Balloon mitral valve dilatation as an aid to weaning from ventilatory support in patients with intractable pulmonary oedema caused by severe mitral stenosis

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Summary

Intractable pulmonary oedema in patients undergoing mechanical ventilation must be investigated as older patients with severe mitral stenosis can be rescued by balloon dilatation of the mitral valve, thus enabling elective cardiac surgery at reduced risk. We describe two such cases and discuss the role of transoesophageal echocardiography in the intensive care unit in the diagnosis and management of these patients. (Br. J. Anaesth. 1996; 76: 879–880)

Key words

Mechanical ventilation is often used to rescue patients who have respiratory arrest caused by severe pulmonary oedema. We report two patients in whom repeated attempts at weaning from ventilatory and haemodynamic support were unsuccessful because of severe mitral stenosis. The success of emergency balloon dilatation of the mitral valve in the management of this problem is discussed.

Case reports

PATIENT NO. 1

A 61-yr-old male in atrial fibrillation underwent elective cardiac catheterization for severe mitral stenosis (estimated valve area on echocardiography of 0.9 cm²). He was found to have severe pulmonary hypertension and significant two-vessel coronary artery disease with moderate left ventricular function. He developed severe pulmonary oedema leading to respiratory arrest 4 h later and required mechanical ventilation. He became severely hypotensive (systolic arterial pressure 75 mm Hg) requiring treatment with i.v. dobutamine, dopamine and noradrenaline. He continued to suffer from pulmonary oedema.

Transoesophageal echocardiography (fig. 1) showed severe mitral stenosis with calcification of the anterior mitral valve leaflet, mild mitral regurgitation and absence of thrombus in the left atrium and atrial appendage. He therefore underwent emergency Inoue balloon percutaneous transvenous mitral commissurotomy (PTMC) up to a maximum dilatation of 26 mm. There was an immediate decrease in mitral valve end-diastolic gradient from 12 to 5 mm Hg and echocardiographically derived mitral valve area increased to 1.7 cm². Echo-Doppler however, showed increased mitral regurgitation. Despite this he was weaned successfully from ventilatory and inotrope support within 3 days and was discharged home 4 days later. He underwent successful elective mitral valve replacement and coronary artery bypass surgery 2 months after PTMC.

PATIENT NO. 2

A 59-yr-old female with known mitral stenosis and cerebrovascular disease presented as an emergency in an unresponsive state with severe pulmonary oedema requiring ventilation. She was profoundly hypotensive with a systolic arterial pressure of 60 mm Hg which required maximum inotropic support. Multiple attempts at ventilatory weaning were however, unsuccessful because of persistent pulmonary oedema. Transoesophageal echocardiography (fig. 1) showed the mitral valve to be tightly stenosed with a mobile anterior leaflet but an immobile calcified posterior leaflet with thickening and calcification of the subvalvar apparatus. There was mild mitral regurgitation. The left atrium was dilated with spontaneous contrast but no thrombus. She underwent emergency Inoue balloon PTMC and was weaned successfully from ventilatory support within 24 h. An increase in echocardiographically derived mitral valve area (0.7 to 1.9 cm²) was achieved but there was now moderate mitral regurgitation. Her symptoms remained improved at outpatient follow-up 3 months later, but elective mitral valve replacement is being considered.

Discussion

The presence of severe pulmonary oedema does not necessarily imply a diagnosis of “left ventricular failure” and echocardiography should be performed...
to exclude mitral stenosis as a cause of intractable pulmonary oedema in patients undergoing ventilation. Mitral valve replacement in such patients carries prohibitive risks which are increased further in the presence of significant coronary artery disease [1].

Although closed mitral valvotomy and PTMC are equally effective in providing haemodynamic improvement in selected patients with severe mitral stenosis, PTMC may do so more cost effectively and without increased complications [2]. Wilkins and colleagues [3] have suggested an echocardiographic scoring system to predict the result of balloon dilatation and have shown that short-term outcome is related directly to the degree of valve leaflet thickening and involvement of the subvalvar apparatus (thickening and calcification). Transoesophageal echocardiographic examination is also important before PTMC to detect the presence of left atrial thrombus [4] which is a relative contraindication to balloon intervention. This is more likely to be present in older patients with left atrial dilatation and atrial fibrillation.

Inoue balloon PTMC has been shown previously to be particularly useful in treating intractable heart failure caused by severe mitral stenosis in pregnant patients [5] and in critically ill young patients [6]. We suggest that this procedure is also useful in older critically ill patients, even with mitral valves with less than ideal characteristics, as a means of achieving a better cardiac haemodynamic state, thus enabling weaning from ventilatory support and allowing elective mitral valve replacement if indicated on symptomatic grounds.

References