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CASE STUDY

Spontaneous pneumopericardium related to active cytomegaloviral infection in a lung transplant recipient

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Spontaneous pneumopericardium related to active cytomegaloviral infection in a lung transplant recipient. G.P.M. Mannes, W. van der Bij, W.J. de Boer, and the Groningen Lung Transplantation Group. ©ERS Journals Ltd 1995.

ABSTRACT: Spontaneous pneumopericardium occurred in a patient almost 4 weeks after bilateral lung transplantation for cystic fibrosis. The patient had no specific complaints and was in stable haemodynamic condition.

We suggest that this pneumopericardium was related to a concomitant active cytomegalovirus (CMV) infection. After treatment of the CMV infection, the pneumopericardium resolved spontaneously.

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Pneumopericardium is diagnosed when air is located in the pericardial space. It is a rare disorder, with varying presentation. Some patients will be without any symptoms, while in others it will lead to death due to cardiac tamponade. Many causes of pneumopericardium have been described [1].

We recently observed a spontaneous pneumopericardium in a lung transplant recipient. We suggest that this was related to a concomitant active cytomegaloviral infection.

Case study

A 44 year old woman who was seropositive for cytomegalovirus (CMV) underwent bilateral lung transplantation because of cystic fibrosis. The donor was CMV-seronegative. After surgery, the patient received antithymocyte globulin, while maintenance immunosuppressive therapy consisted of cyclosporin, azathioprine and prednisolone.

Because of suspected rejection, the patient was treated on two occasions with methylprednisolone, 500 mg daily for 3 consecutive days (fig. 1). However, all the time she was in quite good clinical condition.

At day 21 after surgery, the patient suffered from mild dyspnoea, and was shown to have a right-sided, spontaneous, subtotal pneumothorax. Drainage with a small sized tube was performed and the lung re-expanded easily, whilst hardly any air leakage was observed.

At day 27 after surgery pneumopericardium was detected on a routine chest radiograph (fig. 2). At that time pneumothorax was absent. The patient had no specific complaints, was in stable haemodynamic condition, and physical examination revealed no abnormalities, except for subfebrile temperature (maximum 37.8°C). Computed tomography scan confirmed the pneumopericardium, while no abnormalities could be found at the level of the bronchial anastomoses (fig. 3). Inspection of the bronchial anastomoses during bronchoscopy (day 34 after surgery) showed normal healing without signs of dehiscence.

Cultures from bronchial lavage fluid grew throat flora, and CMV was also isolated. Fungal cultures were neg-

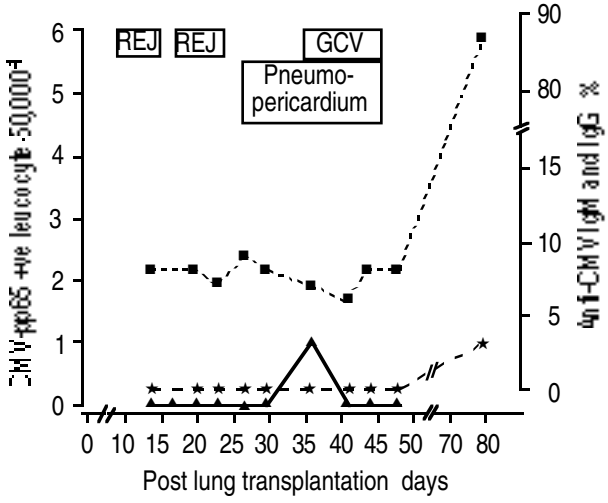

Fig. 1. – Course of CMV-antigenaemia (-▲-), anti-CMV IgM (-★-) and anti-CMV IgG (-■-) (% of reference serum), and clinical events. REJ: anti-rejection course with methylprednisolone, 500 mg·day^{-1}; GCV: ganciclovir; CMV: cytomegalovirus; IgM: immunoglobulin M; IgG: immunoglobulin G.

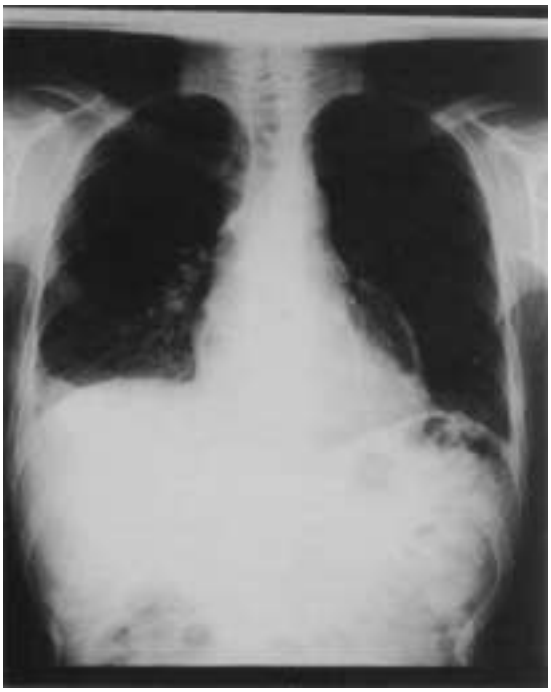

Fig. 2. – Day 27 after surgery. Pneumopericardium with air collection especially at upper left cardiac margin. No signs of pneumothorax.

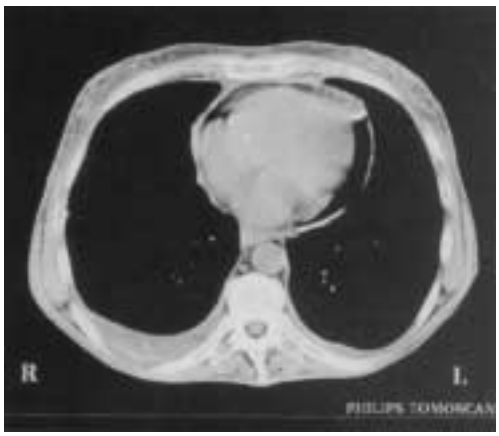

Fig. 3. – Computed tomography scan. The heart is surrounded by air within the pericardial space.

ative. Cytology of the lavage fluid and histology of transbronchial biopsies revealed some reactive changes, without specific abnormalities. The apppearance of CMV in blood, as one of the hallmarks of active infection, was monitored weekly by testing for CMV-pp65 +ve blood leucocytes ("CMV-antigenemia" [2]). In this highly sensitive and specific assay even low numbers of pp65 +ve cells are diagnostic for active CMV infection. In this patient the test was negative at the time the pneumopericardium was detected, but became positive within a few days, although only at one occasion (fig. 1). Because of this secondary CMV infection, the daily azathioprine dose was reduced from 75 mg (1.5 $mg \cdot kg^{-1}$) to 25 mg. However, the patient's condition deteriorated, accompanied by fever to 39.7°C, and moderate disturbances of liver function tests. Treatment with ganciclovir was initiated and the patient made a good clinical recovery, while liver function tests normalized.

The diagnosis of active CMV infection was subsequently supported by serology, as determined by enzyme-linked immunosorbent assay.

Discussion

Pneumopericardium is defined as a collection of air or gas within the pericardium. In a review of the literature, CUMMINGS *et al*. [1] found that 62% of cases of pneumopericardium were caused by blunt or penetrating trauma. The majority of these cases resulted from closed-chest injury with associated increased intrathoracic pressure, *e.g*. positive pressure ventilation (especially in neonates), obstructive laryngitis, and severe asthmatic attacks.

The second largest group of cases of pneumopericardium (25%) were patients with an infection in contiguous organs with fistulous tracts to the pericardial sac.

The pathophysiological mechanism of pneumopericardium is probably a rise in intra-alveolar pressure above atmospheric, resulting in rupture of alveoli and air dissection to the hilum and mediastinum and through the pericardial reflection on the pulmonary vessels into the pericardial cavity.

CMV infection is a common and difficult problem in transplant recipients. In our experience, the prevalence of active CMV infection in CMV-seropositive lung transplant recipients is almost 100%. In our institution, the onset of secondary CMV infections (by using the CMV-antigenaemia) is 25±7 days after lung transplantation, as in the patient mentioned above. We observe that the antibody response during CMV infections in lung transplant recipients is generally much slower and weaker, compared to *e.g*. renal transplant recipients. VAN DER BIJ and co-workers [3] have reported that in heart transplant recipients CMV-antigaenemia appeared 10–28 days before a significant increase in antibody level was measured. In the present patient, the antibody response was also rather slow, although there are no data available between 48–79 days after transplantation.

CMV infection may cause *e.g*. pneumonitis, hepatitis, gastrointestinal disease, and also systemic illness resembling mononucleosis. There have been some reports of CMV causing myocarditis, for example in heart transplant recipients [4–6]. Pericarditis attributed to CMV was reported in renal transplant recipients [7]. We could not find any report on CMV and pneumopericardium. COCHRANE *et al*. [8] reported a single-lung transplant recipient with tension pneumopericardium due to dehiscence of the bronchial anastomosis, in combination with mechanical ventilation with high positive end-expiratory pressure.

In the patient presented here, we think that the spontaneous and isolated pneumopericardium, and possibly also the preceding spontaneous pneumothorax were the result of an active CMV infection. The patient was in good clinical condition and not on mechanical ventilation. The transplanted lungs were from a young donor and showed no blebs at inspection during transplantation. There had

been no invasive procedures that could have caused the air leak. Also, after drainage of the pneumothorax, the lung re-expanded rapidly and active air leakage was not detected.

The pneumopericardium in this patient may have been a similar problem to the pneumatosis intestinalis during active CMV infection, as was recently described in another lung transplant recipient [9]. As shown by the positive CMV culture of the bronchial lavage fluid, CMV was present in the transplanted lungs at the time of the pneumopericardium. Focal CMV pneumonitis may have caused a rise in intra-alveolar pressure, resulting in rupture of alveoli.

As in the patient with pneumatosis intestinalis, the pneumopericardium resolved spontaneously after initiation of virus-specific chemotherapy. The early diagnosis of active CMV infection by the CMV antigenaemia test probably contributed to this successful outcome [2].

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