Case report

Synchronous left lung transplantation and right pneumonectomy for end-stage bronchiectasis through Clamshell approach. Specific problems

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Abstract

A synchronous right pneumonectomy and left lung transplantation is reported in a case of asymmetric thorax. An extreme shift of the mediastinum and over distension of the transplanted lung is shown 3 years later. Post pneumonectomy syndrome must be seeking in this alternative technique. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: Lung transplantation; Pneumonectomy; Postpneumonectomy syndrome

1. Introduction

Lung transplantation is an established therapeutic option for treating patients with end-stage lung disease. Double lung transplants give better results than single lung transplants in terms of lung function tests and exercise tolerance, but unilateral lung transplantation is a more economical solution to maximize use of the donor pool. However, double lung versus single lung comparisons did not show significant difference in survival benefit [1]. On the other hands, in case of septic lung disease (such as cystic fibrosis or bronchiectasis) in order to avoid recurrent infections, removal of all contaminated lung tissue requires bilateral sequential lung or heart lung transplantation [2,3]. In the case of a huge asymmetric chest, a first resection of the destroyed retracted lung and delayed single lung transplantation is an acceptable therapeutic option [4]. We present herein a case of left lung transplantation with right synchronous pneumonectomy through a Clamshell approach in a patient with bronchiectasis and an asymmetric thorax. Specific problems due to this method and occurring in the postoperative course are discussed.

2. Case report

A 30-year-old man was referred to us in 1996 for assess and transplantation for end stage respiratory insufficiency treated by oxygen therapy (1.5 l/mn) over night since 1986. He suffered from extensive bronchiectasis with destroyed and retracted right lung (Fig. 1). His past medical history consisted in a left pneumothorax treated by tube drainage 1 year before. Sputum culture revealed Pseudomonas aeruginosa and alpha haemolytic Streptococcus organisms. A perfusion scan showed absence of function of the right lung. Heart function was normal without pulmonary hypertension (mean pulmonary pression: 26 mmHg). Spirometry data and blood gas are presented in Table 1. The patient was listed for synchronous single left lung transplantation and right pneumonectomy in 1996.

On July 1999, a suitable donor was found. The left lung obtained by distal procurement from a 20-year-old female donor (170 cm height and 60 kg weight) was perfused with 2 l of Celsior® conservation solution, and transported on ice(1).

In the recipient, a single lumen tube was used during anaesthesia. The recipient chest was entered through a Clamshell approach (5th intercostal space). There were dense pleural adhesions, which were freed by electrocautery before starting cardiopulmonary bypass. The ascending aorta and right atria were cannulated for cardiopulmonary bypass without cardiac arrest but with right cavity flow discharge. After starting the cardiopulmonary bypass, the right retracted lung was first resected. Right bronchial suture

1 Celsior®, IMTIX SangStat S.A.S. 58, avenue Debourg B.P. 7055, 69348 Lyon Cedex 07, France.
was performed by staple reinforced by some interrupted stitches resorbable and buttressed by mediastinal tissues. Then, left pneumonectomy was performed. A wash of the tracheal tree was achieved with saline iodine serum after the left bronchus been clamped. Then, the left donor lung was implanted. All three anastomoses were made in a customary fashion, with wrapping of the bronchial anastomose with mediastinal tissues [5]. After reperfusion the patient was weaned from cardiopulmonary bypass without difficulty. A water sealing chest tube was left in the right cavity and two aspirating chest tubes (−20 mmHg) in the left cavity. There were no intraoperative complications. The total ischemic time was 180 min and total bypass time was 176 min.

Postoperative immunosuppressive regimen was triple-drug therapy consisting of antilymphocyte globulin, cyclosporine, and prednisolone. The first post-operative chest X-ray showed a small left pneumothorax, mediastinal shift to the right and mild lung infiltration. The right chest tube was removed on the 2nd post-operative day and the left on the 10th postoperative day. Neither rejection nor infection occurred. Inefficient mechanical ventilation led to delayed weaning from the respirator. Arterial blood gases were PO2 = 146 mmHg; PCO2 = 50 mmHg; Ph = 7.46 on the
5th postoperative day under assisted ventilation with 30% of inspired oxygen fraction. Extubation was attempted but subsequently required re-intubation the following day because acidosis increased (PO2 = 82; PCO2 = 66 mmHg; Ph = 7.34). A tracheotomy was then performed on the 9th postoperative day, which enabled complete weaning from the respirator 2 days later. The patient was discharged from the hospital on the 48th postoperative day. Tracheotomy was spontaneously closed 2 months later. Since then, recovery was spectacular with normal life.

### Table 1

<table>
<thead>
<tr>
<th>Test</th>
<th>Before transplantation</th>
<th>3 years after</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLCO (ml/min per mmHg)</td>
<td>10.2</td>
<td>46</td>
</tr>
<tr>
<td>FEV1 (l)</td>
<td>1.44</td>
<td>2.68</td>
</tr>
<tr>
<td>FVC (ml)</td>
<td>2.1</td>
<td>2.86</td>
</tr>
<tr>
<td>PO2 (mmHg)</td>
<td>56</td>
<td>101</td>
</tr>
<tr>
<td>PCO2 (mmHg)</td>
<td>41.4</td>
<td>30.7</td>
</tr>
<tr>
<td>Ph</td>
<td>7.40</td>
<td>7.42</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>60</td>
<td>92</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.72</td>
<td>1.72</td>
</tr>
<tr>
<td>6 min walk (m)</td>
<td>350</td>
<td>490</td>
</tr>
</tbody>
</table>

Weaning from ventilation was delayed because of hypventilation of the small lung into the single large communicated thoracic cavity. An oversize lung would have been better in this situation. Tracheotomy was the optimal option for wean from the respirator.

In our patient, we paid attention to a likely postpneumonectomy syndrome which is possible because of the over shift of the mediastinum. Postpneumonectomy syndrome which has been described more likely after right pneumonectomy, occurs mainly in young patients in whom the bronchus is softer and more compressible and the mediastinum has more elasticity [6,7]. In our patient, section of mediastinal fixations to the anterior chest wall during the Clamshell approach increased mediastinal mobility. A bilateral anterior muscle sparing thoracotomy with femoral cardiopulmonary bypass may be the technique of choice avoiding communication of the two chest cavities.

Nevertheless, this case illustrates that this is an alternative technique in such a patient.

### References