, pneumomediastinum, pneumothorax, and respiratory failure as a final sequence of the previous pathology.⁽⁴⁾

Radiological findings such as subcutaneous or mediastinal emphysema, the extension of the tip of the endotracheal tube to the right, and cuff overinflation, are usually indirect signs of injury, the diagnosis is confirmed by fiberoptic bronchoscopy and computed tomography.

Treatment options depend on the size of the lesion and clinical situation of the patient, late diagnosis with a lesion 4 cm or more, surgery will be indicated,⁽⁵⁾ in patients with less than 4 cm lesions and diagnosed early

most likely the management will be initially conservative.⁽⁶⁾

Condition of the patient that can guide the management toward surgical intervention, in case of respiratory distress, mediastinitis, pleural perforation, and patients who are not improving or worsening despite the good conservative treatment.⁽⁷⁾

Conservative treatment consists of positioning the tracheal tube cuff distal to the lesion in mechanically ventilated patients, a suitable antibiotic is indicated in any options of treatment.⁽⁸⁾

Depending on the side of the lesion and at the discretion of the surgeon; in cases of mediastinal tracheal injury, right thoracotomy should be performed in the fourth intercostal space.⁽⁹⁾ Subsequently, the tracheal laceration is treated by primary closure using a single layer of the absorbable suture.

Females showing predominance in the total number of post-intubation tracheal injuries with the variation of the age in booth sex, the reported mortality is low and death is not related directly for tracheal injuries and surgery itself but usually related to general health status and comorbidities of the patients.⁽¹⁰⁾

REFERENCES

1. Chamberlain S, Rahman H, Frunza G, Wickham A. Massive surgical emphysema secondary to iatrogenic tracheal laceration. *BMJ Case Reports*. 2015;2015.

2. Misak VB, Beraković AP, Vukusić I, Kogler J, Pazanin L, Ozegović SO. Postintubation tracheal injuries--case series and literature review. *Acta Clinica Croatica*. 2012;51(3):467-71.
3. Singh P, Wojnar M, Malhotra A. Iatrogenic tracheal laceration in the setting of chronic steroids. *Journal of Clinical Anesthesia*. 2017;37:38-42.
4. Pazanin L, Misak VB, Goreta N, Mareković Z, Petrovečki V. Iatrogenic tracheal laceration causing asphyxia. *Journal of Forensic Sciences*. 2008;53(5):1185-7.
5. Elicora A, Akgul AG, Topcu S, Ozbay S, Hosten T, Sezer HF, et al. Management of Post-Intubation Tracheal Membrane Ruptures. *Archives of Iranian Medicine*. 2016;19(7):491-5.
6. Lee BE, Korst RJ. Successful treatment of an iatrogenic tracheal laceration with a temporary polyurethane-coated nitinol stent. *The Annals of Thoracic Surgery*. 2016;102(1):e11-2.
7. Hussein E, Pathak V, Shepherd RW, Shojaee S. Bronchoscopic management of iatrogenic tracheal laceration using polyurethane-covered nitinol tracheal stents. *Journal of Trauma and Acute Care Surgery*. 2016;81(5):979-83.
8. Ovári A, Just T, Dommerich S, Hingst V, Böttcher A, Schuldt T, et al. Conservative management of post-intubation tracheal tears-report of three cases. *Journal of Thoracic Disease*. 2014;6(6):E85-91.
9. Oozeer NB, Fairgrieve R, Clement WA. Conservative management of laryngeal dog bite. *Scottish Medical Journal*. 2013;58(3):e22-7.
10. Tacquard C, Collange O, Olland A, Dégot T, Steib A. Post-intubation tracheal rupture: poor healing of the tracheal wall. *Canadian Journal of Anaesthesia*. 2014;61(4):357-61.

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