

## Case Report

### Tracheal Stenosis: Multimodality Management – A Case Report

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#### Abstract

A case of post-corrosive tracheal stenosis was successfully managed with a multi-disciplinary approach involving Endo Bronchial Electro-Surgery (EBES), Intra-bronchial Ballooning, local administration of inj. Bleomycin followed by Tracheal Stenting. Patient was successfully discharged on the same day.

*Keywords:* Tracheal Stenosis, EBES, Intra-bronchial Ballooning, Tracheal Stenting

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#### Introduction

Tracheal stenosis is not uncommon after ET intubation, tracheostomy and corrosive inhalation, even a short duration of intubation can cause stenosis, which may appear after few days to many years.<sup>1,2</sup> Incidence of tracheal stenosis is on rise in recent years because of increased incidence of prolonged intubations. tracheostomies done for extensive and complex neurological conditions, prolonged cardiovascular, head and neck surgeries and increased incidence of patients coming out of intensive and critical care units because of technological advances. Tracheal stenosis causes moderate to severe choking and can be life-threatening. Tracheal sleeve resection is the definitive treatment for post-intubation tracheal stenoses, but poor general health or unstable coexistent diseases frequently contraindicate surgery, at least temporarily.<sup>3</sup> Therefore, non-operative techniques, including bronchoscopic balloon dilatation, laser resection and stenting have been proposed as alternatives to open surgery.<sup>4,5</sup> Bronchial dilatation using a cone shaped bronchoscope and ballooning are

cheap but with frequent recurrences. Mechanical dilatation alone leads to a recurrence rate of > 90%.<sup>3</sup> Electro-cautery is a fairly cheap and safe procedure especially when compared to laser therapy. Stents are very helpful for splinting lengthy stenoses. In some cases the patients can remain asymptomatic even after removal of a stent if the stent has been kept in place for several months.<sup>5</sup> We report a case where we managed a young patient of post-corrosive tracheal stenosis with a multi-modality approach including EBES, Intra-bronchial ballooning, local instillation of Bleomycin followed by tracheal stenting.

#### Case Report

A 24 year old female was admitted in A female patient from Jalandhar, aged 25 years ingested some corrosive fluid because of family altercation. She was managed conservatively and after 3 weeks developed difficulty in breathing. On investigations she was diagnosed to have tracheal narrowing. She was referred to us for further management.

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Figure 1. Video Bronchoscopic View of Tracheal Stenosis

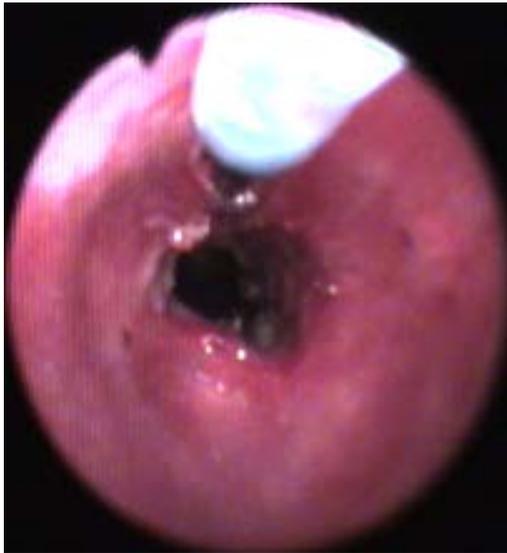


Figure 2: Tracheal Electro-cautery

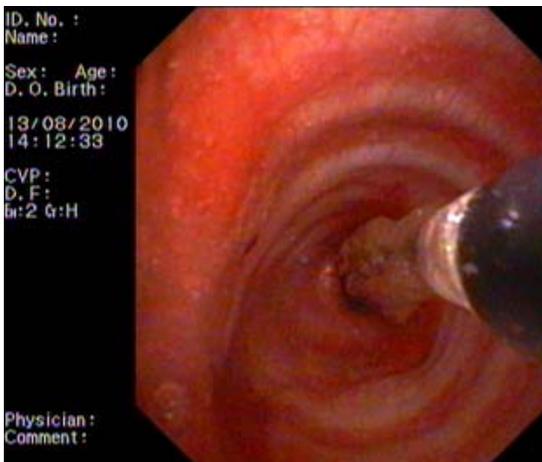


Figure 3. Ballooning

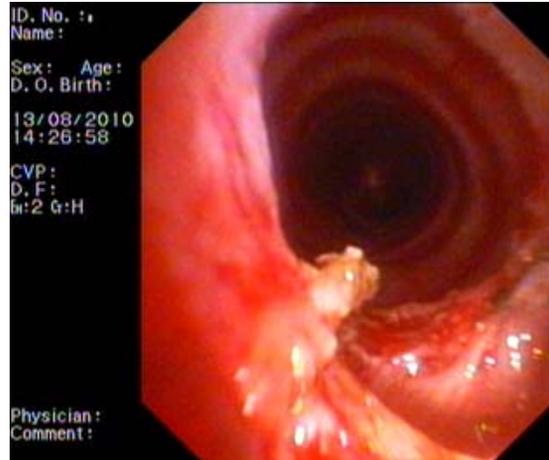


Figure 4. Dilated Trachea

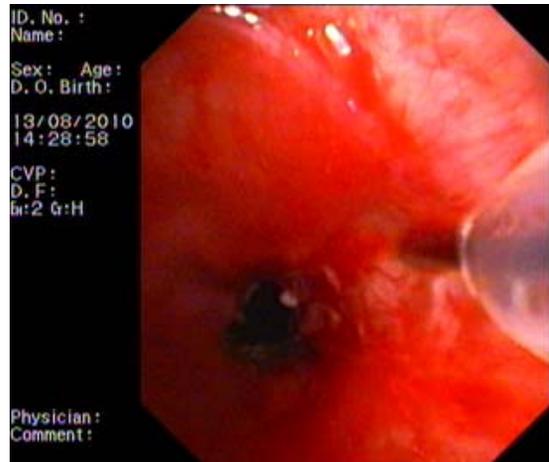


Figure 5. Local Bleomycin injection

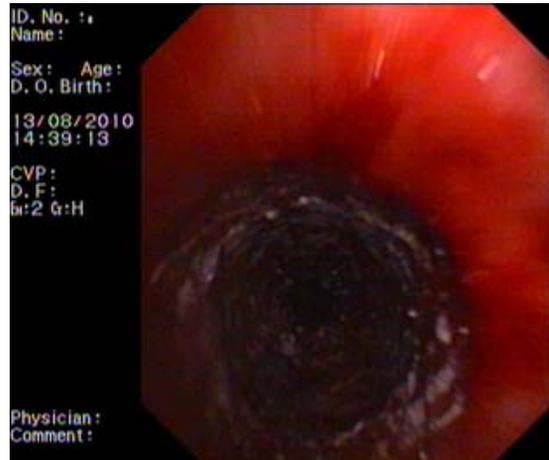


Figure 6. Tracheal Stent in place

Patient was evaluated and video-bronchoscopy done as per American Association for Respiratory Care (AARC) criteria<sup>6</sup> using Olympus video-bronchoscope

### Tracheal Stenosis: Multimodality Management

(BF-T-180), stenosis was localized at thoracic inlet area and scope could not be negotiated beyond the obstruction (Figure 1). Endobronchial Electro Surgery (EBES) was done and stenosis opened (Figure 2). Post EBES, Balloon dilatation was done by inflating the balloon with 10 ml of normal saline to generate a cuff pressure of 15 psi which was kept for 30 seconds, process was repeated thrice (Figure 3 & 4). Injection Bleomycin (15 units in 5 ml NS) was injected via a TBNA needle into the margins of the dilated area to reduce the fibrosis (Figure 5). Finally, tracheal stenting was done by placing guide wire at the dilated site, bronchoscope withdrawn and self expandible metallic tracheal stent guided over it. The whole process was controlled and guided via a bronchoscope inserted through the other nare and stent was deployed (Figure 6). She got tremendous relief from the symptoms and was discharged on the same evening.

#### Discussion

The sequence of events that leads to laryngeal and upper tracheal stenosis involves ulceration of the mucosa and cartilage, inflammatory reactions with associated granulation tissue, fibrous tissue formation, and contraction of fibrous scar tissue.

Tracheal stenosis may complicate tracheal intubation,<sup>1</sup> tracheostomy<sup>7</sup> and corrosive inhalation.<sup>2</sup> Corrosive tracheobronchitis<sup>8</sup> and lung perforation after caustic aspiration have been reported in the literature.<sup>9</sup> Despite improvements in the design of tracheal tubes, occurrence of tracheal stenosis is not uncommon after endotracheal intubation. The main reason of stenosis is high cuff pressure.<sup>1</sup> However, the use of low pressure cuffs has reduced by 10-fold the incidence of post-intubation stenoses.<sup>7</sup> In very selected cases, bronchoscopy alone can be curative. As

shown by Mehta et al. 1993,<sup>10</sup> diaphragm or web like stenoses can be treated by the mucosal sparing technique with a 60% success rate after 1-3 sessions.

Balloon dilatation is the first option in the treatment of benign airway stenosis. Although balloon dilatation is simple and fast, recurrence rate is high<sup>11</sup>. In those patients who cannot and do not want to undergo surgery and those with lengthy stenoses, mechanical dilatation alone leads to a recurrence rate of >90%.<sup>3</sup>

There is a high risk of fibrosis after electro-cautery alone. Verkindre et al 1999<sup>12</sup> have studied the morphological changes induced by endobronchial electrocautery with development of extensive transmural fibrosis and deterioration of the cartilaginous plates. Retractable scar formation and loss of cartilaginous support then produced iatrogenic secondary stenoses.<sup>12</sup>

Bleomycin, an anti-tumour antibiotic is a known anti-cancer drug and acts by induction of DNA strand breaks.<sup>13</sup> It is commonly used to treat Hodgkin's disease, testicular and other tumours. The anti-sclerosing properties of Bleomycin are well known and intralesional Bleomycin has been successfully used for the treatment of warts since the 1970s.<sup>14,15</sup> No systemic side effects have been reported from its intralesional use.<sup>14</sup> We have used Bleomycin locally as an anti-sclerosing agent and no complications occurred after its use.

Pulmonary function improves after expandable metal stent placement for benign airway obstruction,<sup>16</sup> but stenting a much narrower lumen was impractical and not advisable. All these procedures namely EBES, Intrabronchial ballooning and tracheal stenting done singly would have resulted in recurrence and partial relief only. So a multimodality approach was the only logical solution. Ideally, a Silicon stent should be

used in a case of benign tracheal stenosis, but as the Silicon stent was not available at that time and to save the life of the patient, we were compelled to use a self expandable metallic airway stent. So, we have successfully managed a young female patient with post-corrosive tracheal stenosis combining all these three interventional procedures plus local injection of Bleomycin. First, we electro-cauterized the stenosed lesion, did a bronchial ballooning to smoothen the area, injected local Bleomycin to reduce neo-fibrosis and finally, stented the area with a self expandable metallic tracheal stent. The patient got marked relief and was discharged on the same evening. So this is how the multimodality management involving different arms of interventional bronchoscopy can help the patient and avoid a disfiguring surgery.

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