

Unilateral pulmonary edema caused by paravalvular leakage recognized by bedside transesophageal echocardiography

J. DENIS (*) and E. HOFFER (**)

Summary : We describe a case of acute unilateral left pulmonary edema occurring in an old man one year after mitral valve replacement. Transesophageal echocardiography identified a paravalvular leakage with severe mitral regurgitant jet directed to both left pulmonary veins. A prompt surgical closure of the leakage by pericardial patch was decided with rapid clinical and radiological improvement.

Key words : Pulmonary edema ; mitral valve insufficiency ; valvular prosthesis.

INTRODUCTION

Pulmonary edema caused by left ventricular heart failure is usually bilatéral and symmetric (1). Cardiac and pulmonary diseases may cause atypical findings such as unilateral or lobar edema (2). Several cases of focal pulmonary edema have been described as a consequence of mitral regurgitation, generally located in the right upper lobe (3-7). We report a case of left pulmonary edema due to mitral paravalvular leakage with severe mitral regurgitant jet directed to both left pulmonary veins.

CASE REPORT

A 75-year-old man was admitted to hospital for spontaneous acute shortness of breath that appeared one year after aortic and mitral valve replacement (both with St. Jude valve). The patient's past history also included hypertension, moderate COPD and chronic atrial fibrillation. At physical examination, the patient was found to have a grade 5/6 ejection systolic murmur at the apex, radiating to the axilla and crackles over the left chest. A chest radiograph showed cardiomegaly and predominant left-sided pulmonary edema (Fig. 1). Swan-Ganz catheterization with the tip of the catheter located in the left lung showed that the right atrial pressure was 14 mmHg ; the pulmonary arterial pressure was 74/45 mmHg ; and the pulmonary-capillary wedge pressure was 37 mmHg with an important V wave. The cardiac index was

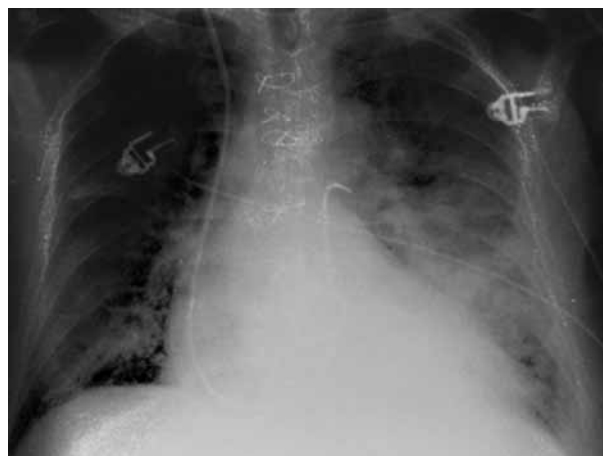


Fig. 1. — Chest radiograph performed early after admission showing cardiomegaly and predominant left-sided pulmonary edema.

2.4 liters per minute per square meter of body-surface area. After institution of mechanical ventilation, a transesophageal echocardiography was performed. It showed a posterior mitral annulus leakage with a major regurgitant jet directed towards both left pulmonary veins (Fig. 2 and 3). Left ventricular systolic function was preserved and there was a significant dilatation of the right cavities with significant tricuspid regurgitation due to an annulus dilatation. Several hours after admission, the hemodynamic status worsened and surgical closure of the leakage by pericardial graft completed by a tricuspid annuloplasty was performed. Early improvement of clinical and hemodynamic status occurred. The pulmonary-capillary wedge pressure decreased to 17 mmHg without residual V wave. A chest radiograph performed 6 hours after surgery showed marked decrease of left lung edema

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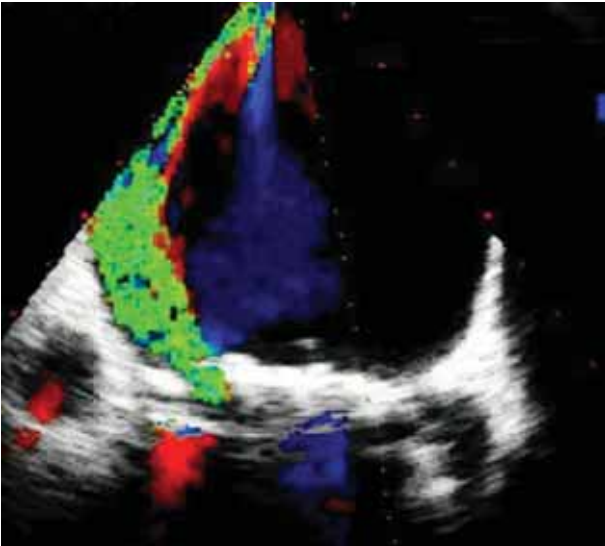


Fig. 2. — Transesophageal echocardiography documented a posterior mitral annulus leakage with a major regurgitant jet.

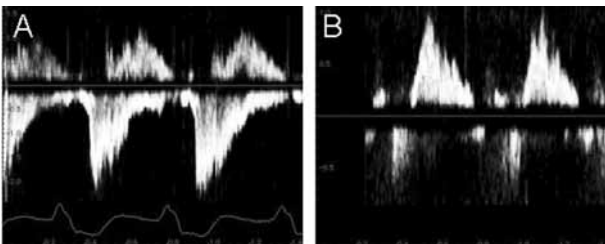


Fig. 3. — Pulse-wave doppler analysis showing a major systolic reversal flow in the upper left pulmonary vein (A) and no systolic reversal flow in the upper right pulmonary vein (B).

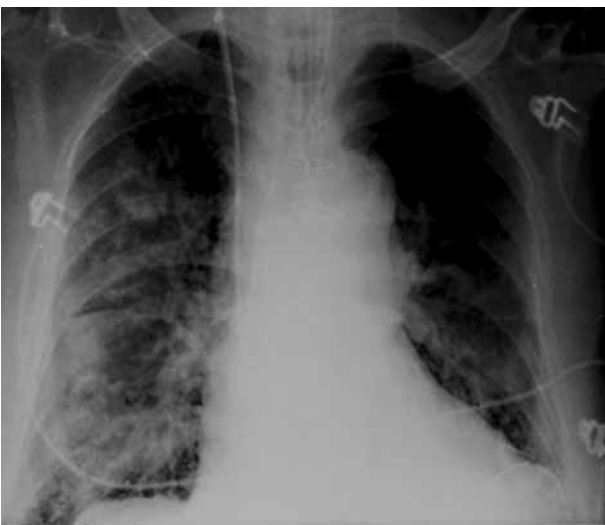


Fig. 4. — Chest radiograph performed 6 hours after surgery showing marked decrease of left lung edema.

(Fig. 4). Unfortunately, the patient developed a severe pulmonary infection five days later, which caused a systemic sepsis. He died 2 weeks after admission.

DISCUSSION

Unilateral pulmonary edema (UPE) is a distinctly unusual clinical entity that often presents interesting and confusing diagnostic challenge. In 1978, CALENOFF *et al.* proposed a distinction between ipsilateral and contralateral edema (2). Ipsilateral pulmonary edema occurs on the same side as focal insult to one lung. Causes may include bronchial obstruction, extrinsic pulmonary venous compression (eg, neoplasm), unilateral veno-occlusive disease, re-expansion edema (caused by rapid extraction of pleural air or fluid), pulmonary contusions, and several others. On the other hand, contralateral edema was described by the authors as edema that occurs in a normal lung only because of an abnormality of the opposite lung. This may occur for example in pulmonary embolism, after pneumonectomy or in congenital absence or hypoplasia of pulmonary artery.

UPE as an initial presenting manifestation for heart failure is uncommon. Although it occurs most commonly with cardiac decompensation who are in dependant position, several cases of UPE secondary to mitral regurgitation have been described, predominantly in the right upper lobe (3-7). Some authors speculated that the right upper lobe is a likely location for edema since its veins open more directly opposite the mitral valve and thus may be exposed to higher pressure from regurgitant jet (8). ROACH *et al.* (5) later reported that the jet of regurgitant flow in a patient with a flail posterior leaflet, the most common valve leaflet involved, is directed specifically towards the right pulmonary veins. These authors also emphasized the usefulness of transesophageal echocardiography in the delineation of the mechanism for edema formation, by detecting differential gradients between the right and left pulmonary venous systems. In our case, such pulse-wave doppler analysis showed a systolic reversal flow in both left pulmonary veins without such pattern in the right pulmonary veins. Furthermore, a precise analysis of the regurgitant flow can be done by transesophageal echocardiography.

Cases of left-sided UPE as a consequence of mitral regurgitation are rare. RICE *et al.* reported the first case of left, predominantly upper lobe, UPE

secondary to paravalvular mitral regurgitation observed four months after prosthetic mitral valve replacement (St. Jude) (9). Therapeutic option and outcome were not described. More recently, TOMCSANYI *et al.* briefly reported a case of left-sided UPE in a 74-year-old man due to an eccentric mitral regurgitation complicating an inferior acute myocardial infarction (10). Early clinical and radiological improvement was observed under diuretics and nitrates infusion. In our case, we also found a very rapid disappearance of unilateral left pulmonary edema, observed only several hours after surgical closure of paravalvular leakage.

In conclusion, in case of UPE, the presence of mitral systolic murmur may suggest an eccentric mitral regurgitation. Transesophageal echocardiography may be useful to confirm the diagnosis and for clinical decision making.

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