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Brief Report

Transcatheter occlusion of a left ventricular to right atrial communication by an Occlutech duct occluder

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Abstract Left ventricular to right atrial communication is a rare congenital or acquired heart defect. There are many reports of successful transcatheter closure of this defect. We describe the device closure of one such communication in a 5-year-old girl using the Occlutech duct occluder. We believe that this device may have some advantages over the devices previously used for this purpose.

Keywords: Gerbode defect; Occlutech duct occluder; device closure

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Direct left ventricle to right atrial communication, eponymously known as Gerbode defect, was first reported after five operated cases were described in 1958.[1] The defect may be congenital or acquired after cardiac operations for closure of ventricular septal defect. Surgery was the only available treatment for majority of congenital heart defects, until the introduction of occlusion devices in mid 1990s.[2] Thereafter, device closure has become a procedure of choice in many conditions because of lesser trauma, avoidance of cardiopulmonary bypass, faster recovery, and better cosmetic result.[3] Among reports using various devices for closing left ventricle to right atrial communication, Amplatzer duct occluder I is the most common.[4–6] This device is preferred over devices with double disk design because of a lower risk for compression on the His bundle with resultant heart block and less likelihood of interfering with the tricuspid valve mechanism.

Occlutech duct occluder (Occlutech International AB, Helsingborg, Sweden) is a newly introduced device for transcatheter closure of patent ductus arteriosus (Fig 1). We present a patient in whom this device was successfully used for the closure of a Gerbode defect. To the best of our knowledge, this is the first report of the closure of this defect using Occlutech duct occluder.

Case report

A 5-year-old asymptomatic girl, weighing 19 kg, was referred for closure of a ventricular septal defect. On clinical examination, her vital parameters were normal. Cardiovascular system evaluation revealed a harsh pansystolic murmur in the left parasternal region. A 12-lead electrocardiogram was within normal limits. Chest x-ray showed mild cardiomegaly with increased pulmonary vascular markings. Echocardiography revealed a Gerbode defect measuring 3.8 mm in diameter and separated from the aortic valve by 6.5 mm. There was mild tricuspid regurgitation with no direct communication between the ventricles.

After obtaining informed consent from the parents, the patient was transferred to the catheterisation laboratory. The left femoral artery and the right femoral vein were accessed and 100 international units/kilogram of heparin was administered. A left ventricular angiogram performed in 40° left anterior oblique and 40° cranial projection showed a left ventricle to right atrial defect measuring 5.7 mm. Oximetry data revealed a shunt ratio of 2.8:1. Pulmonary artery pressure was normal.

[a]All authors contributed substantially to this work, and read and approved the manuscript.

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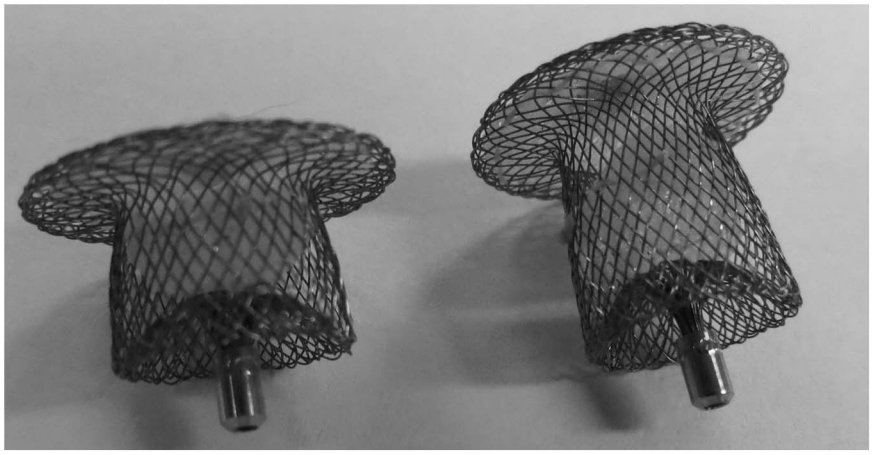

Figure 1.
Occlutech duct occluder. Note the reverse shank configuration.

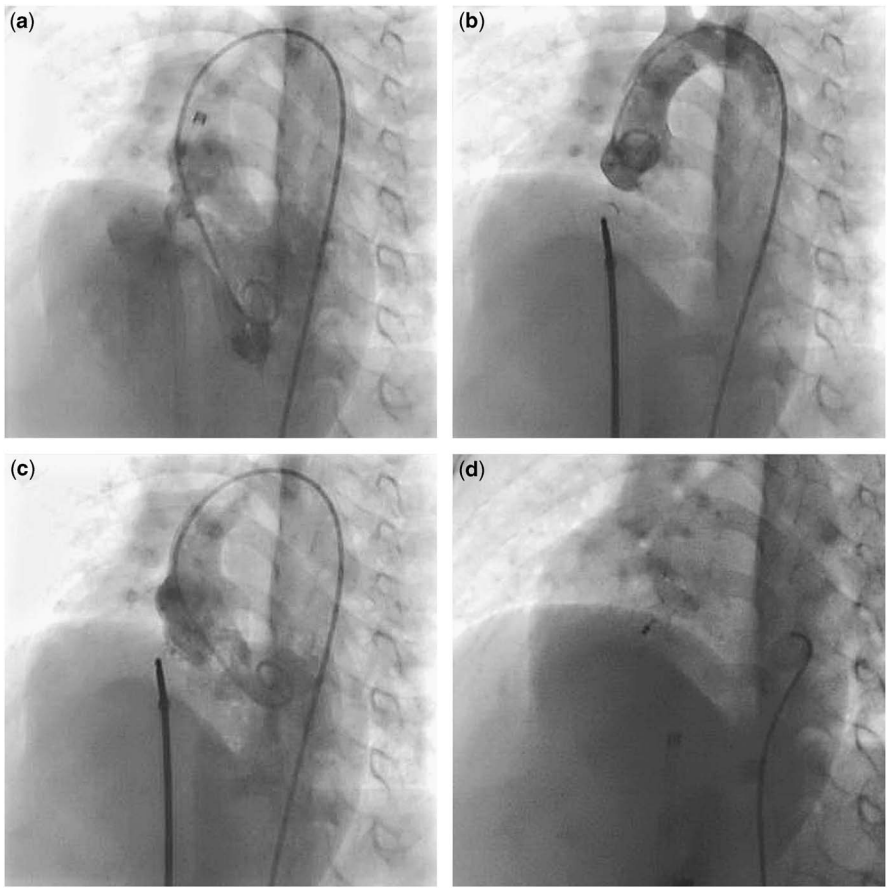

Figure 2.
*(**a**) Left ventriculogram with long delivery sheath passed through the defect. (**b**) Aortogram showing absence of aortic regurgitation. (**c**) Left ventriculogram showing only mild residual shunt. (**d**) Final position of the device after being released.*

It was decided to close the defect by using Occlutech duct occluder with a short shank (7 mm), having a proximal diameter of 8 mm, and distal diameter of 10 mm. The defect was crossed with a 0.035 inch Terumo guide wire (Terumo Corporation, Tokyo, Japan) using a 4 Fr Judkins right coronary catheter (Cordis Corporation, Bridgewater, New Jersey, United States of America). The wire was snared using a 10 mm snare (pfm medical ag, Cologne, Germany) and a circuit established through the right femoral vein. A 7 French

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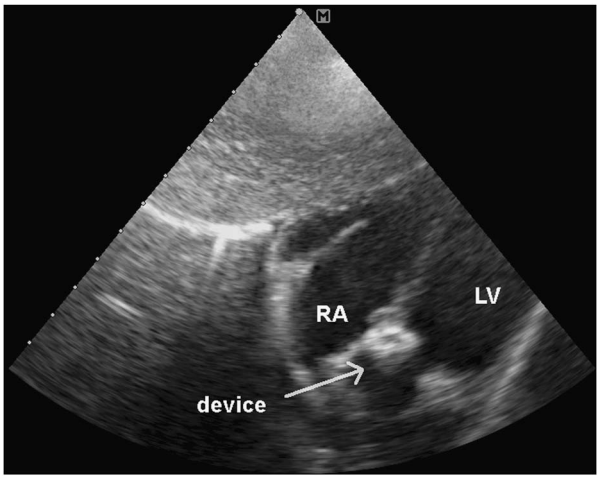

Figure 3.
Echocardiography showing the device in position. RA = right atrium; LV = left ventricle.

Brite-Tip 90 cm long sheath (Cordis Corporation) was introduced from the femoral vein and passed across the defect into the ascending aorta. The device was advanced through the sheath till its tip protruded just outside the distal end of the sheath. The device-sheath assembly was then withdrawn slowly into the left ventricular outflow tract. The disc was delivered fully only after confirming that the device was below the aortic valve. The device was pulled back so as to place the disc at the left ventricular end of the defect. After confirming the position of the disc on left ventricular angiography, the shank was delivered. The device position was confirmed on repeat left ventricular angiography and an aortogram was performed to exclude aortic regurgitation (Fig 2). Transthoracic echocardiogram showed tiny residual flow through the device without any progression of tricuspid regurgitation (Fig 3). The electrocardiogram revealed sinus rhythm with normal conduction. The device was then released.

She was discharged 3 days later on oral Aspirin 80 mg/day without any conduction abnormality. The follow-up echocardiogram 1 month later showed complete closure of the defect without any progression of tricuspid regurgitation. The electrocardiogram performed 3 months after the procedure revealed sinus rhythm with normal atrioventricular conduction.

Discussion

Although Occlutech duct occluder has essentially the same shape as the Amplatzer duct occluder I, some of the small differences in the characteristics of the devices may provide a few advantages for the closure of Gerbode defect. First, the reverse cone shape (Fig 1) may function like a second disc and reduce the risk of embolisation while remaining away from the conduction system and the tricuspid valve. Second, several features of the Occlutech duct occluder related to the reverse shank shape, the availability of an intermediate 5 mm device size, and the increased flexibility owing to Nitinol braiding configuration enable the use of a smaller device, thus reducing the risk of heart block. In addition, the lack of a distal hub reduces the risk of thrombus formation on the left ventricular side. However, these possible advantages need to be validated in a large cohort of patients.

Conclusion

The Occlutech duct occluder may be better for the closure of Gerbode defect than other previously used devices.

Acknowledgement

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Conflicts of Interest

None.

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the Iranian guidelines on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008, and has been approved by the ethical committee of Children's Medical Center.

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