

# Pericardial haemorrhage causing right atrial compression after cardiac surgery: role of transoesophageal echocardiography

I A Simpson, C Munsch, E E J Smith, D J Parker

## Abstract

**After cardiac surgery transoesophageal echocardiography showed a large thrombus compressing the right atrium in three hypotensive patients. No satisfactory images were obtained by transthoracic imaging, which is often difficult in ventilated patients after cardiac surgery. Transoesophageal echocardiography, however, provided rapid diagnostic information and permitted prompt surgical intervention.**

In patients who become hypotensive after major cardiac surgery it is often not easy to make the differential diagnosis between left ventricular dysfunction, prosthetic valve dysfunction, sepsis, cardiac tamponade, and intrathoracic bleeding. Echocardiography can provide additional information about the contractile state of the left ventricle and the function of prosthetic valves but transthoracic imaging in a ventilated patient after cardiac surgery is difficult. Transoesophageal echocardiography provides rapid, real time high resolution imaging of the heart and surrounding structures that is valuable in the management of these patients.

We describe three patients in whom compression of the right atrium by localised haematoma formation presented as either an early or late postoperative complication of valve surgery and in whom transoesophageal echocardiography was of primary diagnostic importance.

## Case reports

### CASE 1

A 59 year old woman with rheumatic mitral valve disease underwent mitral valve replacement with a 29 mm monostrut Björk-Shiley valve. Twelve hours after operation she became hypotensive and oliguric with peripheral vasoconstriction. Arterial blood pressure was 75 mm Hg systolic, central venous pressure 10 mm Hg, and mean left atrial pressure measured via a left atrial line was 30 mm Hg. Clinically, valve function seemed normal and there was no significant drainage from the intrathoracic drains. No satisfactory images could be obtained by transthoracic echocardiography. Transoesophageal echocardiography showed a large clot that surrounded and compressed the right atrium and extended superiorly around the superior vena cava (fig

1). Colour Doppler flow mapping showed that the right atrial cavity was less than 1 cm in diameter. The right ventricle and the left heart were underfilled and the mitral valve prosthesis seemed to be functioning normally. At reoperation the transoesophageal echocardiographic findings were confirmed and direct left atrial puncture showed a left atrial pressure of 5 mm Hg. The large haematoma was removed and haemostasis secured. The patient subsequently made an uneventful postoperative recovery.

### CASE 2

A 66 year old man who had had a Carpentier-Edwards aortic valve replacement for aortic regurgitation and dilatation of the ascending aorta 10 years previously had the prosthetic valve replaced by a number 12 Starr-Edwards valve. The operative procedure was uncomplicated and the patient had an uneventful postoperative course. He was discharged seven days after operation. He was readmitted three days later with a history of increasing shortness of breath, a heart rate of 120 beats/min, and a systolic blood pressure of 70-80 mm Hg. There were no clinical signs of valve dysfunction or chest infection. The electrocardiogram showed atrial fibrillation with a rapid ventricular response and the chest x ray showed some cardiomegaly but clear lung fields. Echocardiography showed a large haematoma surrounding and compressing the right atrium, like that in patient 1. At reoperation there was a large clot compressing the right atrium contained by a partially obliterated pericardium. The source of bleed-

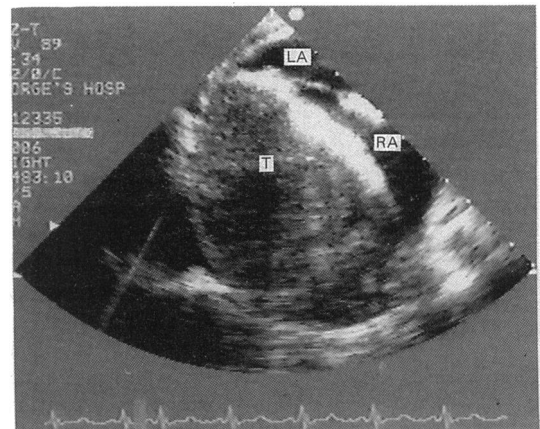


Figure 1 Transoesophageal echocardiogram from patient 1 showing a large round thrombus (T) compressing and almost completely obliterating the right atrial cavity (RA). LA, left atrium.

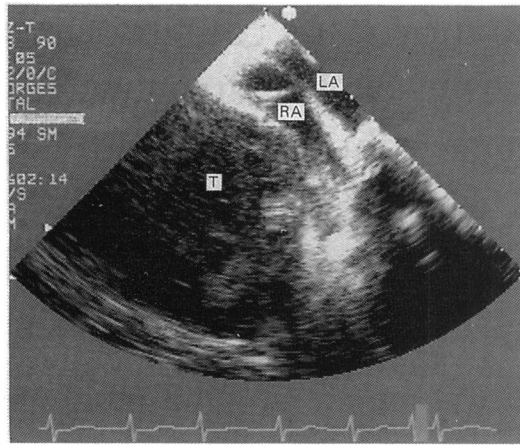
**Regional Cardio-Thoracic Centre, St George's Hospital, London**

I A Simpson  
C Munsch  
E E J Smith  
D J Parker

Correspondence to  
Dr I A Simpson,  
Department of Cardiology,  
St George's Hospital,  
Blackshaw Road, London  
SW17 0QT.

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Figure 2 Transoesophageal echocardiogram from patient 3 showing a large area of thrombus (T) compressing the right atrial cavity. RA, right atrium, LA, left atrium.



ing was identified as an aortic tear posterior to the aortic suture line. The patient had a long postoperative course requiring prolonged ventilation but he remained haemodynamically stable and was discharged home. During subsequent outpatient follow up he has been symptomatically well though he has remained in atrial fibrillation with a controlled ventricular response.

#### CASE 3

A 69 year old woman underwent aortic and mitral valve replacement for severe mixed aortic and mitral valve disease with symptoms of increasing limiting exertional dyspnoea. The preoperative course was complicated by melena secondary to severe biventricular disease. The aortic and mitral valves were replaced with Carbomedics 23 mm and 31 mm valves. After slow mobilisation she was well enough to be discharged 12 days after operation but she was readmitted unwell two days later with hypotension and respiratory wheeze. Since discharge anticoagulation had become uncontrolled (International Normalised Ratio >12). An initial diagnosis of chest infection was made but respiratory function deteriorated and she needed ventilation. Transoesophageal echocardiography (fig 2) showed a large haematoma surrounding and compressing the right atrium with mitral and aortic valves of normal appearance. At reoperation a very large clot was evacuated from the area surrounding the right atrium, the origin of bleeding at the aortic suture line was identified, and haemostasis was secured. Postoperatively the patient remained haemodynamically stable. No further haemodynamic problems developed but the patient eventually died of respiratory infection after prolonged ventilation.

#### Discussion

Transthoracic echocardiography after cardiac surgery is uniformly disappointing yet the information available from imaging the heart and surrounding structures is potentially very important in a critically ill patient. In the three patients we describe the pericardial haemorrhage would not have been recognised without transoesophageal echocardiography and appropriate surgical treatment would not have occurred. This experience is similar to

that of Kochar *et al* who described localised pericardial haematomas in four patients causing right atrial compression after cardiac surgery.<sup>1</sup> These four patients had all undergone coronary artery bypass surgery whereas our patients developed localised haemorrhage after either mitral or aortic valve replacement.

Though haemodynamic information is valuable in patients after cardiac operations in patient 1 the findings of transoesophageal imaging—right atrial compression with an underfilled left heart—were at variance with the haemodynamic information. Hence, transoesophageal imaging allowed a valued clinical judgement of right atrial tamponade to be made and this led to prompt surgical evacuation of the haematoma; the diagnosis was not apparent with transthoracic imaging.

Transoesophageal echocardiography now allows high quality real time imaging of the heart and great vessels with a far greater spatial resolution than is possible with transthoracic imaging.<sup>2</sup> This is largely because of the superior signal/noise ratio and the ability to use higher frequency transducers than for transthoracic study without significantly limiting ultrasound attenuation. Transoesophageal imaging is already becoming accepted as a valuable technique for intraoperative diagnosis and guidance of surgery<sup>3,4</sup> but its role in the intensive care unit for diagnosis of postoperative complications is less well established. We describe three patients in whom transoesophageal echocardiography performed in the intensive care unit allowed a rapid diagnosis of a major complication of valve surgery which might not otherwise have been immediately evident. This somewhat unusual complication occurred in three patients over a period of only three months and may easily have been missed without transoesophageal imaging because the diagnosis may not be apparent from haemodynamic measurements. In particular, central venous pressure measurement may be misleading if the catheter tip does not lie at the site of compression. Chest x ray and conventional transthoracic echocardiography were unhelpful and more sophisticated imaging techniques such as computed tomography or magnetic resonance imaging would be impractical in these critically ill patients. Transoesophageal imaging is a valuable diagnostic tool in the intensive care unit, where the high resolution images obtained allow assessment of postoperative cardiac function, prosthetic valve function, and the presence of cardiac tamponade. We believe that this technique will become increasingly important in the management of patients after cardiac surgery.

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