

Cardiac tamponade, echo-guided pericardiocentesis

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Belgrade, October 23, 2010



European Heart Journal (2004) 25, 587–610



ESC Guidelines

Guidelines on the Diagnosis and Management of Pericardial Diseases Executive Summary

**The Task Force on the Diagnosis and Management of Pericardial
Diseases of the European Society of Cardiology**

Mechanisms of Disease

- Inflamed parietal pericardium rubs against pleura (**Pericarditis**)
- Accumulation of pericardial fluid exerts pressure on cardiac chambers (**Tamponade Physiology**)
- Thickened, +/- calcified pericardium restricts normal cardiac filling (**Constrictive Pericarditis**)
- Others (**neoplasms, cysts, etc**)

Acute Pericarditis

- Infectious
 - viral
 - tuberculosis
 - pyogenic bacterial
- Non-infectious

- Post-myocardial infarction
- Uremia
- Neoplastic disease
- Radiation induced
- Connective tissue diseases
- Drug induced

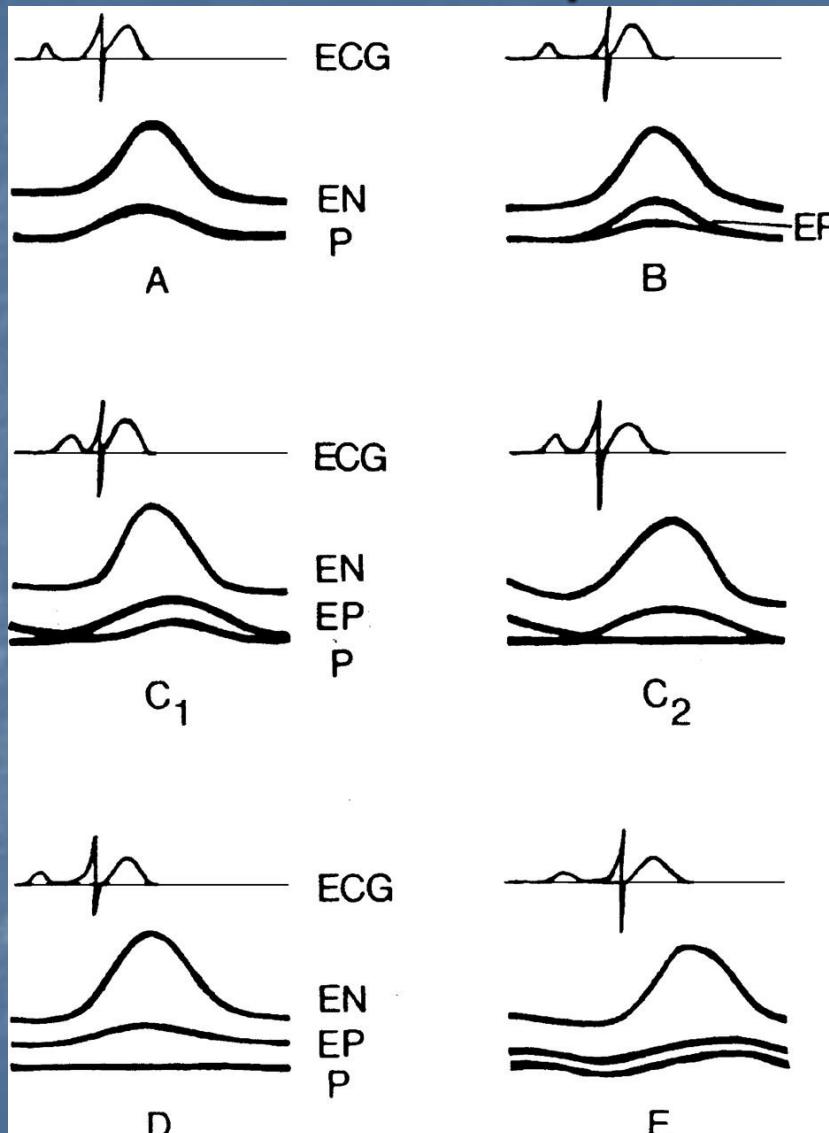
Pericardial Effusion

Echo Evaluation

- Size
- Location
- Loculation
- Consolidation or associated mass
- Hemodynamics
- Clearance for tap



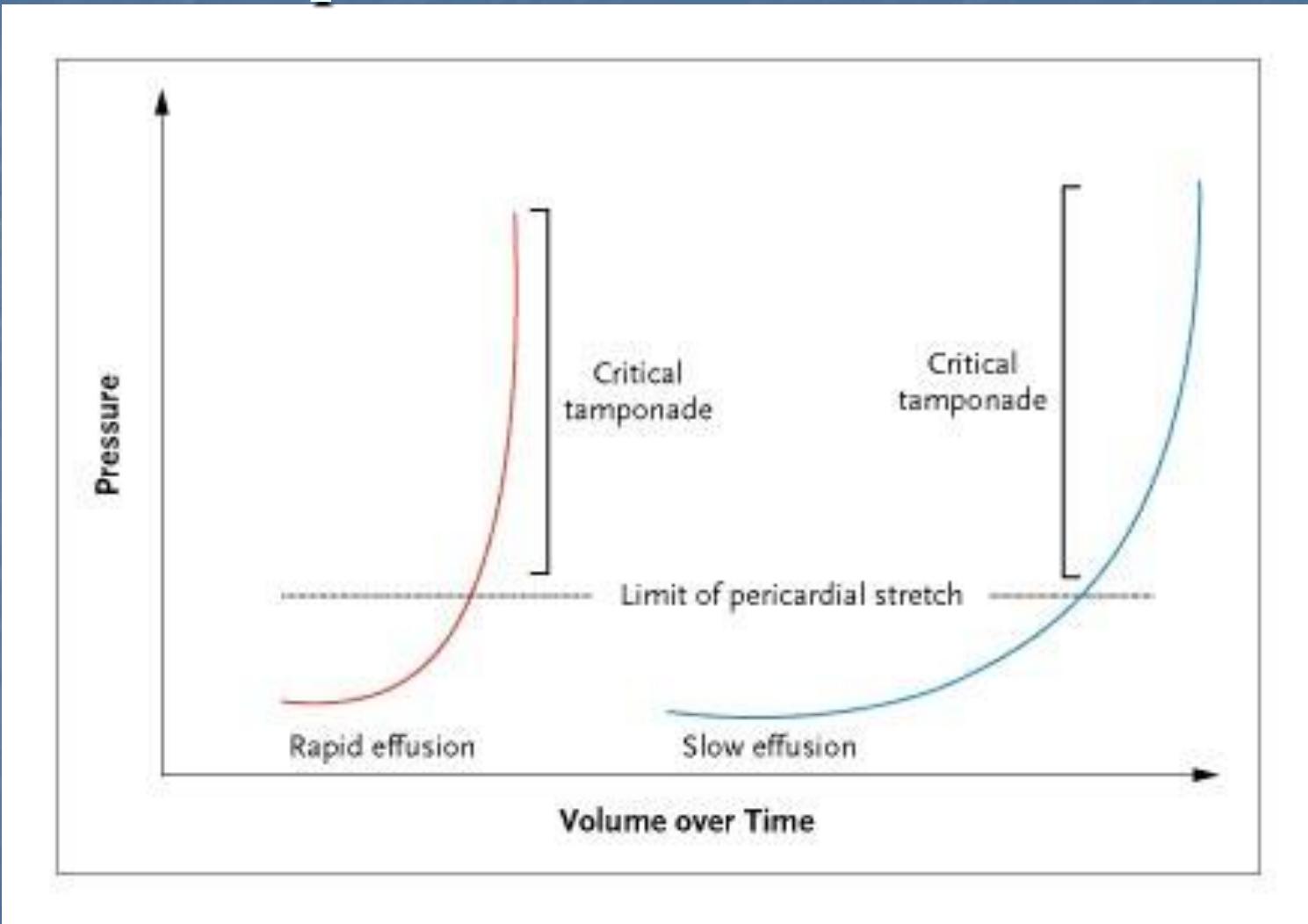
Horowitz classification of pericardial effusion



Task Force members, et al. Eur Heart J 2004 25:587-610

Difference in pericardial pressures

Rapid vs slow accumulation



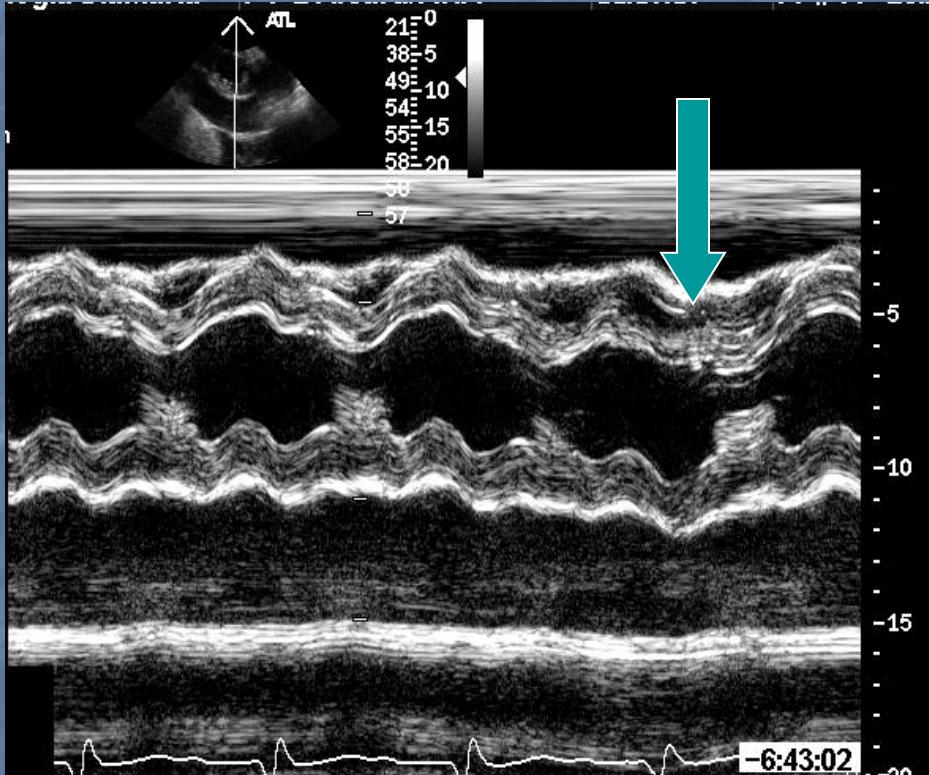
Spodick D. N Engl J Med 2003;349:684-690

Echocardiographic Diagnosis

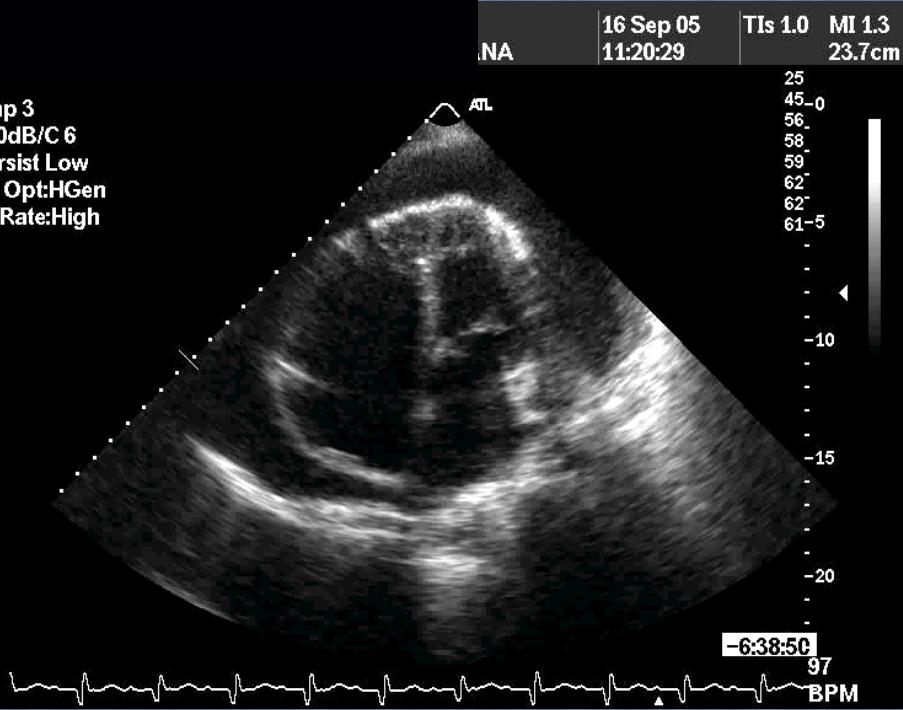
Cardiac Tamponade

- RA and RV diastolic collapse
- Swinging Heart
- Reduced chamber size
- Distended inferior vena cava with no respiratory changes
- Exaggerated respiratory variation of the mitral and tricuspid valve flow velocities

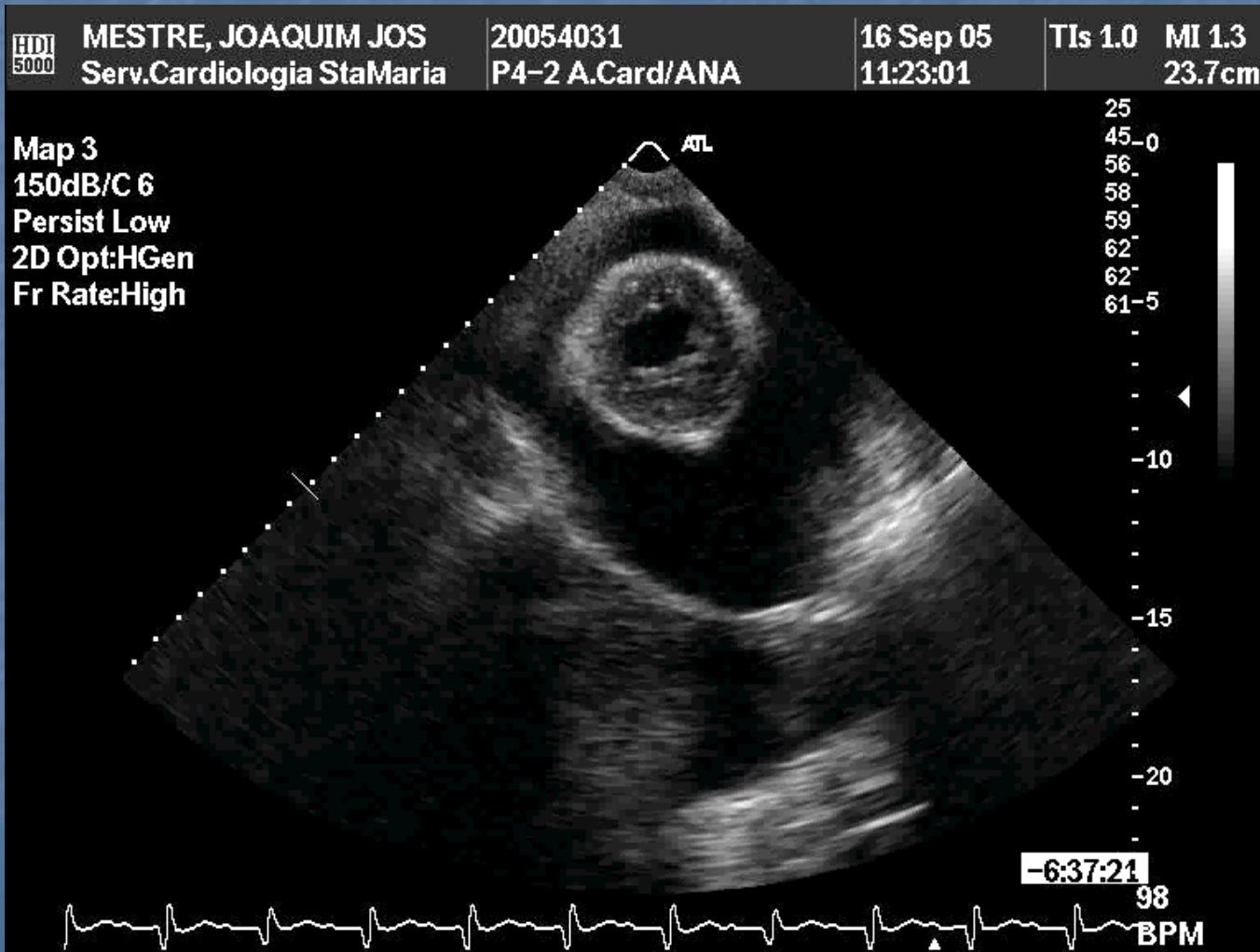
RV Diastolic Collapse



RA Collapse



Swinging Heart

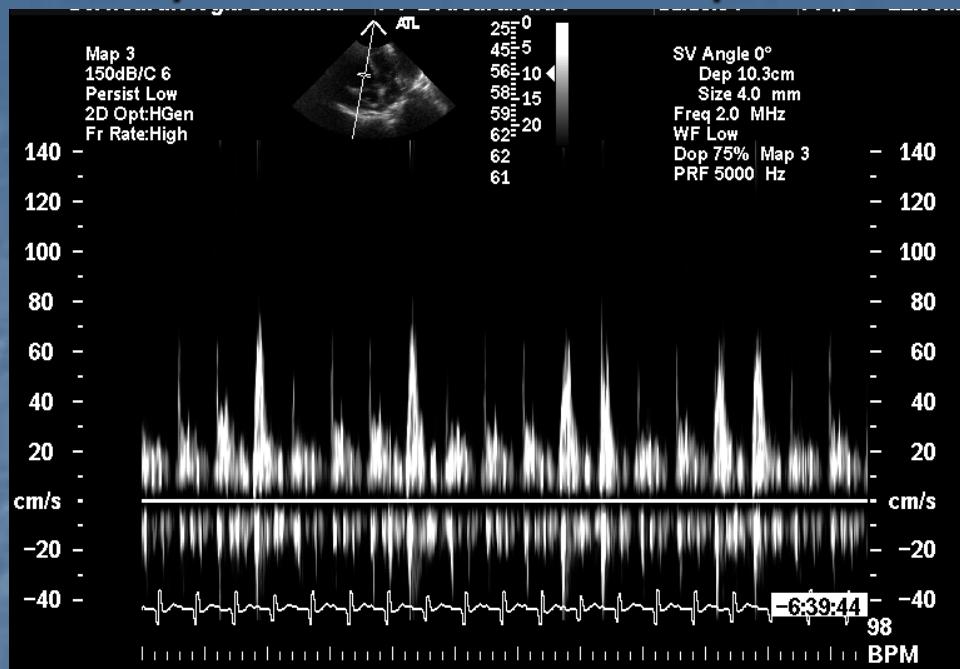


Echo signs of tamponade

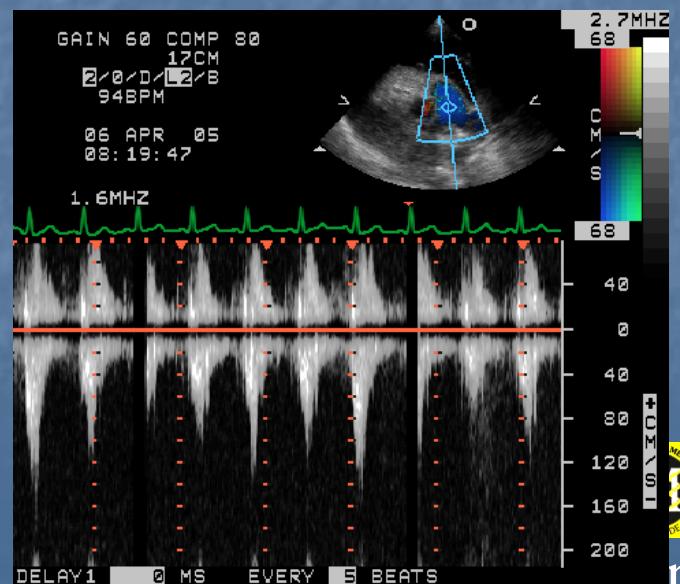
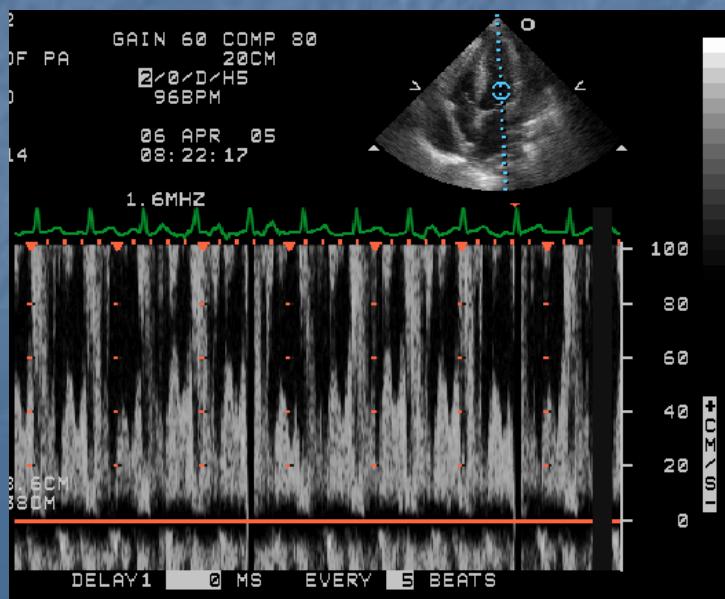
	Sensitivity	Specificity	PPV	NPV
RA collapse	55%	88%	10%	99%
RV collapse	48%	95 %	38 %	99 %
IVC dilation	97 %	66 %	7 %	99 %

Respiratory variation of tricuspid inflow > 50%

Respiratory variation of mitral inflow > 30%



Respiratory variation of pulmonary outflow > 30%



Imaging Findings in Pericardial Tamponade

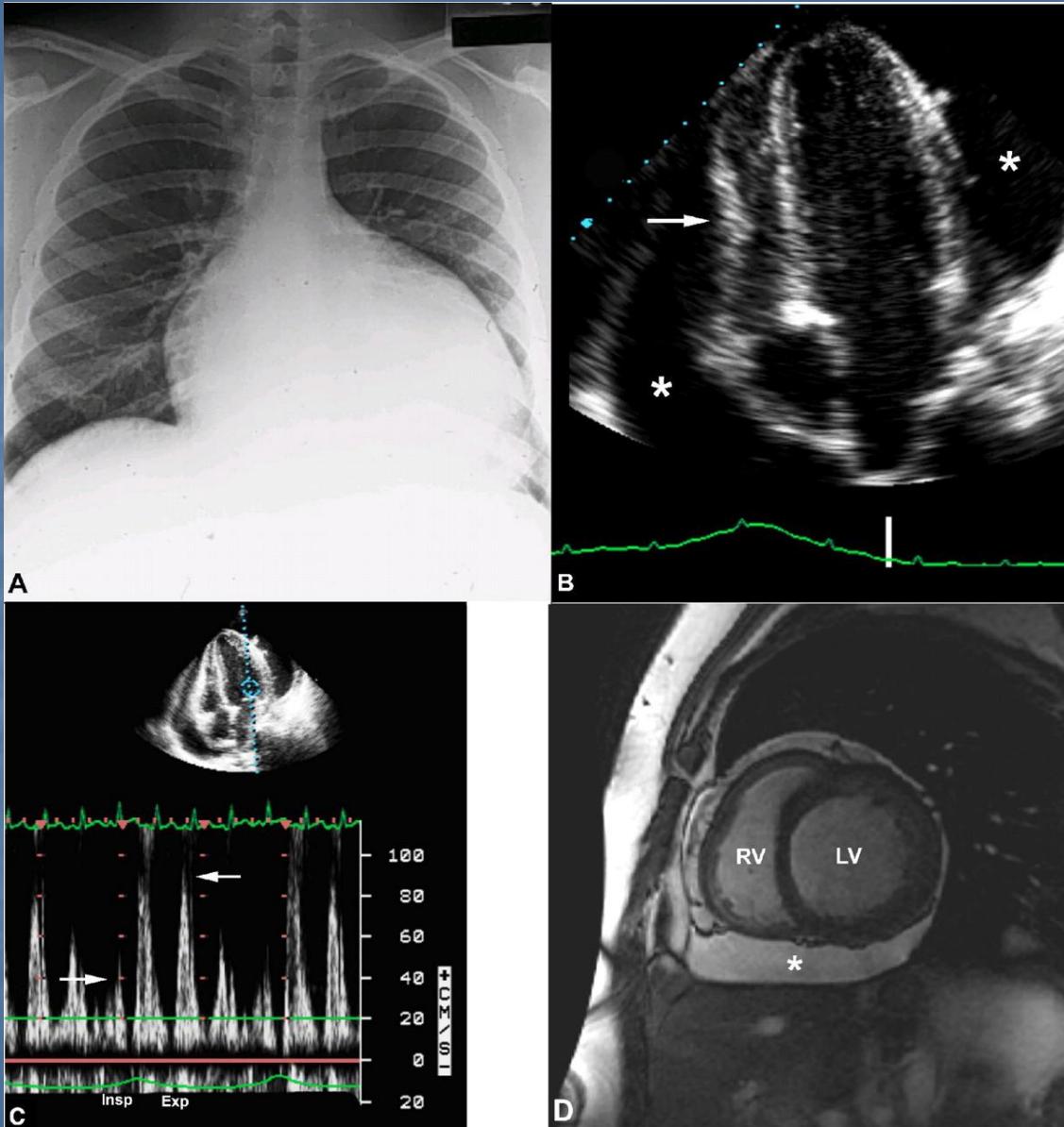


Table 1. Imaging Findings in Pericardial Tamponade

TTE

Pericardial effusion

RV collapse in diastole; right or left atrial collapse in systole

Respiratory variation in mitral (>25%) and tricuspid (>40%) inflow

Ventricular interdependence

Plethora of IVC

Prominence of diastolic reversals in hepatic veins by pulsed Doppler

CCT/CMR

Presence of pericardial effusion, even if loculated or localized

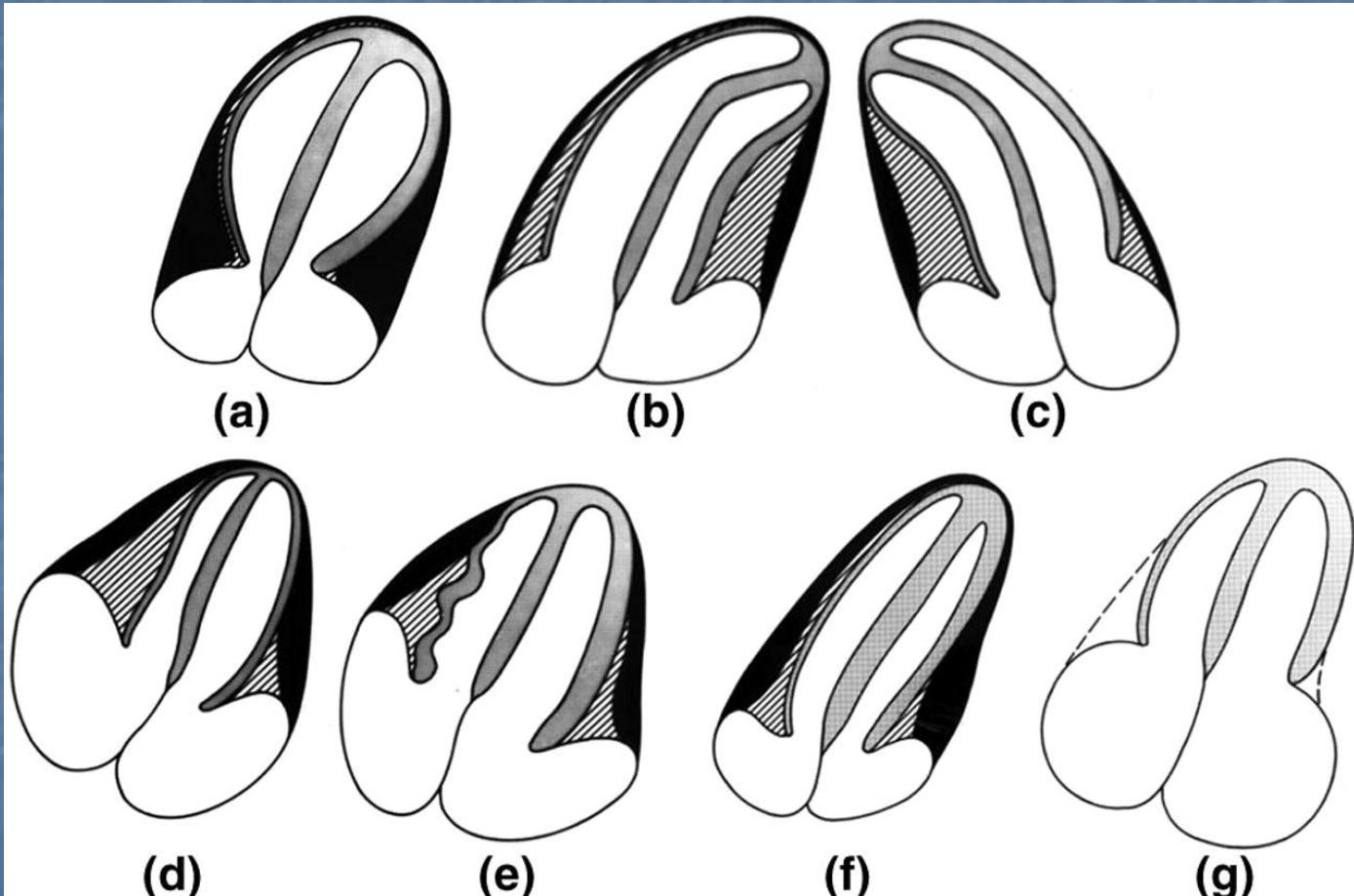
Cine CCT or CMR

Ventricular interdependence

Chamber collapse

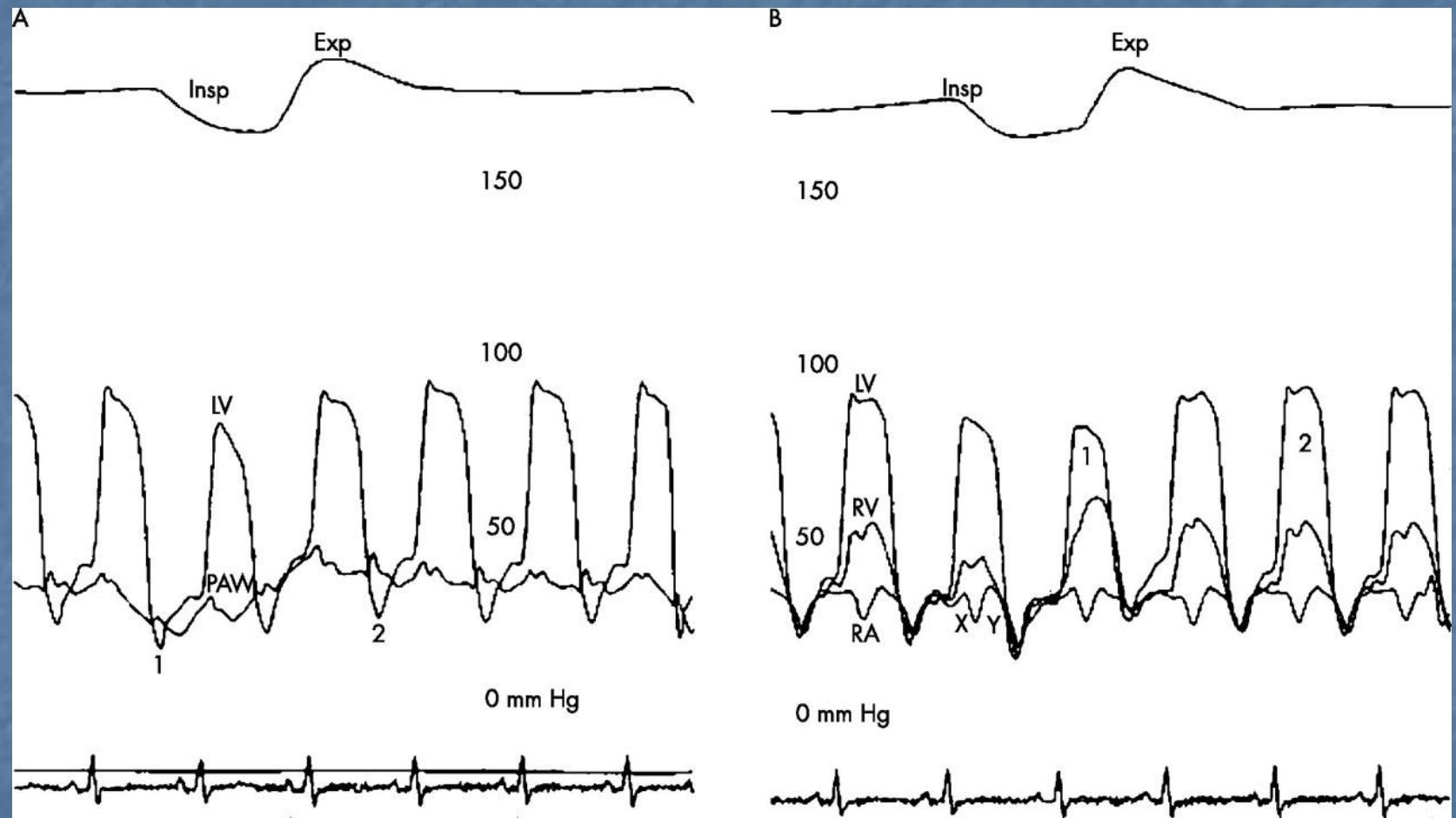
CCT = cardiac computed tomography; CMR = cardiac magnetic resonance; IVC = inferior vena cava; RV = right ventricle; TTE = transthoracic echocardiography.

Constrictive pericarditis vs restrictive cardiomyopathy



Task Force members, et al. Eur Heart J 2004 25:587-610

Constrictive Physiology

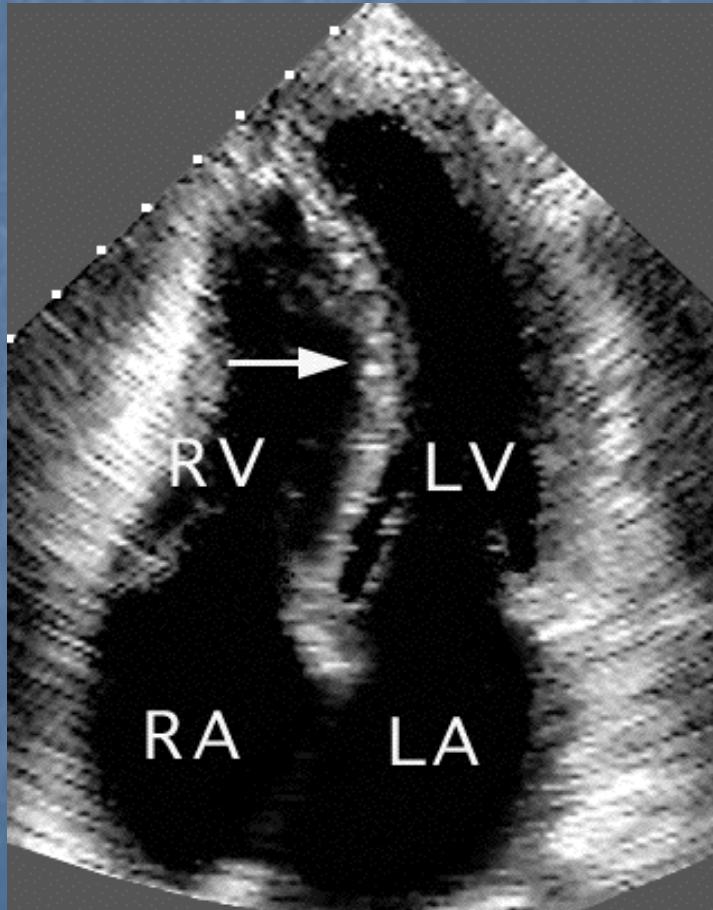


Higano ST et al Catheter Cardiovasc Interv 1999;46:473-86.

Echocardiographic signs of constriction

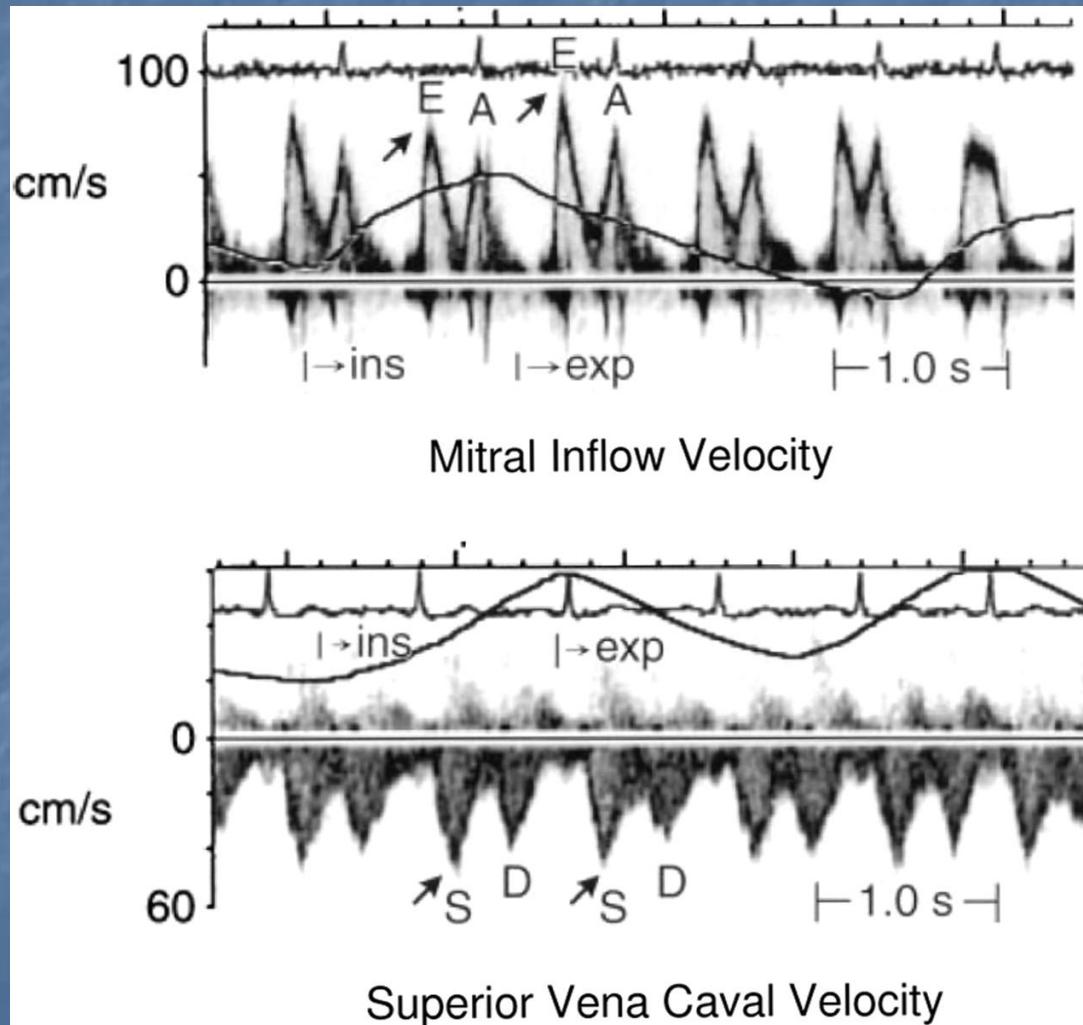
- Thickened and adherent pericardium
- Respiratory “bounce” of septum
- Diastolic mitral regurgitation
- Dilated IVC without respiratory variation
- Respiratory variation >25% in AV valves
- Normal E' on tissue Doppler

Diastolic septal bounce with inspiration



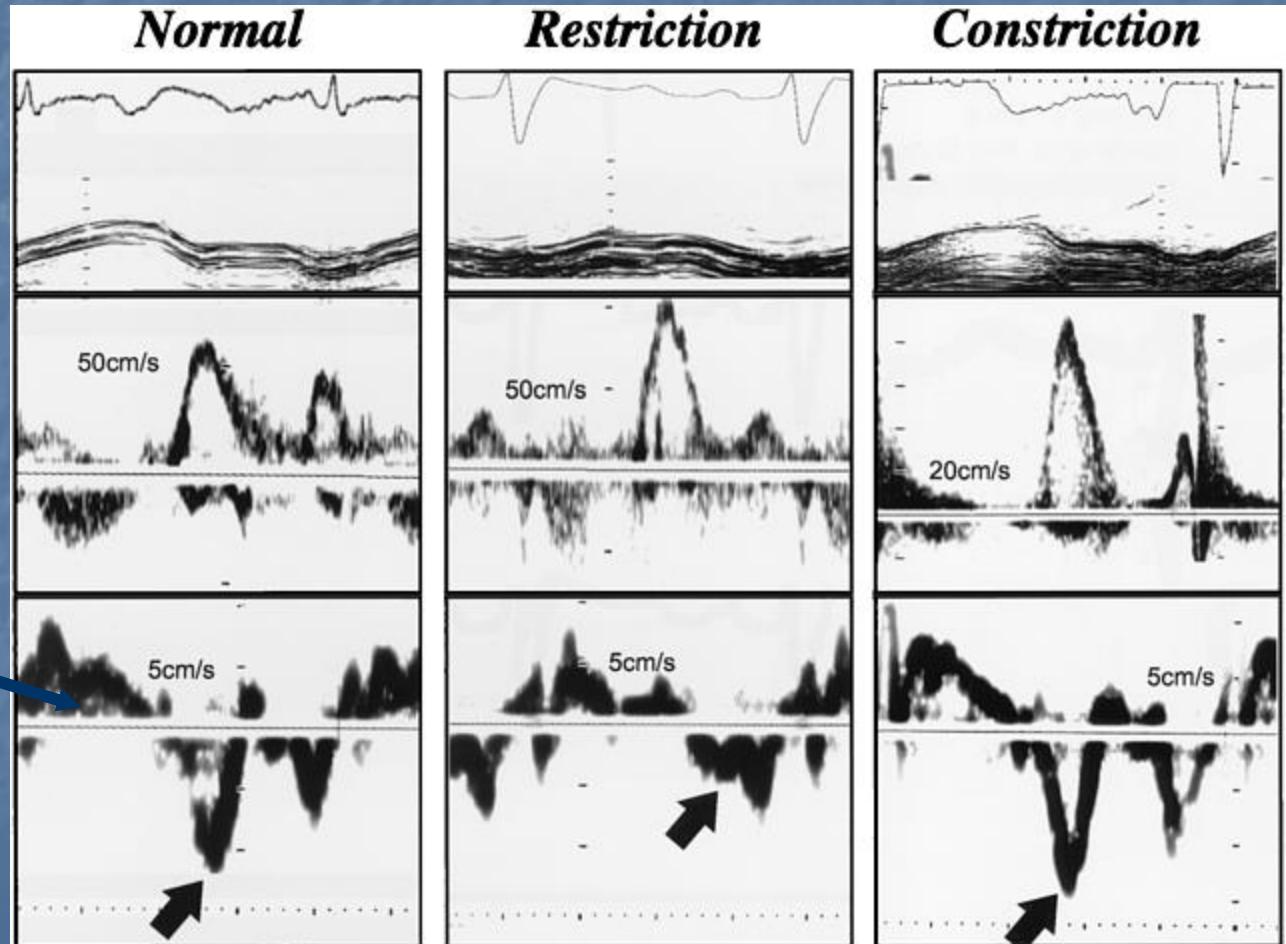
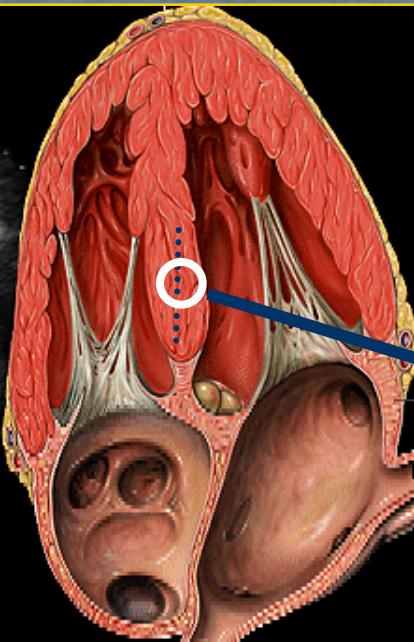
- Venous return increases leading to increased RV volume
- Total cardiac volume constrained by pericardium
- Interventricular dependence leads to septal shift toward left side

Doppler mitral flow and superior vena caval velocity in a patient with pericardial constriction

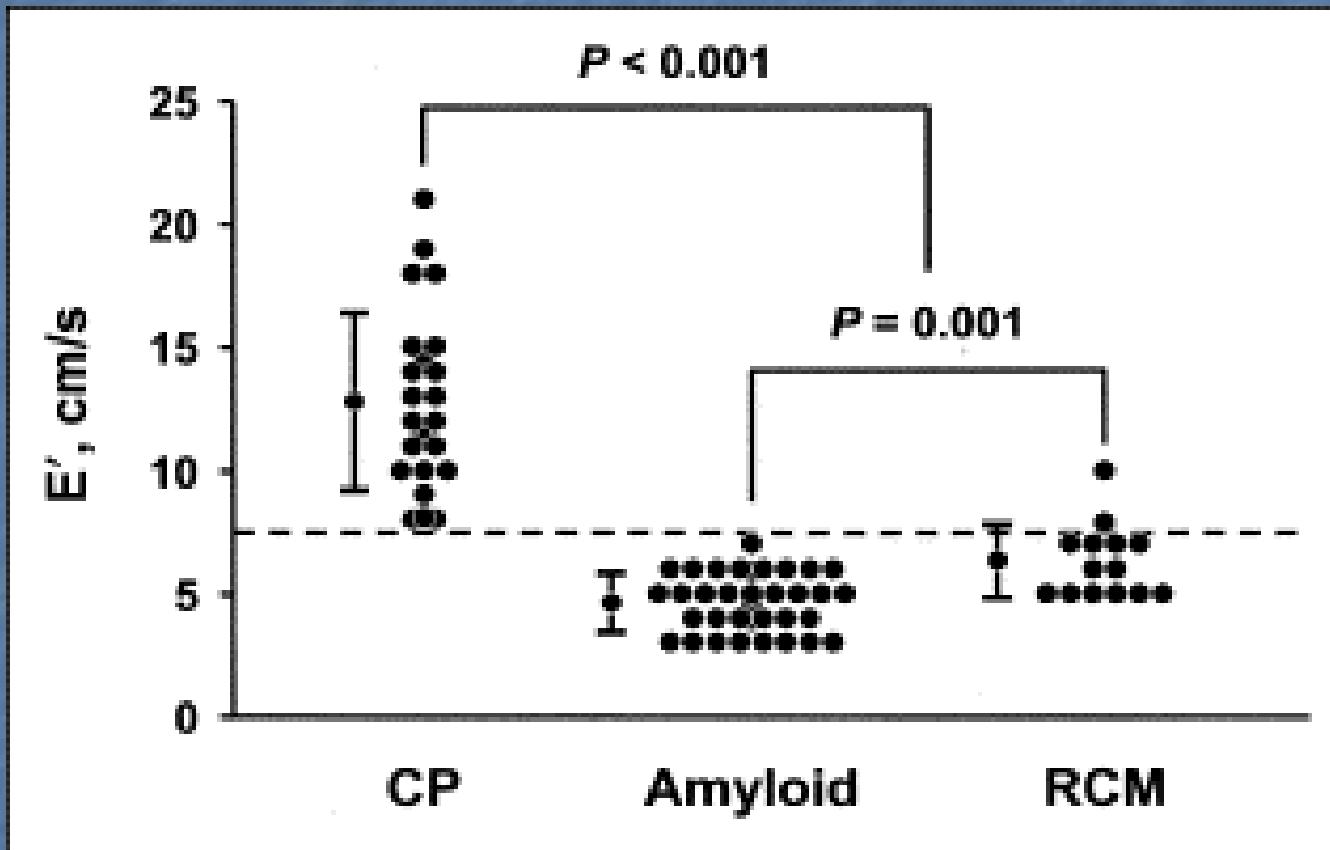


Little, W. C. et al. Circulation 2006;113:1622-1632

Restriction vs Constriction

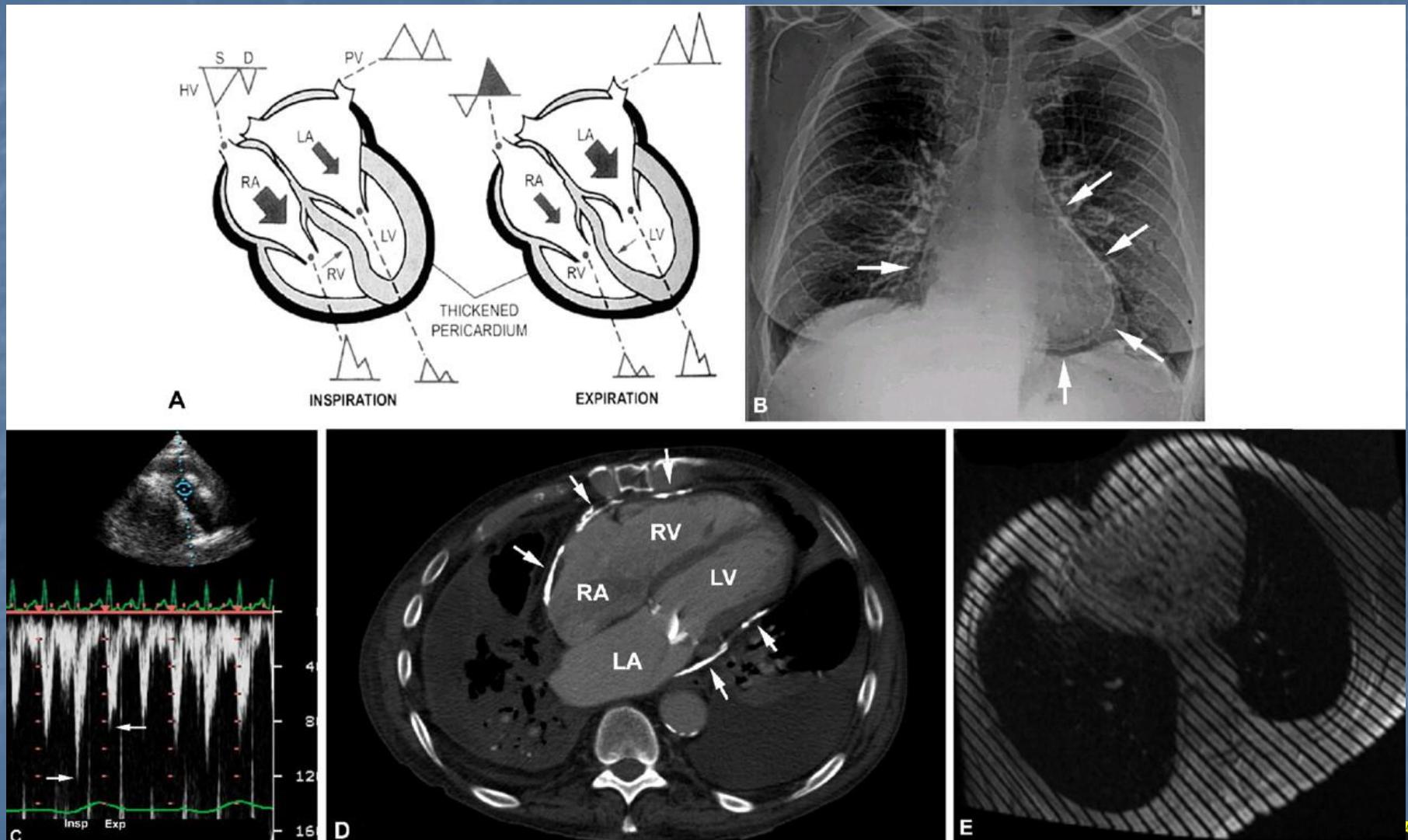


Restriction vs Constriction



Ha JW et al. Am J Cardiol 2004;94:316

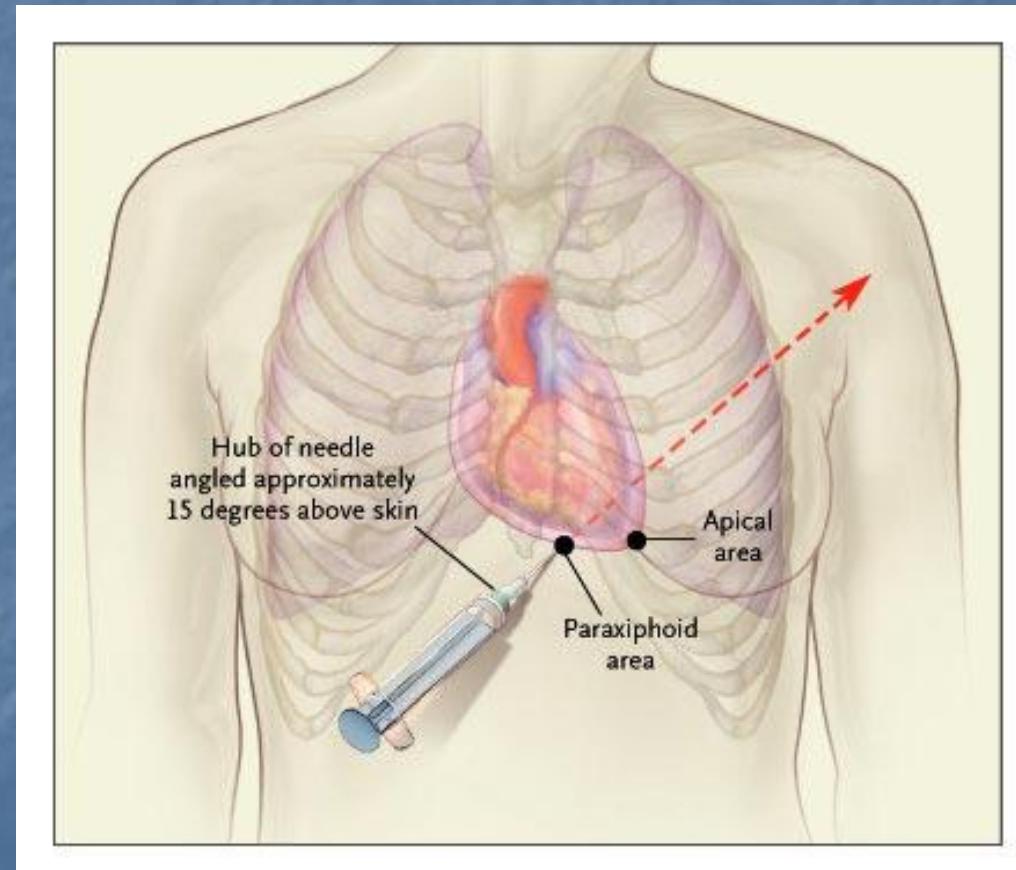
Multimodality Imaging in Constrictive Pericarditis



Echo-guided Pericardiocentesis

SAFE and EFFECTIVE

- locating the optimal site of puncture
- determining the depth of the pericardial effusion and the distance from the puncture site to the effusion
- monitoring the results of the pericardiocentesis



Echo guided pericardiocentesis





Subxiphoid Pericardiocentesis Guided by Contrast Two-dimensional Echocardiography in Cardiac Tamponade: Experience of 110 Consecutive Patients*

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Table 1. Major complications of pericardiocentesis in the different series.

Author	n	Contrast study	Death during puncture	RVP	Arrhythmia
Callahan ^[11]	117	No	0 (0%)	2 (1·7%)	Not mentioned
Guberman ^[24]	56	No	1 (1·8%)	6 (11·7%)	Not mentioned
Chandraratna ^[31]	16	Yes	0 (0%)	3 (18·7%)	Not mentioned
Susini ^[32]	29	Yes	0 (0%)	2 (6·9%)	2 (6·9%)
Krikorian ^[37]	123	No	5 (4·1%)	11 (8·9%)	1 (0·8%)
Present study	110	Yes	6 (5·4%)	11 (10%)	6 (5·4%)

n=number of patients.

RVP=right ventricular puncture.

Echo guided pericardiocentesis

- Safe and effective technique for tamponade relief
- Pericardial contrast may be used for needle tip location
- Prolonged pericardial drainage allows more complete fluid drainage

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