Reminder of important clinical lesson

Tracheal stenosis mimicking severe acute asthma

Ali Bin Sarwar Zubairi,¹ Babar Dildar,¹ Shahid Javed Husain,¹ Mohammad Faisal Khan²¹ Department of Medicine, Aga Khan University, Karachi, Pakistan² Department of Anaesthesiology, Aga Khan University, Karachi, Pakistan

Correspondence to Ali Bin Sarwar Zubairi, ali.zubairi@aku.edu

Summary

Post-intubation tracheal stenosis is a rare but serious clinical entity that rarely develops when intubation is less than a week. These patients may remain asymptomatic for a variable period and are often misdiagnosed as asthmatic. The authors report a case of a middle-aged lady who was initially misdiagnosed as having acute asthma after brief tracheal intubation.

BACKGROUND

Post-intubation tracheal stenosis is an uncommon but serious complication which was first recognised by MacEwen in 1880.¹ The prevalence of tracheal stenosis after prolonged intubation is up to 19%,^{2–3} but only 1–2% of the patients are symptomatic or have severe stenosis.⁴ Stenosis can occur anywhere from the level of the endotracheal tube tip up to the glottic and subglottic area. It occurs at the endotracheal tube-cuff site in one-third of the reported cases. Regional ischemia due to the pressure of the endotracheal tube cuff on the mucosal wall is the proposed mechanism of the injury. Healing with granulation tissue and fibrosis results in the narrowing of the trachea causing the stricture. This usually occurs in 4–6 weeks.⁴

Other complications related to endotracheal intubation include laryngeal oedema, mucosal ulceration and granuloma formation. Laryngeal oedema usually resolves spontaneously in most of the patients. Clinically significant laryngeal oedema is less common, occurring in approximately 5% of patients and requiring reintubation in approximately 1%.⁵

The risk factors that predispose patients to the development of post-intubation tracheal stenosis include prolonged intubation, traumatic intubation, history of previous intubation or previous tracheostomy, corticosteroid usage, advanced age, female sex, oestrogen usage, severe respiratory failure, severe reflux disease, Wegener's granulomatosis, sarcoidosis, obstructive sleep apnoea and previous radiation therapy for oropharyngeal and laryngeal cancer.⁶

Patients with tracheal stenosis usually present with gradual-onset dyspnoea associated with wheezing that is unresponsive to bronchodilators and steroids. It is very rare that these patients present with extreme respiratory failure.

CASE PRESENTATION

A 62-year-old woman presented to the emergency room with 1-week history of severe shortness of breath. She had a recent hospitalisation for an acute myocardial infarction complicated by cardiogenic shock and respiratory failure requiring invasive mechanical ventilation. She underwent emergent angioplasty and stent placement in left anterior

descending artery (LAD). Her condition improved over the next couple of days, and she was successfully weaned from the ventilator and extubated within 48 h. She was discharged home a week later.

After 7 days of extubation, she developed symptoms of chest tightness and mild dyspnoea. She was seen by a Cardiologist and was prescribed oral prednisone and ipratropium inhaler for a presumed diagnosis of new onset asthma. Over the course of the next week, her symptoms persisted and she started developing orthopnea and paroxysmal nocturnal dyspnoea. After optimising her cardiac medications she was referred to ENT for an evaluation. She underwent a fiberoptic laryngoscopy which was reported unremarkable. Due to worsening of her symptoms she presented to the emergency department.

On physical examination, she appeared anxious and was in moderate respiratory distress. Her room-air oxygen saturation was 88%. The pulse was 122/min, blood pressure was 110/80 mm Hg and respiratory rate was 26/min. She did not have a raised jugular venous pressure. Her cardiac examination was unremarkable except tachycardia. She was tachypneic and using the accessory muscles of respiration. On auscultation of the chest, she had diffuse inspiratory and expiratory wheezes. The rest of the examination was unremarkable.

INVESTIGATIONS

The 12-lead EKG showed sinus tachycardia with nonspecific ST- and T-wave changes. The chest radiograph showed clear lung fields. She was given intravenous steroids and started on salbutamol and ipratropium nebulisers. She was diagnosed as status asthmaticus and admitted to the intensive care unit for further management.

Due to persistent symptoms and history of recent endotracheal intubation a suspicion of tracheal stenosis was raised. In the controlled setting of the intensive care unit (ICU) a video bronchoscopy was performed to evaluate the tracheobronchial tree. The fiberoptic bronchoscopy revealed concentric narrowing of the tracheal lumen occluding mid-trachea causing >75% obstruction and leaving a tiny patent trachea (figures 1 and 2).

Figure 1 Fiberoptic bronchoscopy showed concentric narrowing of the tracheal lumen occluding mid-trachea causing >75% obstruction and leaving a tiny patent trachea 254 × 190 mm.

CT scan of the neck revealed tracheal stenosis at the level of lower pole of thyroid gland extending 2.4 cm caudally (figure 3).

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of a patient presenting in the emergency room with new-onset wheezing include new-onset severe asthma, bilateral vocal-cord paralysis, foreign-body aspiration, tracheal tumours, post-intubation/tracheostomy tracheal stricture, Wegener's granulomatosis, obstruction of trachea or mainstem bronchi due to external compression from mediastinal tumours or adenopathy.⁷

TREATMENT

A thoracic surgeon was consulted who advised for tracheal reconstructive surgery; the patient refused to undergo this

procedure. Subsequently, mediastinal tracheostomy was carried out by the thoracic surgeon, in order to relieve the symptoms of upper-airway obstruction.

OUTCOME AND FOLLOW-UP

The patient did well and was transferred out of the ICU the day after surgery and was subsequently discharged. She was not available for follow-up; therefore, surveillance bronchoscopy could be not carried out.

DISCUSSION

Post-intubation tracheal stenosis typically correlates with the duration of intubation and rarely develops when intubation is less than a week. Our patient remained intubated for only 48 h. Only a handful of cases have been reported on tracheal stenosis developing in patients intubated for less than 48 h.⁷⁻⁹

Figure 2 Bronchoscopic view of narrowed trachea 254 × 190 mm.

Different proposed mechanisms of this complication include mucosal destruction caused by erosion of the endotracheal tube tip, excessive movement of a sedated patient after intubation and endotracheal tube cuff pressures of more than 20 mmHg.¹⁰ These findings have encouraged the use of high-volume, low-pressure ET tube cuffs to avoid tracheal injury. This has reduced the number of cases of post-intubation tracheal stenosis.

The risk factors for post-intubation tracheal stenosis in our patient were female gender, advanced age and respiratory failure as a consequence of cardiogenic shock.

Onset of symptoms usually occurs weeks to months later,¹¹ as in our case most patients have progressively increasing exertional dyspnoea associated with variable degrees of wheezing. Rarely, patients present in emergency room with respiratory failure as in our case. The differential diagnosis of a patient presenting in the emergency room with new onset wheezing include new onset severe

asthma, bilateral vocal cord paralysis, foreign body aspiration, tracheal tumours, postintubation/tracheostomy tracheal stricture, Wegener's granulomatosis, obstruction of trachea or mainstem bronchi due to external compression from mediastinal tumours or adenopathy.¹¹

In the past, tracheal stenosis was managed with dilatation alone, and success was measured by the ability to wean patients from tracheostomy tubes. Until recently, surgical resection and end-to-end anastomosis was considered the only definitive treatment for tracheal stenosis. Single-stage resection and reconstruction by a competent tracheal surgeon give good results in 93.7% of patients, with a failure rate of 3.9% and a mortality rate of 2.4%.¹¹

Grillo and Mathisen have reported mortality rates as low as 1.8% associated with surgical intervention but others have reported mortality rates up to 5%. Interventional bronchoscopy procedures can serve as a bridge to surgical treatment but most importantly, can constitute definitive

Figure 3 CT scan of the neck revealed tracheal stenosis at the level of lower pole of thyroid gland extending 2.4 cm caudally 254 × 190 mm.

therapy for many patients, including those who are not surgical candidates or those who refuse surgery. Studies have reported variable success rates of interventional bronchoscopic procedures like rigid bronchoscopy with neodymium-yttrium aluminium garnet laser resection or stent implantation ranging from 32 to 66%.¹²

This case report highlights the importance of early recognition and management of an uncommon and potentially lethal complication of intubation, which is often mistaken for bronchial asthma.¹³ Careful physical examination, supported by characteristic flow volume loops on spirometry and early evaluation by fiberoptic laryngobronchoscopy, enables identification of this condition. Attempted endotracheal intubation in the presence of tracheal stenosis might worsen mucosal oedema precipitating a near-total obstruction.

Learning points

- This case report highlights the importance of early recognition and management of an uncommon and potentially lethal complication of intubation, which is often mistaken for bronchial asthma.¹²
- Careful physical examination, supported by characteristic flow-volume loops on spirometry and early evaluation by fiberoptic laryngobronchoscopy, enables identification of this condition.
- Attempted endotracheal intubation in the presence of tracheal stenosis might worsen mucosal oedema precipitating a near-total obstruction.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Macewen W.** General observations on the introduction of tracheal tubes by the mouth, instead of performing tracheotomy or laryngotomy. *Br Med J* 1880;**2**:122–4.
2. **Grillo HC**, Donahue DM. Postintubation tracheal stenosis. *Chest Surg Clin N Am* 1996;**6**:725–31.
3. **Stauffer JL**, Olson DE, Petty TL. Complications and consequences of endotracheal intubation and tracheotomy. A prospective study of 150 critically ill adult patients. *Am J Med* 1981;**70**:65–76.
4. **Zias N**, Chroneou A, Tabba MK, *et al.* Post tracheostomy and post intubation tracheal stenosis: report of 31 cases and review of the literature. *BMC Pulm Med* 2008;**8**:18.
5. **Darmon JY**, Rauss A, Dreyfuss D, *et al.* Evaluation of risk factors for laryngeal edema after tracheal extubation in adults and its prevention by dexamethasone. A placebo-controlled, double-blind, multicenter study. *Anesthesiology* 1992;**77**:245–51.
6. **Kastanos N**, Estopá Miró R, Marín Perez A, *et al.* Laryngotracheal injury due to endotracheal intubation: incidence, evolution, and predisposing factors. A prospective long-term study. *Crit Care Med* 1983;**11**:362–7.
7. **Millard A.** Double respiratory sequelae of head injury: subglottic stenosis and bilateral pneumothoraces. *Br J Anaesth* 2003;**90**:94–6.
8. **Aguilera IM**, Walker RW, Dearlove OR. Postintubation tracheal stenosis in an 11-year-old boy: a surgical and anaesthetic challenge. *Paediatr Anaesth* 2002;**12**:733–7.
9. **Hawkins DB**, Luxford WM. Laryngeal stenosis from endotracheal intubation. A review of 58 cases. *Ann Otol Rhinol Laryngol* 1980;**89**(5 Pt 1):454–8.
10. **Keane WM**, Denny JC, Rowe LD, *et al.* Complications of intubation. *Ann Otol Rhinol Laryngol* 1982;**91**(6 Pt 1):584–7.
11. **Wain JC.** Postintubation tracheal stenosis. *Chest Surg Clin N Am* 2003;**13**:231–46.
12. **Mehta AC**, Lee FY, Cordasco EM, *et al.* Concentric tracheal and subglottic stenosis. Management using the Nd-YAG laser for mucosal sparing followed by gentle dilatation. *Chest* 1993;**104**:673–7.
13. **Yang KL.** Tracheal stenosis after a brief intubation. *Anesth Analg* 1995;**80**:625–7.

This pdf has been created automatically from the final edited text and images.

Copyright 2010 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Zubairi ABS, Dildar B, Husain SJ, Khan MF. Tracheal stenosis mimicking severe acute asthma. *BMJ Case Reports* 2010;10.1136/bcr.12.2009.2517, date of publication

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow