Proposal for bail-out procedures - Thoracic general

**Tuberculous tracheobronchial stricture causing post-pneumonectomy-like syndrome corrected by insertion of a bespoke Dumon stent**

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**Abstract**

Post-pneumonectomy syndrome is a well-recognised but uncommon late complication of pneumonectomy. Usually occurring after right-sided surgery, the mediastinal contents are rotated and displaced into the right hemithorax, producing airways or oesophageal compression. We report a case in which the radiological features and symptoms of post-pneumonectomy syndrome appeared to be precipitated by the development of a complex tuberculous tracheobronchial stenosis that resolved after the insertion of a bespoke Dumon stent.

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1. Introduction

Post-pneumonectomy syndrome (PPS) refers to a condition where there is excessive shift and rotation of the mediastinum into the pneumonectomy space [1]. This produces compression of either the bronchus and/or oesophagus, with symptomatic dyspnoea and dysphagia [1, 2]. Post-pneumonectomy syndrome is more commonly seen after right pneumonectomy than left, and in younger patients. We report a case of PPS developing ten years after original surgery that appeared to be precipitated by the presence of a complex tuberculous tracheobronchial stenosis.

2. Case report

A 28-year-old woman presented to our department with a short history of acute respiratory distress associated with cough and sputum production. She had undergone right pneumonectomy ten years previously for destroyed lung secondary to pulmonary tuberculosis (TB). She had been under long-term review as an outpatient with no symptoms of dyspnoea, and a recent chest X-ray (CXR) that demonstrated a normal postoperative appearance. At the time of her acute presentation, CXR and computed tomogram (CT) demonstrated the new development of gross mediastinal shift with hyperinflation of the left lung (Fig. 1). Rigid bronchoscopy was undertaken and demonstrated complex multiple-level stenoses, with inflamed endobronchial mucosa and thick secretions, but no evidence of extrinsic compression. A 3-dimensional CT reconstruction of the airways confirmed the presence of a 2 cm long stenosis of the proximal trachea (diameter reduced to 4 mm). There was a further 8 cm stenosis involving the distal trachea with a diameter of 6 mm at its narrowest point. The proximal left main bronchus was also acutely narrowed just beyond the carina. A straight Dumon silicone tracheal stent (60 mm×12 mm) was inserted, with the distal end positioned within the proximal left main bronchus.

The patient experienced some symptomatic relief of dyspnoea following stent insertion, but the CXR remained unchanged. She required further admissions for infective exacerbations with sputum retention and proximal stent migration. A bespoke Y-shaped Dumon stent was manufactured based on the airways’ dimensions [3]. The right-sided limb of the stent was trimmed back to the level of the carina and the stent inserted without difficulty under general anaesthesia. Following insertion the CXR normalised, with centralisation of the mediastinal structures and good symptomatic relief (Fig. 2).

3. Discussion

Factors that predispose to post-pneumonectomy syndrome are not clearly understood. Loss of volume in the operated pleural cavity often produces a modest degree of mediastinal shift following a pneumonectomy. Symptomatic PPS following right pneumonectomy is associated with excessive mediastinal shift and counter-clockwise rotation of the mediastinum into the pneumonectomy space [1]. The airway, or less commonly oesophagus, is compressed between the pulmonary artery and thoracic aorta or spine. A degree of acquired tracheobronchomalacia may further contribute to airways obstruction [1]. Excessive mediastinal shift following pneumonectomy is more commonly seen in those operated on at an early age [4]. It is believed that young
children are capable of a significant degree of compensatory hyperplasia following pneumonectomy, with postoperative lung function tests often better than predicted values [1, 4]. In adolescents, hypertrophy of the remaining lung is probably more important than hyperplasia [5]. Symptomatic PPS appears to affect a minority of children despite extreme radiological findings [4].

Several surgical procedures have been recommended for the treatment of PPS. These include mediastinal repositioning by simple retrosternal fixation, the insertion of a silastic or saline-filled prosthesis into the pneumonectomy space, or even division and extra-anatomical grafting of the compressing vascular structures [1]. Surgical intervention may have limited success and can be associated with significant morbidity and mortality [1]. The use of metal expandable stents has also been described as a treatment for PPS in a very small number of cases [6, 7]. However, the potential for stent migration and erosion of local structures after metal stent insertion has made their use in benign disease controversial [8].

In our reported case the expected findings of extrinsic compression of the trachea or bronchus was absent. Instead, a complex tracheobronchial stenosis was found that appeared to be producing significant distal air-trapping, with acute hyperinflation of the lung and rapid development of shift and symptoms. We have previously reported our experience with the Dumon silicone stent for the management of tuberculous airways disease [9]. Although stent migration and sputum retention can still be a problem, the stent is easily repositioned and generally well-tolerated.

Fig. 1. Chest radiograph (a) and computed tomogram (b) of the thorax at the time of presentation, demonstrating marked mediastinal shift and rotation consistent with post-pneumonectomy syndrome.

Fig. 2. Post-stenting chest radiograph demonstrating mediastinal repositioning towards the midline.

References