Case Report

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Transcatheter Closure of Ruptured Sinus of Valsalva Aneurysm: Early Experience from Nepal

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Abstract

Background: Ruptured sinus of Valsalva aneurysm (RSOV) is a rare but potentially life-threatening condition traditionally managed with surgery. Transcatheter closure (TCC) has recently emerged as a less invasive alternative.

Case Summary: We report two adult patients; a 27-year-old male and a 48-year-old female, with RSOV arising from the non-coronary sinus and rupturing into the right atrium. Both presented with palpitations and dyspnea. Multimodality imaging confirmed the diagnosis. TCC was successfully performed using a Cera duct occluder in the first case and a Cocoon duct occluder in the second. Post-procedure imaging showed optimal device position, preserved aortic valve function, and no significant residual shunt, with no procedural complications.

Conclusion: Transcatheter closure of RSOV is a safe and effective alternative to surgery in selected patients.

Keywords: Ruptured of sinus of Valsalva aneurysm; Transcatheter closure; Surgical closure of Ruptured of sinus of Valsalva

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Introduction

Ruptured sinus of Valsalva aneurysm (RSOV) results in heart failure, and is associated with a poor prognosis and high mortality rates if left untreated.[1] Surgical repair has remained the standard treatment for since 1956.[2] In recent years, the transcatheter Closure (TCC) of RSOV has emerged as a viable, less invasive alternative to surgery.[3] We report two cases of RSOV successfully treated with TCC at our center.

Case 1

Clinical Presentation

A 27-year-old male, apparently well until 5-6 months prior to presentation, presented with palpitations, shortness of breath, and chest heaviness. He was initially treated in a local hospital and was subsequently referred to our center because of persistent symptoms. During the presentation, the patient was comfortable and in fair general condition. Pulse was regular and 72 beats/min. Blood pressure was 130/70 mmHg. Cardiovascular examination revealed: normal precordium, audible first and second heart sounds, continuous murmur, more prominent during diastole. The systemic examination was unremarkable. Transthoracic echocardiography (TTE) revealed: RSOV from non-coronary sinus draining into the right atrium, trivial mitral regurgitation, mild tricuspid regurgitation, mild pulmonary arterial hypertension and preserved biventricular systolic function. Transesophageal echocardiogram (TEE) confirmed the diagnosis,

The aortogram confirmed RSOV with defect size (waist) of 9.8 mm. During the procedure arteriovenous loop was established by snaring the guidewire from the right superior venacava. A Cera™ duct occluder (14/16 mm) was successfully deployed under fluoroscopic and TEE guidance. Post-deployment angiography and TEE demonstrated optimal device position, no residual shunt, free movement of aortic cusps with no evidence of aortic regurgitation.

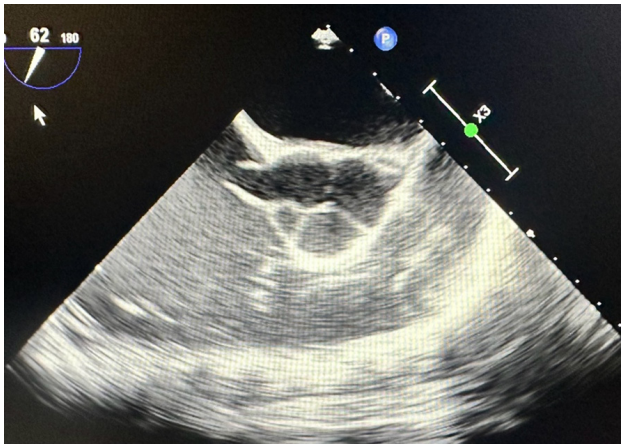

Figure1. *2 D TEE showing RSOV*

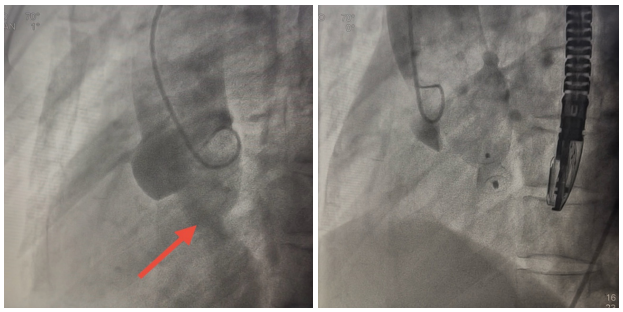

Figure 2. *Aortogram showing RSOV with waist (red arrow). (B) RSOV was occluded by a PDA device (cera™ duct occluder 14/16)*

Case 2

A 48-year-old female presented with palpitations and shortness of breath. Echocardiography at the referring center revealed a ruptured sinus of Valsalva aneurysm, and she was referred for further management. She had no significant past medical history, including hypertension, and no family history of cardiac disease. The patient was comfortable and in fair general condition with a pulse of 84 beats/min, regular, blood pressure: 100/70 mmHg and no radio-radial or radio-femoral delay. Cardiovascular examination showed normal precordium, normal heart sounds, and continuous murmur. The systemic examination was unremarkable. Transthoracic Echocardiography revealed the Ruptured sinus of Valsalva aneurysm (non-coronary sinus to right atrium). Preserved biventricular systolic function. A CT revealed the RSOV from non-coronary sinus to the right atrium as shown in Figure 3. Aortography revealed the defect size (waist) of 10.2 mm. During the procedure, an arteriovenous loop established via right superior venacava. TCC was performed using a Cocoon™ duct occluder (14/16 mm) under fluoroscopic and TTE guidance. Post-procedure imaging demonstrated: Optimal device position, tiny residual shunt, free movement of aortic cusps and no aortic regurgitation.

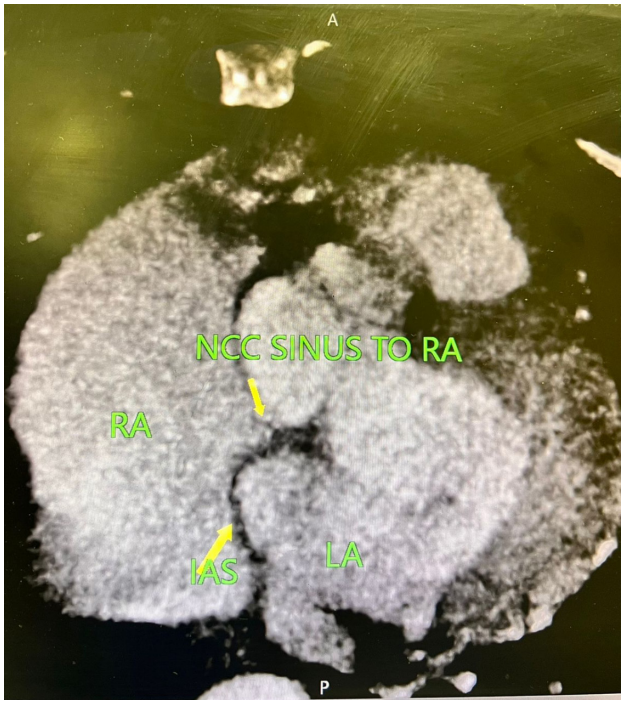

Figure 3. *CT angiographic image showing the ruptured sinus of Valsalva aneurysm arising from the non-coronary sinus into the right atrium.*

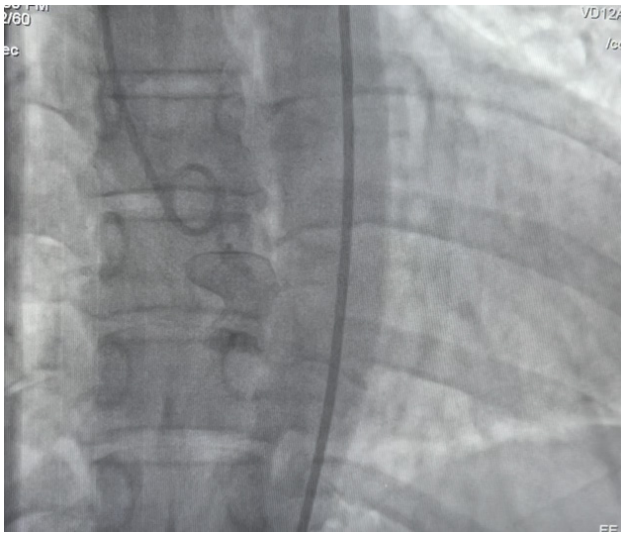

Figure 4. *Cocoon™ duct occluder 14/16*

Written informed consents were obtained from the patients for publication of these case reports and accompanying images."

Discussion

Surgical repair with patch closure under cardio-pulmonary bypass used to be the conventional treatment in RSOV.[4] Even though the mortality following surgical closure is low (<2%), potential morbidity from cardiopulmonary bypass and thoracotomy are underlying hazard.[4,5] Hemodynamically unstable patients with multi-organ dysfunction [5,6] are at high risk for surgical procedures.

The first report on the TCC of RSOV was published by Cullen et al. in 1994 using a Rashkind umbrella device.[7] Several case reports and case series related to this technique have been reported with encouraging follow-up results, and percutaneous closure has been an attractive alternative to surgery in appropriately selected patients.8 Surgically treated patients remain at risk of prolonged hospital stays and postoperative complications such as chest pain and septicemia, making percutaneous device closure an attractive alternative.[1] Although surgery is the gold standard, percutaneous TCC has now become equally efficacious and brings with it fewer complications.[9]

The technique of transcatheter closure of RSOV is like device closure of a peri-membranous VSD; the defect is located just above the aortic valve instead of below. Sizing the defect can be done by angiographic measurement, and/or periprocedural echocardiography with color doppler interrogation, which helps in device selection (2-4 mm larger than the aortic end). However, an echocardiogram also gives additional information about its neighboring structures, namely the aortic valve, tricuspid valve, and right ventricular outflow tract, and it does the periprocedural monitoring of acute aortic and tricuspid regurgitation, and residual shunting.

TCC can be associated with complications, which include device embolization, impingement on the aortic valve causing aortic regurgitation, occlusion of coronary ostia, and infective endocarditis.[10] Residual shunting and severe hemolysis requiring repeat intervention and eventual surgery have been described.[10]

Limitations

This report describes only two cases, which limits the generalizability of the findings and precludes meaningful statistical analysis. The case series only addressed the procedural outcome.

Conclusion

Transcatheter closure of a RSOV is a safe and effective alternative to surgical repair in carefully selected patients. Our experience demonstrates successful closure with excellent immediate outcomes.

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