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Original Article

Echocardiographic parameters in clinical responders to surgical pericardiectomy – A single center experience with chronic constrictive pericarditis



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ABSTRACT

Background: Chronic constrictive pericarditis (CCP) is the end result of chronic inflammation of the pericardium. Developing countries continue to face a significant burden of CCP secondary to tuberculous pericarditis. Surgical pericardiectomy offers potential cure. However, there is paucity of echocardiography data in post-pericardiectomy patients vis-a-vis their clinical status. We studied the changes in multiple echocardiographic parameters in these patients before and after pericardiectomy.

Methods: Twenty-three patients (14 men, 9 women) who underwent pericardiectomy for CCP in the last 5 years (from January 2009 to December 2014) were subjected to detailed clinical and echocardiographic evaluation during the study period (between June 2013 and December 2014). Patients with residual symptoms of NYHA class II and below were considered as 'responders'. The data thus obtained were compared to the pre-operative parameters.

Results: After pericardiectomy, the incidence of vena caval congestion decreased from 100% to 15% ($p < 0.001$). There was significant reduction in the mean left atrial size from 39.33 ± 10.52 mm to 34.45 ± 10.08 mm ($p < 0.001$) and also the ratio of left atrium to aortic annulus from 1.93 to 1.69 ($p < 0.001$) among 'responders' to pericardiectomy. Septal bounce was observed to persist in 5 (25%) patients after pericardiectomy. There was significant respiratory variation of $39.23 \pm 15.11\%$ in the mitral E velocity before pericardiectomy. After pericardiectomy, this variation reduced to $14.43 \pm 7.76\%$ ($p < 0.001$). There was also significant reduction in the respiratory variation in tricuspid E velocities from $31.33 \pm 18.81\%$ to $17.35 \pm 16.26\%$ ($p < 0.001$). After pericardiectomy, the mean ratio of mitral annular velocities, medial e': lateral e', reduced from 1.08 to 0.87 ($p < 0.03$). The phenomenon of 'annulus reversus' was found to persist in 6 'responders', thereby reflecting a 50% reduction in its

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incidence after pericardiectomy ($p < 0.001$). The ratio of mitral E to medial e' (E/e') increased from 4.21 ± 1.35 before pericardiectomy to 6.91 ± 2.62 after pericardiectomy ($p = 0.001$).

Conclusion: Among clinical responders to surgical pericardiectomy, echocardiographic assessment revealed a significant reduction in vena caval congestion, LA size, ratio of LA to aortic annulus, septal bounce, respiratory variation in mitral and tricuspid E velocities, mitral annular medial e' and the phenomenon of annulus reversus. Also, there was a significant rise in minimum tricuspid and mitral E velocities and the E/e' ratio.

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1. Background

Chronic constrictive pericarditis (CCP) is an uncommon but disabling disease. It results from chronic pericardial inflammation and fibrosis. As many as 30–60% of patients with tuberculous pericarditis develop CCP as sequelae.¹ It is of substantial clinical interest because of the potential for surgical cure.² Pericardiectomy is the only accepted curative measure, which provides dramatic clinical improvement. However, there is paucity of Indian data on echocardiographic parameters vis-a-vis the clinical outcome in patients post-pericardiectomy. We assessed the echocardiographic parameters in these patients and compared it with their pre-procedural status.

2. Methods

2.1. Study population

Over an 18-month period from June 2013 to December 2014, we could access 23 patients who underwent pericardiectomy at the department of Cardiothoracic Surgery of our institute within the last 5 years and had adequate pre-procedural records. These patients were included in our study and underwent clinical and echocardiographic assessment during the study period. The pre- and post-pericardiectomy data thus obtained were compared.

2.2. Diagnosis of CCP

Presence of typical clinical, CT and echocardiographic findings was considered to be diagnostic of CCP (Table 1). Diagnosis was ultimately confirmed at the time of surgery in all patients. Cardiac catheterization was performed in three patients due to initial diagnostic ambiguity.

2.3. Clinical parameters

The clinical parameters considered in this study were the symptoms of dyspnea and fatigability as per the New York Heart Association (NYHA) classification, chest pain, edema, and ascites. The presence of clinical signs such as distended neck veins, Kussmaul sign, pulsus paradoxus, peripheral edema, and pericardial knock were also included in assessment. Patients having symptom class of NYHA II or below at

post-operative evaluation were considered as 'responders' to pericardiectomy.

2.4. Echocardiographic examination

Echocardiography was done at least 15 days pre-operatively in all patients and post-operatively over 3 months to 6 years (a median of 9 months). All patients had comprehensive evaluation on the Philips iE33 (Philips Medical Systems, Andover, MA, USA) commercially available echocardiography system using a 1.6 MHz transducer (S5-1, Philips Medical Systems, Andover, MA, USA). M-mode, 2D, pulsed wave (PW) Doppler, and tissue Doppler Imaging (TDI) interrogation were performed both before and after pericardiectomy. Left ventricle (LV) ejection fraction (EF) was calculated by 2D echocardiography with a modification of the method by Quinones et al.³ Right ventricular (RV) function was assessed by eye-balling and TAPSE (tricuspid annular peak systolic excursion). Mitral

Table 1 – Clinical and imaging features of chronic constrictive pericarditis.

Clinical
Ascites Precox
Peripheral odema
Easy fatigability
Dyspnea
Atypical chest pain
Engorged neck veins
Kussmaul sign
Prominent x and y descents of jugular venous pulse
Pulsus paradoxus (uncommon)
Apical retractions
Pericardial knock
Chest radiograph
Pericardial Calcification
Pericardial effusion
Echocardiography
Congested inferior vena cava without any respiro-phasic variation
Thickened or calcified pericardium
Septal bounce
Pericardial effusion
More than 25% expiratory increase in mitral inflow (E) velocity
Annulus reversus
Mediastinal CT
Pericardial calcification and thickness > 3–4 mm

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