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Original Article

# Postmyocardial infarction left ventricular dysfunction – Assessment and follow up of patients undergoing surgical ventricular restoration by the endoventricular patchplasty

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ABSTRACT

*Background:* Surgical ventricular restoration with endoventricular patchplasty improves left ventricular function and restores left ventricular shape.
*Method:* The study included patients who presented with transmural anterior myocardial infarctions between June 2007 and May 2008. Briefly the technique included – coronary revascularization, resection of the endocardial scar, left ventricular reconstruction using an endoventricular synthetic patch. Left ventricular geometric parameters were studied preoperatively, early postoperatively, at 3 and 6 months and statistically analyzed by SPSS 14 software package.
*Results:* The ejection fraction increased from 33.5 ± 5.02 to 37.77 ± 7.17 immediate postoperatively. The preoperative left ventricular ejection fraction – a mean of 33.25% (±5.02%), increased by 10.3%–11% at the third and fourth follow up respectively after surgical ventricular restoration ($p \leq 0.001$). The left ventricular end systolic volume index improved from a mean of 48.84 ± 11.37 preoperatively to 24.66 ± 5.92 postoperatively ($p \leq 0.001$).
*Conclusions:* Surgical ventricular restoration in our study has clearly demonstrated a positive effect on LV geometry.


## 1. Introduction

In ischemic cardiomyopathy, surgical remodeling is often combined with revascularization, mitral valve repair, and cardiac resynchronization therapy, along with arrhythmia prevention and other pharmacologic regimens, to provide a comprehensive therapeutic strategy for patients with this infirmity.[1] Myocardial regional or global dysfunction can persist after successful early reperfusion leading to adverse remodeling and clinical heart failure in a consistent number

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of patients.[2] Surgical ventricular restoration (SVR), with endoventricular patchplasty (EVPP) is an emerging technique and a safe and effective surgical option for postinfarction myocardial dysfunction. It results in improvement of left ventricular (LV) geometry, reduction in wall tension, and improvement in pump function, functional status and survival.[3] Numerous investigations have demonstrated the value of LV volume measurement at a single time-point and over time in predicting clinical outcomes in patients with heart failure and in those after myocardial infarction.[4] Considering the ischemic cardiomyopathy, we undertook to study the clinical and hemodynamic benefits of surgical ventricular restoration by the endoventricular patchplasty in a sample of Indian subjects who had previous anterior myocardial infarction with left ventricular dysfunction.

## 2. Methods

### 2.1. Study population and study design

After due clearance from the Ethics Committee of the hospital, surgical ventricular restoration (SVR) using the endoventricular patch was performed in 59 consecutive patients (48 males) from June 2007 to May 2008,with previous transmural anterior myocardial infarction at a mean age of 56.3 (32–78) years. All the surgeries were done at our center – Vijaya Heart Foundation. Postinfarction LV dysfunction was present in most patients with a large akinetic or dyskinetic left ventricle in 20 and 32 patients, respectively. They were evaluated by history, detailed clinical examination, electrocardiogram, coronary angiography and echocardiographic documentation of the left ventricular geometric parameters.

Nine LV geometric indices were measured in all patients preoperatively, at discharge, at 3 months and 6 months. Trends in selected variables at 3 time intervals following EVPP were studied- Left ventricular ejection fraction (LVEF), LV end-systolic dimension, LV end diastolic dimension (Fig. 1), LV end systolic volume, LV end diastolic volume, LV end systolic volume index, LV end diastolic volume index (Fig. 2), wall motion score index and the diastolic sphericity index.[5]

The above mentioned indices were measured on Philips 5500 Echocardiographic machine by a single operator and the study was not blinded. Mean follow up in operative survivors was six months. Lost to follow up and death excluded 7 patients from this analysis. Hence, 52 patients comprised the final study. All the patients were on optimal doses of the standard therapy with betablockers, Angiotensin converting enzyme inhibitors or Angiotensin receptor blockers, antiplatelet agents and diuretics with individual dosage adjustments according to clinical parameters and renal function status, preoperatively as well as postoperatively.

#### 2.1.1. *Inclusion criteria*

1. Previous anterior myocardial infarction – by history, ECG, ECHO; 2. Significant ventricular dysfunction – LVEF $\leq$ 40% and LV end systolic dimension $\geq$ 40 mm; 3. Large akinetic or dyskinetic segments (more than 35% of LV mass); 4. LV dysfunction after myocardial infarction with symptoms of angina, congestive heart failure, or ventricular tachycardia.

#### 2.1.2. *Exclusion criteria*

1. Patients with grossly elevated Pulmonary artery pressures (MAP $\geq$ 50 mmHg); 2. Patients with associated comorbidities – like end stage renal disease, liver disease, stroke with residual paralysis; 3. Lost to follow up and very early deaths (within 5 days of surgery).

#### 2.1.3. *Definitions*

Dyskinetic LV segment: is defined as a segment displaying paradoxical motion without obvious protrusion from the LV outline; Akinetic LV segment: segment of the LV wall revealing loss of movement during systole, displaying 'nonparadoxical' motion; Anterior MI: All anterior, anterolateral and anteroapical myocardial infarctions with septal involvement; Preoperative assessment (Preop): preoperative status; Early postoperative: At discharge following surgery at day 7 or day

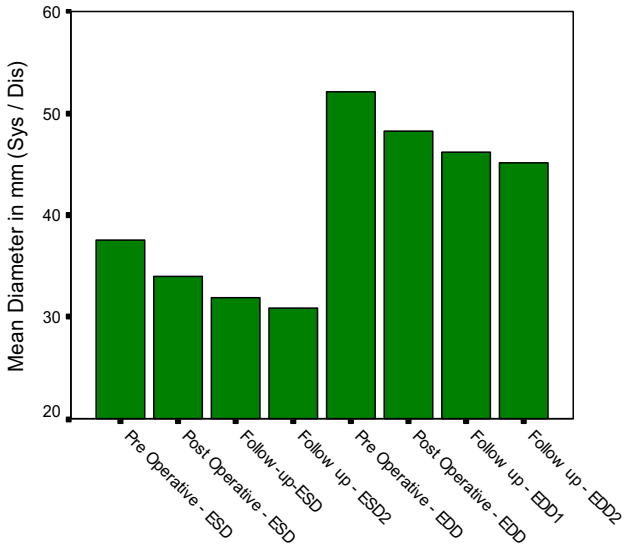


**Fig. 1 – LV diameter (systolic/diastolic).**

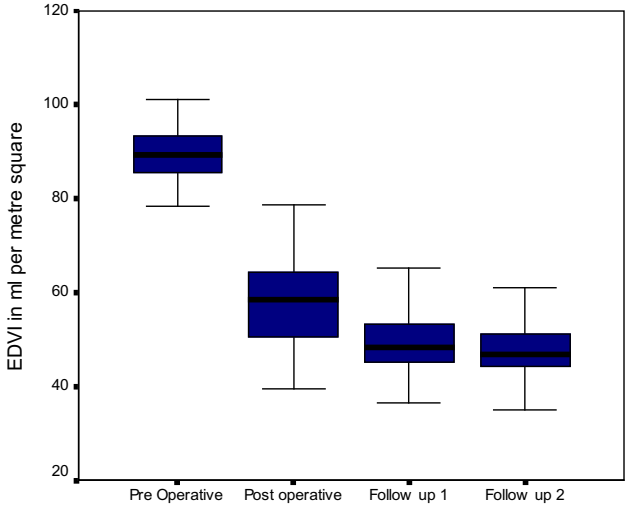


**Fig. 2 – LV end diastolic volume index.**