

# Endotracheal Tuberculous Stenosis: Ventilation Rescue and Bronchography Guided Stenting

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## ABSTRACT

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We present the case of a 16-year-old female patient who presented with dyspnoea, cough and noisy breathing that progressed further in hospital with the development of stridor and severe respiratory compromise requiring mechanical ventilatory support. Investigations were consistent with a diagnosis of endotracheal tuberculosis with tracheal and bronchial stenosis. Despite adequate anti-tuberculous therapy and ventilation the patient had high airway pressures, low tidal volumes and hypercapnia, which prevented weaning from mechanical ventilation. Balloon dilatation and stenting of the 4.5cm long, 2.3mm diameter stenotic tracheal segment was performed under radiological guidance. The patient was weaned successfully from the ventilator post-procedure. This report illustrates the successful management of an uncommon presentation of a common disease with modern endoscopic therapy. [Indian J Chest Dis Allied Sci 2010;52:55-58]

**Key words:** Endotracheal tuberculosis, Tracheal stenting, Fluoroscopy.

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## INTRODUCTION

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Richard Morton, an English Physician first described endobronchial tuberculosis in 1689.<sup>1</sup> Endotracheal tuberculosis is less common than endobronchial tuberculosis, with 150 cases reported worldwide.<sup>2</sup>

We report the case of a 16-year-old primigravida with tuberculous endotracheal and endobronchial stenosis presenting with stridor and respiratory failure. The patient was successfully treated with balloon dilatation and stenting.

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## CASE REPORT

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A 16-year-old primigravida at 24 weeks of gestation presented to the emergency room with complaints of breathlessness for four months worsening over the last 24 hours. Dyspnoea was associated with productive cough and noisy breathing which was worse at night. The patient was diagnosed to have bronchial asthma and was treated with inhaled bronchodilators. Since there was no symptomatic improvement, the patient came to our hospital for further evaluation and treatment. On examination, the patient was tachypnoeic and had a wheeze. Chest radiograph (postero-anterior view) with abdominal shielding showed features of right middle and lower lobe consolidation with a right-

sided pneumothorax (Figure 1). An intercostal tube was inserted, and the lung re-expanded with significant symptomatic improvement. Sputum direct smear examination for acid-fast bacilli (AFB) showed moderate AFB and the patient was started on category I anti-tuberculosis therapy (ATT) as per Revised National Tuberculosis Control Programme.



Figure 1. Chest radiograph showing right middle and lower lobe consolidation with a right-sided pneumothorax.

On day two of the hospital stay, there was clinical and radiological resolution of the pneumothorax and

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the intercostal drain was removed. On day four, she developed stridor. The diagnosis of laryngeal tuberculosis or upper airway pathology was considered but nasopharyngolaryngoscopy did not reveal any abnormality. Endotracheal tuberculosis was suspected but as the patient improved with supportive therapy and in view of her pregnancy, further investigations including computerised tomography (CT) and bronchoscopy were deferred.

The patient continued to experience recurrent episodes of stridor. On day 14, the patient had a respiratory arrest and was intubated and mechanically ventilated. The endotracheal tube could not be passed beyond 20cm from the incisors, suggesting a probable site of stenosis at that location. A fibreoptic bronchoscopy was performed that revealed a concentric stenosis distal to the tip of the endotracheal tube beyond which the bronchoscope could not be passed. The contrast enhanced CT of the thorax (Figure 2) showed concentric and irregular thickening of the tracheal wall (up to 8.4mm) with the lumen of the narrowest segment measuring only 2.3mm in diameter. The narrowed segment measured 4.5cm in length and extended into the right main bronchus. There were large mediastinal and right paratracheal nodes with evidence of collapse of the right lung and moderate right-sided pleural effusion. The patient subsequently had a spontaneous abortion of the six months old foetus.

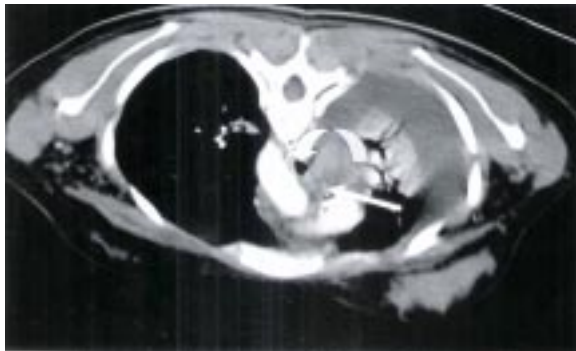


Figure 2. CECT of the chest showing tracheal stenosis (curved arrow) and mediastinal lymphadenopathy (arrow).

The presence of the tracheal stenosis made ventilation difficult and weaning from the ventilator almost impossible and hence an interventional procedure was performed. The patient had balloon dilatation of the tracheal stenosis followed by tracheal stenting with a 14-40 self-expandable nitinol metallic stent (Figure 3), performed by the radiologists under general anesthesia. Post stenting bronchography showed a bronchial stenosis in the right main bronchus, that was dilated but not stented. The patient improved rapidly post stenting and was weaned off the ventilator within a week. A repeat chest radiograph showed re-expansion of the right lung (Figure 4).

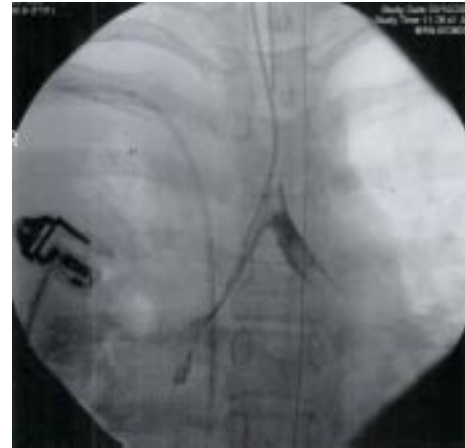


Figure 3. Photograph of post tracheal stenting and balloon dilatation of the right main bronchus, bronchography showing smooth flow of dye in the trachea and right main bronchus.



Figure 4. Chest radiograph taken at discharge showing complete resolution and re-expansion of the lung.

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## DISCUSSION

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Endobronchial tuberculosis was much more common in the pre-antibiotic era before the availability of effective chemotherapeutic agents. It is more common in young women. The challenge lies in distinguishing this disease process from new onset bronchial asthma that is also common in the same age group.<sup>3</sup>

Therapeutic interventions in endobronchial tuberculosis depends on the stage of the illness: (a) active (hyperplastic changes with oedema on imaging) or (b) fibrotic (smooth narrowing on imaging) — a distinction that is usually made on a CT scan.<sup>2</sup> Patients with active disease usually respond to ATT and require no further intervention. While those in the fibrotic stage of the illness may require radiologically guided procedures or surgical interventions. The types of interventional procedures and the outcomes in previous studies are summarised in the table.

**Table. Outcomes of tracheal stenting in previous studies**

Study Country	Number of Patients	Site of Stenosis	Type of Therapy	Outcome
Huang <i>et al</i> (Taiwan) <sup>7</sup>	3	Trachea +LMB	Staged dilatations+ stent insertion	Stent removed and patient remained well
Wan <i>et al</i> (Korea) <sup>4</sup>	10	Trachea	Balloon dilatation	Symptomatic improvement 83%
	2	Trachea + LMB		
	2	Trachea + RMB		
Kato <i>et al</i> (Japan) <sup>8</sup>	1	Trachea	Bronchoplastic reconstructive surgery	Not reported
Nomori <i>et al</i> (Japan) <sup>9</sup>	1	Trachea- 2 sites	Dumon silicone stent	Granuloma causing re-stenosis and requiring removal of stent - 2
Ryu <i>et al</i> (Korea) <sup>6</sup>	14	Trachea	Dilatation (balloon, Yag laser, bougienage+ Dumon stent)	Stent removed - 5

LMB=Left main bronchus, RMB=Right main bronchus

Indications for dilatation with or without stenting include dyspnoea, stridor, lung collapse, and recurrent episodes of obstructive pneumonia due to the stricture. Patients ventilated for respiratory failure can be weaned off the ventilator after bronchoscopy-guided stenting without long-term complications.<sup>4,5</sup> Complications during the procedure include excessive bleeding, pneumothorax and formation, re-stenosis and mucostasis.<sup>6</sup> Re-stenosis due to granulation tissue has been successfully treated with laser ablation and cryotherapy.<sup>5,6</sup>

Silicon stents are preferred over metallic stents as they can be customised to the patient, re-positioned and removed which is especially useful in benign diseases;<sup>10</sup> the disadvantages include stent migration and obstruction. Metallic stents have the advantage of easy insertion, stability, and lower inner to outer ratio and better conformation to airway. These advantages are offset by the impossibility of stent removal or re-positioning and inward growth of granulation tissue or tumour via the interstices of the stent. To overcome some of these disadvantages, newer covered retrievable metallic stents were introduced. These stents have a retrieval hook wire attached to the stent drawstring that aids in bronchoscopic removal of the stent. The covering of the stents with polyurethane or polytetrafluoroethylene prevents tissue hyperplasia through the stent wires.<sup>11</sup>

A recent study<sup>12</sup> of fluoroscopy-guided tracheal stenting with self-expandable stents from India showed 90% of the patients were free of dyspnoea at the end of one year. Adverse events after the procedure included cough in 50% and blood tinged sputum in one patient. Only one among the eight study patients required surgical intervention due to fracture of the stent.<sup>11</sup>

The use of corticosteroids to prevent bronchial stenosis in endobronchial tuberculosis is controversial and steroids have generally not been found to be useful.<sup>13</sup> We treated our patient with only ATT and corticosteroid therapy was not instituted.

On follow-up a year later, the patient is doing well with a repeat CT showing a fully re-expanded lung and resolution of the mediastinal lymphadenopathy. This case report highlights that although endotracheal tuberculosis is a rare life-threatening manifestation of tuberculosis, tracheal dilatation and stenting can result in a successful outcome even in mechanically ventilated patients.

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