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Technical note

Thoracoscopic pericardial fenestration: diagnostic and therapeutic aspects

A Cantó, R Guijarro, A Arnau, A Fernández-Centeno, M A Císcar, J Galbis, A García-Vilanova

Abstract

The cause of cardiac tamponade is only established in 50% of cases. This problem is most commonly treated by pericardiocentesis alone, pericardiotomy being reserved for cases of recurrence and pericardiectomy for those patients presenting with constrictive pericarditis. A series of 16 patients treated with pericardial fenestration via a thoracoscope is presented. Pericardial and pleural biopsies were performed, together with cytological and biochemical analysis of the pericardial and pleural fluid where present. This procedure established the aetiology of effusion in all cases. In malignant pericardial effusion bleomycin was used for pericardial sclerosis. This resulted in fewer recurrences than in those patients where sclerosis was not attempted (12·5% *v* 60%).

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A traumatic pericardial effusion, although relatively common, fails to be accurately diagnosed in over 50% of cases.[1] In malignant pericardial effusion caused by metastatic dissemination, the differential diagnosis includes pericarditis following irradiation, cardiac toxicity from chemotherapeutic agents, and other conditions not directly related to the neoplastic process. Non-inflammatory idiopathic causes are also surprisingly common in patients with cancer.[2] It is therefore important to determine the cause of a pericardial effusion even in a patient with known malignancy.

Few comparative studies have been undertaken on how best to manage patients with recurrent malignant pericardial effusion. In each case the approach adopted depends on the general condition of the patient, the long term prognosis, and/or physician experience.

In 80% of cases pericardial effusion resolves after pericardiocentesis under echocardiographic control. However, about 6% require more prolonged drainage, either by pericardial fenestration or a pericardiostomy; open pericardiectomy is reserved for cases in which constrictive pericarditis develops.[1]

Obliteration of the pericardial space after pericardiocentesis has been attempted in malignant disease with various sclerosing agents including carboplatin,[3,4] acid tetracycline,[5,6] and bleomycin.[7]

Pericardioscopy was initially performed with a choledochoscope[8] or mediastinoscope.[9] This system allowed direct visualisation of the pericardium, but was not as effective or safe as thoracoscopy. Vogel and Mall[10] and Maisch and Drude[11] have reported results on pericardioscopy and thoracoscopy. This endoscopic approach allows visualisation of macroscopic alterations affecting both the epicardium and pericardium. It also facilitates sampling for cytological examination of pericardial or pleural fluid, and pleural, lung and pericardial biopsies. The technique is of therapeutic value for fenestration in cases of tamponade and when performing pericardiodesis with sclerosing agents.

In this paper we report our experience with the method and describe the technical aspects involved.

Surgical technique

Thoracoscopy using a Wolf surgical thoracoscope (10·5 mm) with a videocamera attachment (Richard Wolf 14" monitor, S-VHS Sony Trinitron) was performed to open a pericardial window in 20 patients (16 men and four women; mean age 55, range 38–70 years). Four cases had a thickened pericardium visible on computed tomographic scan and echocardiography, and the procedure was abandoned; open surgical fenestration was preferred in these patients.

Therapeutic exploration under analgesia without endotracheal intubation was performed at surgery. The surgical approach depended on whether or not the pericardial effusion was accompanied by a pleural effusion. A left sided approach was used in the absence of a pleural effusion, while the hemithorax with the largest effusion was chosen in the presence of fluid following thoracocentesis of the contralateral hemithorax.

In the first six patients the trocar was introduced through the seventh intercostal space. In the remaining cases a second approach through the fifth anterior intercostal space was also made. The initial incision was used

Thoracic Surgery Unit, Valencia University General Hospital, 46014 Valencia, Spain
A Cantó
R Guijarro
A Arnau
A Fernández-Centeno
M A Císcar
J Galbis
A García-Vilanova

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Dr A Cantó

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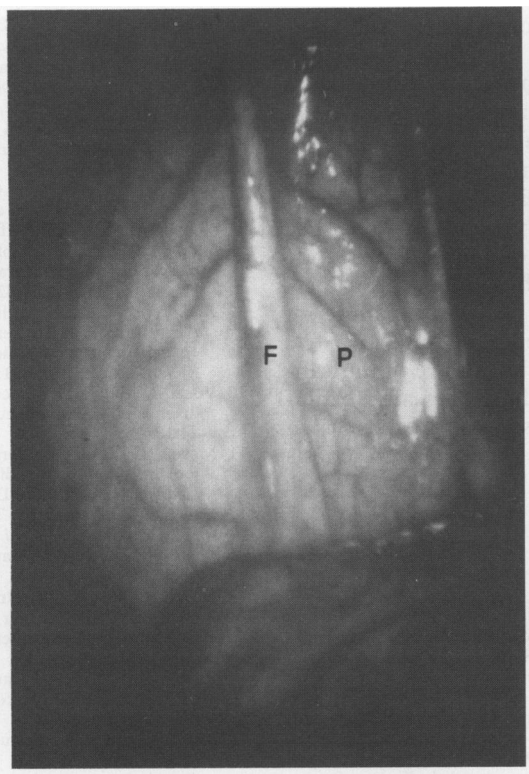

Figure 1 View of pericardium through the thoracoscope. F—phrenic nerve; P—pericardium.

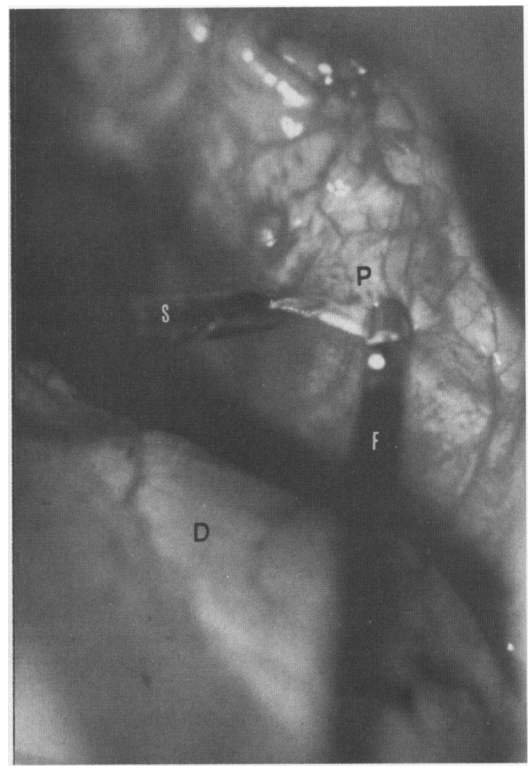

Figure 3 Pericardial fenestration. S—scissors; F—forceps; P—pericardium; D—diaphragm.

to introduce the thoracoscope and aspirate pleural fluid, allowing air to enter and collapse the lung. After exploring the pleural cavity pleuropulmonary biopsies were performed and the fluid distended pericardium examined (fig 1). The thoracoscope needle (Wolf, 1·6 mm diameter) was used to perforate the pericardium anterior to the phrenic nerve to extract a sample of fluid (fig 2). Pericardial fenestration was performed posteriorly in the first six patients with the biopsy forceps. In the remaining cases access was via the initial incision to grasp and pull on the pericardium, while the endoscopic scissors were introduced through the anterior incision to fashion the windows. A third incision was made for the optics (fig 3). Pericardial fluid flow was aided by the elevated intrapericardial pressure and systole, and bleeding at the resection margins was coagulated. A window of 1 × 2 cm was fashioned, and the resected pericardium processed for histopathological study.

When malignancy was suspected, talc pleurodesis was performed. In our last eight cases we also instilled bleomycin intrapericardially (15 IU; 15 mg bleomycin sulphate in 10 ml) to induce pericardiodesis. An aspiration drain was placed following exploration through the first access, while the second access was closed by a single suture. The drain was removed after 48–72 hours.

Over a follow up period of six months to six years the effusion recurred in three of five cases (60%), compared with one of eight cases treated with pleurodesis and pericardiodesis with bleomycin (12·5%). In three patients with pericarditis of benign aetiology only fenestration was performed without recurrence at follow up.

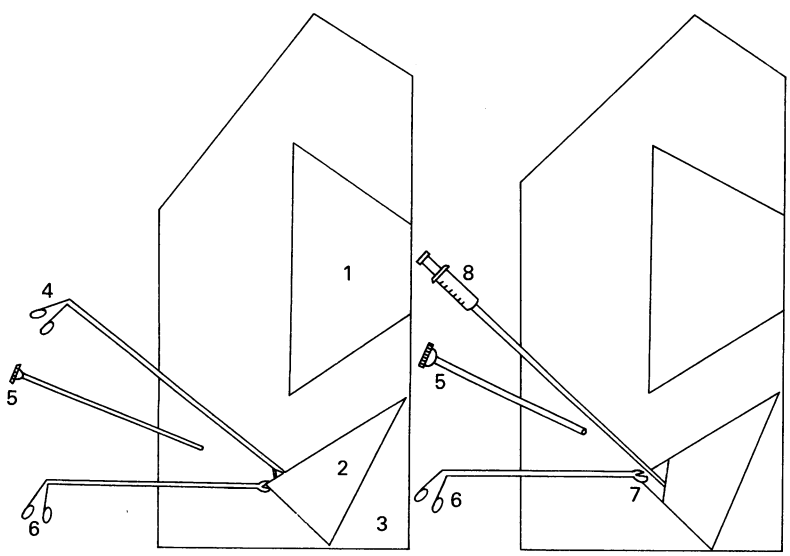

Figure 2 Schematic representation of the surgical procedure. 1—lung; 2—pericardium; 3—heart; 4—scissors performing fenestration; 5—optics; 6—forceps holding and exerting traction on the pericardium; 7—pericardial fenestration; 8—pericardial fluid aspiration and instillation of the sclerosing agent.

Discussion

The technique described involves no difficulties other than the diagnostic thoracoscopy, although a contraindication was the thickness of the pericardium which, if excessive, made fenestration too difficult.[12] Open surgical fenestration and/or drainage is advised in these cases.[3–15]

Pericarditis accompanying primary or secondary malignant pleural disease is not very common. In our experience it was encountered in 13 of 600 cases of malignant pleural

diseases in whom thoracoscopy was performed.[16]

Although thoracoscopy makes it possible to explore the entire pleural cavity, rigid optic pericardioscopy only allows observation of the external pericardium of that hemithorax, with virtually no visualisation of its internal counterpart. A larger proportion could be visualised with the help of a flexible fibreoptic bronchoscope, although we have not performed this procedure to date. Failure of pleurodesis and recurrence of fluid in a few cases may be explained by closure of the window by the lung itself three days after exploration. Hence, success was greater when performing pleurodesis and pericardiodesis with bleomycin.

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