Case report

Cardiac dislocation after extended pneumonectomy with pericardioplasty

G. Veronesi*, L. Spaggiari, P.G. Solli, U. Pastorino

Thoracic Surgery Division, European Institute of Oncology, Via Ripamonti 435, 20141 Milan, Italy

Received 14 April 2000; received in revised form 28 September 2000; accepted 27 October 2000

Abstract

Two cases of cardiac dislocation occurred after intrapericardial right pneumonectomy with extended pericardiectomy and radical nodal dissection in spite of proper reconstruction with a pericardial fat flap in one case and with a Gore-tex® prosthesis in the other. In the case of major pericardial excision resulting in extensive mobilisation of the SVC a complete reconstruction of pericardium and mediastinal pleura is recommended in order to prevent cardiac dislocation. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Pneumonectomy/adverse effects; Heart disease etiology; Hernia surgery; Pericardial flap; Pericardium surgery

1. Introduction

Cardiac herniation is a rare complication occurring after a pneumonectomy and pericardiectomy without closure of the pericardium [1,2], and even less frequent after traumatic pericardial laceration [3] or congenital pericardial defect [4].

To prevent this event, the pericardial defect is usually repaired with prosthetic non-absorbable materials, absorbable meshes or autologous patches [5,6].

Cardiac herniation is exceptional after pericardial closure and to the best of our knowledge only a few reports have been published [7].

We report two cases of early cardiac dislocation after right pneumonectomy, extended mediastinal dissection and reconstruction of the pericardial defect.

2. Case report 1

A 49-year-old man was operated on after three cycles of induction chemotherapy for a squamous cell carcinoma with a mediastinal proven N2 disease and primary tumor involving the origin of the right main bronchus and the pulmonary artery. After right intrapericardial pneumonectomy and mediastinal dissection a pericardial flap was prepared and swung to cover the bronchial stump (Fig. 1a). The resulting pericardial defect (about 10 × 8 cm) was localized around the large vessels and ventral to the phrenic nerve. A pedicled pericardial fat pad graft preserving the blood supply from the pericardial branch of the internal mammary artery [8], was turned up posteriorly and sutured to the pericardial margins (Fig. 1b). Chest drainage was clamped after closure of thoracotomy. In the ICU, 30 min after a normal routine post-operative chest X-ray, the patient developed bradycardia with haemodynamic failure. Despite inotropic drug infusion and adequate fluid administration he maintained low pressure levels and ECG alterations. A second postero-anterior chest roentgenogram showed the right cardiac herniation. The patient was immediately positioned on the left side and this simple manoeuvre produced an improvement of the haemodynamic parameters. He was immediately re-operated. The fat flap appeared lacerated in the midline with the sutures in the pericardial borders intact. The pericardial defect was repaired with a prolene patch. The postoperative chest radiograph and ECG were normal and the subsequent postoperative course was uneventful. The patient is alive, asymptomatic and disease-free 14 months after the operation.

3. Case report 2

A 55-year-old man presented at our attention for a local recurrence of NSCLC previously treated with three cycles of induction chemotherapy and right upper sleeve bilobectomy with a microscopic neoplastic residual on the bronchial stump.

After a complete restaging, we performed a right completion pneumonectomy with tracheal and chest wall resection (5–7th ribs) for a neoplasm that extended to the right tracheobronchial angle and to the chest wall. Invasion
of the right pulmonary artery and the presence of fibrous reaction correlated to the previous surgery required an intrapericardial vascular ligation and extended pericardial resection. The tracheo-bronchial anastomosis was wrapped with a pedicled mediastinal fat flap. A chest wall reconstruction was achieved by a mesh of Marlex and closure of the pericardium performed with a Gore-tex® patch. A band of Gore-tex® measuring approximately 15 × 5 cm was positioned in a transversal way from the anterior to the posterior margin of pericardium covering about two-thirds of the defect extension. An open sizeable window has been left above the prosthesis (Fig. 2).

Also in this case the chest drainage was left clamped. Twelve hours after the end of the operation the patient presented sudden hypotension (55/35 mmHg) and a chest X-ray demonstrated right cardiac dislocation. The patient was positioned on the left side and the chest drainage connected with a balanced system with improvement of the clinical picture. At the re-thoracotomy a complete mediastinal dislocation with cardiac herniation above the intact Gore-tex® prosthesis was demonstrated. The superior vena cava appeared distended and the right atrium enlarged.

The heart was repositioned into the pericardium and the defect closed with a double Gore-tex® and Vicryl prosthesis. The postoperative course was uneventful and the patient is alive without evidence of disease 6 months after the operation.

4. Comment

Cardiac herniation is a very rare complication of lung surgery, fatal when unrecognized and associated with 50% mortality when recognized and surgically corrected.

Large pericardial resection without reconstruction may avoid heart strangulation but does not prevent cardiac herniation or displacement, particularly on the right side. Therefore a number of pericardial substitutes have been
proposed. The use of non-absorbable synthetic devices is simple but may represent a risk factor in case of pleural empyema.

The mediastinal vascularized fat flap [6,8] that we use does not require the sacrifice of intrathoracic structures, it is quick and easy to prepare, and in most instances after limited pericardial resection it is sufficiently strong to maintain the heart in the pericardial sac until fibrous adhesions have developed. In our experience, no morbidity related to this procedure has been previously recorded. The use of a pedicled diaphragmatic flap has been also utilized with satisfactory results for repairing extensive pericardial defects [9].

Regarding the first case, the technical fault was the choice of a material too weak for a large resection of the pericardial sac and complete mobilisation of the SVC. In fact the pericardial fat flap was correctly positioned but it has broken in its middle portion. In such a situation replacement with synthetic prosthesis would have been preferable.

The second case was even more peculiar because a reconstruction of the pericardial defect was performed with a synthetic patch and the prosthesis was intact and well positioned. The possible explanation is that the heart could have lifted above the upper opening as a consequence of increased intrathoracic pressure related to a Valsalva mechanism. In addition, the tracheal anastomosis with a mechanism of traction over the left lung and the instability of intrathoracic pressure related to air incontinence and paradox movements of the chest wall defect, may have contributed to the mediastinal dislocation toward the right side. After extended pericardial resection, especially in the presence of these risk factors, greater attention is required not to leave a sizeable window above or below the prosthesis.

From our experience we conclude that in patients undergoing right pneumonectomy with extensive pericardial resection, cardiac herniation is a complication that should always be considered in the differential diagnosis of post-operative cardiogenic shock and it should be confirmed or ruled out by an anterior–posterior chest X ray. Turning the patient on the left side usually improves haemodynamic parameters and allows immediate transportation to the operating room for thoracotomy.

References