Double partitioning of the left atrium: a previously unreported echocardiographic finding in a case in which transoesophageal echocardiography aided operative resection

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Abstract
Precordial echocardiography showed two membranes obstructing pulmonary venous return in the left atrium of a 9 month old infant. This anomaly has not previously been described; therefore transoesophageal echocardiography was performed at the time of surgery. This confirmed the anatomy and aided complete resection of both membranes. Even in small infants transoesophageal echocardiography can provide useful information about complex atrial malformations.

Transoesophageal echocardiography (TOE) is gaining widespread acceptance as an adjunct to precordial echocardiography, particularly where there is diagnostic doubt and/or difficulty in imaging more posterior structures such as the left atrium. We describe a previously unreported variant of cor triatriatum presenting in infancy where TOE aided optimal surgical management.

Case report
A 9 month old boy presented with a short history of weight loss, increasing dyspnoea, and cough. Intermittent breathlessness had been noted throughout life but development was normal. Clinical examination showed mild tachypnoea with subcostal recession and normal peripheral pulses. The liver was enlarged 4 cm below the costal margin and there was clinical evidence of right ventricular hypertrophy. Auscultation revealed a soft middiastolic murmur at the left sternal edge, a loud pulmonary component to the second heart sound, and a third heart sound. Chest x-ray showed cardiomegaly and pulmonary venous prominence.

Precordial echocardiography showed a dilated right atrium, ventricle, and pulmonary artery with right ventricular hypertension. There was tricuspid regurgitation with peak flow velocity on Doppler examination of 4-5 m/s; that was consistent with moderately severe right ventricular hypertension. The left atrium was partitioned in an unusual manner. The pulmonary veins connected to a proximal chamber that was separated from the mitral valve by two distinct membranes. The membranes had a common origin from the atrial septum at the level of the closed fossa ovalis. The proximal membrane (membrane 1) almost bisected the left atrium. The second more distal membrane (membrane 2) paralleled the aortic root proximally and was closely applied to (but separate from) the mitral valve more distally.

Both membranes ballooned towards the mitral valve in diastole, the distal one particularly giving the classic wind-sock appearance of cor triatriatum (fig 1). Their relation to the left atrial appendage could not be clearly determined. The mitral valve apparatus was normal. Doppler examination showed two areas of flow through the distal atrium along the atrial septal and lateral aspects of membrane 2. Peak velocity was 2-3 m/s with continuous turbulent flow indicative of severe obstruction. No flow could be shown in the area between the two membranes.

Because of the unusual echocardiographic appearances, TOE examination was performed at the time of cardiac repair. A 5 MHz transoesophageal paediatric probe was used, connected to an Aloka SSD870 ultrasound system. The anatomy of the two membranes was confirmed and the left atrial appendage could be seen on the mitral side of the second membrane. There was spontaneous contrast within the proximal left atrium and between the membranes, which was indicative of stasis (fig 2).

During cardiopulmonary bypass, the left atrium was opened parallel to the inter-atrial groove. A large and “fairly redundant” dia-
phragm was identified (membrane 1). A separate leaf of this diaphragm arose from its central region and the interatrial septum some distance from the main diaphragm (membrane 2). The anatomical details and route of blood flow were difficult to identify in situ; the clear preoperative visualisation of the anatomy proved most helpful. Complete excision of both membranes was verified intraoperatively with TOE and unobstructed pulmonary venous return was clearly demonstrated. Postoperative recovery was uneventful: the child was well and symptom free 12 months later.

Discussion
TOE is now feasible in all but the smallest infants, though most congenital cardiac lesions can be adequately determined with precordial echocardiography. In our patient transoesophageal echocardiography gave useful confirmation of a previously undescribed left atrial anomaly in a small child. Magnetic resonance imaging has been advocated for confirmation of left atrial membranes but is not always readily available. The use of TOE for diagnosis of cor triatriatum in adults has already been reported. TOE may be valuable for atrial examination in small children. Intraoperative confirmation of the adequacy of membrane excision was also very helpful in this patient. Clarification of atrioventricular malformations and assessment of pulmonary venous drainage anomalies may also be facilitated by the use of TOE.

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