

strain rate, Time to onset of relaxation by CAMM analysis and Post-systolic index. The cut offs for the above variables used were  $-15\%$ ,  $-1.00/s$ ,  $+1.00/s$ ,  $0.50$  ms and  $0.35$  respectively.

Systolic strain had the highest sensitivity to detect CAD in the region of LAD (positive predictive value  $-78.4\%$ , sensitivity  $-83.6\%$ ) followed by the RCA region (positive predictive value  $-78.7\%$ , sensitivity  $-89.5\%$  and LCX region (positive predictive value  $-78.4\%$ , sensitivity  $-84.7\%$ ). Similar trends were observed for the Systolic strain rate, Diastolic strain rate and CAMM analysis as well. Post-systolic shortening was present in  $54.8\%$  cases. However, true posts-systolic shortening as determined by Post-systolic index of more than  $0.35$ , was found in  $33.6\%$  cases and was  $100\%$  specific in localising CAD to a particular region.

CAMM analysis was superior to the other variables in localising CAD to the respective regional wall. For detection of CAD in LAD territory, the sensitivity, specificity, positive and negative predictive values of CAMM analysis were respectively  $-90.1\%$ ,  $81.3\%$ ,  $87.3\%$ ,  $85.3\%$ . Diastolic strain rate was the next variable with predictability higher than Systolic strain rate or Systolic strain. Similar trends were noted for detection of regional wall motion abnormalities in RCA and LCX territory as well. Similarly CAMM analysis had a high negative predictive value of  $98.5\%$  to rule out any obstructive CAD in a patient.

**Conclusion:** Longitudinal myocardial deformation has a good predictive value for diagnosing obstructive CAD. Systolic strain has the highest sensitivity for detecting obstructive CAD in LAD followed by RCA and LCX. CAMM analysis had a highest negative predictive value to rule out obstructive CAD.

## “Balloon-on-String Thrombus”: A previously undescribed entity



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**Introduction:** Anticoagulation with OAC/NOAC is the cornerstone in the management of deep vein thrombosis (DVT). IVC filter (IVCF) is indicated only for anticoagulation contraindication or failure; even in this situation, OAC is doubly important (if not contraindicated) in order to avoid thrombus formation within the IVCF. We report a rare case of successfully treated “Balloon-on-String” Thrombus (BOST) extending from the IVC filter into the Right atrium, popping across the tricuspid valve, with intermittent episodes of Pulmonary Embolism.

**Case report:** A 25 year obese woman with past history of left lower limb DVT during late pregnancy, was treated with OAC. One year later, she had recurrence of massive left lower limb DVT with pulmonary thromboembolism despite adequate anticoagulation. Gunther-Tulip optional IVCF was placed transrenally (in view of extension of thrombus in the infrarenal IVC) and OAC was continued. Extensive hypercoagulable workup was negative. She was asymptomatic for 3 years and then stopped her OAC voluntarily and lost to follow up.

She presented now with breathlessness and was diagnosed elsewhere to have right atrial myxoma. Echocardiography here revealed a large “ball-valve like” thrombus popping across the tricuspid valve with mild RA, RV dilatation and mild PAH. CT pulmonary angiogram revealed thrombus in bilateral lower lobe branches. CT IVGgraphy showed BOST, with the string attached distally to the apex of the IVCF & proximally attached precariously to the large  $7.5$  cm  $\times$   $6.8$  cm RA thrombotic mass.

In view of the high potential for thrombolytic detachment of the BOS thrombus with catastrophic consequences, careful surgical thrombectomy was done with good result. Postoperative echo showed no evidence of thrombus or PAH. She was discharged with advice for lifelong OAC.

**Conclusion:** Mostly, retrievable IVC filters are used nowadays. If the IVCF is needed to be left in-situ for any reason, the need for long-term OAC becomes doubly important as highlighted by this case. Also, a rare type of thrombus with “Balloon-on-String” appearance developed in this case, suggestive of the IVCF itself acting as the nidus. Surgical thrombectomy becomes the only option in such cases. Recurrent DVT & IVCF thrombus despite extensive hypercoagulable workup necessitates good long-term OAC & patient education.

## Prevalence & predictors of occult left ventricular diastolic dysfunction in elderly



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**Introduction:** Because the process of myocardial remodelling starts before the onset of symptoms, recent heart failure (HF) guidelines place special emphasis on the detection of subclinical left ventricular (LV) systolic and diastolic dysfunction and the timely identification of risk factors for HF. Our goal was to describe the prevalence and determinants (risk factors) of LV diastolic dysfunction in asymptomatic elderly population which is expected to have higher prevalence of diastolic dysfunction.

**Methods:** We evaluated 103 asymptomatic elderly populations at random in the LTMG Hospital, Mumbai from January 2015 to June 2015. For this we have included the patient's relatives who were beyond 60 years of age with LV Ejection fraction  $\geq 60\%$ . Patients with organic heart disease were excluded from the study. Data on demographics, baseline characteristics, and medical therapies was collected. In a randomly recruited population sample (n 103; 53.3% women; mean age, 67.9 years), we measured early and late diastolic peak velocities of mitral inflow (E and A), pulmonary vein flow by pulsed-wave Doppler, and the mitral annular velocities (Ea and Aa) at 4 sites by tissue Doppler imaging. Stata SE 13.1 was used to analyse data. Fishers Exact test was applied to test the relationship of categorised independent and dependent variables.

**Results:** In the study population of 103, overall prevalence of diastolic dysfunction was  $63.10\%$  with the number of subjects in diastolic dysfunction groups 1 (impaired relaxation), 2 (elevated LV end-diastolic filling pressure), and 3 (elevated E/Ea and abnormally low E/A) were 43 ( $41.74\%$ ), 18 ( $17.47\%$ ), and 4 ( $3.88\%$ ), respectively (Table 1). We used (Ar-A  $> 30$  ms) to confirm possible elevation of

Table 1

Echo parameters (mean)	Normal function N = 38 (36.89%)	Grade I N = 43 (41.74%)	Grade II N = 18 (17.47%)	Grade III N = 4 (3.88%)
LA (mm)	38.8	40.6	42.5	41.4
LV (mm)	50.3	50.7	50.5	48.5
IVS (mm)	9.6	10.4	10.8	12.2
PW (mm)	8.5	9.2	9.6	10.4
EF (%)	68.4	66	71.8	71.6
Epeak (cm/s)	78.3	53.8	81.3	63
Apeak (cm/s)	60.6	78.9	82.2	96.2
E/A	1.37	0.7	1.02	0.65
IVRT (ms)	98.3	114.9	108.5	107.1
Ea peak	12.7	8.28	7.8	5.94
Aa peak	10.2	12.1	10.5	11.6
E/Ea ratio	6.37	6.66	10.6	10.7

Table 2

	Normal diastolic function N = 38	Diastolic dysfunction N = 65	p value
Age (mean)	65	71	0.02
Male (n,%)	14 (36.84)	34 (52.30)	0.09
Smoker	7 (18.42)	29 (44.61)	0.05
Diabetic	15 (39.47)	39 (60)	0.03
Hypertensive	20 (52.63)	37 (56.92)	0.10

LV filling pressures in group 2. Only 38 (36.89%) patients had normal diastolic function. Predictors of diastolic dysfunction in elderly were identified as age >70 years ( $p = 0.02$ ), type 2 DM ( $p = 0.03$ ), smoking ( $p = 0.05$ ). Though we did not find any significant difference correlating diastolic dysfunction with sex ( $p = 0.09$ ), hypertension ( $p = 0.1$ ) (Table 2).

**Conclusions:** The overall prevalence of LV diastolic dysfunction in a random sample of an elderly population is as high as 63.10% with advanced age being the best predictor of diastolic dysfunction followed by diabetes mellitus and smoking, though gender and hypertension failed to predict the presence of diastolic dysfunction.

### Effect of danazol on cardiac, hematological, biochemical parameters and lipid profile in aplastic anemia patients



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**Objective:** Aim of the study was to study the side effects of danazol in aplastic anemia patients.

**Background:** Danazol is used occasionally for aplastic anemia in resource limited settings but studies focussing on its cardiac and metabolic effects in this subset are lacking.

**Methods:** Fifty patients of aplastic anemia were included in the study and were started on Danazol therapy. The primary outcome was change in cardiac functions, lipid profile, hematological and biochemical parameters. The follow up period was six months.

**Results:** (14,916.67 ± 10,365.81/cu mm to 22,083.33 ± 19,986.24/cu mm,  $p = 0.006$ ). Serum transaminase levels (SGOT and SGPT) ( $p = <0.001$  and 0.004), urea and creatinine levels ( $p = <0.001$  and  $<0.001$  respectively) increased significantly but were within clinically normal range. HDL showed a significant decline from 33.53 ± 10.06 mg% at baseline to 24.5 ± 7.87 mg% at 6 months ( $p = <0.001$ ) and LDL increased from 83.67 ± 23.3 mg% at start and 92.82 ± 26.55 mg% at 6 months; ( $p = 0.002$ ). Echocardiography showed increase in septal and posterior wall thicknesses of heart, LV mass ( $p = <0.001$ ) and ejection fraction ( $p = <0.001$ ). Doppler echocardiography at mitral inflow showed decreased Peak E-wave velocity ( $p = <0.001$ ) and increased A-wave velocity ( $p = 0.01$ ). Left atrial volumes increased significantly (for diastolic LA volume  $p = <0.001$ ) and pulmonary vein Doppler showed significant decrease in peak S-wave velocity ( $p = <0.001$ ). Tissue Doppler imaging showed significant decrease in peak Em-wave velocity of mitral annulus at septal wall level. Although E/Em ratio showed no significant increase at any level, be it septal, lateral, inferior, or anterior ( $p = 0.802, 0.172, 0.414, 0.604$  respectively). Danazol therapy was associated with improved platelet counts.

**Conclusion:** Use of danazol was associated with significantly improved platelet counts. Effect on lipid profile was deleterious. Renal and hepatic function were deranged but were within clinically normal range. There was an increased systolic cardiac function, increased LV mass and worsened diastolic function.

### Ruptured aneurysm of the mitral-aortic intervalvular fibrosa – A 3D echocardiographic depiction



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**Introduction:** Aneurysm of mitral-aortic intervalvular fibrosa (MAIVF) is a rare and potentially fatal complication of infective endocarditis. It usually occurs with native or prosthetic aortic valve endocarditis. This report describes a pseudo-aneurysm of the MAIVF rupturing into left atrium (LA) in a patient with double valve replacement with special reference to 3D echocardiographic imaging.

**Case report:** A 30 years old man presented to our outpatient department with complains of dyspnea on exertion of NYHA class II, for the past five years. He had undergone aortic and mitral valve replacement in 2004 and was admitted with septic shock due to infective endocarditis of prosthetic aortic valve in 2009. It recovered over a period of two months and he presented to our OPD with progressive dyspnea in 2014. On examination the pulse rate was 84 per minute and blood pressure 110/70 mmHg. Cardiovascular examination revealed pan systolic murmur at the apex and preserved prosthetic valve clicks. There was no clinical evidence of infective endocarditis.

Chest X-ray showed gross cardiomegaly with cardiothoracic ratio more than 80%. ECG showed atrial fibrillation with controlled ventricular rate and left ventricular hypertrophy. Two-dimensional transthoracic echocardiography (TTE) showed a pseudoaneurysm in the region of the MAIVF. No aortic or mitral regurgitation was noted on color flow imaging. Both prosthetic valves function was normal. There were no prosthetic valvular vegetations. Trans-esophageal echocardiography (TEE) color Doppler showed two color flow into LA through two separate openings. TEE using Xplane imaging with and without color Doppler confirmed the pseudoaneurysm in the region of MAIVF. Subsequent trans-esophageal three dimensional echocardiography (3D) showed a pouch like lesion in the region of the MAIVF protruding into the LA in systole and collapsing in diastole. It also demonstrated a rent in its wall and communication with LA causing a shunt in systole.

**Discussion:** The MAIVF is a small area which forms the junction between the left half of the noncoronary cusp and the adjacent third of the left coronary cusp of the aortic valve and the anterior mitral leaflet. It is a thin, fibrous and relatively avascular tissue, with predisposition to infection and abscess formation. The abscesses may subsequently rupture into the ventricle outflow tract and LA or organize into a pseudoaneurysm. The pseudoaneurysm can enlarge and compress left coronary artery causing angina or rupture to create a communication between LVOT and LA. When this occurs, the clinical picture resembles that of heart failure, as in our patient.

Echocardiogram remains the mainstay in the diagnosis of infective endocarditis and its complications. TEE is more superior to TTE in the detection of pseudoaneurysm of MAIVF. The sensitivity of TEE is about 90%. However, it is hard to differentiate a smaller pseudoaneurysm from an abscess. In this regard, a real-time 3-dimensional (3D) echocardiography provides useful information in understanding the anatomy. In our case, it clearly showed a pouch