

Brief Report

Cite this article: Çetiner N, Yıldırım Baştuhan I, and Çeliker A (2020) Transcatheter baffle leak closure via an amplatzer septal occluder in a senning-operated child. *Cardiology in the Young* 30: 1507–1509. doi: [10.1017/S1047951120002255](https://doi.org/10.1017/S1047951120002255)

Received: 22 May 2020

Revised: 12 June 2020

Accepted: 4 July 2020

First published online: 28 July 2020


Keywords:

Amplatzer septal occluder; atrial switch operation; baffle leak; transposition of great arteries

Author for correspondence:

Nilüfer Çetiner, MD, Postal Address: Koç University Faculty of Medicine, Davutpaşa Cad. No: 4 Topkapı/Istanbul, Turkey.
Tel: +90 5058326343; Fax: +90 2123113410.
E-mail: nilufercetiner@hotmail.com

Transcatheter baffle leak closure via an amplatzer septal occluder in a senning-operated child

Nilüfer Çetiner¹ , Işıl Yıldırım Baştuhan² and Alpay Çeliker¹

¹Department of Pediatrics, Division of Cardiology, Koç University Faculty of Medicine, Istanbul, Turkey and

²Department of Pediatrics, Division of Cardiology, Antalya Education and Research Hospital, Antalya, Turkey

Abstract

Senning operation is a surgical treatment for transposition of great arteries that can be complicated by post-procedural atrial or caval baffle leaks. We present a 6-year-old boy with a history of Senning repair for transposition of great arteries, who developed a pulmonary venous baffle leak. Percutaneous baffle leak closure was successfully performed using an Amplatzer septal occluder.

Prior to widespread acceptance of the arterial switch procedure, atrial switch procedures that performed by the Senning or Mustard technique were the standard surgical approach for patients with D-transposition of great arteries.^{1,2} This procedure may be associated with long-term baffle-related problems such as baffle leaks and obstruction, which are often dealt with by surgical treatment.^{3,4} There are limited reports of transcatheter treatment by an Amplatzer septal occluder and outcomes of baffle leaks in adults. We present a child who underwent successful transcatheter closure of a baffle leak.

Case report

A 6-year-old boy was taken to our clinic with exertional fatigue. His medical history was remarkable for an atrial switch operation by a Senning procedure at 3 months of age. The patient received a diagnosis of pulmonary venous baffle leak at 2 years of age, which worsened during follow-up. At the current presentation, he had no complaints of fever or weight loss. Physical examination revealed a mild systolic murmur on the mesocardiac region. He had no hepatomegaly, lower limb oedema, or jugular venous distension. The blood chemistry findings were unremarkable.

An electrocardiogram revealed first-degree atrioventricular block and right ventricular hypertrophy. Echocardiography showed right ventricular dilatation with mild tricuspid regurgitation and a defect of 9 mm in width with a left-to-right shunt between the pulmonary and the systemic venous baffle (Fig 1a). Transcatheter baffle leak closure was performed using an amplatzer septal occluder under two-dimensional transoesophageal echocardiography guidance under general anaesthesia. The size of the defect was measured as 10 mm (Fig 1b). There was no obstruction in any of the baffles. On cardiac catheterisation, the mean pressures of the pulmonary and systemic venous baffle were 15 and 14 mm Hg, respectively, with a superior caval vein pressure of 15 mm Hg and a pulmonary-systemic shunt ratio of 1.5:1. Contrast injection showed a transition from the pulmonary venous baffle to the systemic venous baffle. The defect was successfully closed using a 12-mm amplatzer septal occluder easily. Control transoesophageal echocardiography and contrast injection showed no residual shunt, pulmonary venous stenosis, or baffle obstruction (Fig 2a,b). He was discharged after 24 hours without complications. Acetylsalicylic acid treatment in anti-platelet dose was initiated to the patient for 6 months. The patient was asymptomatic, and echocardiography showed no residual shunt on the amplatzer septal occluder at 2 years of follow-up.

Discussion

The patients who underwent physiologic correction of D-transposition of great arteries remain at increased risk of cardiovascular complications and have a markedly increased mortality risk compared to the general populations. Complications of this procedure include systemic ventricular dysfunction, tricuspid regurgitation, dysrhythmias, and venous baffles obstruction and/or leaks, which are generally occurred in adulthood.⁴ The clinical consequences of baffle leaks in this population are poorly understood, and the indications for closure are incompletely defined. Baffle leak device closure procedures after atrial switch operations have been reported

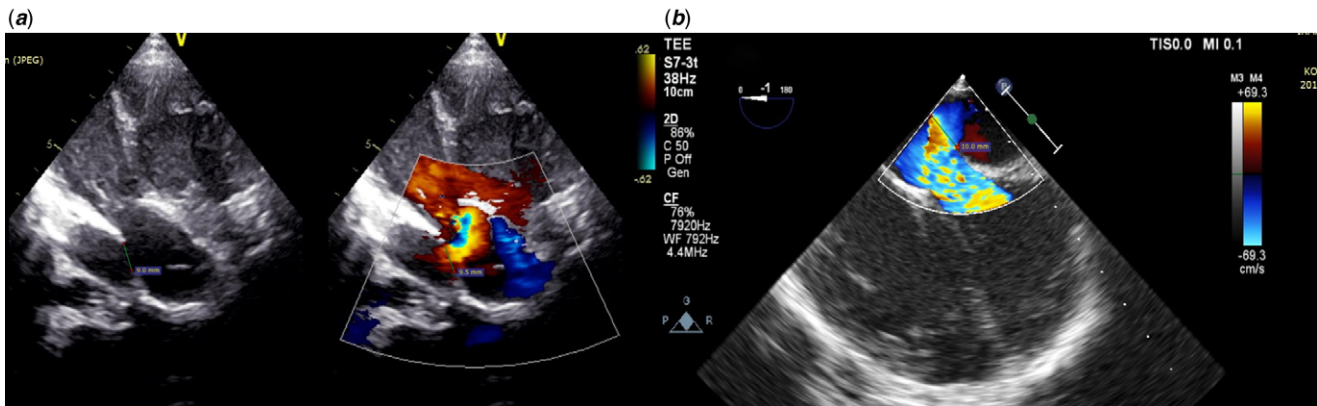


Figure 1. (a and b) Transthoracic echocardiography showed mild tricuspid regurgitation and a defect of 9 mm in width with a left-to-right shunt between the pulmonary and systemic venous baffle. The size of the defect was measured as 10 mm on transoesophageal echocardiography.

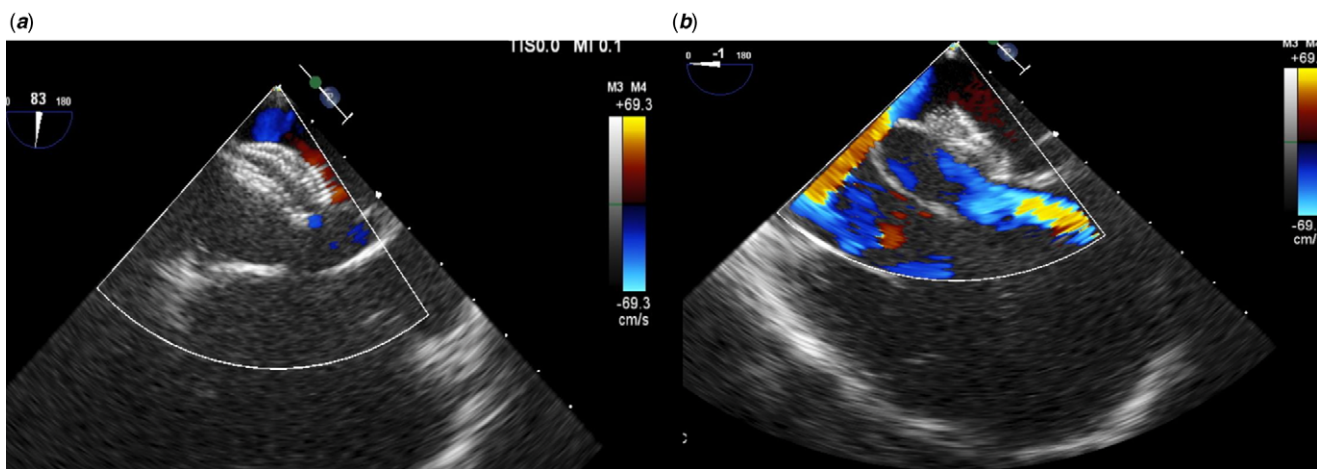


Figure 2. (a and b) Control transoesophageal echocardiography showed no residual shunt on the amplatzer septal occluder.

to succeed in correcting haemodynamic defects. Baffle leaks are reported in 5–10% of atrial switch-operated patients, these being generally resolved by surgical treatment.⁵ One study reported baffle leaks in four patients from a cohort of 59 undergoing cardiac catheterisation for electrophysiological or haemodynamic study. One defect was managed with an occluder, and a second with stent. The other two defects were of no haemodynamic importance and were not closed.⁶ Baffle leaks were detected in 11 patients (15 leaks) during outpatient follow-up of 126 patients following atrial redirection surgery in another study. The mean age of the 11 patients was 26 years, and 10 were cyanosed at rest or during a simple walk test. All underwent transcatheter closure using either an occluding device or a covered stent in the presence of concomitant baffle obstruction.⁷ Most defects can easily be closed by simple closure devices. The use of endografts to exclude Mustard baffle leaks was also reported in a patient with obstructed systemic baffles. In that report, a baffle leak without obstruction was managed by endograft by generating a three-dimensional printed model of the complex anatomy.⁸ There have also been brief reports describing successful Amplatzer septal occluder use for this procedure in some adult patients, because the Amplatzer septal occluder is easy to deploy and recapture prior to release from the delivery system.^{9,10} Use of newer imaging methods, such as intra-cardiac echocardiography, may be useful for better visualisation during the procedure.¹⁰

Conclusion

While the patient in the present case was a child with a moderate size baffle leak, patients with baffle leaks in previous reports have been older. Despite the relatively space-occupying nature of the Amplatzer septal occluder, we have not observed any obstruction in the baffles to date. Closure of this moderate size defect may prevent further enlargement and possible temporary right-to-left shunt, which may lead to paradoxical embolism. Transcatheter closure of baffle leaks without surgery should be tried in younger patients with Senning operations.

Acknowledgements. None.

Financial support. This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Conflict of interest. None.

Ethical standards. All procedures performed in this case were in accordance with the ethical standards of the institutional and national research committee and with the 1975 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent. Informed consent was obtained from patients' parents.

References

1. Senning A. Surgical correction of transposition of the great vessel. *Surgery* 1959; 45: 966–980.
2. Mustard WT. Successful two-stage correction of transposition of great vessels. *Surgery* 1964; 55: 469–472.
3. Tobler D, Williams WG, Jegatheeswaran A, et al. Cardiac outcomes in young adult survivors of the arterial switch operation for transposition of the great arteries. *J Am Coll Cardiol* 2010; 56: 58–64.
4. Horer J, Karl E, Theodoratou G, et al. Incidence and results of reoperations following the Senning operation: 27 years of follow-up in 314 patients at a single center. *Eur J Cardiothorac Surg*. 2008; 33: 1061–1067.
5. Khairy P, Landzberg MJ, Lambert J, O'Donnell CP. Long-term outcomes after the atrial switch for surgical correction of transposition: a meta-analysis comparing the mustard and senning procedures. *Cardiol Young* 2004; 14: 284–292.
6. Patel S, Shah D, Chintala K, Karpawich P.P. Atrial baffle problems following the mustard operation in children and young adults with dextro-transposition of the great arteries: the need for improved clinical detection in the current era. *Congenit Heart Dis* 2011; 6: 466–474.
7. Bentham J, English K, Hares D, Gibbs J, Thomson J. Effect of transcatheter closure of baffle leaks following senning or mustard atrial redirection surgery on oxygen saturations and polycythaemia. *Am J Cardiol* 2012; 110: 1046–1050.
8. Porras D, Mitsouras D, Steigner M, et al. Transcatheter mustard revision using endovascular graft prostheses. *Ann Thorac Surg* 2017; 103: 509–512.
9. Schneider DJ, Moore JW. Transcatheter treatment of IVC channel obstruction and baffle leak after Mustard procedure for d-transposition of the great arteries using Amplatzer ASD device and multiple stents. *J Invas Cardiol* 2001; 13: 306–309.
10. Armstrong EJ, Kwa AT, Bhat A, Romick B, Smith T, Rogers JH. Intracardiac Echocardiography to guide percutaneous closure of atrial baffle defects. *J Invasive Cardiol* 2012; 24: 473–476.