A 41-year-old woman presented with paroxysmal chest pain, dyspnea, and palpitations, and a continuous heart murmur was heard over the right upper and lower sternal borders. Transthoracic echocardiography revealed a giant ruptured sinus of Valsalva aneurysm (SOVA), which had dislodged and ruptured into the right atrium adjacent to the tricuspid valve. The diameter of the aortic end of the defect was 4 mm. Interestingly, this windsock SOVA swung into the right atrium and the right ventricle during different phases of the cardiac cycle (Figure 1 and Movie I in the online-only Data Supplement). Bialtrial enlargement showed that the left atrial volume was 54 mL and the right atrial volume was 91 mL. We attempted to perform a transcatheter closure of this ruptured giant SOVA at the aortic end of the rupture site.

An aortic angiogram confirmed the presence of the giant windsock SOVA (Figure 2 and Movie II in the online-only Data Supplement). A 6-mm modified double-disk ventricular occluder (Shanghai Shape Memory Alloy Ltd, China), similar to the Amplatzer occluder, was used in this procedure. The modified occluder (Figure 3) was made of 0.005-in nitinol wire mesh with fabric inside. The diameter of the left disk was 4 mm larger than the waist, and the right disk was 2 mm larger than the waist. The waist of the occluder was 3 mm thick. The modified double-disk ventricular occluder was approved by the State Food and Drug Administration of the People’s Republic of China in 2003.1 During the postoperative evaluation, the right coronary ostium was located relatively high in relation to the SOVA. The ECG showed no changes in the S-T segment after the procedure. The modified occluder (Figure 3) was made of 0.005-in nitinol wire mesh with fabric inside. The diameter of the left disk was 4 mm larger than the waist, and the right disk was 2 mm larger than the waist. The waist of the occluder was 3 mm thick. The modified double-disk ventricular occluder was approved by the State Food and Drug Administration of the People’s Republic of China in 2003.1 During the postoperative evaluation, the right coronary ostium was located relatively high in relation to the SOVA. The ECG showed no changes in the S-T segment after the procedure. The modified occluder (Figure 3) was made of 0.005-in nitinol wire mesh with fabric inside. The diameter of the left disk was 4 mm larger than the waist, and the right disk was 2 mm larger than the waist. The waist of the occluder was 3 mm thick.

The modified double-disk ventricular occluder was approved by the State Food and Drug Administration of the People’s Republic of China in 2003.1 During the postoperative evaluation, the right coronary ostium was located relatively high in relation to the SOVA. The ECG showed no changes in the S-T segment after the procedure. Transthoracic echocardiography was performed at that time, which revealed that the occluder was well fixed. There were no tricuspid or aortic regurgitation and no residual shunting. The aneurysm was shown to have been resolved completely; the left atrial volume was 47 mL, and the right atrial volume had decreased from 91 to 62 mL (Figure 4 and Movie III in the online-only Data Supplement). A repeat aortic angiogram confirmed that the giant SOVA had disappeared (Figure 5 and Movie IV in the online-only Data Supplement).

SOVAs are relatively more common in adolescent and young adult Asian populations, with recorded incidences of 0.46% to 3.5% in Eastern countries compared with 0.14% to 0.23% in studies from Western areas.2 It is usually a congenital anomaly in which a dilatation of the aortic wall is located between the aortic valve and the sinotubular junction. In this present case, the aortic angiogram revealed that the SOVA originated from the right sinus of Valsalva and ruptured into the right atrium, creating a left-to-right shunt with profound hemodynamic effects. Patients with unruptured SOVAs may not manifest clinical symptoms for many years. When the rupture is sudden, the patient may present with chest pain and heart failure.

Although surgical procedures are generally acknowledged as the gold standard of treatment for ruptured SOVAs, with recent advances in the nonsurgical closure of other left-to-right shunts, transcatheter closure has been suggested as an attractive alternative to surgery, with encouraging short-term and midterm outcomes.3 The present case was a technical challenge. First, the aneurysm measured 41×34 mm at the maximal echocardiographic diameters. To the best of our knowledge, this was the largest size recorded in patients with this rare form of SOVA undergoing transcatheter closure. Second, the transthoracic echocardiography revealed that the aneurysm was adjacent to the tricuspid valve. During the catheterization procedure, it was necessary to monitor for the occurrence of aortic or tricuspid regurgitation and residual shunting with color Doppler. Third, choosing a suitable occluder was paramount. To date, no specific equipment for such closures has been developed. The Amplazer duct occluder has been widely used recently, and a ventricular septal defect occluder has also been used in some patients.4 According to our experience, the ventricular septal defect occluder device was chosen on the basis of the anatomy of the defect, which was similar to an aneurysm-like ventricular septal defect. To avoid the influence of the right ventricular outflow tract as much as possible, we decided to occlude the defect at the aortic end and therefore selected a 6-mm ventricular septal defect occluder that was 2 mm larger than the aortic end of the defect. At the
1-year follow-up assessment, transthoracic echocardiography revealed that the occluder was well fixed and that there was no procedure-related aortic insufficiency (Figure 6).

We report the incidental finding of a ruptured giant SOVA. Although the catheterization procedure was challenging, the procedure was successful, which suggests that transcatheter closure is a safe and effective approach. Such an intervention could become an attractive alternative treatment to surgery for appropriately selected patients with ruptured SOVAs.

Disclosures

None.

References


Figure 1. A, Transthoracic echocardiogram obtained in the aortic short-axis view showing a giant windsock sinus of Valsalva aneurysm (SOVA), which had become dislodged and ruptured into the right atrium. It was adjacent to the tricuspid valve during systole. B, The SOVA swung into the right ventricle during diastole. AV indicates aortic valve; RA, right atrium; RV, right ventricle; and TV, tricuspid valve.

Figure 2. The aortic angiogram confirmed a giant windsock sinus of Valsalva aneurysm.

Figure 3. A modified double-disk ventricular occluder was applied in this procedure.
Figure 4. Transthoracic echocardiogram image obtained in the aortic short-axis view showing that the occluder was well fixed.

Figure 5. A repeat aortic angiogram confirmed that the giant sinus of Valsalva aneurysm had been completely resolved and that there was no procedure-related aortic regurgitation.

Figure 6. Successful occlusion of the ruptured aneurysm was confirmed in the left ventricular long-axis and aortic short-axis views by transthoracic echocardiogram.
Transcatheter Closure of Giant Ruptured Sinus of Valsalva Aneurysm
Feng Chen, Song Hua Li, Yong Wen Qin, Pan Li, Su Xuan Liu, Jiang Dong and Xian Xian Zhao

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Movie Legend

Movie 1:  the windsock SOVA swung into the right atrium and the right ventricle during different phases of the cardiac cycle. Best viewed with Windows Media Player.

Movie 2:  An aortic angiogram confirmed the presence of the giant windsock SOVA. Best viewed with Windows Media Player.

Movie 3:  The aneurysm was shown to have been resolved completely. Best viewed with Windows Media Player.

Movie 4:  A repeated aortic angiogram confirmed that the giant SOVA had disappeared. Best viewed with Windows Media Player.