TRP Hemodynamics Review

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Objectives

At the end of this session, you should be able to:

1. Recall some crucial basic principles of hemodynamic assessment
2. Identify the central venous waves and explain their mechanisms… in your sleep
3. Demonstrate a logical approach to the interpretation of hemodynamics tracings
4. Successfully tackle several common hemodynamics scenarios
5. Avoid a few hemodynamics pitfalls

I. Cath Lab Basics

Hemodynamics studies include:

- Measurements of **pressure**
- “Measurements” of **flow**
- Determination of vascular **resistances**

I. Cath Lab Basics

$$\dot{Q} = \frac{\Delta P}{R}$$

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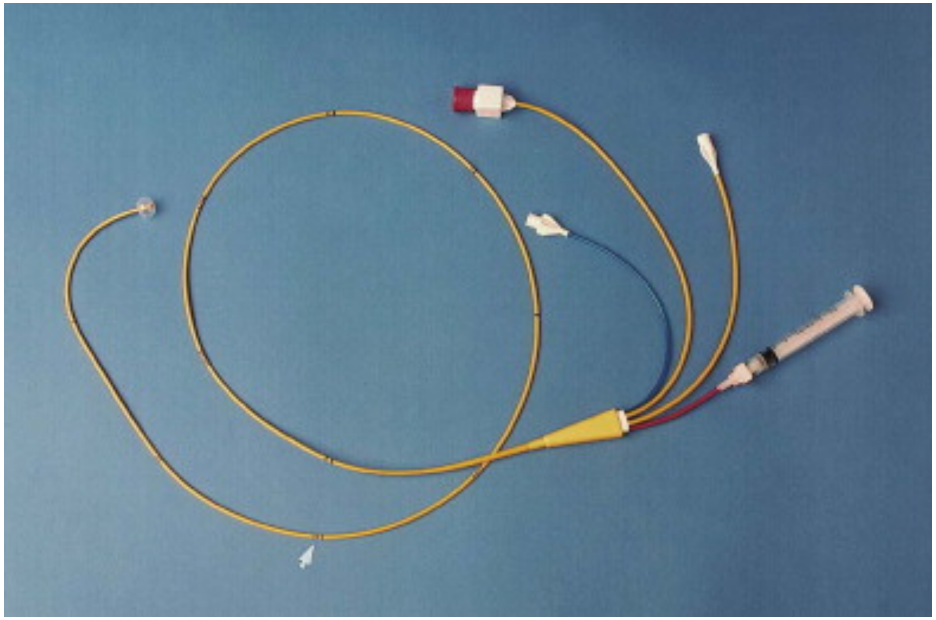
Flows

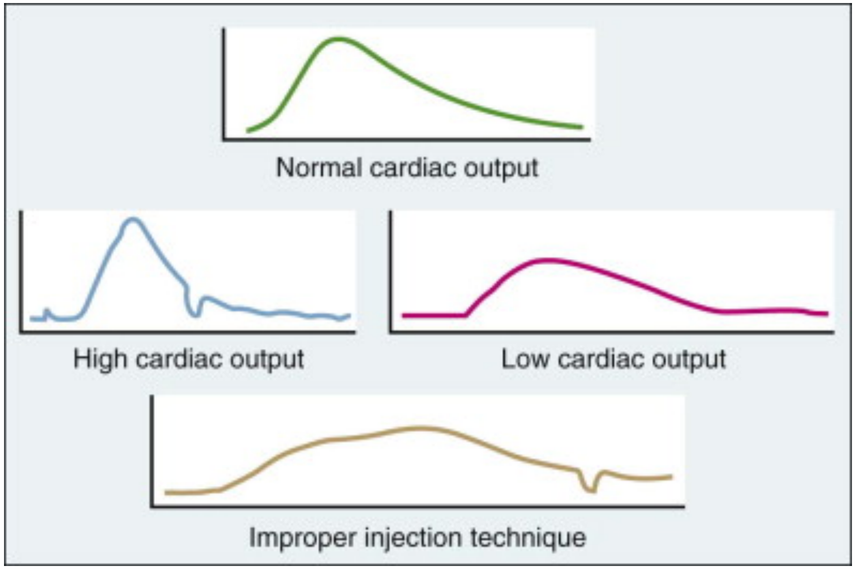
Cardiac Output

- Thermodilution
- Fick Method



Thermodilution Technique

Cardiac output is inversely proportional to the area under the curve



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Thermodilution

PITFALL:

In what clinical conditions is the thermodilution technique unreliable as a measure of cardiac output and how so?

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Thermodilution

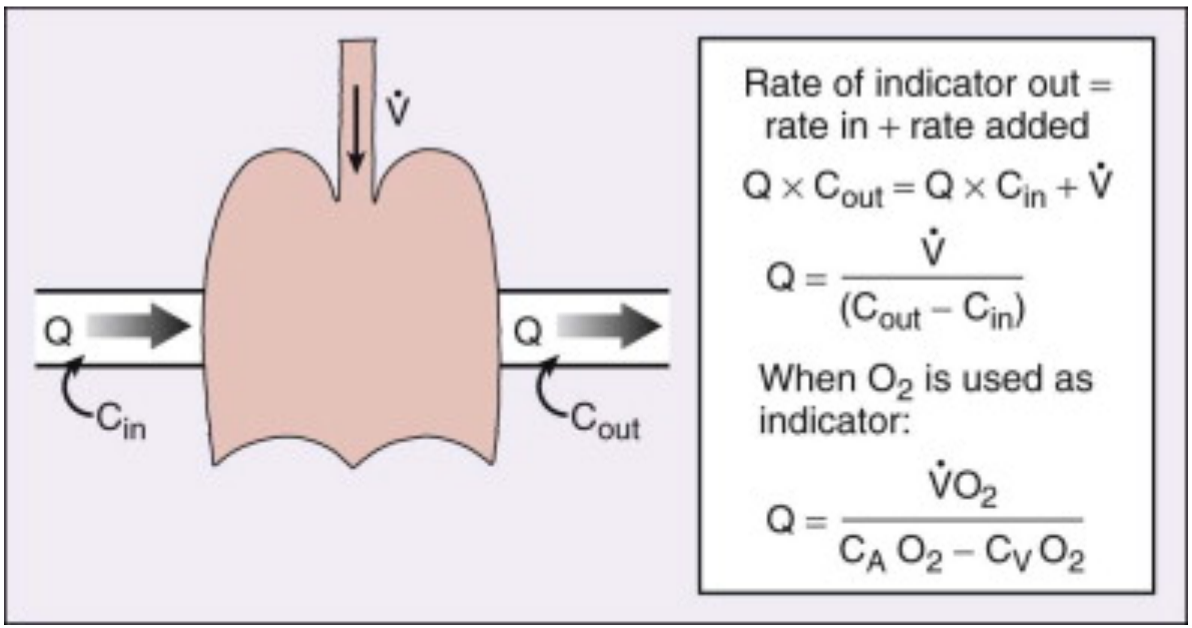
1. Severe TR:
2. Severe PI:
3. Left to right shunts:

Underestimates CO

4. Low cardiac output: Overestimates CO

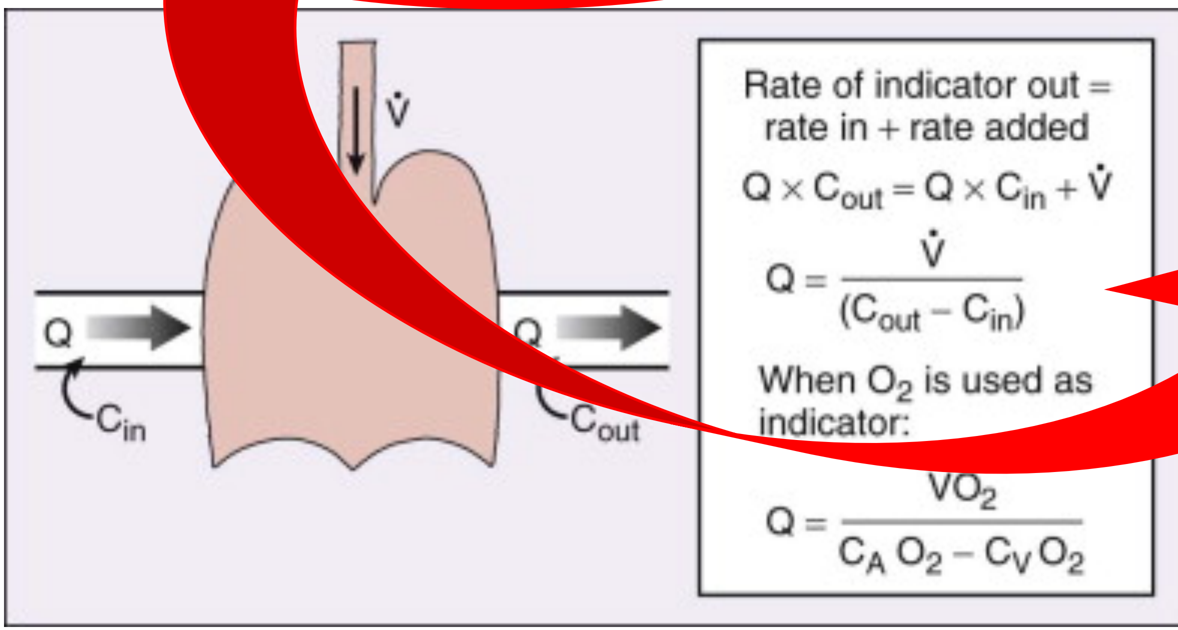
Fick Method

$\dot{Q}$ **= O_2 consumption / A-V O_2 difference**



Fick Method

$\dot{Q}$ = O_2 consumption / A-V O_2 difference



Estimated:
125 mL/min/m^2

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Resistance

$$\dot{Q} = \frac{\Delta P}{R}$$

$$R = \frac{\Delta P}{\dot{Q}}$$

What is normal **SVR**?

What is normal **PVR**?

Resistance

SVR	PVR
700-1600 dyn·secs/cm^5	0.25-1.6 Woods Units

II. Hemodynamics Basics

1. The Central Venous Pressure and JVP

2. Arterial Waveforms

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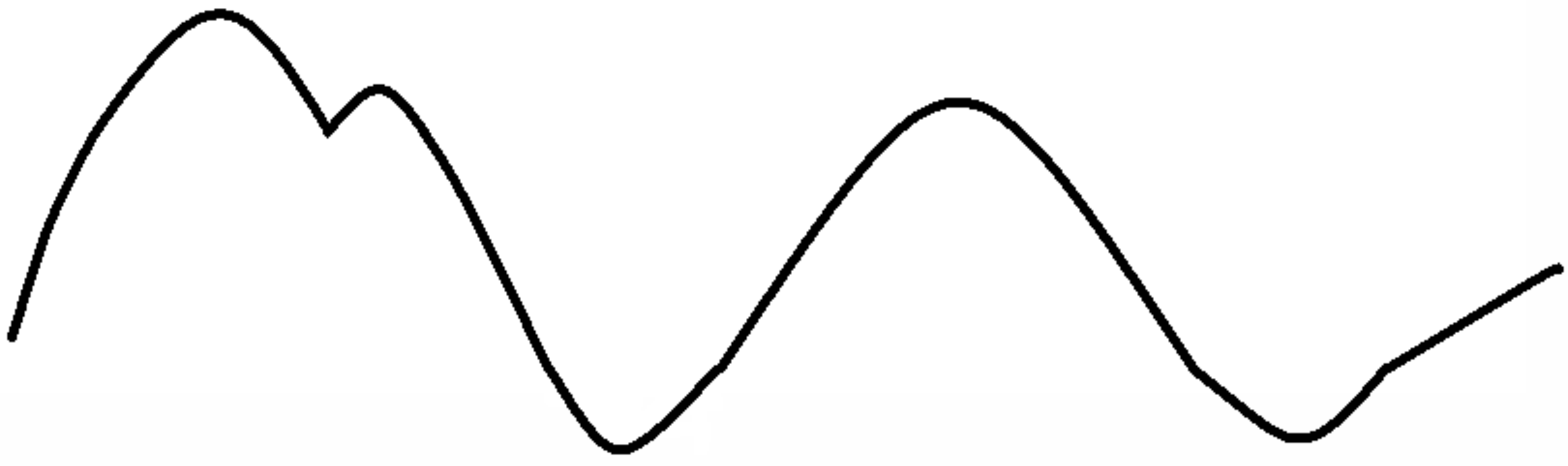
Central Venous Pressure



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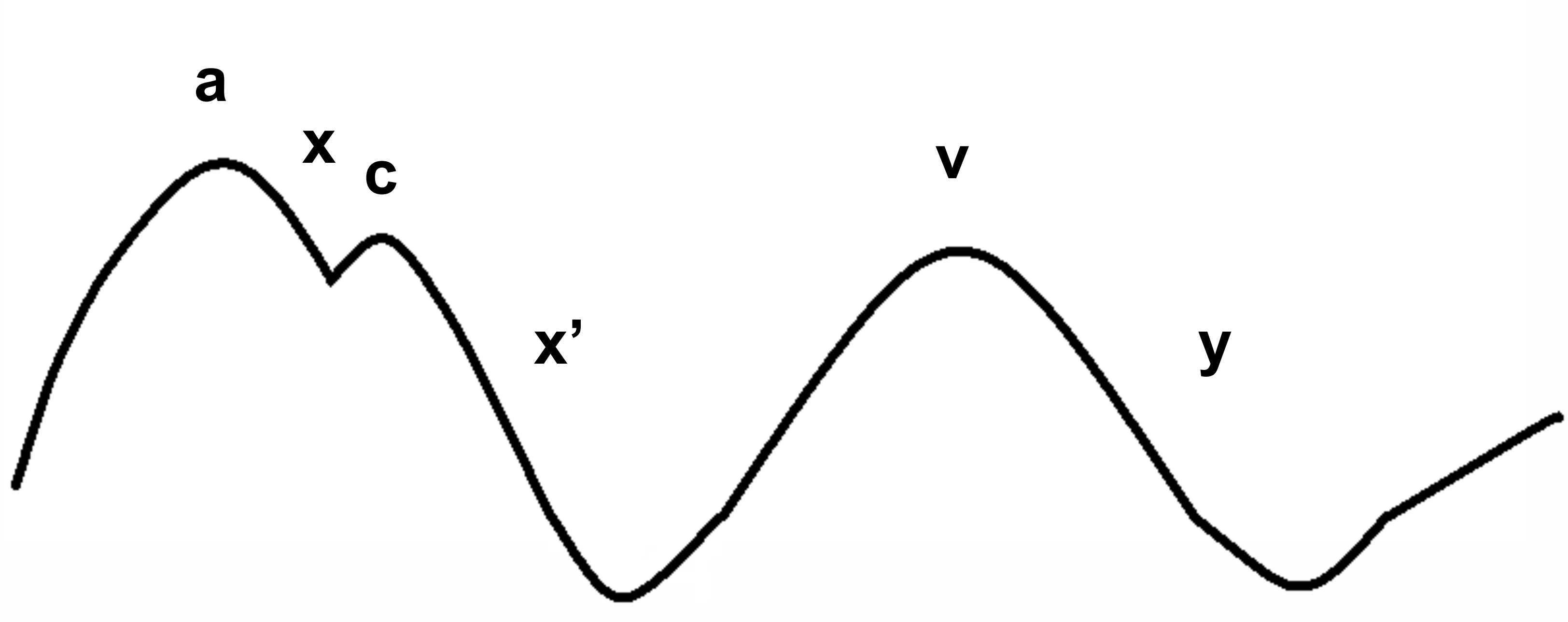
Central Venous Pressure



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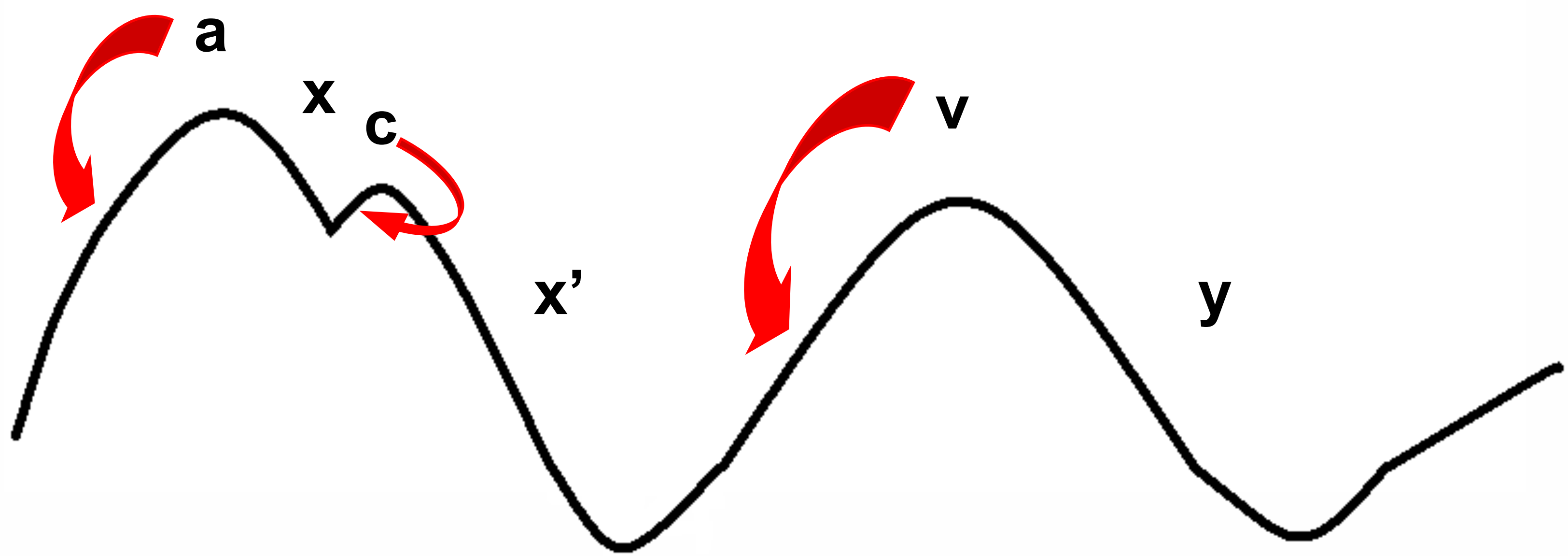

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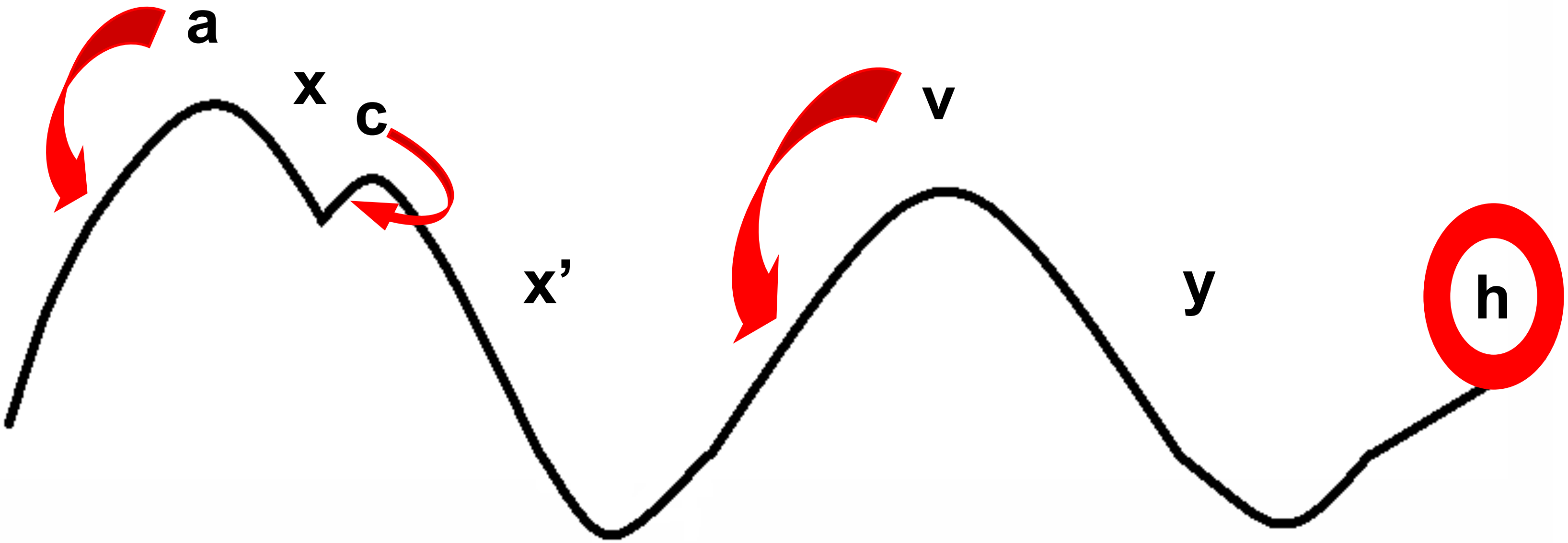
Central Venous Pressure



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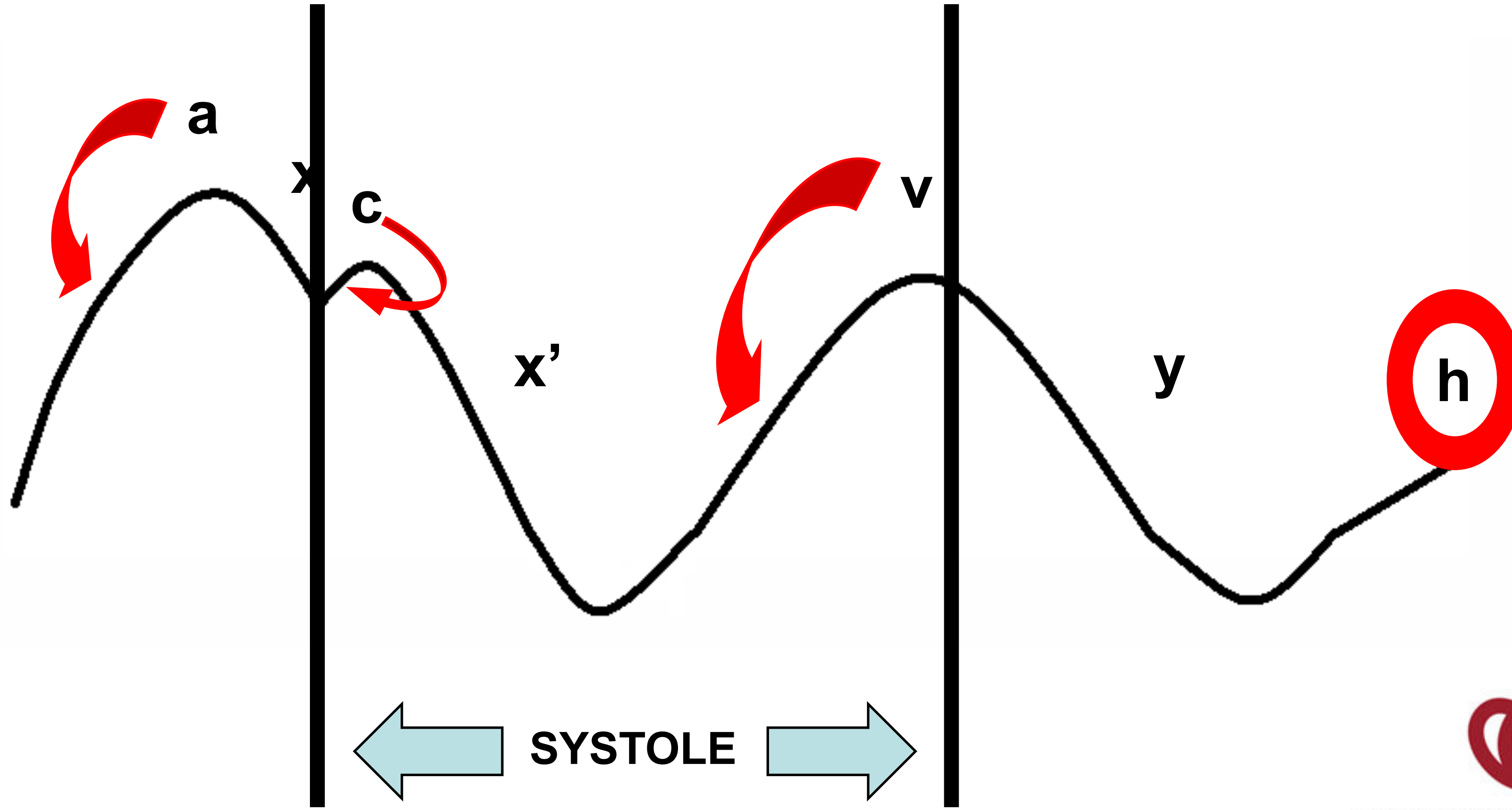
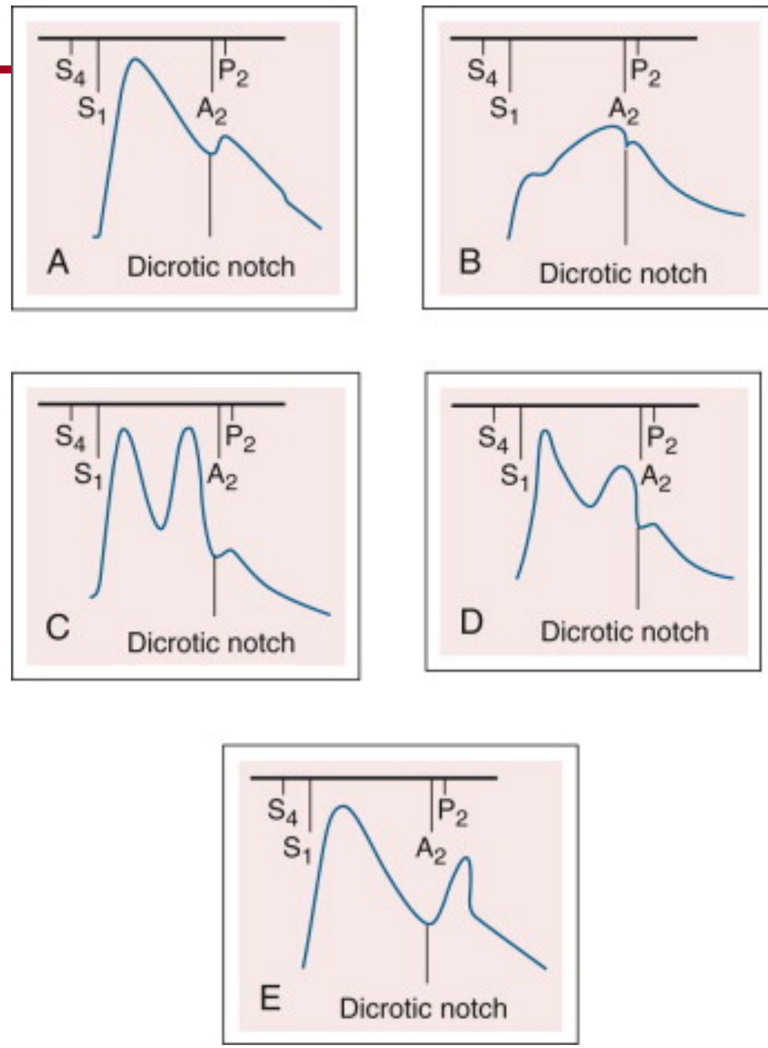
Central Venous Pressure



Arterial Waveforms



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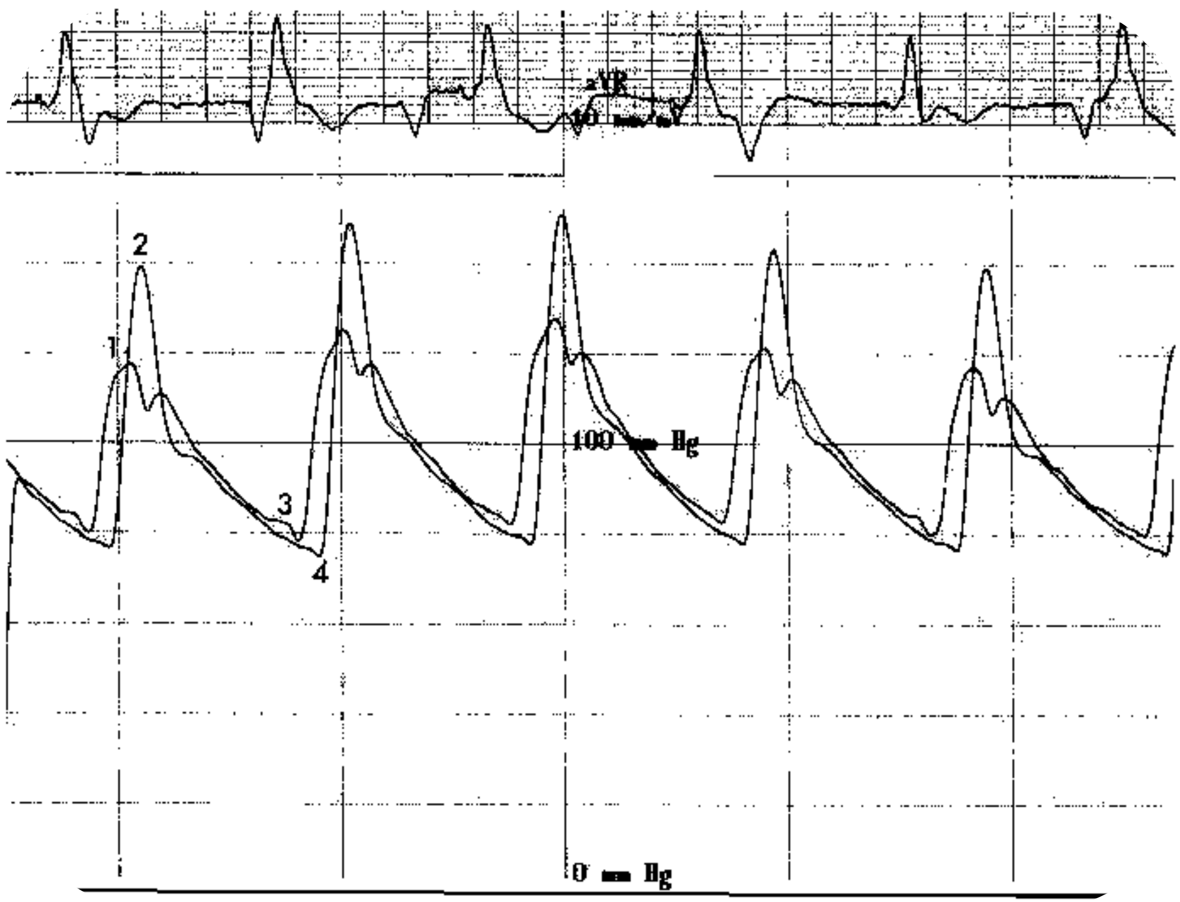
Identify tracings and explain:



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Arterial Waveforms

As pressure wave moves from central to periphery:

- Upstroke becomes brisker*
- Systolic peak becomes higher (at least 10 mm Hg)*
- **Mean pressure remains the same**

* The result of reflected waves

III. Clinical Problems

Hemodynamics Interpretation:

1. Identify the scale (Y axis)
2. Identify the heart rhythm (X axis, if given); note cardiac electrical events
3. Identify the chambers interrogated (note any labels)
4. Identify the problem(s) illustrated

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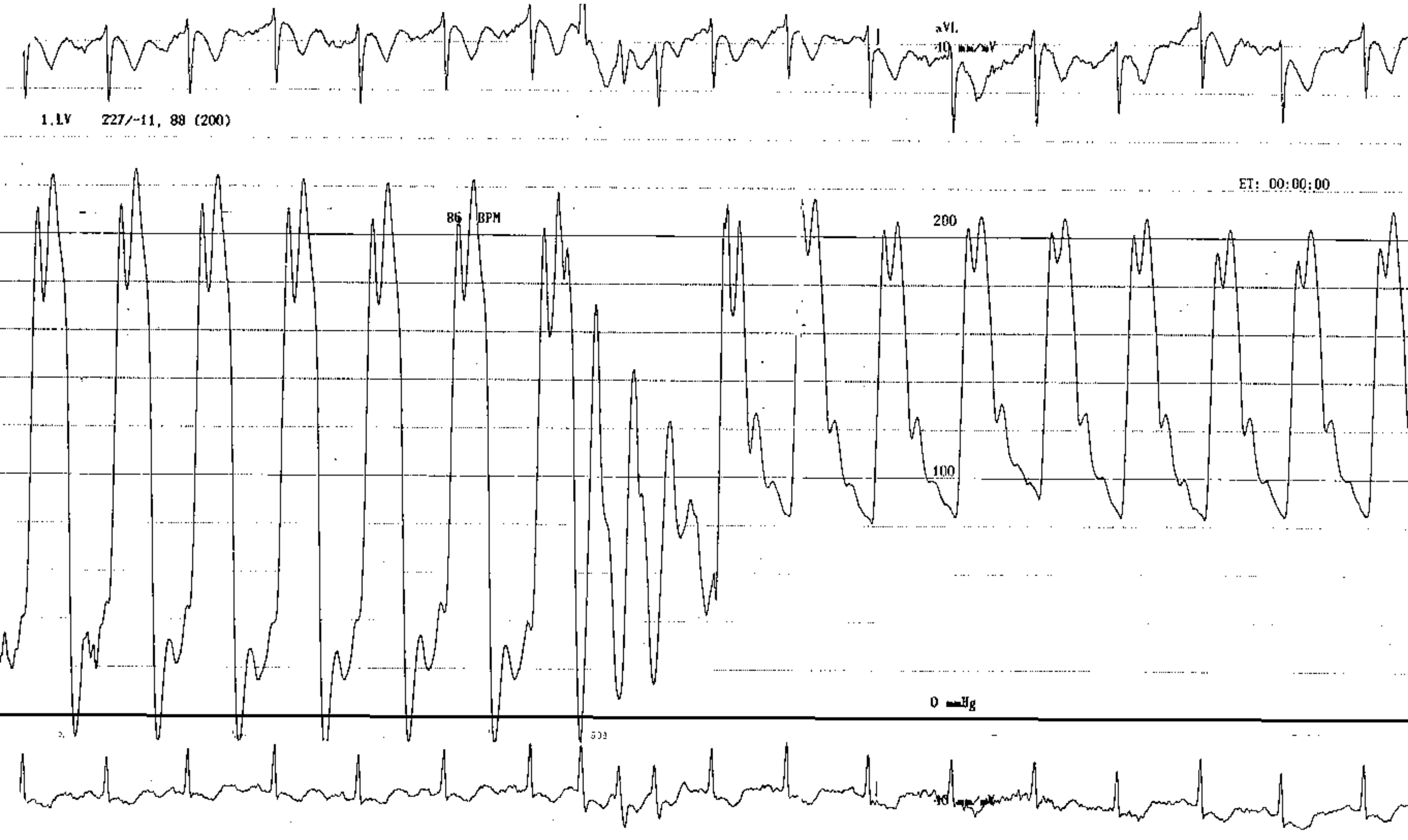
Warm Up



Bread and Butter: List 3 Causes

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MR, LVSD, VSD

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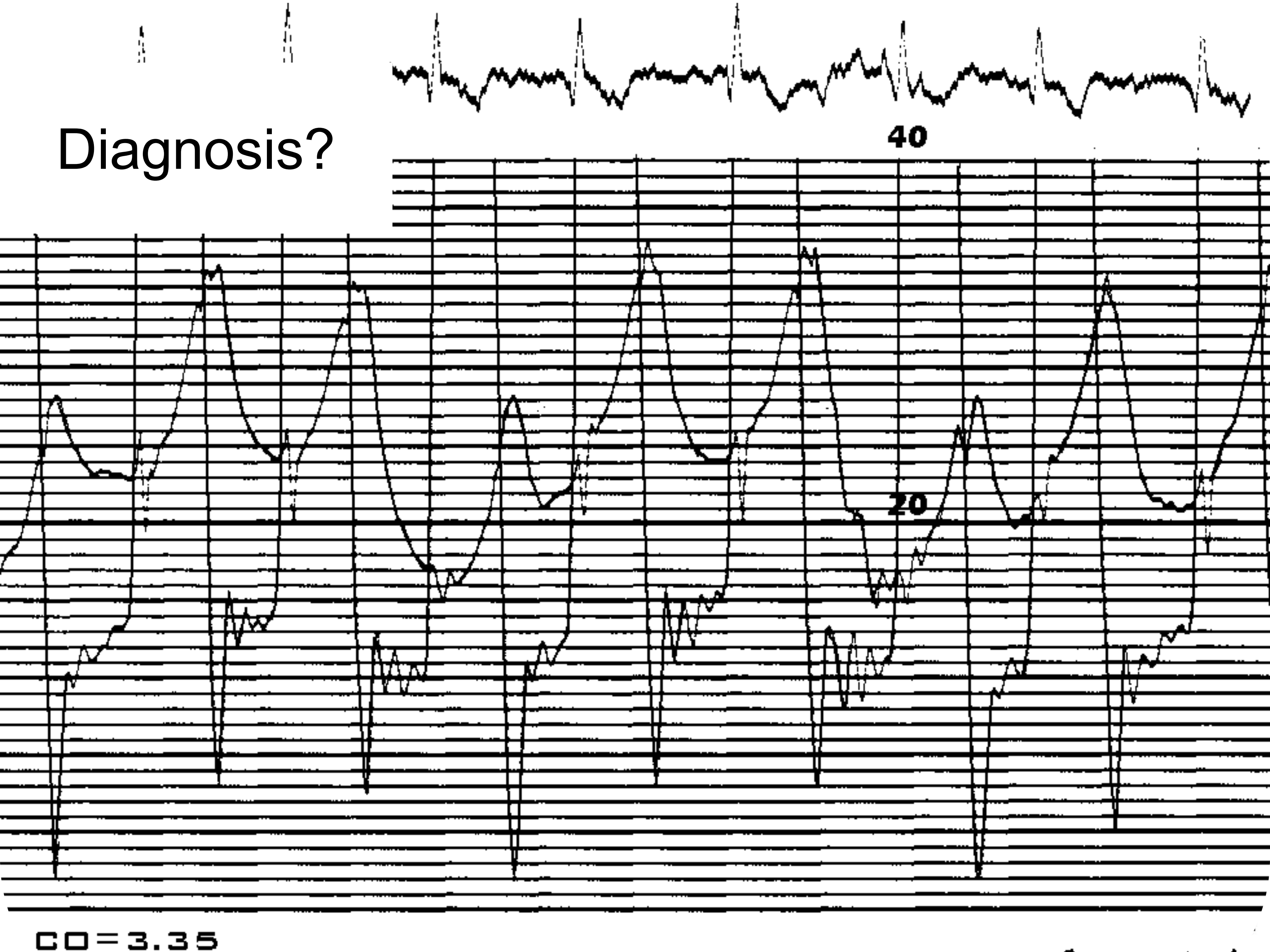
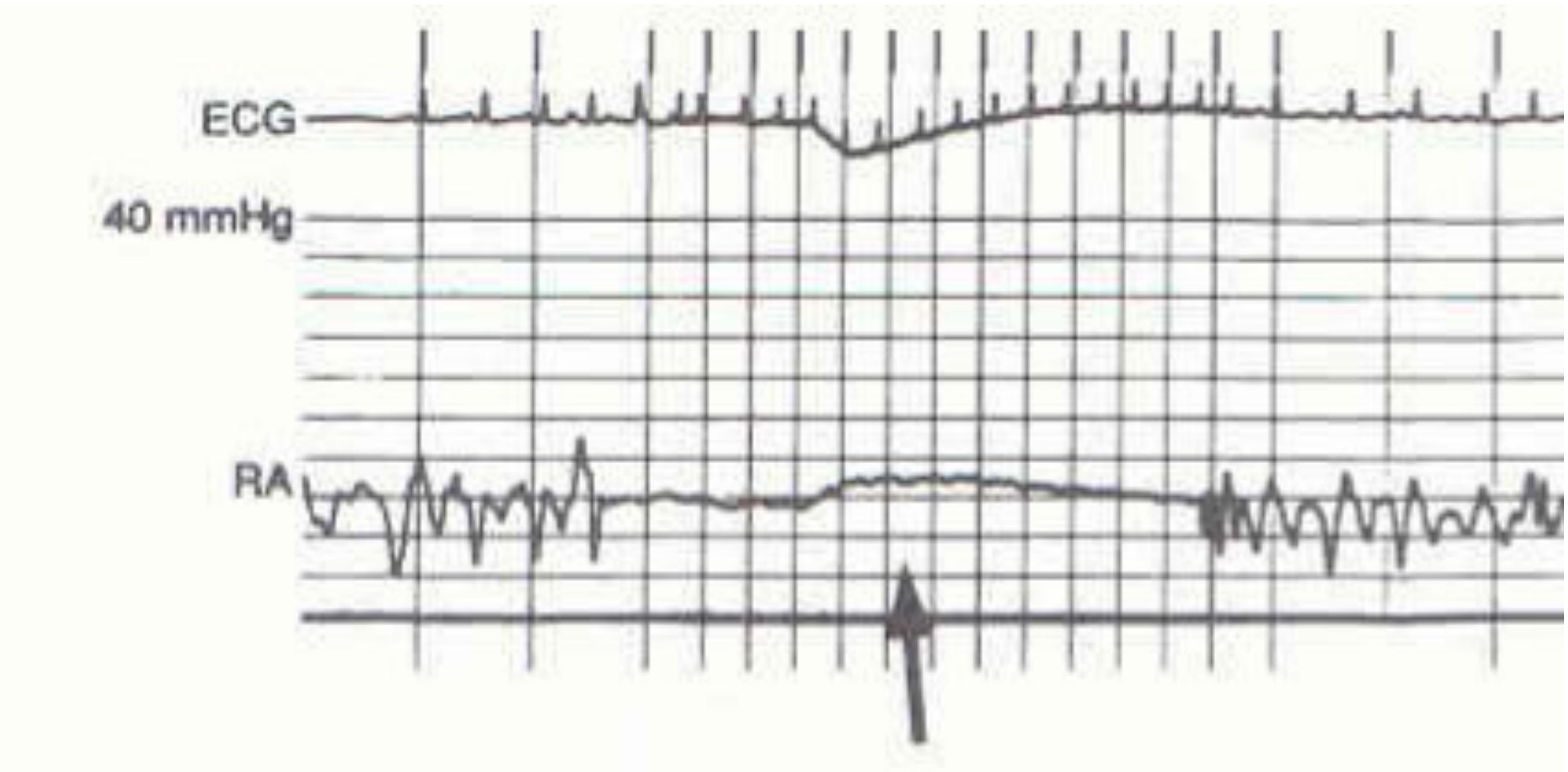
Diagnosis?



What is the Differential Diagnosis?



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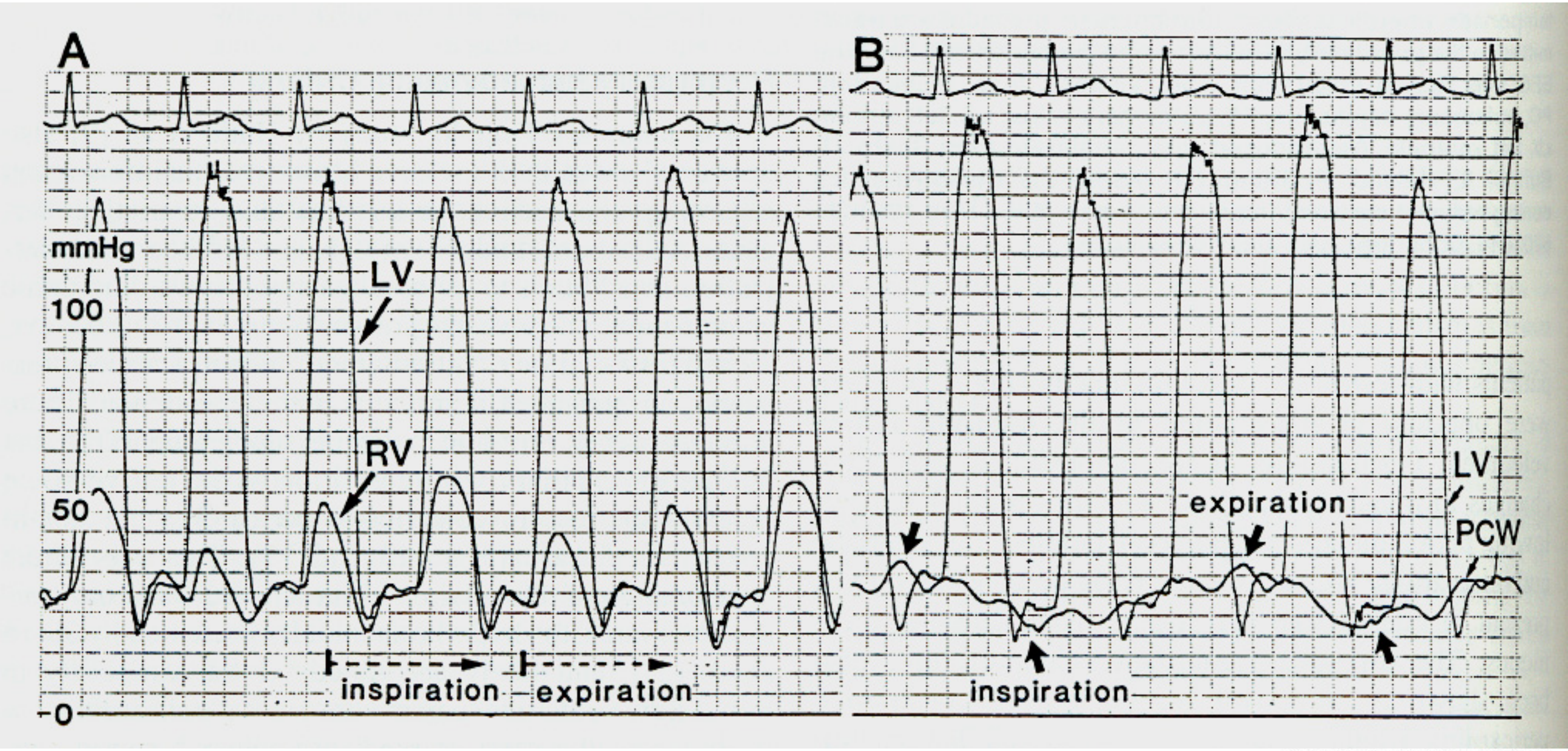
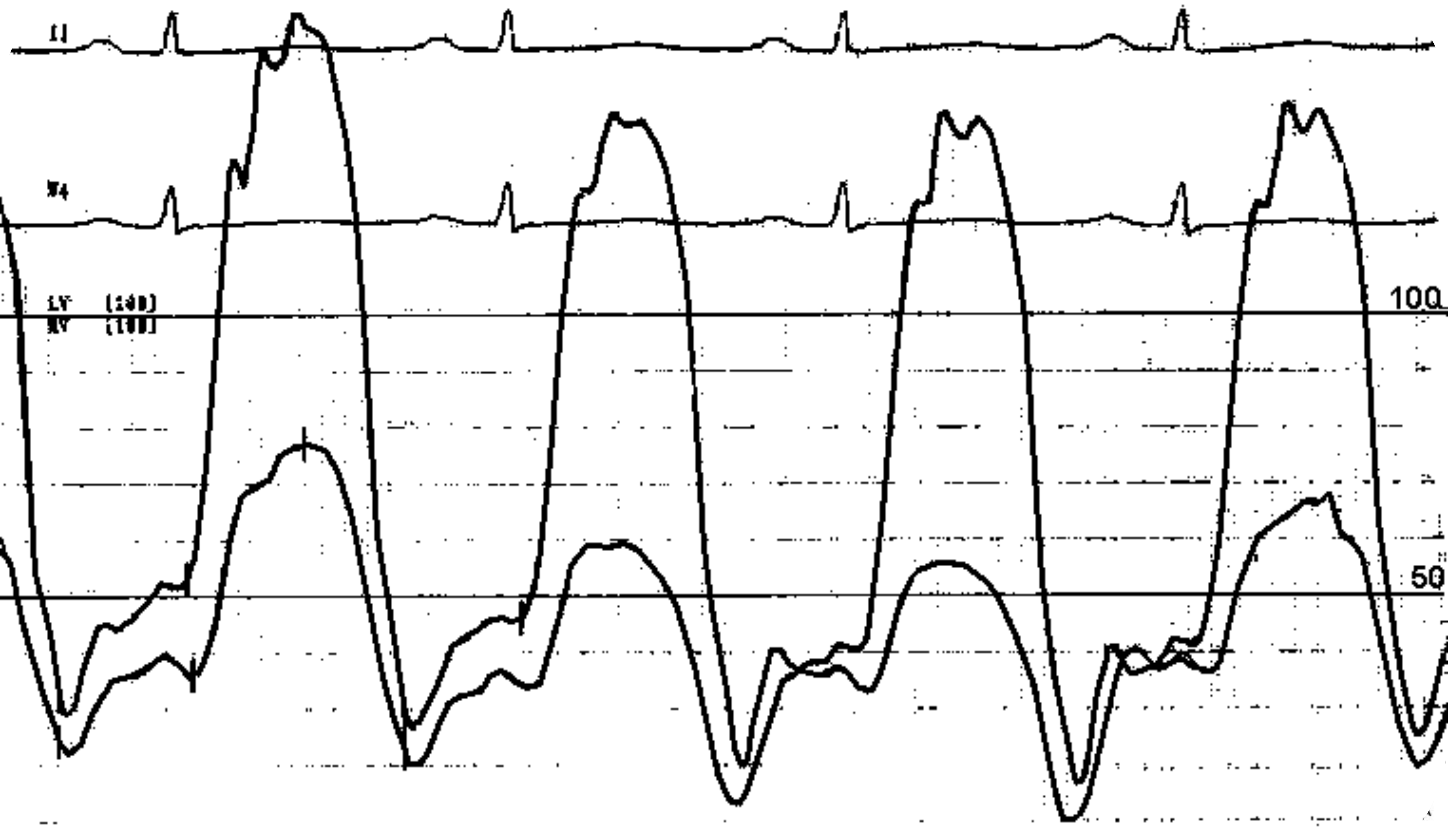
Likely Diagnosis?

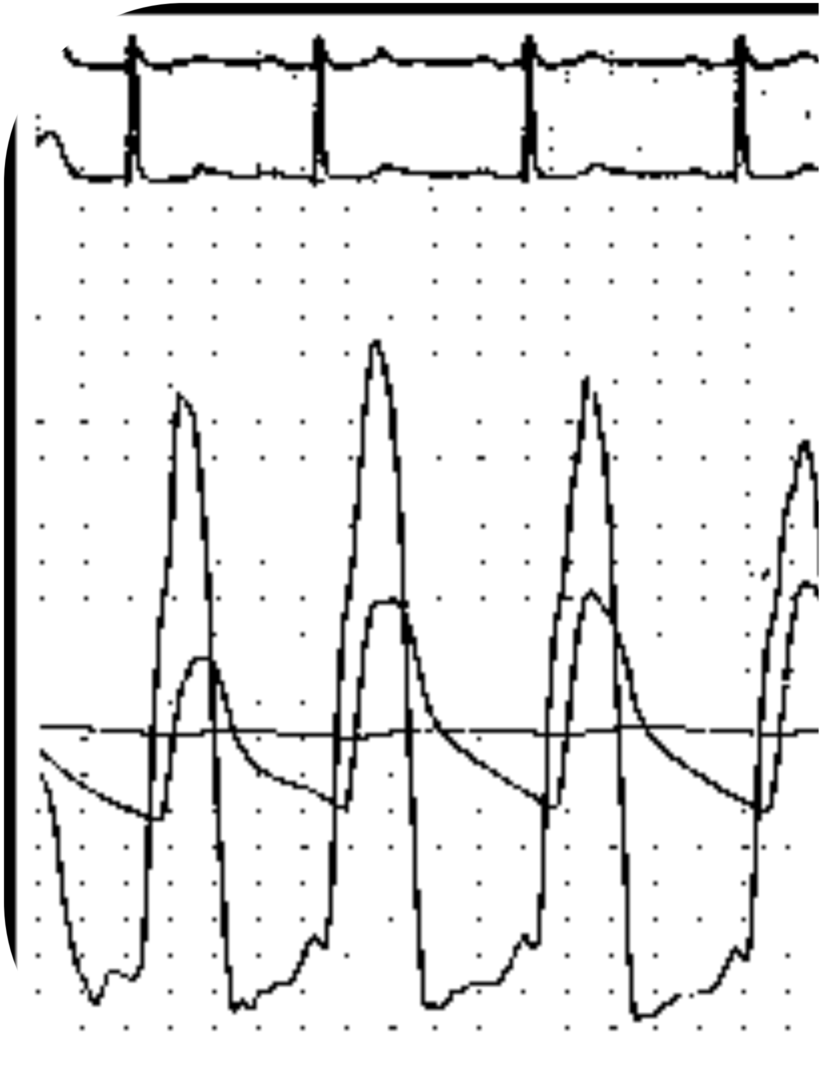


Likely Diagnosis?



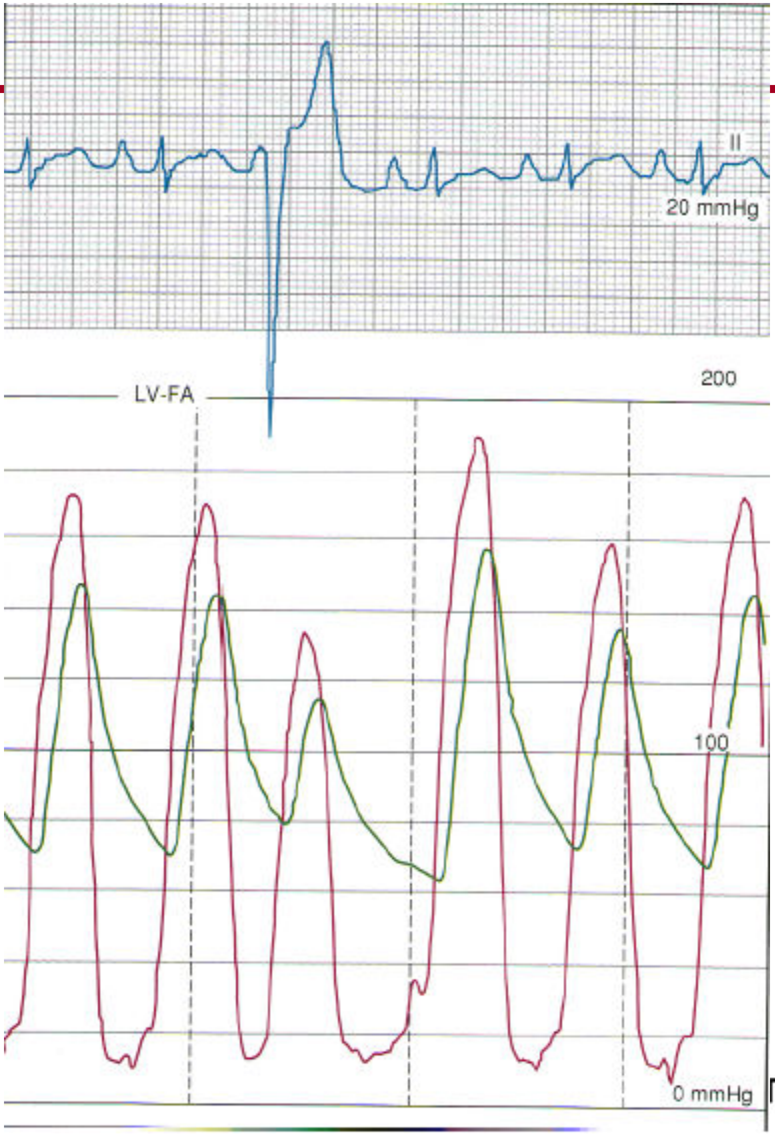
Constriction vs Restriction

Criteria	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Traditional				
LVEDP − RVEDP ≤5 mm Hg	60	38	4	57
RVEDP/RVSP >⅓	93	38	52	89
PASP <55 mm Hg	93	24	47	25
Dynamic respiratory				
PCWP/LV respiratory gradient ≥5 mm Hg	93	81	78	94
LV/RV interdependence	100	95	94	100



Label the tracings and identify this problem

Diagnosis?



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Describe what happens next

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Questions?

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