Case Report

Bronchoscopic Management of Benign Bronchial Stenosis by Electrocautery and Balloon Dilatation

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ABSTRACT

Benign bronchial stenosis is managed by surgical or bronchoscopic methods. Although surgical approach is definitive, it is technically demanding and is costlier than bronchoscopic treatment. Here, we report the case of a 27-year-old female patient with symptomatic benign bronchial stenosis of the left main bronchus. The stenosis was dilated successfully through a fibreoptic bronchoscope by electrocautery followed by balloon bronchoplasty and application of mitomycin-C. On follow up, there was no evidence of re-stenosis. **[Indian J Chest Dis Allied Sci 2012;54:41-43]**

Key words: Flexible bronchoscope, Benign bronchial stenosis, Electrocautrey, Balloon dilatation.

INTRODUCTION

Benign tracheobronchial stenosis in adults can be a complication of a variety of diseases/ interventions, including tuberculosis (TB), sarcoidosis, Wegener's granuomatosis, trauma, endotracheal intubation, tracheostomy, bronchial sleeve resection, irradiation, and fibrosing mediastinitis.[1,2] Depending on the site of the lesion and severity of the narrowing, the stenosis may cause symptoms of dyspnoea, stridor, wheeze, cough, or recurrent respiratory tract infections. Definitive treatment of such stenoses is surgical resection and re-anastomosis. However, this may not be a feasible option in many patients because of poor general condition, compromised pulmonary functions, or technical difficulties.

A variety of bronchoscopic techniques, such as bougie or balloon dilatation (bronchoplasty),[3] Nd-YAG laser resection,[4] cryotherapy,[5] electro-cautery,[6] and stent placement[7,8] have been used as an alternative, if a surgical approach is not possible. In some cases, successful manage-ment of a strictured segment may require more than one modality or technique through the broncho-scope.

In the present report, we describe the use of a multi-modality treatment consisting of electrocautery, balloon bronchoplasty, and subsequent local application of mitomycin-C for the dilatation of a benign tracheobronchial stenosis.

CASE REPORT

A 27-year-old woman presented with complaints of recurrent episodes of cough with expectoration during the last four years. She had been hospitalised several times with complaints of high grade fever, productive cough, and breathlessness and treated each time with intravenous antibiotics and bronchodilators, to which she responded. She denied any history of TB, surgical intervention in the chest, or any other significant medical illness in the past.

On examination of the chest, breath sounds on the left side were reduced with localised wheeze on the same side. Chest radiograph showed deviation of the mediastinum to the left with crowding of ribs, indicating a loss of volume. The left hemithorax was hazy and showed multiple soft, nodular opacities with small calcific foci and thickening of the left apical pleura. A contrast-enhanced computed tomography (CT) of the thorax confirmed loss of lung volume on the left side with fibrosis and bronchiectasis of the left upper lobe. The left lower lobe was largely normal with minimal dilatation of a few bronchi. A reconstructed coronal image of the CT showed that the left main bronchus was narrowed with a 2.5cm long, narrow stricture; however, the distal bronchi were patent as shown in figure 1.

Routine investigations including complete blood counts, renal and liver function tests, and urine examination were in the normal range. Sputum smears for acid-fast bacilli, and smears and cultures for pyogenic organisms and fungi were also negative. An autoimmune screen for collagen vascular diseases

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and anti-neutrophil cytoplasmic antibodies were also negative.

Figure 1. Computed tomography coronal reconstruction showing stenosis of the left main bronchus with patent distal bronchi.

A fibreoptic bronchoscopy was performed under sedation and local anaesthesia that revealed a very narrow opening (about 2mm) in the left main bronchus about 3cm from the carina. The bronchoscope could not be passed beyond the stenosis. The right sided bronchial segments were essentially normal. Dilatation of the stricture was planned during the same sitting. Initially, an electocautery probe was passed through the suction channel of the fibreoptic bronchoscope (Figure 2). Linear cuts were made on the walls of the stricture at 10 O′ clock, 2 O′ clock, and 6 O′ clock positions with this probe under vision through the bronchoscope, and the stenotic opening was enlarged.

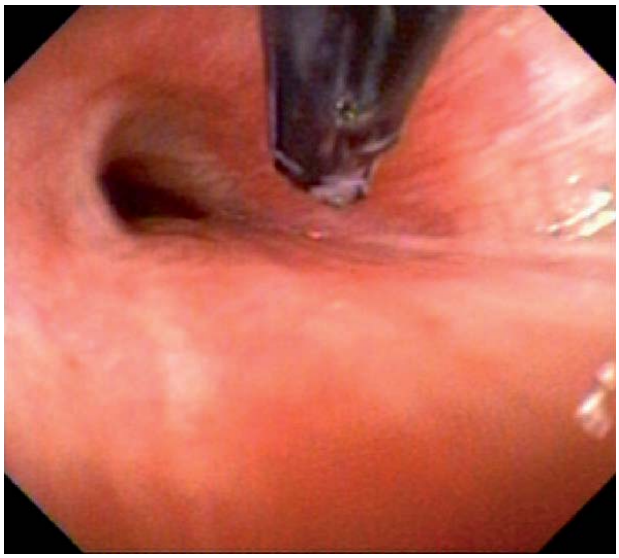

Figure 2. Photograph showing left main bronchus on bronchoscopy with elutrocautery probe.

This resulted in a significant dilatation of the stenosis to about 4mm. Linear patency of the distal bronchial tree was then checked by inserting a guide wire. The stricture was then dilated using a 6mm × 4cm long balloon (microinvasive mf/8-3/5/180). The balloon was passed through the suction channel of the bronchoscope. Correct placement of the balloon in the stricture segment was done under direct vision (Figure 3). The balloon was then inflated in the strictured segment with normal saline for one minute and this procedure was repeated once. Further dilatation was then done using a 10mm balloon for one minute.

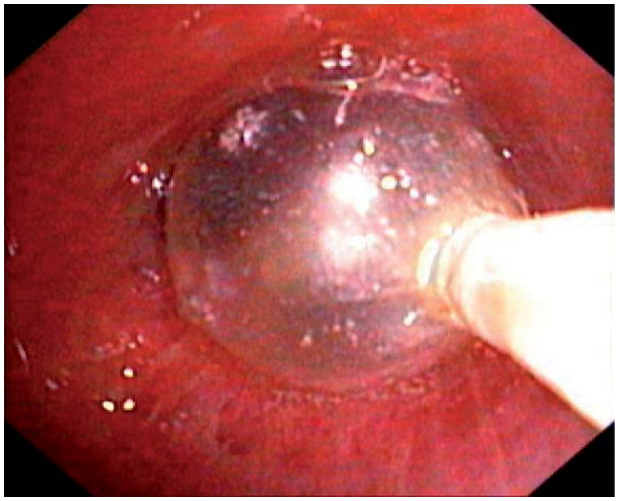

Figure 3. Photograph showing balloon in left main bronchus before dilatation.

Following this a dilatation of about 9mm was achieved, allowing easy passage of the bronchoscope whose outer tip diameter was 5.8mm (Figure 4). The distal bronchi were found to be patent, though full of mucoid secretions. Bronchial secretions were sent for microbiological examination including direct smear and culture for *Mycobacterium tuberculosis*, and these were reported negative subsequantly.

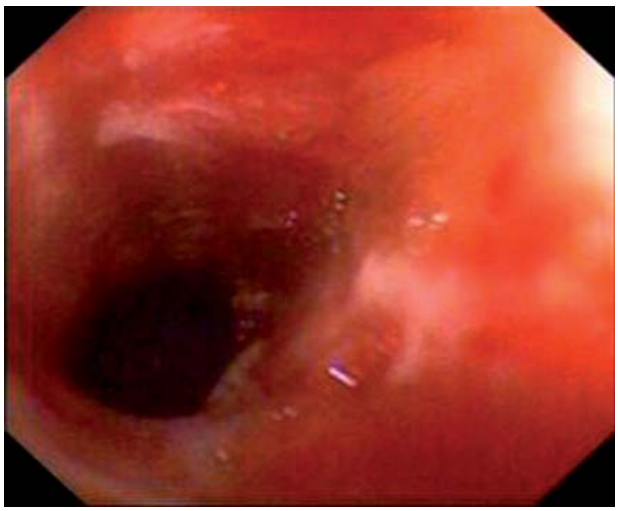

Figure 4. Photograph showing dilated left main bronchus after balloon-bronchoplasty.

To prevent re-stenosis due to fibrosis, 3mL of 0.2mg/mL mitomycin-C was sprayed at the stricture site. After dilatation and thorough suctioning, the upper lobe, lingular lobe, and lower lobe openings were clearly visible. The upper lobe opening was also found to be narrowed, and it was dilated using a 6mm balloon. The patient tolerated the procedure well and was discharged the same day after a few hours of observation.

A second bronchoscopy done after a week confirmed that the patency of the dilated bronchi was maintained. Follow-up bronchoscopies were done at 3 and 7 months after the original procedure. These showed a well dilated left main bronchus with no signs of re-stenosis. The patient had mild cough and expectoration for a few days after the procedure, that responded to symptomatic treatment.

The cause of the bronchial stricture could not be ascertained in this patient where investigations failed to show any definitive aetiology.

DISCUSSION

Tracheobronchial strictures can be managed either by surgery or by employing a variety of endoscopic techniques. Surgical resection of the stenosis is an option but the associated risks, and the technical limitations of surgical resection and reconstruction warrant the need for other therapeutic options in many patients. Serial dilatation of the stenosis with a blunt-tipped rigid bronchoscope can be performed; but, initial dilatation of a tight stenosis as in our patient can prove difficult, especially if there is a mismatch between the stenosis and the diameter of the rigid bronchoscope. Moreover, the procedure requires general anaesthesia.[9,10]

Among the treatment options reported, treating such strictures using a flexible bronchoscope along with cautery/laser and balloon dilatation appears to be least invasive, quick, safe, and inexpensive, and it is associated with a low risk of complications. It can be done under local anaesthesia with conscious sedation. Post-procedure stay in the hospital is short and the patient can be discharged on the same day. The only drawback is a possible need for multiple sittings as serial dilatations may be required. Various studies have shown that more than 50% of patients treated with balloon dilatation may not need any other form of therapeutic intervention. Hence, it may reasonably be considered as the preferred option to restore the airway lumen in benign stenosis.[1,2]

In the case described here, re-stenosis did not occur, possibly due to the short length of the stricture as well as the use of mitomycin-C to decrease the fibrosis after the dilatation. Various studies have shown that topical application of mitomycin-C, a potent inhibitor of fibroblasts, reduces granulation tissue formation and prevents restenosis.[11]

Complications associated with dilatation are tearing of the bronchial wall due to excessive stretching, resulting in pneumothorax, pneumomediastinum, and subcutaneous emphysema. These complications can be avoided using cautery/Nd-YAG laser for cutting open the fibrotic stricture prior to balloon dilatation, as it avoids the need for excessively high pressures for dilating the balloon.[12] This was done successfully in the present case.

To conclude, balloon dilatation along with electrocautery via a flexible bronchoscope is an effective and safe multi-modality approach for benign tracheal stenosis. It may be used as a preferred option to surgery or use of a rigid bronchoscope because of lower costs, avoidance of general anaesthesia and fewer complications. The application of mitomycin-C to the dilated segment immediately after the procedure appears to decrease the chances of re-stenosis.

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