Case report

Postpneumonectomy syndrome and pre-existing thoracic scoliosis

Antonio Bobbio, Marco Alifano *, Pierre Magdeleinat, Jean-François Regnard

Unité de Chirurgie Thoracique, AP-HP, Hôtel-Dieu, 1 Place du Parvis Notre-Dame, 75181 Paris Cedex 04, France

Received 25 July 2001; received in revised form 27 September 2001; accepted 1 October 2001

Abstract

We report a case of postpneumonectomy syndrome in a 75-year-old man operated on for right lung cancer 18 months previously. The patient had a pre-existing severe thoracic scoliosis. Treatment involved positioning of an expandable silastic prosthesis in the postpneumonectomy cavity. A favorable outcome was observed. We think that a pre-existing scoliosis could be considered as a potentially predisposing factor to the development of the syndrome.

Keywords: Scoliosis; Pneumonectomy; Postpneumonectomy syndrome; Etiology

1. Introduction

Postpneumonectomy syndrome (PPS) is a rare clinical entity characterized by compression of distal trachea or proximal bronchi against thoracic aorta or spine [1]. The exact etiologic mechanism remains obscure [1]. We report herein a case of PPS that occurred in a patient with a pre-existing thoracic scoliosis.

2. Case report

A 75-year-old North African man was admitted for dyspnea and fever. His medical history included tobacco smoking (45 pack-years), chronic obstructive lung disease and left-sided thoracic scoliosis; Cobb’s angle measured 32° (this angle is formed by a line drawn along the upper endplate of the vertebral body representing the upper end-vertebra of the scoliotic curve and a line drawn along the lower endplate of the vertebral body representing the lower end-vertebra of the scoliotic curve). A right pneumonectomy had been performed 18 months previously for a T2N0 squamous cell carcinoma (Fig. 1). Pneumonectomy space had been drained by using the Pneumonectomy Balanced Drainage system (Pleur-Evac A-4301, Genzyme, Cambridge, MA, USA), a device including both a positive and a negative pressure control chamber. The drain had been removed 24 h postoperatively.

On admission the patient was pyretic (38.5°C) and tachycardic (120 beats/min) but normotensive. Clinical examination revealed inspiratory stridor, rules and wheezing on the left side. Chest X-ray showed a right-sided mediastinal shift with signs of emphysema of left lung. Fiberoptic bronchoscopy revealed an extrinsic compression of left mainstream bronchus with 80% narrowing; culture of bronchial aspirate grew Haemophilus influenzae. Computed tomography (CT) scan (Fig. 2) confirmed the right-sided mediastinal shift. The presence of a left-sided thoracic scoliosis with anterior displacement of thoracic aorta was also evident. A stretched main bronchus was remarkably compressed against the abnormally dislocated thoracic aorta. Arterial gas analysis showed hypoxemia (55 mmHg) with normocapnia. Diagnosis of PPS was established. Antibiotic treatment of surinfection (Amoxicillin-Clavulanate, SmithKline Beecham, Philadelphia, PA, USA), oxygen, inhaled steroids and bronchodilators were administered with a slight improvement in clinical conditions. The persistence of a severe respiratory impairment justified the positioning of an expandable silastic prosthesis in the postpneumonectomy space. At operation the cavity was entered through the fourth intercostal space, the expandable prosthesis was inserted and inflated with 500 ml of 0.9% saline solution. A further 200 ml of saline was injected into the prosthesis in the immediate postoperative period. The patient experienced rapid symptom relief. Four weeks postoperatively the prosthesis was further injected with 300 ml of saline with a further slight increase in patient comfort. Gas analysis improved as well, with a return of PO2 to normality. Fiberoptic bronchoscopy showed an almost complete resolution of bronchial narrowing; no sign of tracheo-bronchomalacia was observed while the patient breathed...
3. Discussion

PPS is characterized by symptomatic proximal airway obstruction caused by extreme shift and rotation of the mediastinum after pneumonectomy [1–4]. Distal trachea, main or lobar bronchi are stretched and compressed against descending aorta or thoracic spine [1,2]. Herniation of the remaining lung with overdistension accompanies this [1,2]. In the case of long-standing bronchial compression and stretching, tracheo-bronchomalacia becomes a concern [2]. Its role in the genesis of dyspnea may be of paramount importance; unfortunately its presence predicts a frequently unsatisfactory outcome [1,2].

After right pneumonectomy the mediastinum shifts posterolaterally and rotates in a counterclockwise direction (relative to the spine, from the standard CT perspective) [2]; on the other hand, after left pneumonectomy clockwise rotation is observed [2]. Extreme mediastinal shift and rotation are currently recognized as the causes of compression of stretched airways against descending aorta or thoracic spine in PPS [2]. PPS is exceptionally observed and the reasons for its occurrence in some patients are unknown. It is generally believed that PPS occurs more frequently in children and young adults because of increased mobility of the mediastinum and higher elasticity and compliance of the remaining lung, allowing hyperinflation [5]. In adult patients no predisposing factor has been identified thus far. The patient described in the present report had a pre-existing left convex thoracic scoliosis, and it is possible that this represented a predisposing factor. Descending aorta was anteriorly displaced in our case before pneumonectomy: at the level of T8, the aorto-vertebral angle, a measure of location of thoracic aorta relative to spine, was 6° before pneumonectomy (Fig. 1); in control subjects this angle measures 24.4 ± 6.9° [6]. In our patient, this angle further decreased to −18° after pneumonectomy (Fig. 2). This anterior displacement of the aorta was probably at least in part responsible for the compression of the left mainstream bronchus against the thoracic aorta itself (Fig. 2). Codsi et al. reported a case of postpneumonectomy syndrome associated with a pre-existing thoracic lordoscoliosis [7]. In their opinion lordoscoliosis aggravated the respiratory impairment caused by the PPS, but no etiologic relationship was suggested. Of note in our patient, the placement of an expandable prosthesis remarkably improved the aorto-

Fig. 1. Preoperative thoracic CT scan at the level of T8. The anterior displacement of the thoracic aorta is evident. The aorto-vertebral angle is formed by a line drawn from the posterior midpoint of the neural canal through the anterior tip of the vertebra and a line drawn from the posterior midpoint of the neural canal through the middle of the aorta. The angle measures 6° (value in control subjects 24.4 ± 6.9° [6]).

Fig. 2. Thoracic CT scan 18 months after pneumonectomy. (Left) Level of left mainstream bronchus. Note the compression of the bronchus against the anteriorly displaced thoracic aorta. (Right) Level of T8. The aorto-vertebral angle further decreased to −18°.
vertebral angle (from $-18^\circ$ to $-4^\circ$) with corresponding symptomatic relief.

In our opinion it is possible that scoliosis and related anomalous positioning of the thoracic aorta relative to the spine may represent a predisposing factor for development of PPS.

References