Left Ventricular Aneurysmectomy and Repair of Post-infarct Ventricular Septal Defect with Concomitant Aortocoronary Bypass Grafting: A Video Presentation

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Abstract

Mechanical complications resulting from myocardial infarction usually have profound acute or chronic hemodynamic effects. Left ventricular aneurysm formation and ventricular septal rupture occurs in 10-20% patients after acute myocardial infarction [1-6]. Surgical techniques have gradually evolved since the first successful operation for post-infarct ventricular septal defect was performed by Cooley and colleagues in 1956 [2,3,6].

We present here-in a 65-year-old male patient diagnosed to have double vessel coronary artery disease (left anterior descending artery- 100% occlusion; first intramyocardial marginal branch of circumflex artery- 90% occlusion (1.5 mm diameter) and post infarct ventricular septal defect with inferior left ventricular aneurysm and unstable hemodynamics. The patient underwent double vessel aortocoronary saphenous vein bypass grafting, Dacron patch closure of the ventricular septal defect and linear Teflon felt supported left ventricular repair. Postoperative recovery was uneventful. No intra-aortic balloon counter pulsation was required.


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Surgical Technique

1. The great saphenous vein is harvested from the left leg for the purpose of coronary revascularization. The left internal mammary artery was not harvested for extreme sternal osteoporosis and severe chronic obstructive pulmonary disease.
2. Following median sternotomy, the thymus is sub totally excised taking care not to expose the brachiocephalic vein.

3. The pericardium is opened in the midline in between stay sutures using scissors, and not cautery to avoid inadvertent cautery-induced ventricular fibrillation on a distended, poorly contractile cardiac chambers.

4. The operation is performed with moderately hypothermic cardiopulmonary bypass using angled venous cannulas into superior and inferior caval veins and aortic cannulation.

5. The main pulmonary artery is being vented to facilitate cardiac decompression and prevent intraoperative soiling of blood through coronary arteriotomy.

6. The right pleural cavity is widely opened for later dislocation of the cardiac mass to facilitate exposure and prevent compression injury to the necrotic ventricular mass.

7. Following aortic cross-clamp, myocardial protection is achieved by administration of cold hyperkalemic blood cardioplegia administered through the aortic root, additional graft cardioplegia and topical ice-cold saline.

8. The reversed saphenous vein is anastomosed to the left anterior interventricular coronary artery and intramyocardial first marginal artery using 7-0 polypropylene sutures (Johnson and Johnson Ltd., Ethicon, LLC, San Lorenzo, USA).

9. A laparotomy pack is placed behind the heart with the pulmonary artery vent on suction to facilitate exposure. The apex and diaphragmatic surface of the heart is lifted up. The outlines of the ventricular infarct and ventricular aneurysm are identified.

10. The scarred myocardium overlying the apex and diaphragmatic surface of the left ventricle is identified and opened in between stay sutures without causing injury to the adjacent coronary arteries.

11. Laminated clot located within the trabecule of the left ventricle is carefully removed. The left ventricular cavity is thoroughly irrigated using cold saline.

12. Through the left ventriculotomy, the ventricular septal defect is identified and sized.

13. A slightly redundant over-sized Dacron polyester patch (Bard® Savage® filamentous knitted polyester fabric, Bard Peripheral Vascular Inc., Tempe, AZ, USA) is sutured to close the ventricular septal defect using 4-0 polypropylene sutures buttressed by medium sized Teflon felt pledgets. The intracavitary portion of the Dacron patch is being sutured till the level of the ventricular parietal margin.

14. Extreme precautions are taken on both the upper and lower ends of the defect. The sutures are tied ensuring perfect apposition and hemostasis.

15. Two Teflon strips are placed on two sides of the ventriculotomy, just to the right of the left anterior interventricular coronary artery.

16. Multiple interrupted horizontal mattress sutures of 3-0 polypropylene (Johnson and Johnson Ltd., Ethicon, LLC, San Lorenzo, USA) are used for the purpose of repair of the defects. The sutures are passed through the Teflon felt, the parietal wall of left ventricle, through the anterior portion of the ventricular septal patch and out through the opposite ventricular wall and Teflon felt strip ensuring no injury to the coronary arteries. Another long Teflon strip is placed over the raw edges of the ventriculotomy scar and
sutured over the same using the 3-0 polypropylene sutures.

17. Care is taken to avoid injury to the papillary muscles and the adjacent coronary arteries. After completing the repair and releasing the aortic cross-clamp, ensuring perfect hemostasis, proximal coronary anastomoses are performed on the ascending aorta using 6-0 polypropylene suture.

18. After coming off bypass, oximetry is performed between the right atrium and pulmonary artery to exclude residual ventricular septal defect. Additionally, transesophageal echocardiography demonstrated mild ventricular dysfunction and no residual ventricular septal defect. Postoperatively, the patient had mild left ventricular dysfunction, left ventricular ejection fraction (0.55) on dopamine 7.5 µg/kg/min and Adrenaline 0.1µg/kg/min. No intra-aortic balloon counter pulsation was used.

References


