

Conservative Management of Large Post-Intubation Tracheal Laceration

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ABSTRACT

Tracheal rupture is a very rare but life-threatening complication of endotracheal intubation. It is more common in women and patients older than 50 years old. Overinflation of endotracheal tube cuff and tracheal wall weakening are the most important pathogenetic mechanisms. Laceration sites are located in the posterior membranous wall in most cases. Subcutaneous and mediastinal emphysema and respiratory distress are the most common manifestations. A 55-year-old female presented with postoperative subcutaneous and mediastinal emphysema without dyspnea because of a tear in the posterior tracheal wall. The diagnosis was based on clinical manifestation, chest computer tomography scans (CT), and endoscopic findings. A conservative approach by broad-spectrum antibiotic therapy was decided because of patients' vital signs stability and the absence of esophageal injury. The follow-up showed that there was no lesion in the posterior tracheal wall. Our case showed that in clinically stable patients without mediastinitis and with spontaneous breathing, conservative management of tracheal tears is a safe procedure.

Keywords: Intratracheal intubation, lesions, subcutaneous emphysema, trachea

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INTRODUCTION

Tracheal rupture is a rare and life-threatening condition. The main causes are traumatic or iatrogenic procedural complications such as during endotracheal intubation, surgery on the neck and chest, tracheostomy, bronchoscopy, placement of stent, or esophagectomy.^[1] The posterior membranous wall, which is the weakest portion of the trachea is the site of rupture described in almost all reported cases.^[2] Clinical manifestations are pneumothorax, subcutaneous emphysema, respiratory failure, and hemoptysis.^[3] Diagnosis is based on bronchoscopy which reveals the size and site of the lesion and computer tomography scan. The clinical status of the patient determines whether the medical management should be conservative management or urgent surgical repair.

CASE REPORT

A 55-year-old female underwent elective surgery because of left breast tumor recurrence, under general anesthesia in a local hospital. Unexpected difficult endotracheal intubation was performed by an experienced anesthesiologist using a single lumen internal diameter 7 mm cuffed tracheal tube. At the end of the surgery, the endotracheal tube was removed after spontaneous respiration was achieved. Postoperative subcutaneous emphysema was noticed. The chest X-ray film showed mediastinal and soft tissue emphysema, without pneumothorax [Figure 1]. The first computer tomography (CT) scan of the chest showed a rupture of the membranous portion of the thoracic tracheal wall, at a total length of 12 cm from the sixth to

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tenth cartilaginous ring [Figures 2 and 3]. Therefore, she was transferred to our hospital 10 h after the operation. She was continuously monitored for vital signs in the ICU. Her medical history was breast cancer surgery, chemotherapy, and radiotherapy 4 years ago.

Fiberoptic bronchoscopy was performed the other day as this procedure is the gold standard for tracheobronchial injury diagnosis. It revealed a linear laceration of about 10 cm in length on the posterior membranous wall (from 6 to 10 cartilaginous rings).

Gastroscopy has excluded any tear in the esophagus. The only clinical manifestation was spontaneous emphysema without dyspnea, so we decided on conservative management. The next day the patient remained hemodynamically stable without respiratory distress. A second CT neck and chest scan, 7 days later, showed that there was an improvement in the subcutaneous emphysema as well as tracheal tearing [Figures 4 and 5]. One month later, new CT scans revealed that there was no tracheal tearing and the patient was in fine condition without any symptoms [Figure 6].



Figure 1: Digital topogram of the patient at initial examination (supine position). Pneumomediastinum and subcutaneous emphysema are suspected



Figure 3: Initial chest CT at a lower level shows pneumomediastinum

DISCUSSION

As it is known, tracheal rupture after endotracheal intubation is rare and usually occurs in women over 50 years old.^[3] The risk factors may be divided into mechanical and anatomical. Mechanical factors associated with tracheal tear include double lumen tubes and overinflation of the cuff, gum elastic bougie, inexperience of the health professional, incorrect position of the tip of the tube, repositioning of the tube without deflation of the cuff, inappropriate size of the tubes, and significant cough. Anatomical factors include chronic obstructive pulmonary disease and other inflammatory lesions of the tracheobronchial tree, congenital tracheal abnormality, chronic use of steroids, advanced age, female sex, and weakness of the pars membranosa of the trachea, so the vast majority of tracheal rupture occur in the membrano-cartilaginous junction, most commonly right.^[1,5,6]

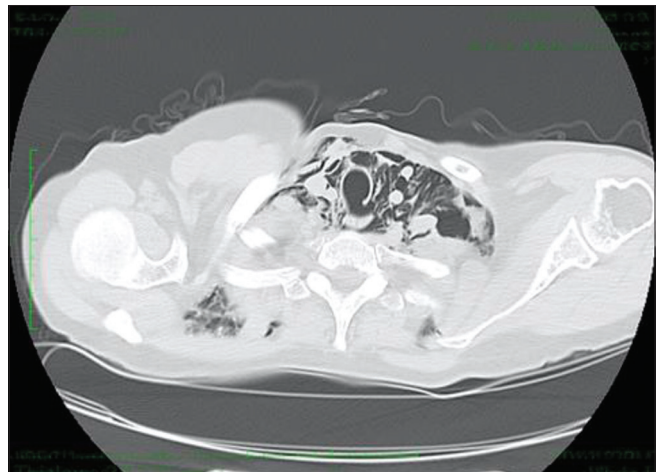


Figure 2: Initial chest CT depicts a large tear – gap in the posterior tracheal wall, with concomitant mediastinal and subcutaneous emphysema



Figure 4: Follow-up CT of the thorax a week later. There is a focal thickening of the tracheal wall at the site of initial tear. No discernible gap at the posterior tracheal wall

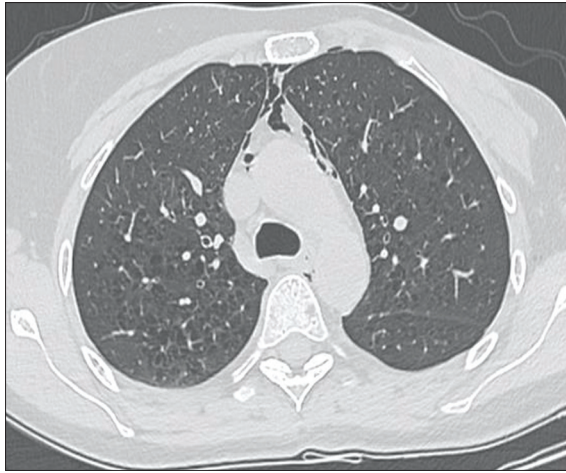


Figure 5: Follow-up CT a week later at mediastinal level shows partial resolution of pneumomediastinum

Signs of tracheal rupture are commonly subcutaneous emphysema and respiratory distress. Dyspnea, cough, hemoptysis, pneumoperitoneum, and vocal change were also included. If diagnosis is delayed, fever, retrosternal pain, mediastinitis, and leukocytosis may develop. Immediately after extubation clinical manifestation can be seen.^[3,5,6] Diagnosis can be obtained. The X-ray films reveal pneumothorax, pneumomediastinum, and subcutaneous emphysema. Emergent flexible bronchoscopy shows the exact location and extent of the lesion and is performed in the operative room. CT scans of the neck and thorax are the other diagnostic means that revealed pneumomediastinum and laceration of the trachea.^[4,6]

Recently, more authors have opted for conservative management in patients with small ruptures, less than 2 cm in patients with mild symptoms and without air leakage on spontaneous breathing, no respiratory difficulty, no esophageal injury, and patients whose extubation is expected within 24 h. Other authors suggested conservative therapy in cases with tears up to 4 cm in length.^[7]

Rupture of more than 2 cm in patients with progressive pneumomediastinum and dyspnea warrants emergency surgical treatment. Moreover, the same series demonstrated that in critically ill patients surgical repair is a high-risk procedure with mortality that can reach 71%.^[7] The surgical approach depends on the location of the tracheal tears. Right thoracotomy is preferred for midline and lower tracheal laceration and cervical incision for higher lesions. Safe ventilation of the patient is required during the repair of tracheal tears without further tracheal damage.^[6]

A new therapeutic approach was the tracheal stenting of post-intubation lacerations. In patients with a high risk

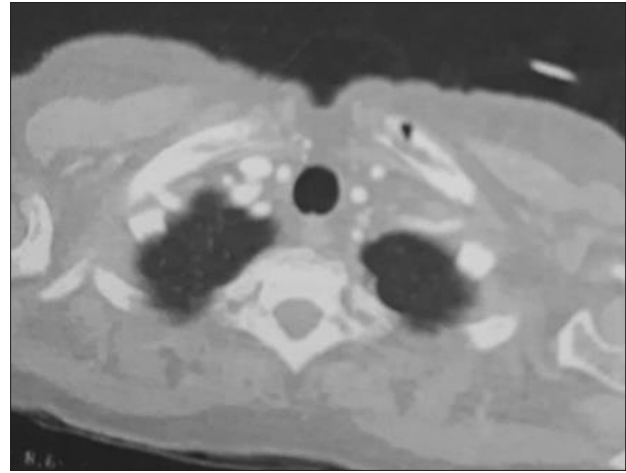


Figure 6: Same level as Figure 3 a month later. Barely visible thin web at the posterior tracheal wall, most possibly representing scarring at the site of the tear

of surgery-related mortality, tracheal stents represent an alternative to surgical treatment.^[7,8] The management protocol proposed by Cardillo *et al.* classified PITL into four levels based on the depth of tracheal laceration. Nonsurgical management is indicated in level I characterized by mucosa/submucosa lacerations with subcutaneous or mediastinal emphysema and in level II characterized by laceration up to the muscularis wall without mediastinal emphysema and without esophageal injury. Some level III-A injuries (complete laceration of the tracheal wall with esophageal or mediastinal soft-tissue hernia without esophageal injury or mediastinitis) can be managed conservatively in centers with experienced surgeons.^[9]

CONCLUSION

We recommended that in clinically stable patients without mediastinitis and with spontaneous breathing, the conservative management of tracheal tears is a safe clinical approach.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Miñambres E, Burón J, Ballesteros MA, Llorca J, Muñoz P, González-Castro A. Tracheal rupture after endotracheal intubation: A literature systematic review. *Eur J Cardiothorac Surg* 2009;35:1056-62.
2. Akkas M, Tiambeng C, Aksu NM, Onur R. Tracheal rupture as a result of coughing. *Am J Emerg Med* 2018;36:2133.e1-3.
3. Xu X, Xing N, Chang Y, Du Y, Li Z, Wang Z, *et al.* Tracheal rupture related to endotracheal intubation after thyroid surgery: A case report and systematic review. *Int Wound J* 2016;13:268-71.
4. Arti JC, Thomas RG, Atul CM, Malcolm D. Tracheal Rupture. *Journal of Bronchology* 2024;11:268-9. doi: 10.1097/01.lab.0000139764.21336.63.
5. Lim H, Kim JH, Kim D, Lee J, Son JS, Kim DC, *et al.* Tracheal rupture after endotracheal intubation-A report of three cases. *Korean J Anesthesiol* 2012;62:277-80.
6. Stannard K, Wells J, Cokis C. Tracheal rupture following endotracheal intubation. *Anaesth Intensive Care* 2003;31:588-91.
7. 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. *J Thorac Dis* 2014;6:E85-91.
8. Fiorelli A, Cascone R, Di Natale D, Pierdiluca M, Mastromarino R, Natale G, *et al.* Endoscopic treatment with fibrin glue of post-intubation tracheal laceration. *J Vis Surg* 2017;3:102.
9. Cardillo G, Carbone L, Carleo F, Batzella S, Jacono RD, Lucantoni G, *et al.* Tracheal lacerations after endotracheal intubation: A proposed morphological classification to guide non-surgical treatment. *Eur J Cardiothorac Surg* 2010;37:581-7.