

**EKG**

**LAP**

**Pulmonary vein (PV)**

**Transmital flow (E & A)**

Spectral Doppler Interrogation of the  
Pulmonary Veins for the Diagnosis of  
Cardiac Disorders: A Comprehensive Review

Review Fadel, BM et al. JASE 2021;34:223-236

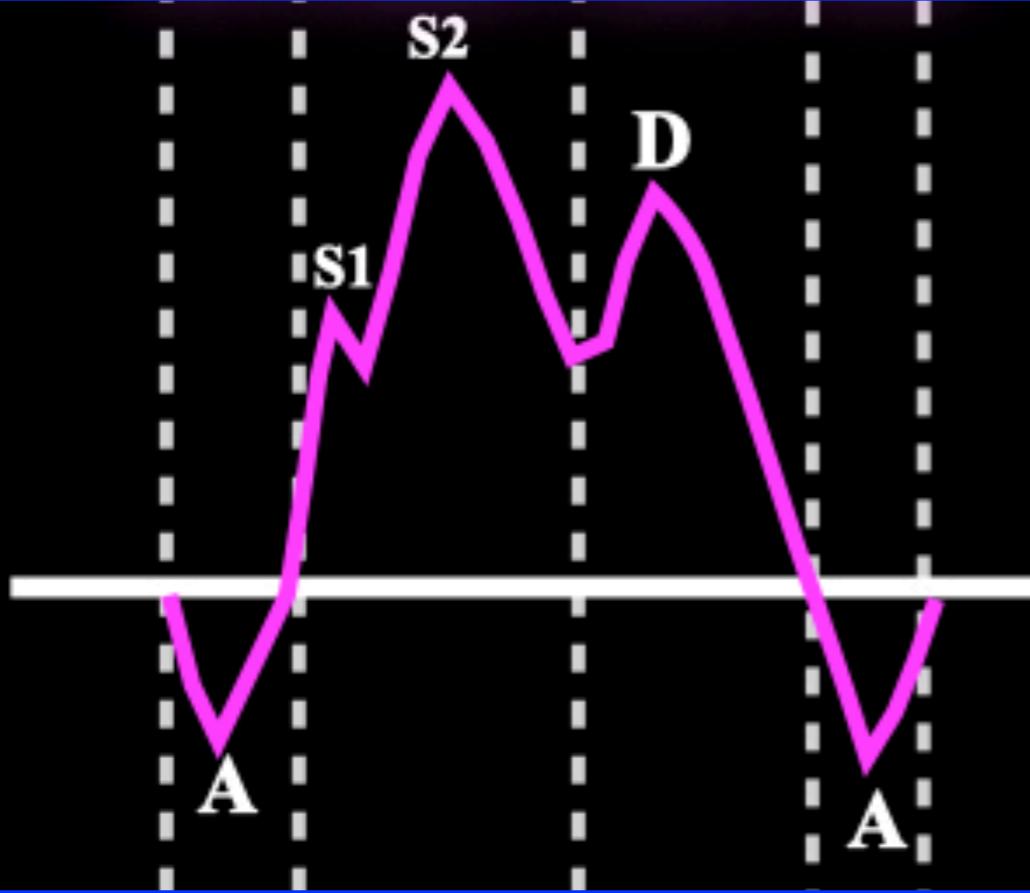
## **Physiologic Determinants of Pulmonary Venous Waves:**

A: LA contractility and LV stiffness.

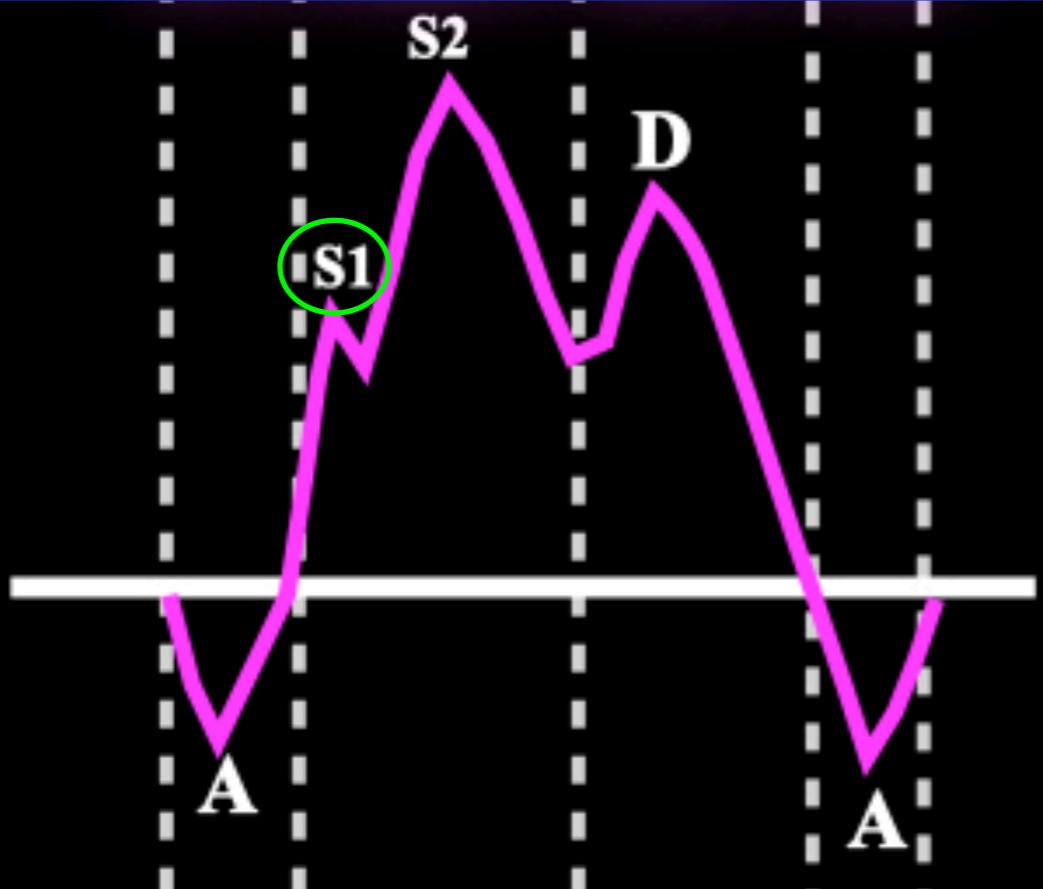
S1: LA relaxation.

S2: RV stroke volume, LA compliance, LV contractility.

D: LV relaxation, LV compliance.



***Pulmonary vein (PV)***



*S1-wave*

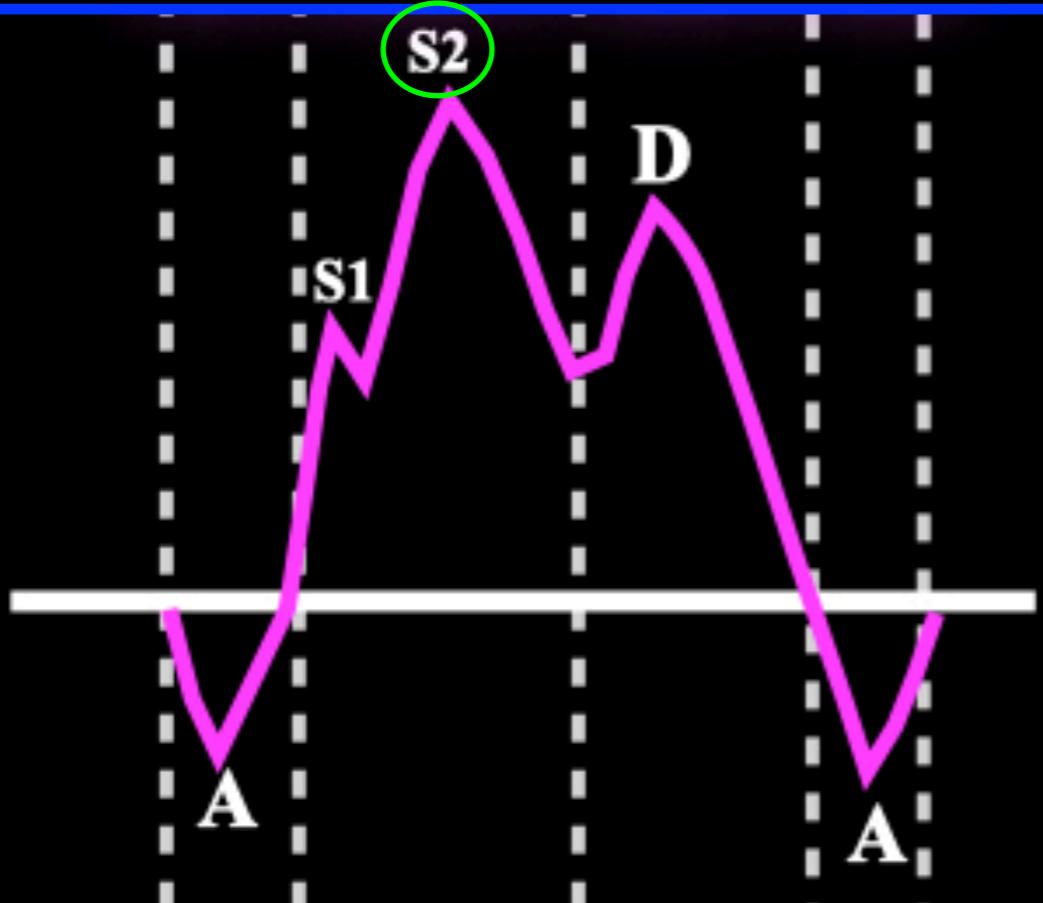
*Pulmonary vein (PV)*

*S1: Physiological determinant = LA relaxation*

*S1 increased by inc LA contractility*

*S1 Decreased by:*

- 1. A-fib*
- 2. LA mechanical failure*



**S2-wave**

**Pulmonary vein (PV)**

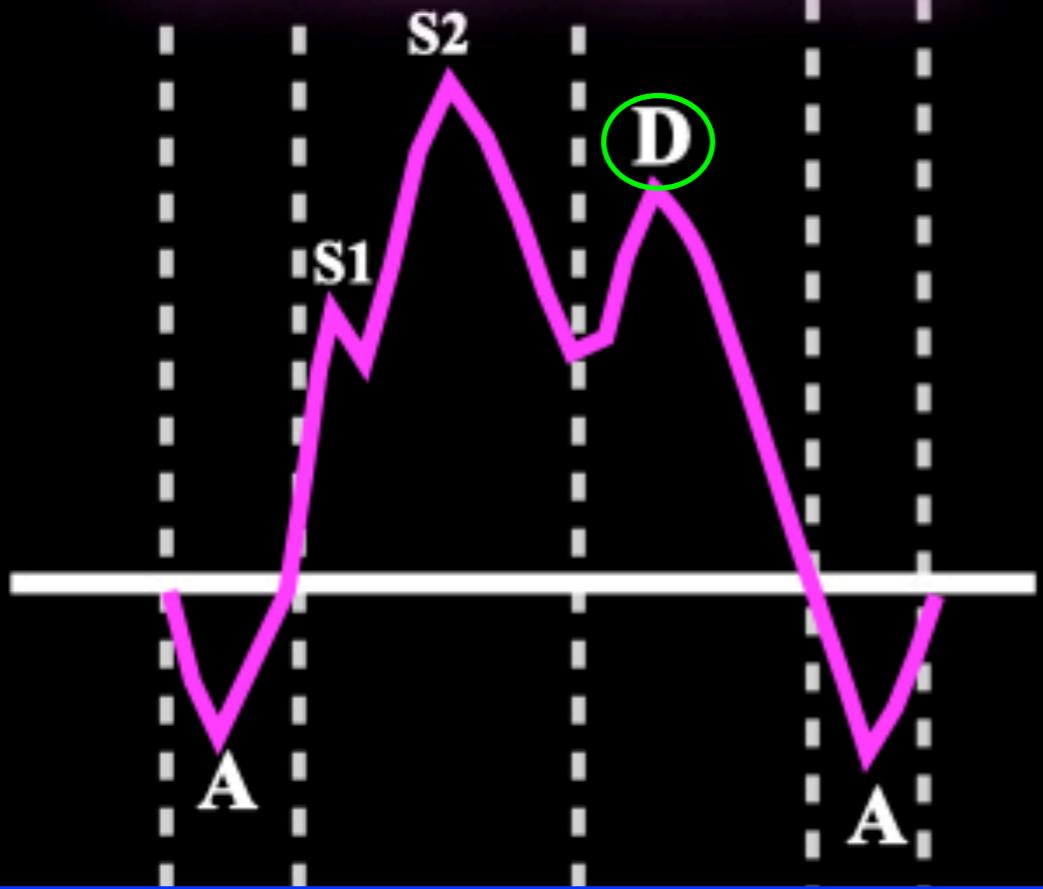
***S2: Physiological determinant = RV SV, LA compliance, LV contractility***

**S2 increased by:**

1. Inc LV contractility
2. Impaired LV relaxation
3. Volume loading

**S2 Decreased by:**

1. High LAP
2. MR
3. A-fib



**D-wave**

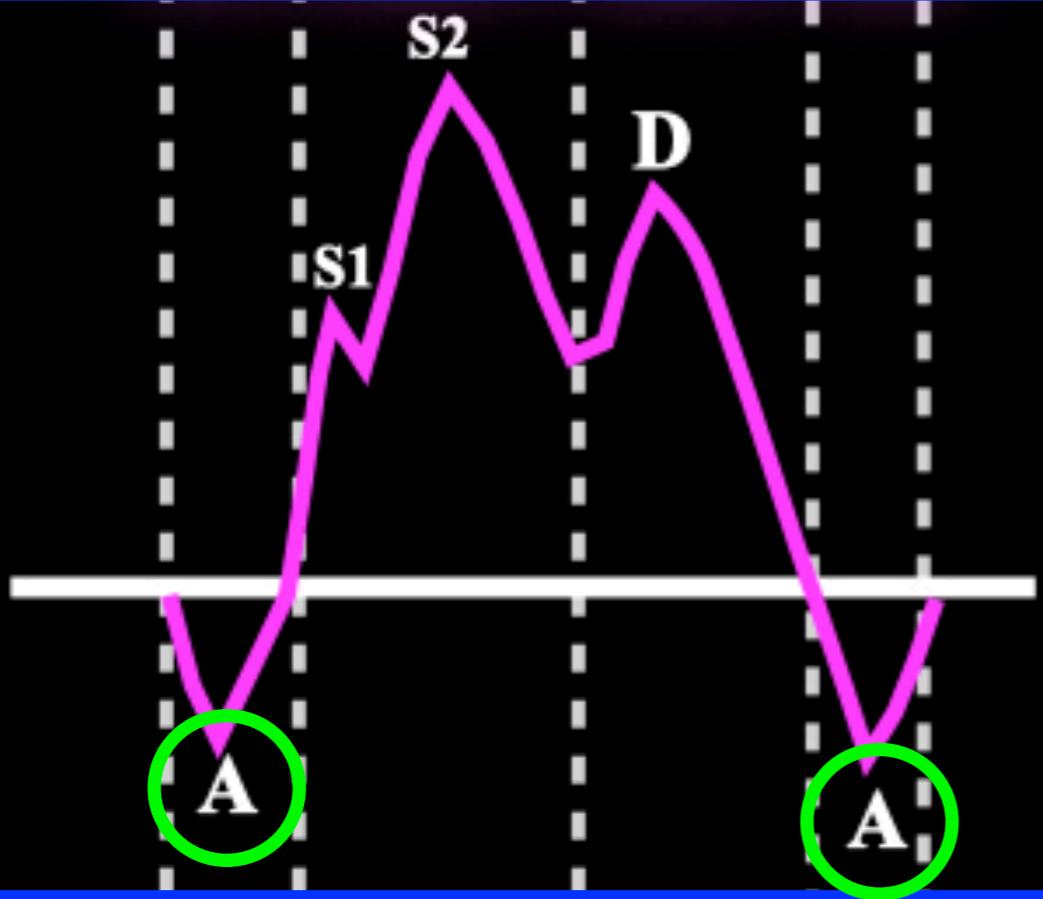
**Pulmonary vein (PV)**

*D: Physiological determinant = LV relaxation + LV compliance*

*D increased by HIGH LAP*

**D Decreased by:**

- 1. Reduced preload*
- 2. Impaired LV relaxation*



*A-wave*

*Pulmonary vein (PV)*

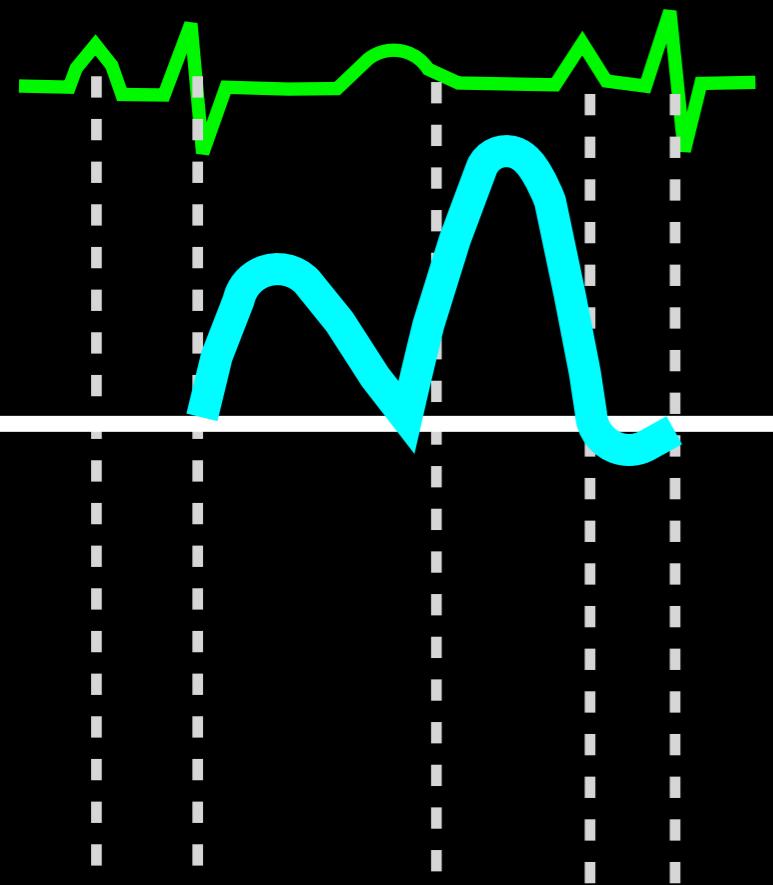
*A: Physiological determinant = LA contractility + LV stiffness*

*A increased by:*

1. *High LVEDP*
2. *Short PR interval*
3. *MS*

*A Decreased by:*

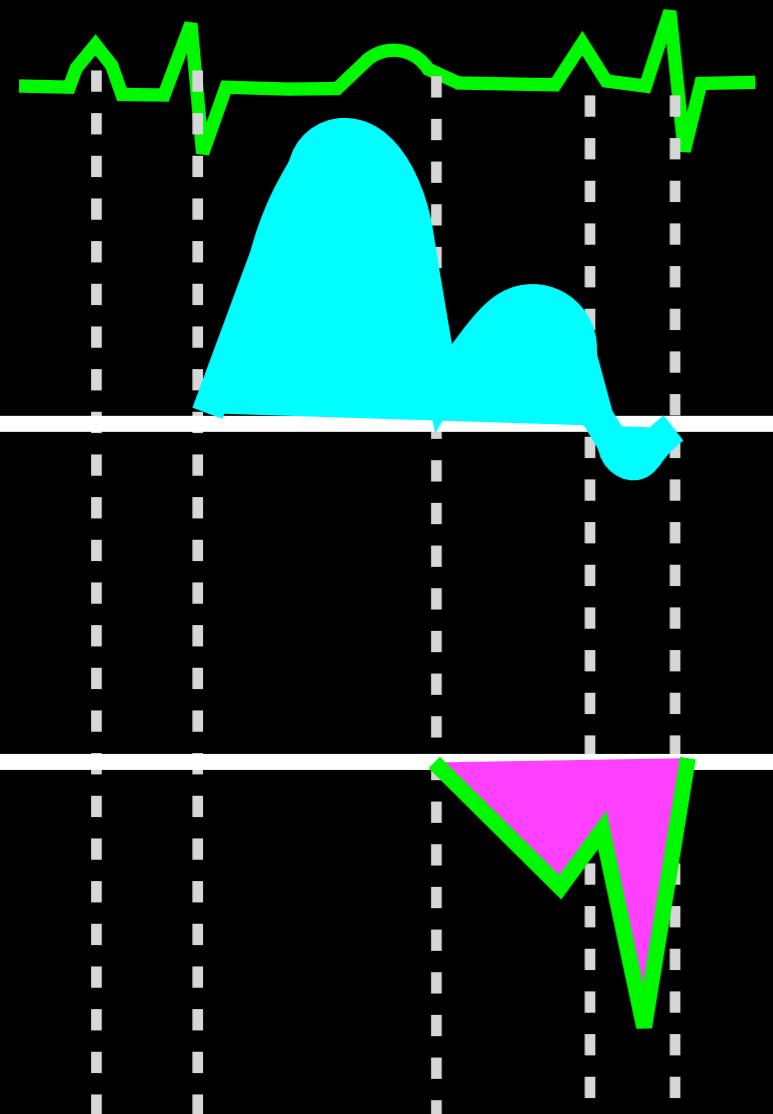
1. *Reduced preload*
2. *LA mech failure*
3. *A-fib*
4. *Sinus Tach*
5. *1st deg AV block*



*Pulmonary vein (PV)*

Most likely clinical scenario?

- A.Mitral stenosis
- B.Severe MR
- C.Grade I diastolic dysfunction
- D. Young healthy athlete***

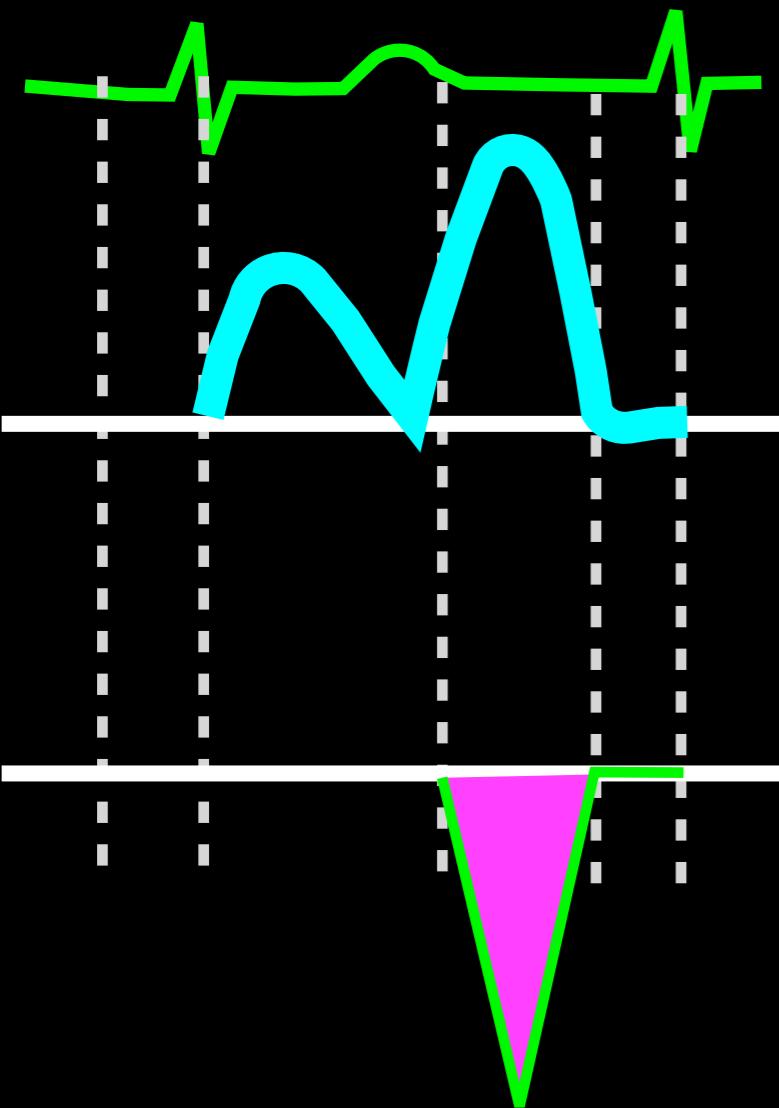


*Pulmonary vein (PV)*

*E & A*

Most likely clinical scenario?

- A. Mitral stenosis
- B. Severe MR
- C. *Grade I diastolic dysfunction*
- D. Young healthy athlete
- E. End stage amyloidosis



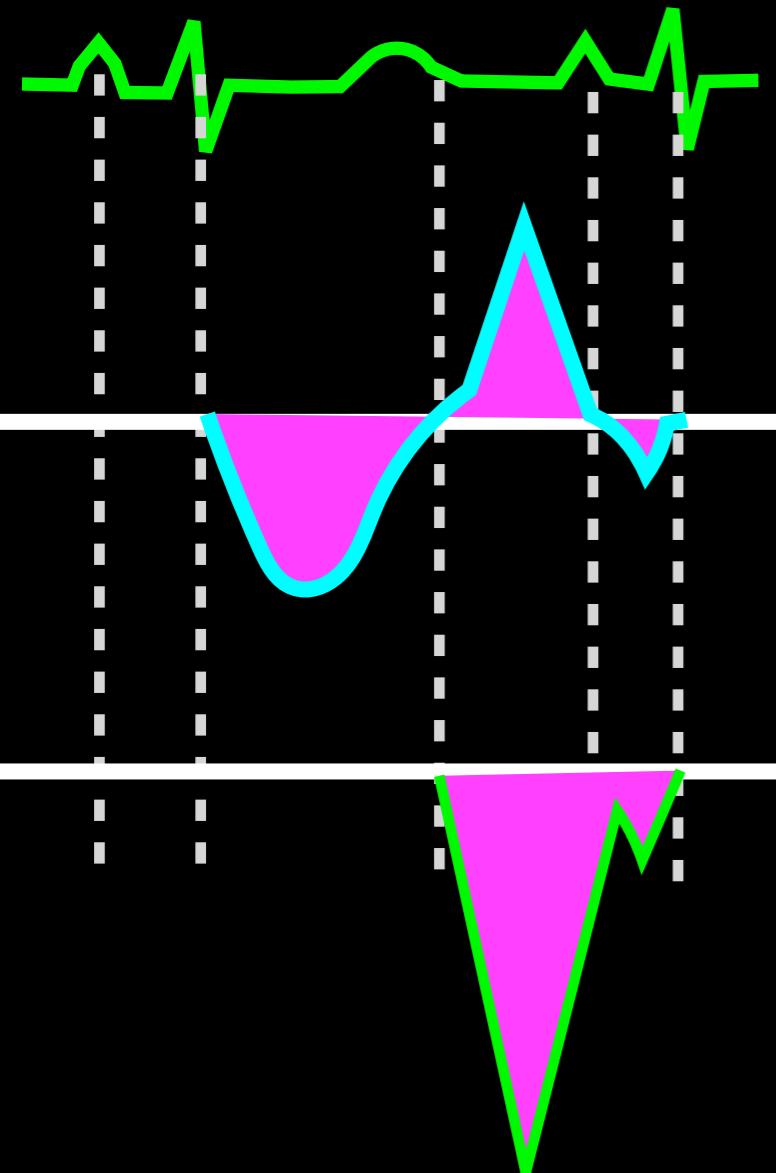
**EKG**

**Pulmonary vein (PV)**

**E & A**

Most likely clinical scenario?

- A. Mitral stenosis
- B. ASD
- C. Grade I diastolic dysfunction
- D. Pulmonary vein stenosis
- E. Atrial Fibrillation**



EKG

Pulmonary vein (PV)

E & A

Most likely clinical scenario?

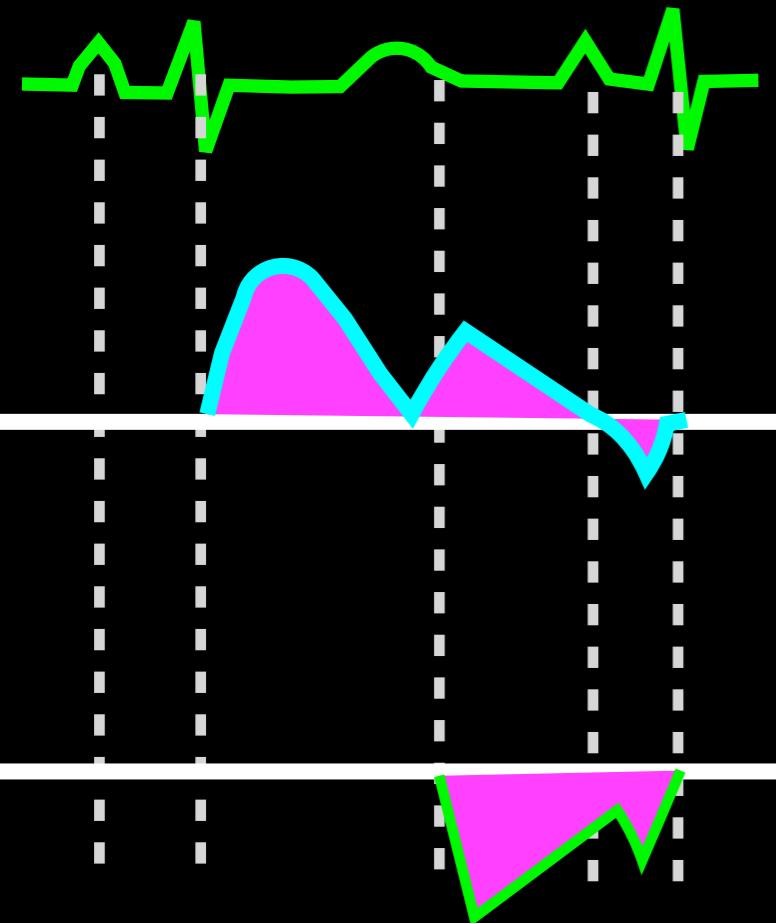
A. Mitral stenosis

B. Severe MR

C. Grade I diastolic dysfunction

D. ASD

E. Atrial Fibrillation



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# Most likely clinical scenario?

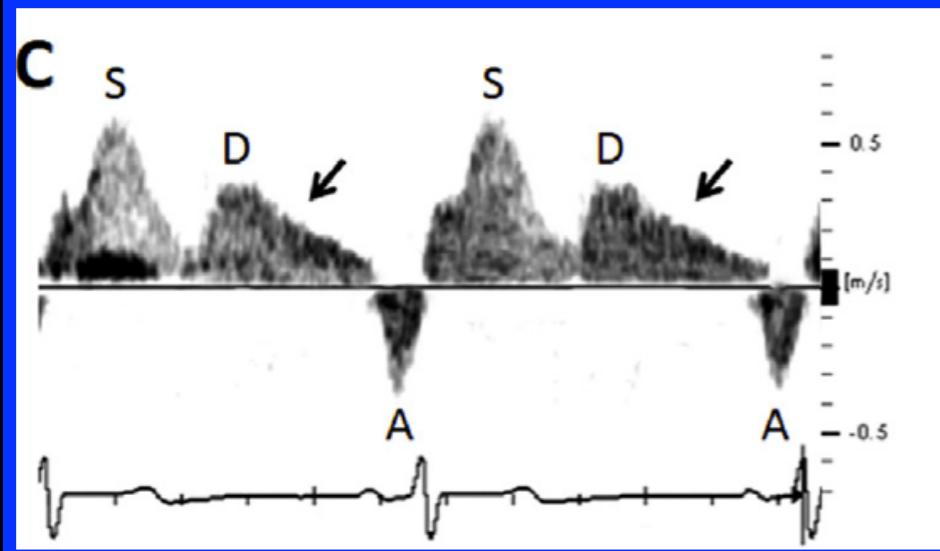
**A. Mitral stenosis**

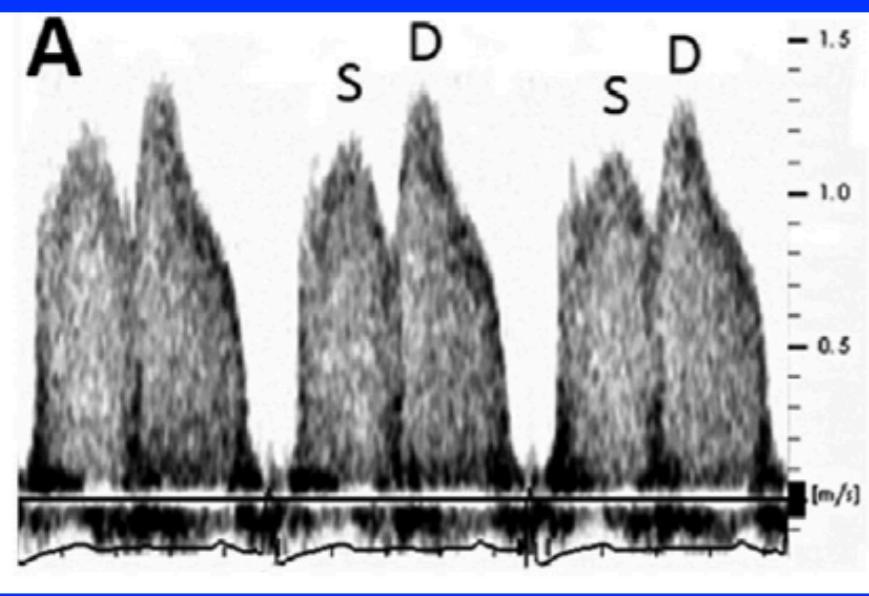
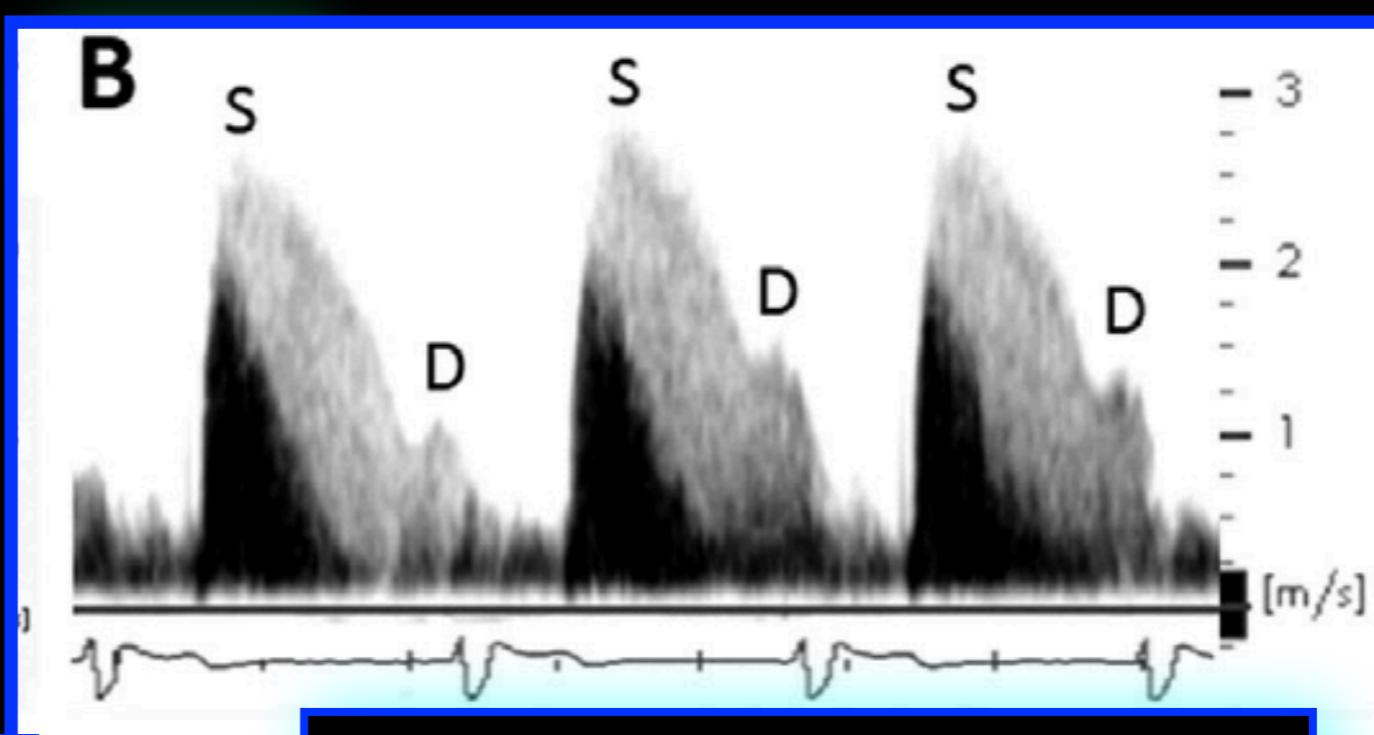
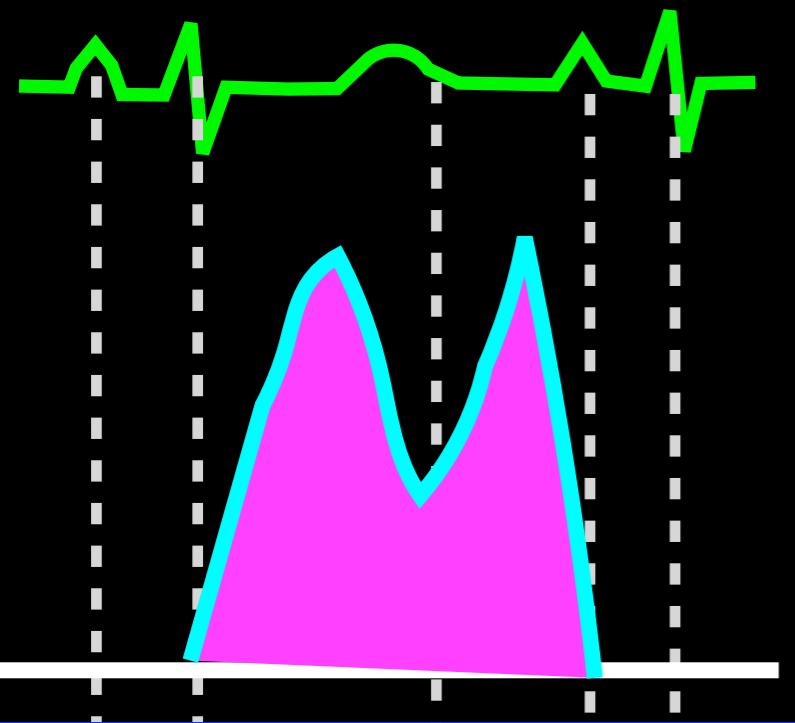
B. Severe MR

C. Grade III diastolic dysfunction

D. Pulmonary vein stenosis

E. Atrial Fibrillation

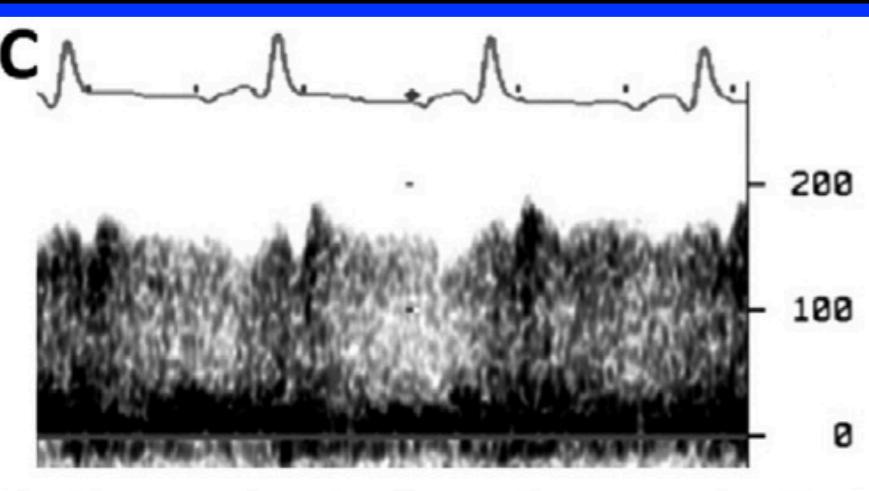


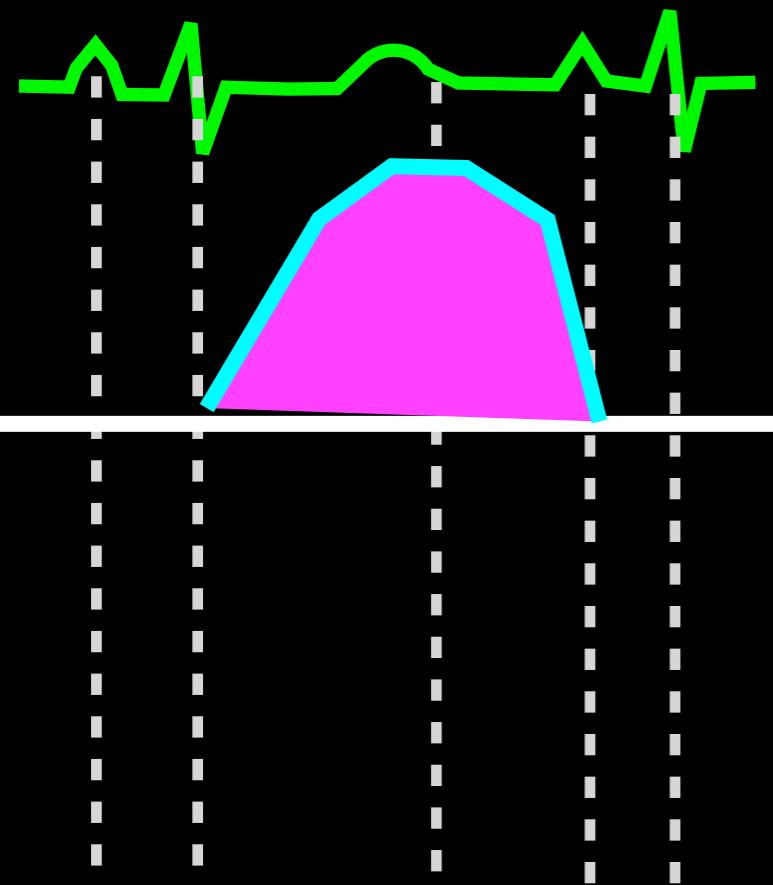


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# Most likely clinical scenario?

- A.Mitral stenosis
- B.Severe MR
- C.Grade I diastolic dysfunction
- D. *Pulmonary vein stenosis***
- E. Cor triatriatum



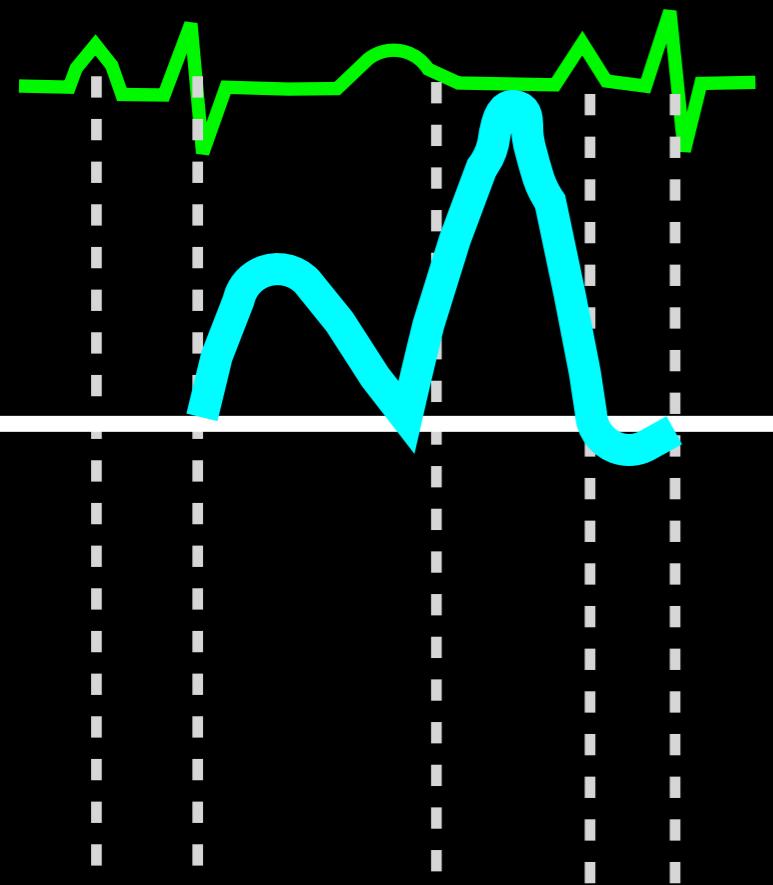


**EKG**

***Pulmonary vein (PV)***

Most likely clinical scenario?

- A. Mitral stenosis
- B. Severe MR
- C. Grade I diastolic dysfunction
- D. ASD***
- E. Constrictive pericarditis

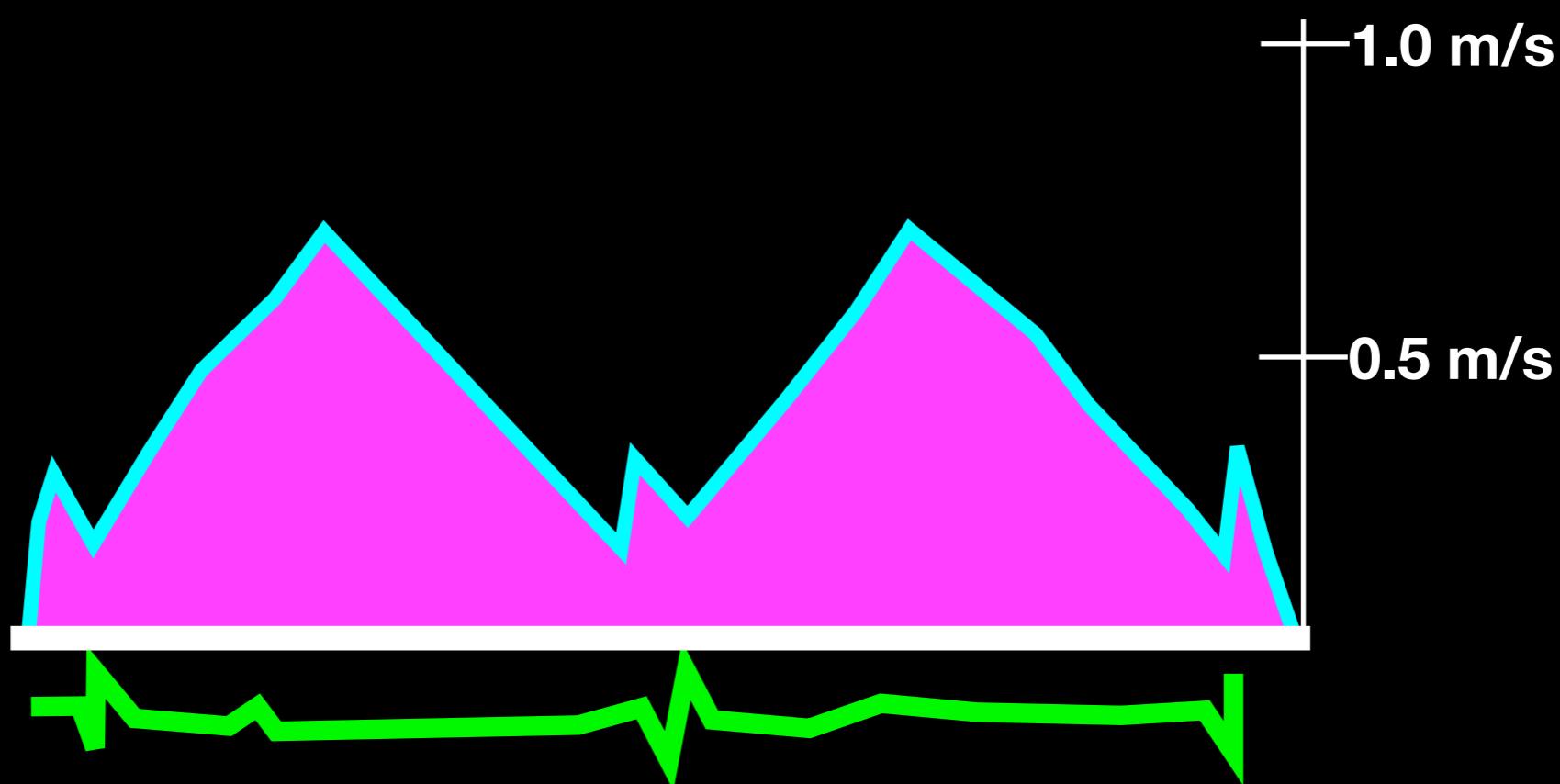


*Pulmonary vein (PV)*

Most likely clinical scenario?

- A. AV dissociation
- B. Severe MR
- C. ASD

*D. Grade III diastolic dysfunction*



Most likely clinical scenario?

A.Mitral stenosis

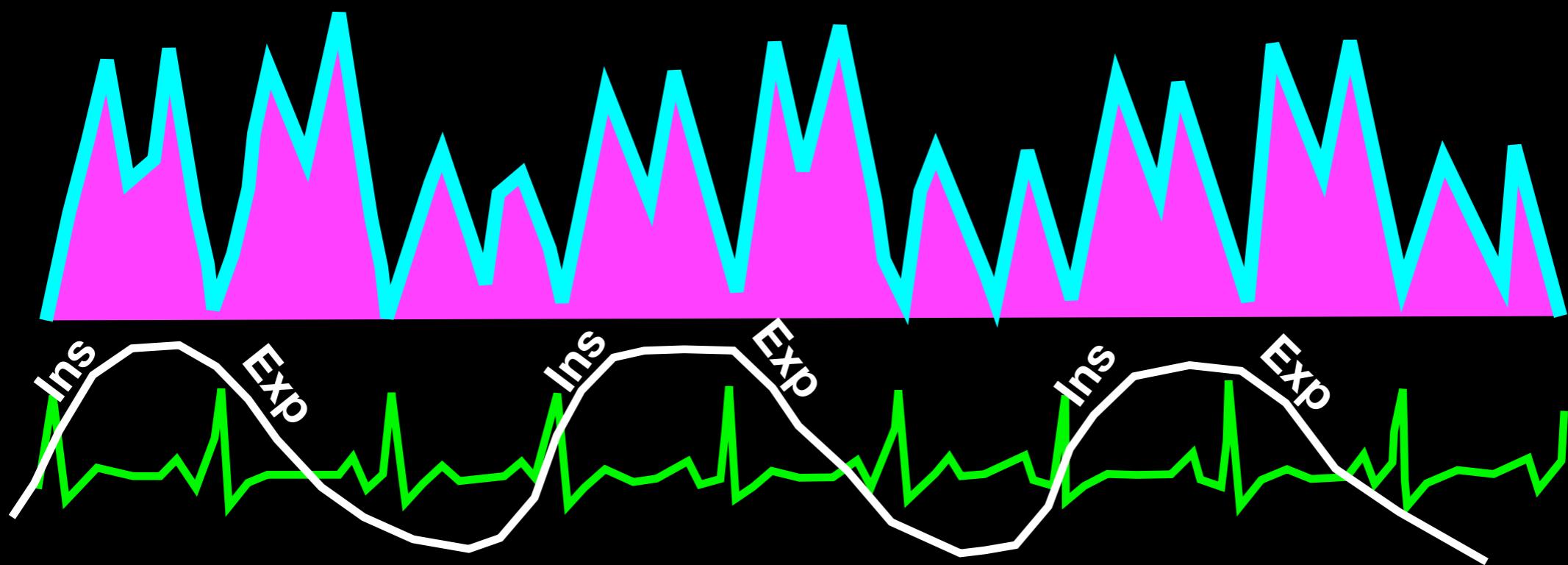
B.Severe MR

C.Grade I diastolic dysfunction

**D. ASD**

E. Constrictive pericarditis

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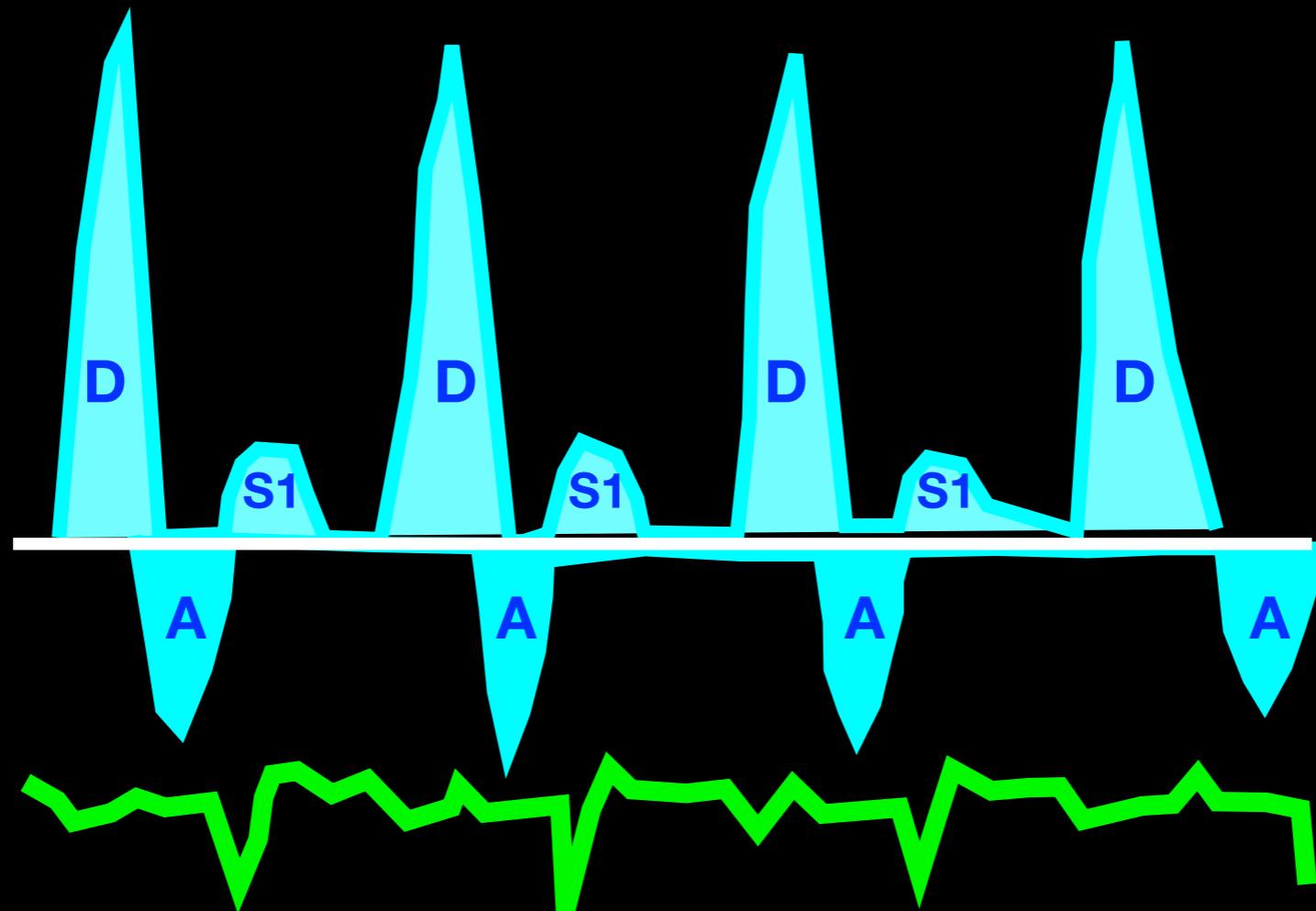


Most likely clinical scenario?

- A.Mitral stenosis
- B.Severe MR
- C.Grade III diastolic dysfunction
- D. ASD

*E. Constrictive pericarditis*

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Most likely clinical scenario?

A. Mitral stenosis

***B. Amyloidosis***

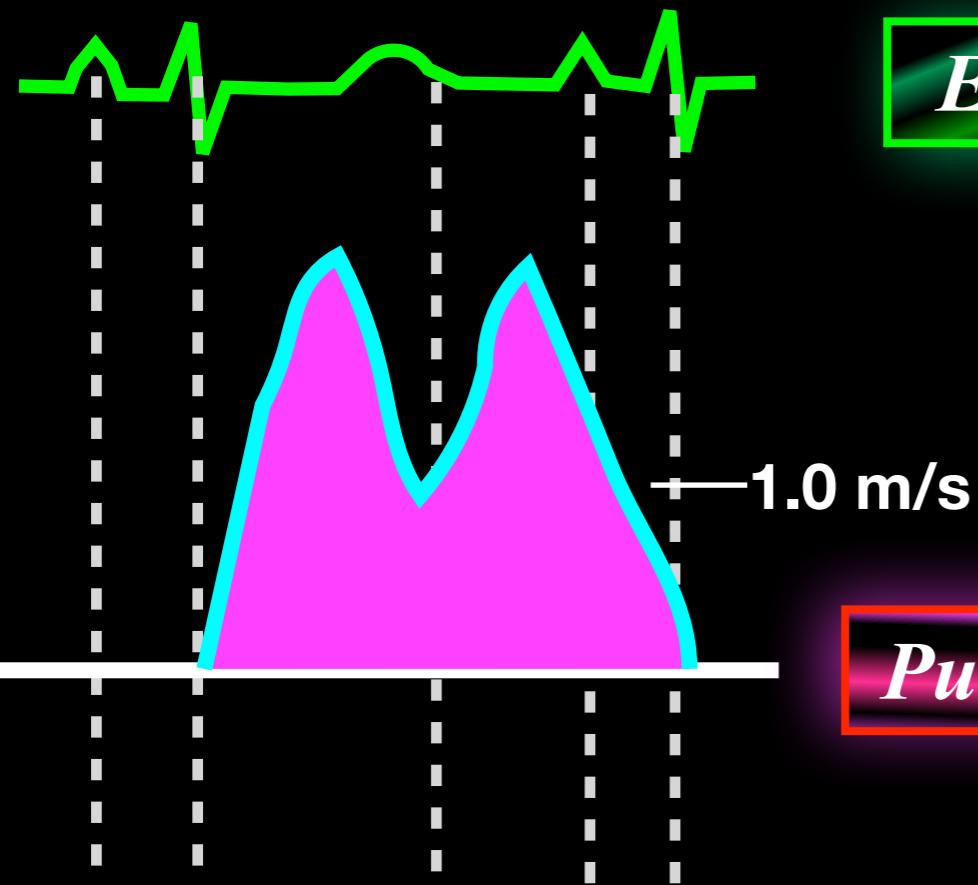
D. ASD

E. Constrictive pericarditis

F. Grade I diastolic dysfunction

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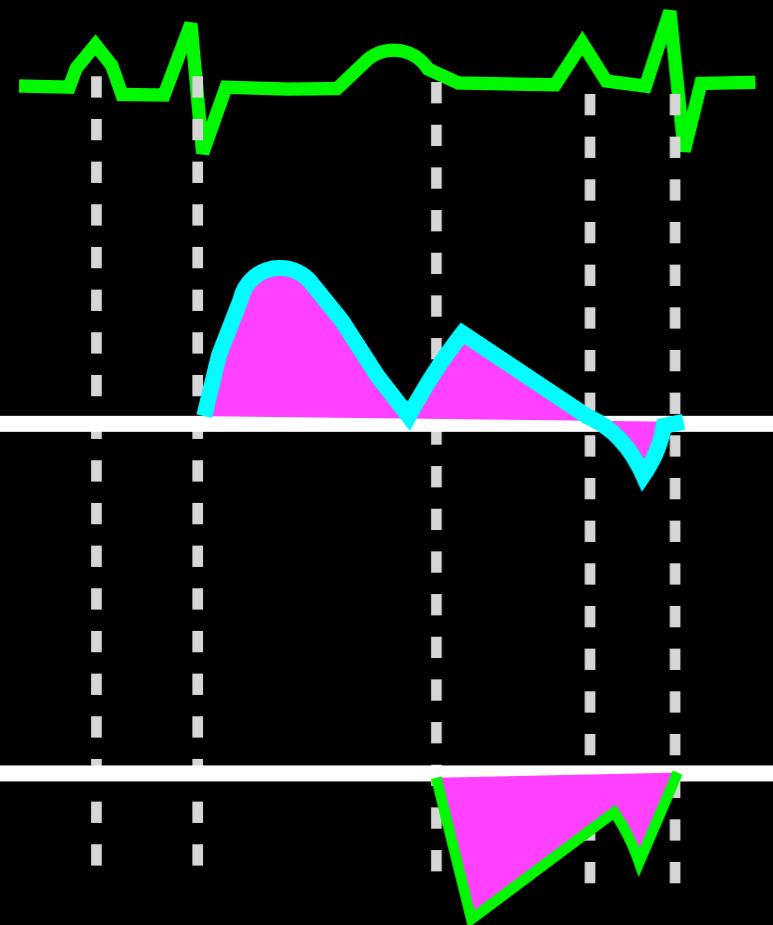
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- D. *Pulmonary vein stenosis***
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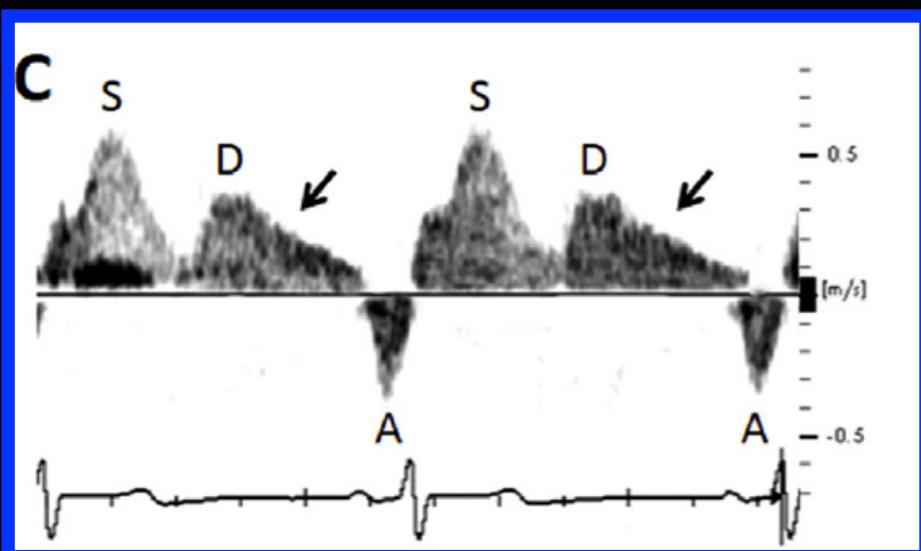
A. *Mitral stenosis*

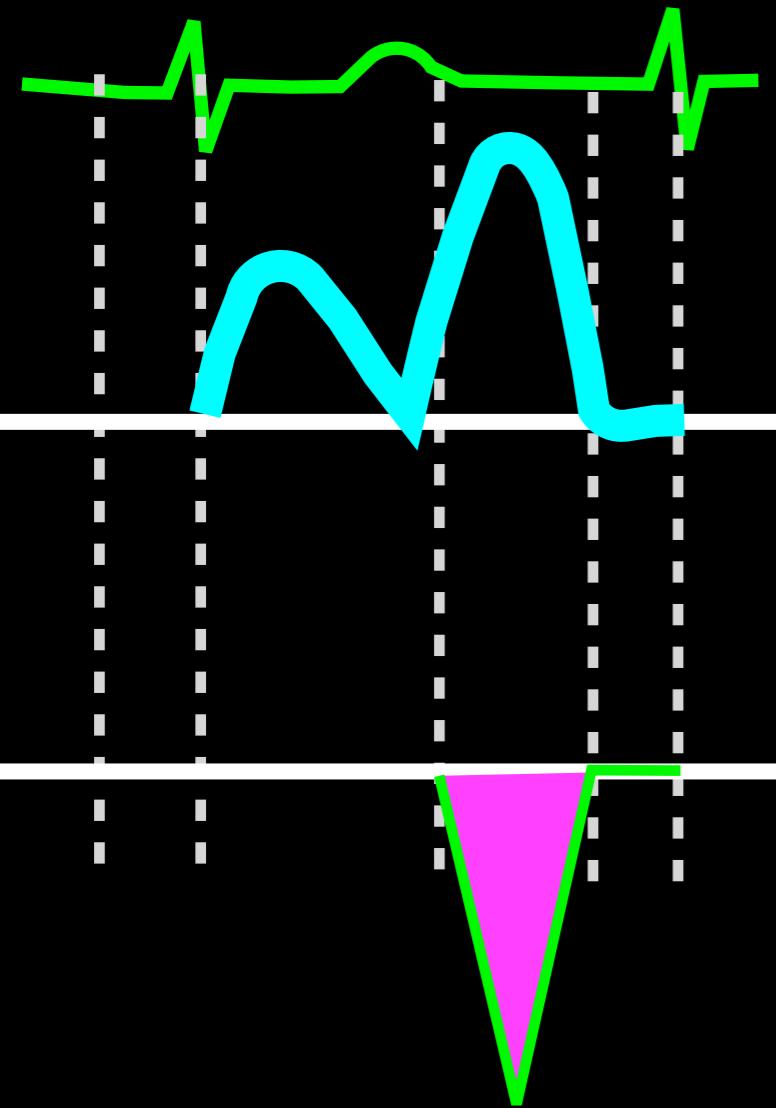
B. Severe MR

C. Grade III diastolic dysfunction

D. Pulmonary vein stenosis

E. Atrial Fibrillation





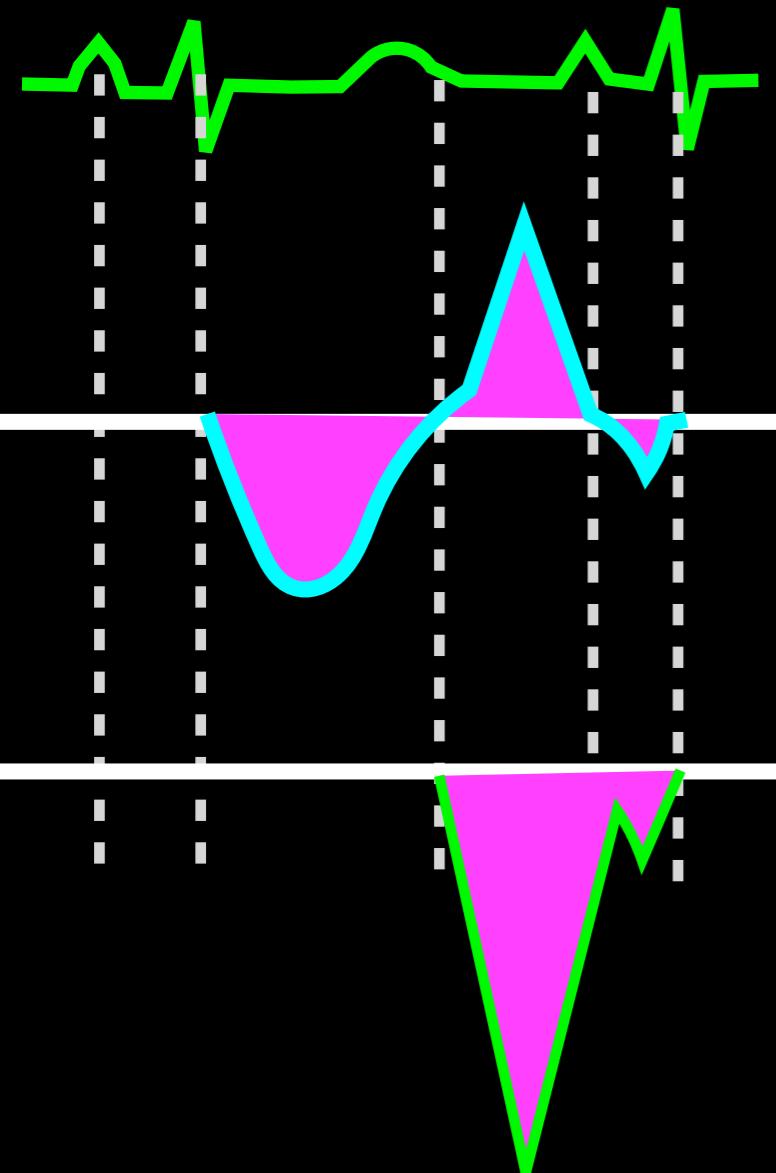
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