



A Rare Case of Device Closure in a Patient with Residual Shunt Following Surgical Patch Repair for Ventricular Septal Rupture

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

The incidence of ventricular septal rupture (VSR) following ST elevation myocardial infarction has decreased from 1-3% in the pre-reperfusion era to 0.17-0.31% after the advent of primary percutaneous coronary intervention. Surgical repair is the definitive treatment strategy, but is associated with the highest mortality rates amongst all cardiac surgeries (42.9%). The incidence of a residual shunt is also very high (23.7% to 34%). There is often a dilemma in the management of patients with a significant residual shunt and a high risk for a second surgery. We report the case of a patient with post myocardial infarction VSR who had a significant residual shunt after surgical patch repair and was successfully treated by device closure.

Keywords: Ventricular septal rupture; surgical patch repair; residual shunt; ventricular device closure.

1. INTRODUCTION

Ventricular septal rupture (VSR) is one of the most dreaded complications of acute myocardial infarction (MI). Though its incidence has fallen from 1-3% in the pre reperfusion era to 0.17-

0.31% following primary percutaneous coronary intervention (PCI), the mortality still remains very high (20-42.9%) despite advances in therapeutic strategies [1-3]. The optimal timing of surgical repair is important. The mortality rates fall from 54.1% for surgical repair within 7 days of MI to

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18.4% after 7 days [1]. Due to the friability of the infarcted tissue, the incidence of residual shunt despite patch repair is 23.7% to 34% [4,5]. Most patients are then found to be at high risk for a second surgery and aggressive medical management is adopted. But, in a subset of patients, the shunt fraction increases leading to deterioration of the patient condition. Device closure is a suitable therapeutic strategy in such significant residual shunts.

2. CASE REPORT

We report a case of 56 year old lady, with diabetes mellitus and hypertension for the past four years, who presented with acute anterior wall ST elevation MI. She was thrombolysed with tenecteplase within a window period of 6 hours. She was in Killips Class I with poor ST resolution. The next day she was found to have a pansystolic murmur (PSM) at the left lower sternal border and transthoracic echocardiography (TTE) confirmed the presence of an apical VSR of size 8 mm with a gradient of 59 mm of Hg. It also revealed anterior wall hypokinesia with good left ventricular (LV) function. She was stabilized medically and subjected to coronary and LV angiography. She had single vessel disease with left anterior descending (LAD) coronary artery showing mid discrete tight 90% stenosis followed by diffuse disease in the distal LAD. She was taken up for surgery on the 7th day after the occurrence of VSR. An apical VSR of size 8 × 8 mm with unhealthy margins was found intra-operatively. A double velour dacron patch repair of VSR was done with interrupted pledgeted sutures. The LAD was grafted with a saphenous vein graft. Perioperative transesophageal echocardiography (TEE) revealed no residual shunt. Eight hours after the surgery, a faint PSM reappeared in the left lower sternal border. TTE at that time showed a 3.6 mm mid septal residual VSR. As the patient was stable, she was extubated on 2nd postoperative day. On the 11th postoperative day, she had acute pulmonary oedema with cardiogenic shock. The intensity of the PSM had increased. TTE revealed the residual VSR had increased to a size of 6 mm. Further management strategy was discussed in the heart team. Due to the high risk for a second surgery, repair. In any VSR, if the shunt is not reduced by at least two-thirds, the patient is unlikely to survive to discharge [6]. The challenges in device closure of a residual shunt include patient related factors and technical issues. The patients are usually fragile, often in cardiogenic shock with the contrast load contributing further to renal

ventricular septal device closure under general anaesthesia (GA) was decided as the optimal intervention. Under GA, her right femoral artery (RFA) and right internal jugular vein (RIJV) were accessed with 6F sheaths. A 6F pigtail catheter (Translumina, New Delhi, India) was placed in the LV via the RFA and the LVEDP was recorded as 25mm of Hg. An oximetry run was not done due to clinical instability. A 6F JR guide catheter (Medtronic, Minneapolis, Minnesota, USA) was introduced into the LV and an exchange length Terumo wire (Terumo Europe N.V., Leuven, Belgium) was passed through the VSR into the right ventricle (RV) and then into the left pulmonary artery. A multipurpose A (MPA) (Translumina, New Delhi, India) catheter was introduced through the RIJV and was passed into the left pulmonary artery. A goose neck snare (Medtronic, Minneapolis, Minnesota, USA) was then introduced through the MPA catheter and the exchange length terumo wire was snared and externalized through the RIJV thus creating an arterio-venous loop. The 6F sheath in the RIJV was removed and a 10F Mullins trans septal introducer sheath (Medtronic Europe, Tolochenaz, Switzerland) was introduced over the wire into the RV and then into the LV through the VSR. A 16mm HeartR™ Lifetech VSD Occluder Device (Lifetech Scientific, Shenzhen, China) was introduced through the Mullins sheath into the LV and under TTE guidance the LV disc was deployed. With mild tug on the system, the RV disc was also deployed. After confirming no residual shunt by both TTE and a hand injection through the 6F JR catheter, the device was released. A final injection with a pigtail catheter in the LV showed no residual shunt. She successfully came out of GA and her vasopressor supports were slowly tapered and stopped. Her post procedure TTE showed no residual shunt, moderate LV dysfunction with an ejection fraction of 40%. She went home walking on the 7th post device closure day. She has been under close follow up for the past two years and is presently at functional class II, comfortably carrying out all her routine activities.

3. DISCUSSION

Ventricular device closure is a suitable option for patients with residual shunt after surgical patch dysfunction and acidosis. The technical difficulty of the procedure is increased by the partially dehisced patch as the wire can get trapped in blind-ending pockets created by the dehisced patch [6]. But we felt, that device closure for residual shunts is a feasible option due to two reasons. Firstly, in this patient the device closure

was done on the 20th day after detecting the VSR, by which time the lysis and necrosis of the myocardium at rims of the defect may have ceased. Secondly, the presence of a patch with some sutures still attached to the myocardium will give added stability to the occluder device.

4. CONCLUSION

In view of the high mortality of patients with a significant residual shunt (43.75%)⁴, this option of device closure should be carefully weighed against the risk of a redo surgery and favored if the latter is found to be of high risk.

CONSENT

It's not applicable.

ETHICAL APPROVAL

It's not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Goyal A, Menon V. Contemporary management of post-MI ventricular septal rupture. J Am Coll Cardiol; 2018.
2. Arnaoutakis GJ, Zhao Y, George TJ, Sciortino CM, McCarthy PM, Conte JV. Surgical Repair of Ventricular Septal Defect After Myocardial Infarction: Outcomes From The Society of Thoracic Surgeons National Database. Ann Thorac Surg. 2012;94(2):436-444. DOI: 10.1016/j.athoracsur.2012.04.020
3. Zhang R, Sun Y, Sun M, Zhang H, Hou J, Yu B. In-Hospital Outcomes and Long-Term Follow-Up after Percutaneous Transcatheter Closure of Postinfarction Ventricular Septal Defects. BioMed Res Int. 2017;2017:1-8. DOI: 10.1155/2017/7971027
4. Huang S-M, Huang S-C, Wang C-H, et al. Risk factors and outcome analysis after surgical management of ventricular septal rupture complicating acute myocardial infarction: a retrospective analysis. J Cardiothorac Surg. 2015;10(1):66. DOI: 10.1186/s13019-015-0265-2
5. Pang PY, Sin YK, Lim CH, et al. Outcome and survival analysis of surgical repair of post-infarction ventricular septal rupture. J Cardiothorac Surg. 2013;8(1):44. DOI: 10.1186/1749-8090-8-44
6. Calvert PA, Cockburn J, Wynne D, Ludman P, Rana BS, Northridge D, Mullen MJ, Malik I, Turner M, Khogali S, Veldtman GR. Percutaneous closure of postinfarction ventricular septal defect: in-hospital outcomes and long-term follow-up of UK experience. Circulation. 2014;129(23):2395-402.

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