

## Case Studies: Pericardial effusion and fat pad

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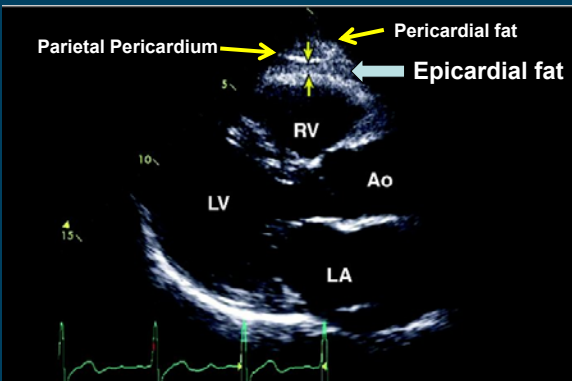
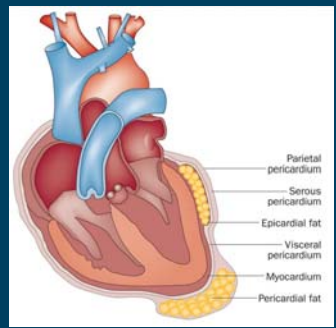
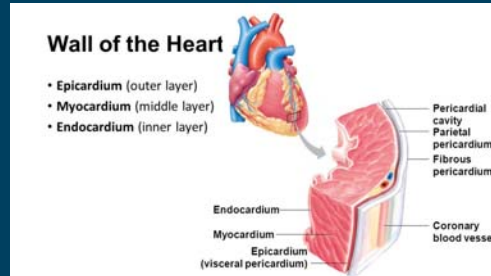
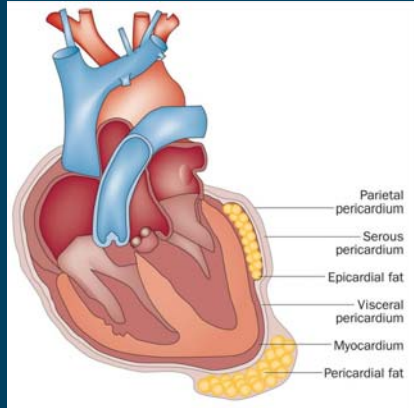
## No Disclosures

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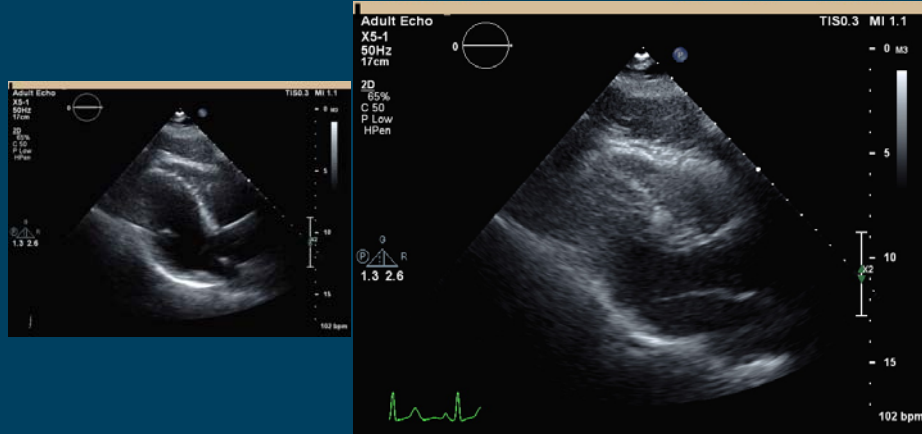


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# Pericardial layers and fat



# Pericardial pericardium and fat



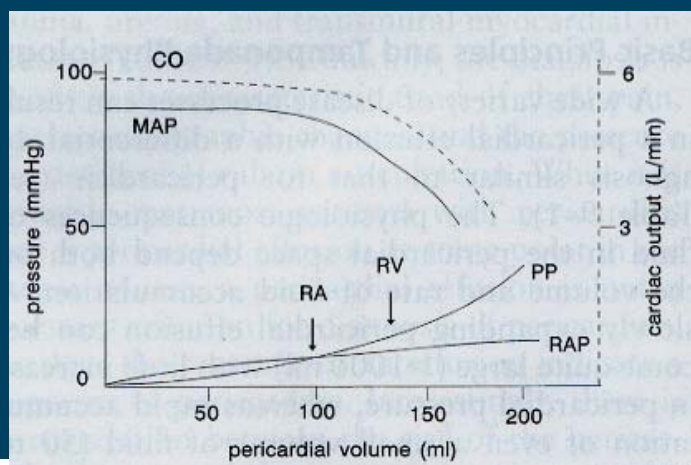
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# Tamponade is a clinical diagnosis

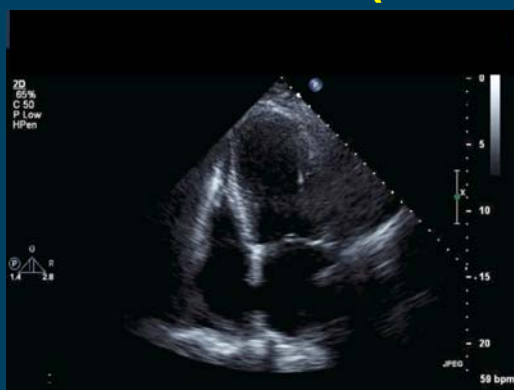


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## Tamponade: Pericardial pressure >> Right heart chamber pressure

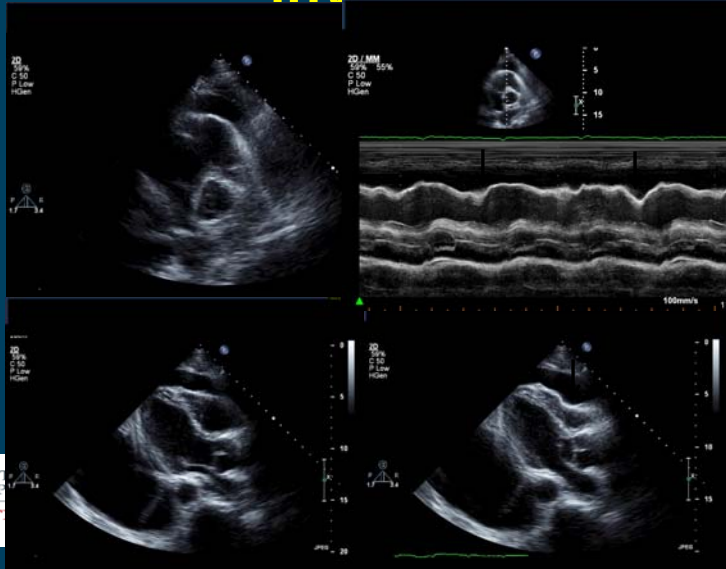


## Right atrial inversion (collapse)



- RA inversion occurs in late diastole and into systole
- Sensitivity > Specificity
  - Duration of RA inversion lasting > 1/3 of the cardiac cycle seems to improve specificity; (specificity of 100% and sensitivity of 94% for clinical tamponade in one series).

# Right ventricular diastolic inversion



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# Right ventricular diastolic inversion

Apical 4 Chamber

Subcostal



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## RV diastolic inversion

- Timing of RV Diastolic Inversion can occur briefly (typically early diastole) or throughout diastole
- RV diastolic inversion: specificity (85 to 100%) > sensitivity (60-80%)
- RV (and RA) inversion may be masked in presence of elevated right-sided pressures (pulmonary hypertension); decreased RV compliance (RV hypertrophy)



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## Respirophasic Doppler Changes

Inspiratory Change:  $\frac{\text{Inspiratory Velocity} - \text{Expiratory Velocity}}{\text{Expiratory Velocity}}$

	Normal Variation	Pandian <sup>81</sup>	Leeman <sup>83</sup>	Appleton <sup>84</sup>
Control				
Mitral	Mitral Valve Flow Variation: -10%	-10	-8	-4
Tricuspid	Tricuspid Valve Flow Variation: +20%	17	5	14
Aortic		—	-3	-4
Pulmonic	Aortic Valve Flow Variation: -5%	—	9	5
Effusion				
Mitral		-12	-3	-5*, -31†
Tricuspid		17	21	32*, 74†
Aortic		—	-7	-17
Pulmonic	<b>Tamponade Variation</b>	—	11	49
Tamponade				
Mitral	Mitral Valve Flow Variation: >↓ 35 to 40%	-42	-35	E -43 ± 9%; A -28 ± 12%
Tricuspid	Tricuspid Valve Flow Variation: >↑ 80%	117	80	E 85 ± 53%; A 58 ± 25%
Aortic	Aortic Valve Flow Variation: ↓ 25-35%	—	-33	-26
Pulmonic		—	86	40 ± 25%
Left ventricular isovolumic relaxation time		—	—	85 ± 14%
Left ventricular ejection time		—	—	-21 ± 3%



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Table from Principles of Echocardiography; 1992; Weyman AE.

## Guidelines

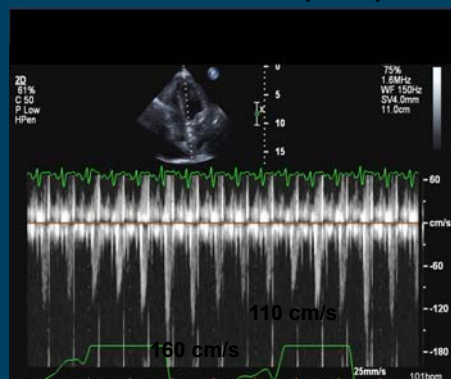
- 1) exp-insp/exp as way to do calculation for MV and TV respiratory variation
- 2) Tamponade: MV > 30%, TV > 60%
- 3) Constriction: MV > 25%, TV > 40%
- Significant respiratory variability of the mitral and tricuspid inflows should not be used as a stand-alone criteria for cardiac tamponade without concomitant presence of chamber collapse, IVC dilatation or abnormal hepatic venous flows (blunting or reversal or diastolic flow in expiration).



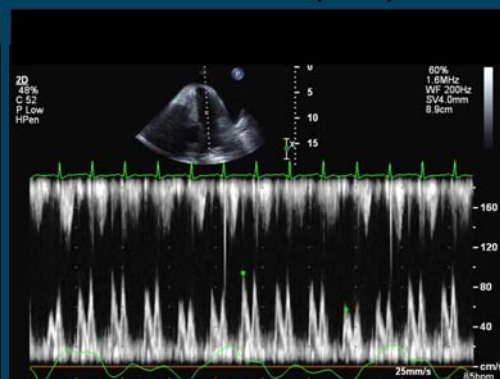
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## Doppler Findings

Aortic Outflow (30%)



Mitral Outflow (40%)

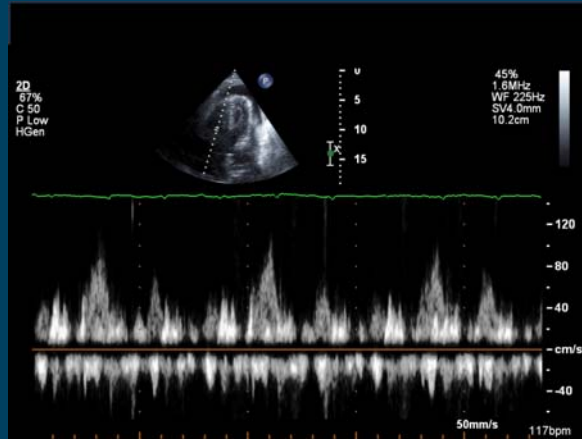


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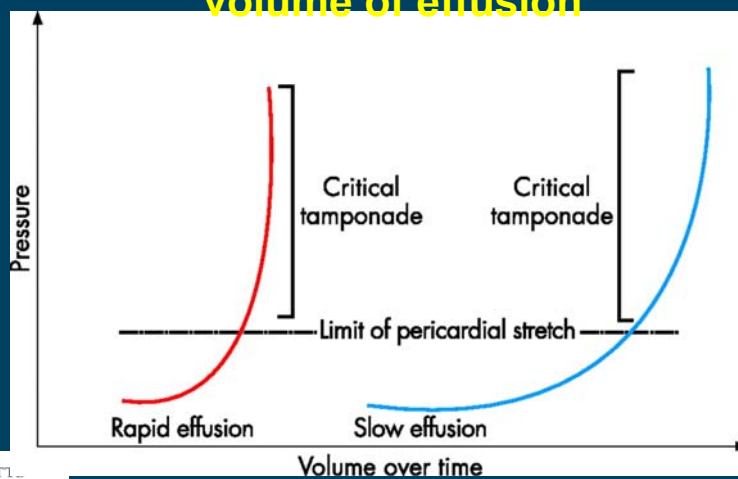
# Doppler Findings

Tricuspid Inflow (80%)



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Pericardial pressure depends on compliance of pericardium as well as volume of effusion



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## LA Collapse

- LA Collapse (specific sign but not sensitive; present in 25% of cases)

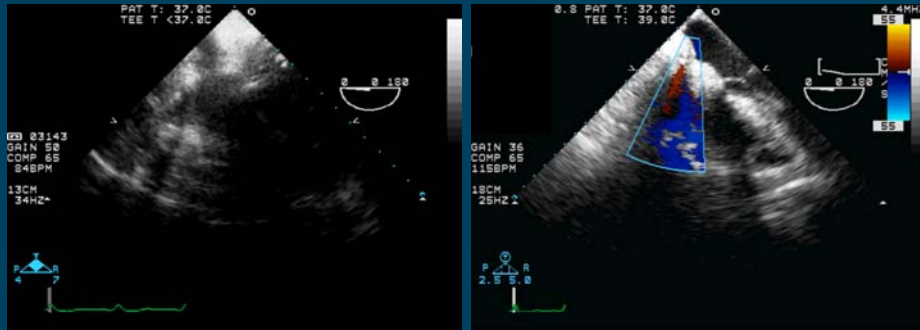


## Swinging Heart



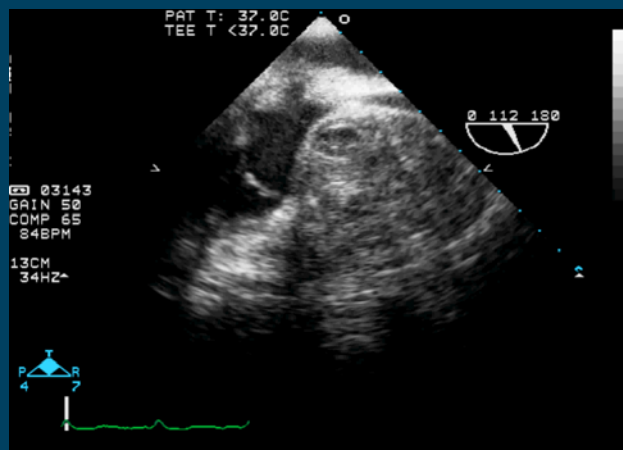


## Cardiac Tamponade post-operative hematoma



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## Hematoma compressing right atrium causing tamponade



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# Cardiac Tamponade post-operative hematoma



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