Transcatheter Closure of Right-to-Left Atrial Shunts Using Amplatzer Septal Occluder

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Abstract

**Purpose:** We reviewed our experience in the closure of right-to-left atrial shunts using Amplatzer septal occluders. **Methods:** This is a retrospective review of 13 patients who underwent transcatheter closure of right-to-left atrial shunts for systemic hypoxaemia, at a median age of 8.0 years (range, 2.1 to 17.5), between April 1998 and March 2005. **Results:** The right-to-left shunts were associated with Fontan fenestrations (n=8), pulmonary atresia post right ventricular outflow tract reconstruction (RVOTR) (n=3), and critical pulmonary stenosis post-balloon valvoplasty (n=1) and RVOTR (n=1). The median procedural and fluoroscopic times were 140 minutes (range, 75 to 250) and 23 minutes (range, 13 to 55), respectively. A single occluder, with size ranging from six to 24 mm, was placed in 12 patients, while two (17 mm and 20 mm) occluders were deployed in one. There were no procedural failures or immediate complications. Systemic arterial oxygen saturation increased from 81.0 ± 9.0% to 94.9 ± 2.4% (p=0.008), while the mean right atrial pressure increased slightly from 11.8 ± 3.6 to 13.5 ± 3.5 mmHg (p=0.013) after the procedure. The median follow-up duration was 63 months (range, 7 to 75). One patient developed transient ischaemic attacks within the first week of device implantation. Follow-up echocardiography revealed no leak through the implanted devices, although residual shunts through additional small atrial communications were noted in four patients. **Conclusion:** Amplatzer septal occluder effectively eliminates right-to-left atrial shunts with significant improvement in systemic arterial oxygenation. Serial monitoring for systemic venous congestion is, however, warranted.

Key words Amplatzer septal occluder; Atrial shunts

Introduction

Fenestration of the Fontan circuit, which permits right-to-left shunting of blood into the pulmonary venous atrium, has been shown to improve short-term postoperative outcomes by decreasing pleural drainage, length of hospital stay, need for additional postoperative procedures and Fontan failure rate.1,2 In patients with poorly compliant right ventricles that occur in association with severe right ventricular outflow obstruction, the right-to-left shunt through the atrial septum may likewise benefit by decompressing the systemic venous system and augmenting systemic cardiac output.3 With gradual resolution of postoperative risk factors that impedes pulmonary blood flow early after Fontan procedure4 and improvement of right ventricular compliance after relief of right ventricular outflow obstruction and regression of hypertrophic myocardium,5 spontaneous closure of the fenestration and right-to-left shunt through the atrial septum may occur, respectively. Nonetheless, these residual right-to-left shunts may persist to cause arterial oxygen desaturation, secondary polycythaemia and possibility of paradoxical embolism.

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Received April 21, 2005