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Combined Approach for Postinfarction Ventricular Septal Defect Treatment: A Case Report

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ABSTRACT

Postinfarction ventricular septal defect is an uncommon condition with a poor prognosis. We report a case of successful early percutaneous closure of postinfarction ventricular septal defect using an occluder device followed by delayed off-pump revascularization.

INTRODUCTION

Postinfarction ventricular septal defect (VSD) is a relatively uncommon condition. VSD develops in about 0.2% of patients with acute myocardial infarction (MI) [Crenshaw 2000]. Even with improved surgical techniques and medical management, this complication has a poor prognosis. Thirty-day mortality is close to 50% for patients managed surgically and 94% for those managed medically [Crenshaw 2000]. Percutaneous closure of postinfarction VSD is now a third option, but clinical experience with this approach is minimal. We report a case of successful percutaneous closure of postinfarction VSD with an Amplatzer muscular VSD PI occluder (AGA, Golden Valley, MN, USA) followed by a delayed off-pump coronary artery revascularization 3 weeks later.

CASE REPORT

An 81-year-old woman, known to have hypertension and hypothyroidism, was referred to our center for management of an acute postinfarction VSD. Three days earlier, she had sustained an inferior MI; due to delayed presentation, thrombolysis was precluded. Her case was further complicated by congestive heart failure, mild acute renal failure, and bifascicular block and a 7-8 mm inferior VSD. On admission, she was relatively stable with a blood pressure of 110/67 mmHg, a pulse rate of 110/minute, and a grade 3/6 pansystolic murmur at the left lower sternal border with radiation to the axilla. The next day, her hemodynamic status was the same, and transthoracic echocardiography confirmed an ischemic inferior VSD with moderate left-to-right shunting (Figure 1). Because of the priority state and the advanced age of the patient, we chose a percutaneous approach as a permanent treatment or a bridge toward surgical repair.

Cardiac catheterization and coronary angiogram were performed through the right femoral vein (7F sheath) and artery (6F sheath). An 8-mm inferior VSD with pulmonary blood flow/systemic blood flow of 1.7:1 and a cardiac index of 1.37 L/min per m^2 was found. Mean pulmonary wedge pressure was 16 mmHg. Coronary angiogram showed a diffuse triple-vessel disease with complete occlusion of the right coronary artery. Therefore, no coronary angioplasty was performed. Transesophageal echocardiography, used to monitor the procedure, confirmed the 8 × 11 mm inferior VSD. While the patient was under general anesthesia, a catheter was advanced through a transeptal and right internal jugular vein approach, up to the pulmonary artery after crossing the VSD. A 0.035 inch × 260 cm Super Stiff exchange guidewire (Boston Scientific, Maple Grove, MN, USA) was advanced in the pulmonary artery and a 10F Del system 45/80-cm long sheath was introduced in the right ventricle. Finally, under transesophageal echocardiography guidance, an Amplatzer muscular VSD postinfarction occluder (20-mm waist) was delivered (Figure 2). The right-sided disc was opened in the right ventricle and then the left-sided disc in the left ventricle. No residual shunting was found (Figure 3). At the end of the procedure, an intra-aortic balloon was installed in the right femoral artery.

For the next few days and weeks, the patient was hemodynamically stable and the TTE did not show any residual shunting. She developed only transitory grade 2/4 mitral and tricuspid insufficiencies and iatrogenic thrombosis of the right femoral artery. One month after the procedure, she underwent a triple-vessel off-pump coronary artery bypass surgery. This complete revascularization was successfully done without any complications. The mitral insufficiency was no longer present. She was then discharged on aspirin and

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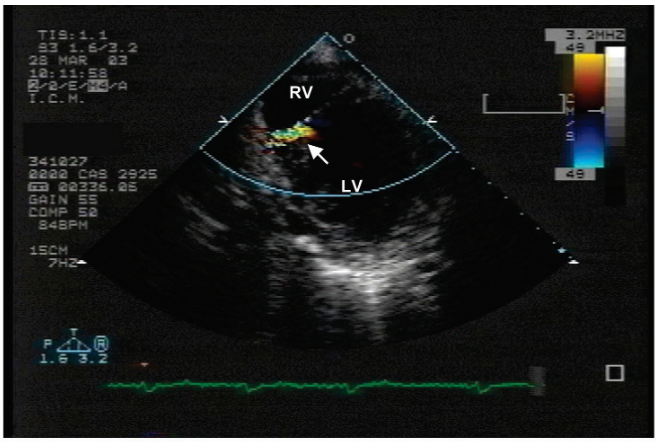

Figure 1. Transthoracic echocardiography showing a dual-chamber view of the heart with the ventricular septal defect (arrow). RV indicates right ventricle; LV, left ventricle.

ticlopidine. A year later, she successfully underwent an elective right ilio-femoreal thromboendarterectomy, and 2 years later she is still doing well and is in New York Heart Association functional class I.

DISCUSSION

Due to the high mortality and morbidity associated with postinfarction VSD, percutaneous closure is an attractive approach. The timing of the intervention is the key to this approach. Close to 75% of patients survive the first 24 hours, but only 50% will survive the first week [Sanders 1956; Oyamada 1961]. In recent years, many centers, including ours, have been tempted to manage this complication conservatively. In most cases, the patient was managed medically and with intra-aortic balloon catheterization during the first few weeks. Only a few survivors would undergo surgical repair after these weeks. This conservative philosophy can be explained by the poor results and technical difficulties associated with early surgical repair. We concede that surgical success was improved by delaying the intervention because of the scarring maturation of necrotic tissues surrounding the VSD. However, this delay significantly reduces the number of surgical candidates, with the most unstable patients deceasing before surgical treatment.

Early repair should be considered each time postinfarction VSD is encountered, even though intervention is more challenging. The decision to use a percutaneous approach should be based on the size of the VSD and the age of the patient. Percutaneous closure was considered in this case because of the patient's advanced age and the surgical risk to the patient. Currently, the AGA device is available in waist sizes varying from 16 to 24 mm and requires a 9F or 10F sheath for delivery. Taking that into account, device closure is performed in cases where VSD are ≤14 mm. We do not allow more than a 10-mm difference between the waist and the VSD sizes, because in early intervention we assume that further extension of necrotic tissues loss surrounding the VSD will occur. Each disc of the Amplatzer device gives an extra 10 mm in relation to the waist size. In case of residual shunting, delayed definitive surgical repair can be performed. For a VSD larger than 14 mm, early surgical repair should be considered [David 1995, 1998].

Device closure in postinfarction VSD is indicated when there is an expectation of definitive correction, when the goal is a bridge to definitive surgical repair, and when the closure can offer a permanent alternative to primary surgery. In cases where the closure is definitive treatment, correction of the underlying coronary artery disease should be done. Either percutaneous coronary artery angioplasty or surgical coronary artery bypass are the current options. We opted for off-pump coronary artery bypass to minimize surgical trauma in this octogenerian patient.

To our knowledge, this is the first reported case of combined noninvasive closure and off-pump bypass for the treatment of postinfarct VSD. More experience is needed to fully assess the potential and the risk of this technique, but

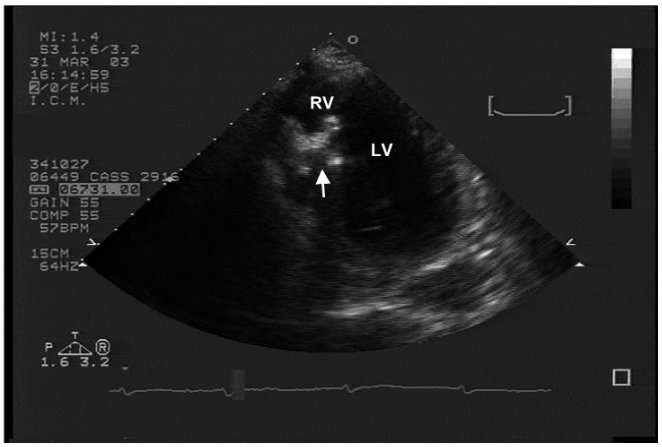

Figure 2. Transthoracic echocardiography showing a dual-chamber view of the heart with the ventricular septal defect occluder in place (arrow). RV indicates right ventricle; LV, left ventricle.

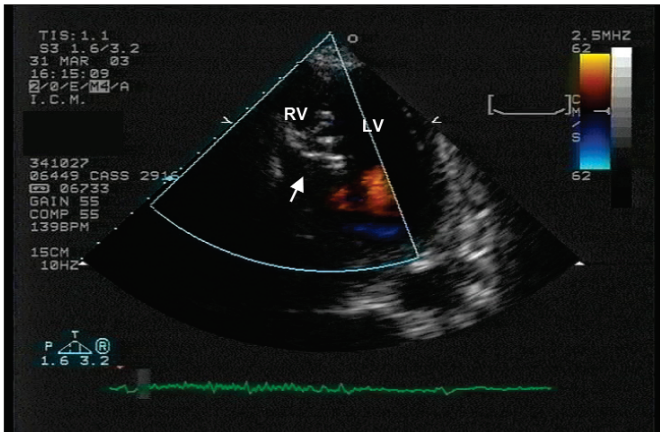

Figure 3. Transthoracic echocardiography showing a dual-chamber view of the heart with the ventricular septal defect occluder in place (arrow) and the disappearance of the shunt. RV indicates right ventricle; LV, left ventricle.

for selected high-risk patients this technique clearly offers potential benefits.

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