

# STOP BLOQ Tutorial

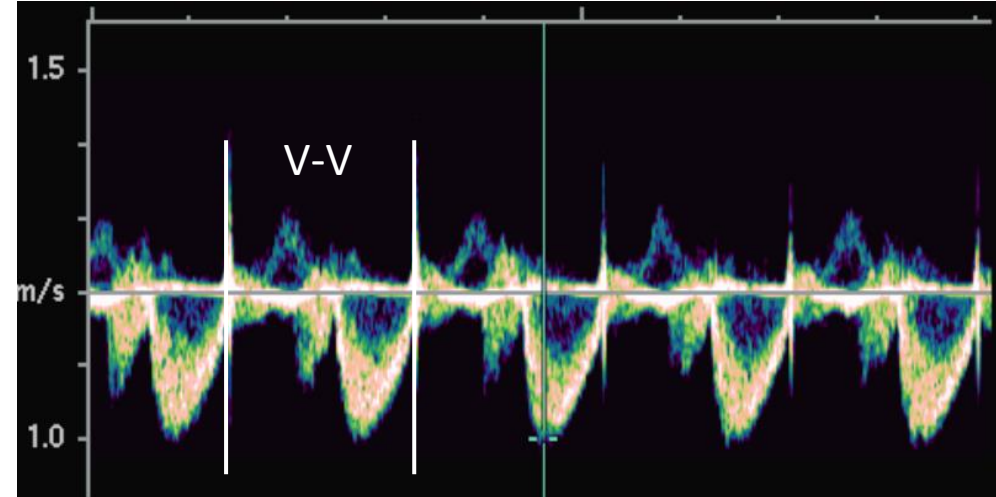
# Contents

- Surveillance echoes: Measuring fetal heart rate (FHR) and AV interval
  - Defining normal AV inflow
  - Defining a normal AV interval
  - Differential diagnosis of a prolonged AV interval
- Surveillance echoes: Endocardial fibroelastosis (EFE) and AV valve insufficiency
  - Location of EFE
  - Grading AV valve insufficiency
- Diagnostic echoes: Irregular fetal heart rhythm or abnormal FHR
  - Techniques to assess arrhythmia
    - Premature atrial or ventricular contractions
    - Type 1, 2° AV block
    - Type 2, 2° AV block
    - 3° AV block
    - Blocked atrial bigeminy
    - FHR > 180 bpm
    - FHR < 110 bpm

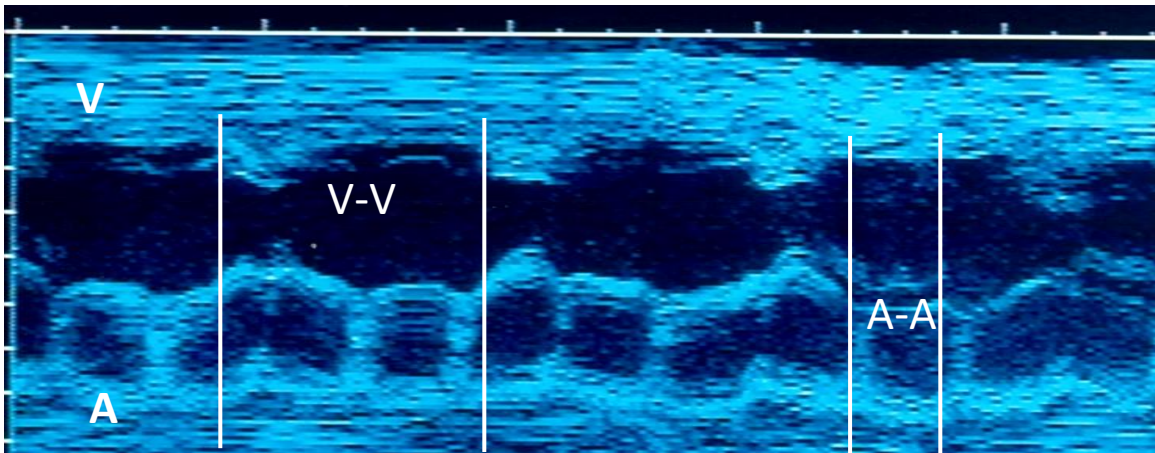
Measuring fetal heart rate

- If atrial and ventricular beat rates are the same
  - V-V interval from pulsed Doppler of aorta or PA
    - Beats per minute = FHR
    - Cycle length (ms):  $60,000/CL = FHR$
  - V-V interval from ventricular m-mode
- If atrial and ventricular beat rates are different
  - A-A interval and V-V interval both from m-mode
  - A-A interval from hepatic vein

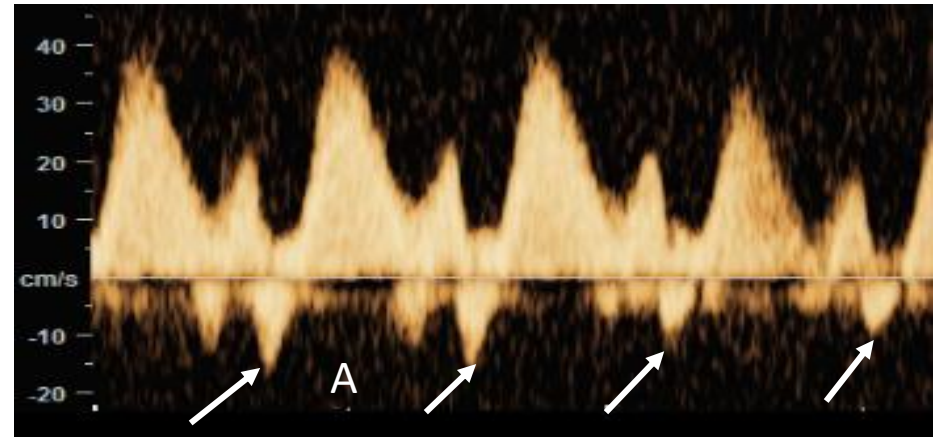
Aorta



Simultaneous Ventricular and atrial M-Mode



Hepatic Vein



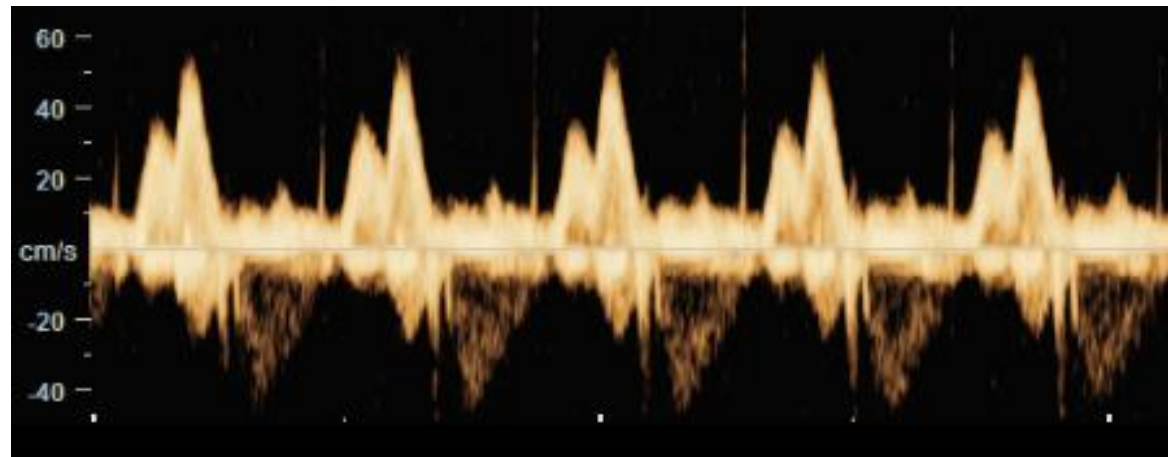
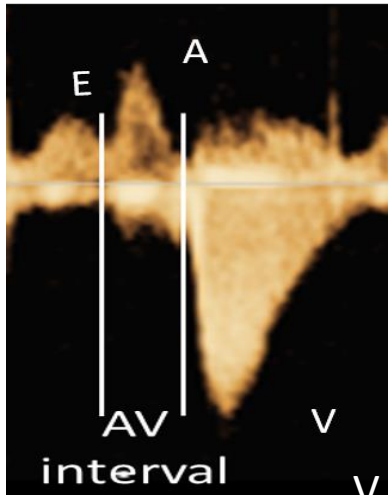
# Mitral inflow and aortic outflow and measuring AV interval

Normal AV interval

# The Normal Fetal AV Interval

## Mitral inflow/aortic outflow: Normal

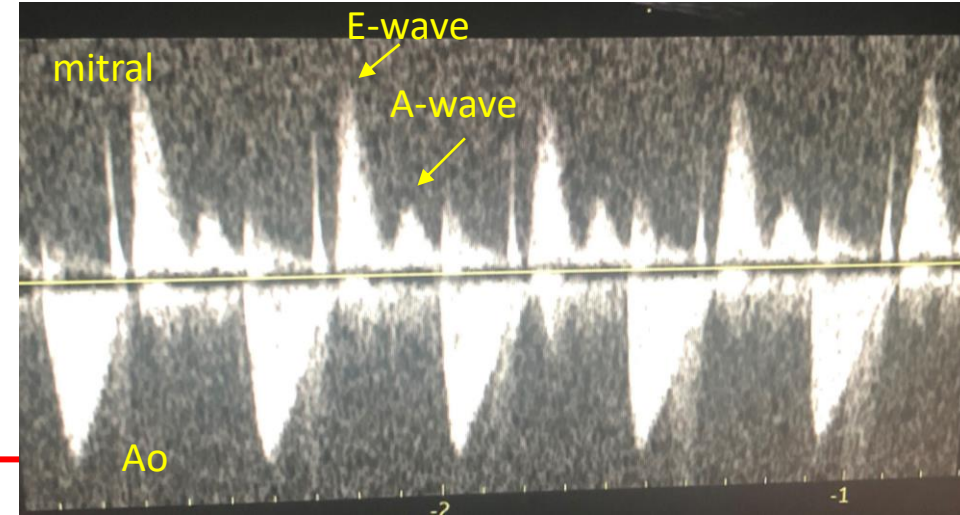
- Bi-phasic inflow (distinct E and A waves)
  - If FHR > 150 ms measure AV interval again when FHR is slower
- Time from onset of mitral A-wave to onset of aortic V-wave = AV interval = < 170 ms (average of 3 measures)



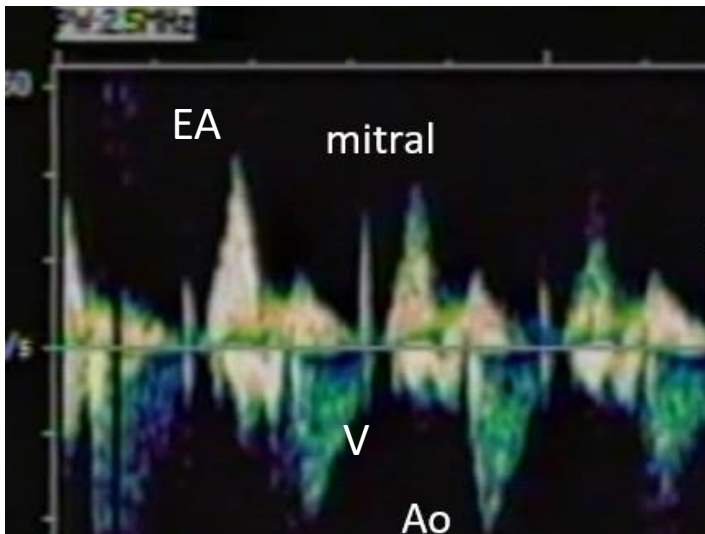
# Abnormal mitral inflow

- Monophasic inflow (single or fused E and A waves)
- Some biphasic and other monophasic inflows
- E-wave velocity is higher than A-wave velocity
- E and A-waves have equal velocities
- Inflow abnormalities can occur with normal AV interval!

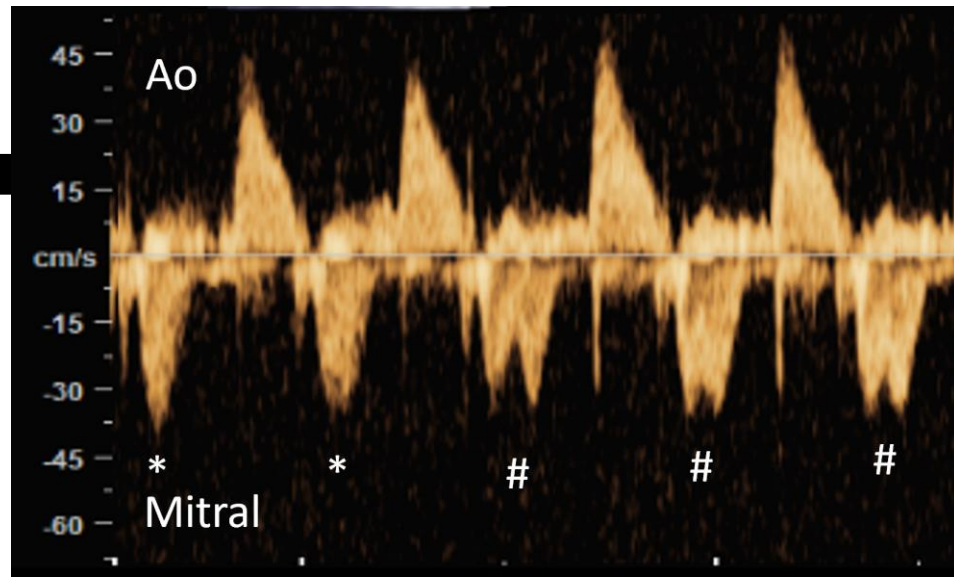
Diastolic dysfunction E-wave velocity is higher than A-wave velocity



1° AV block: Monophasic inflow

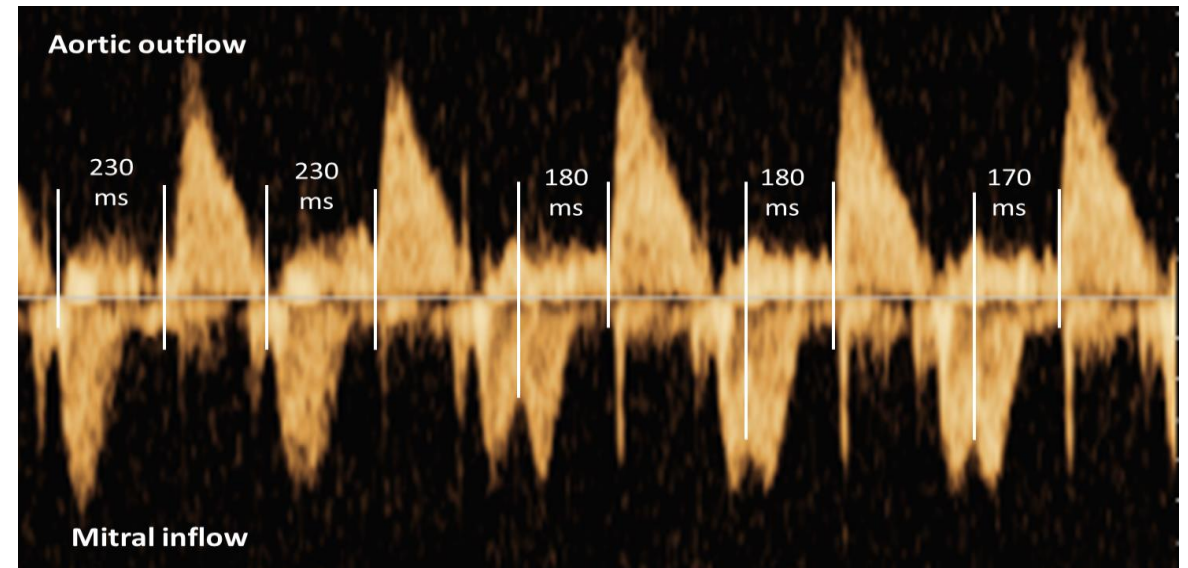
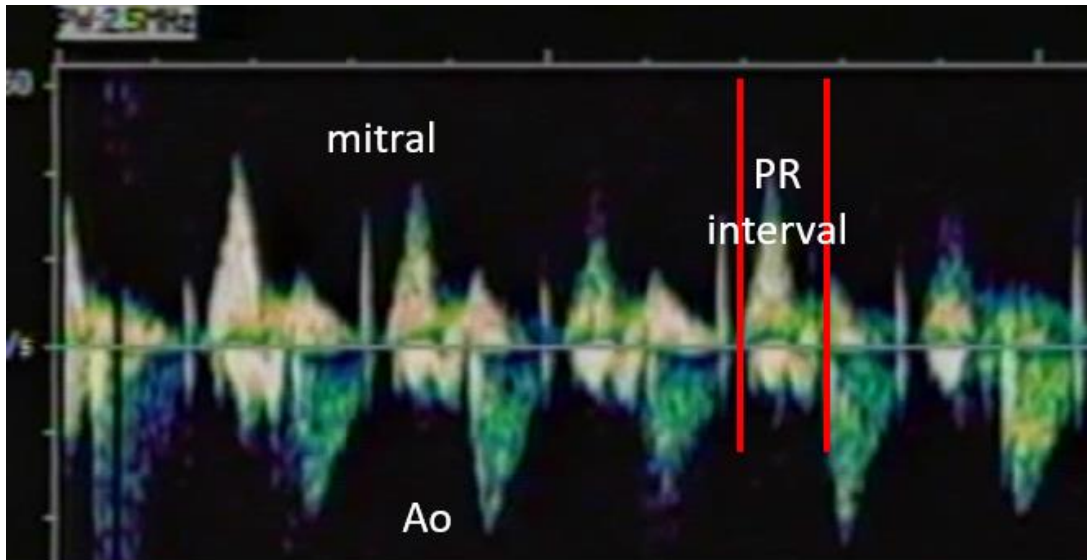
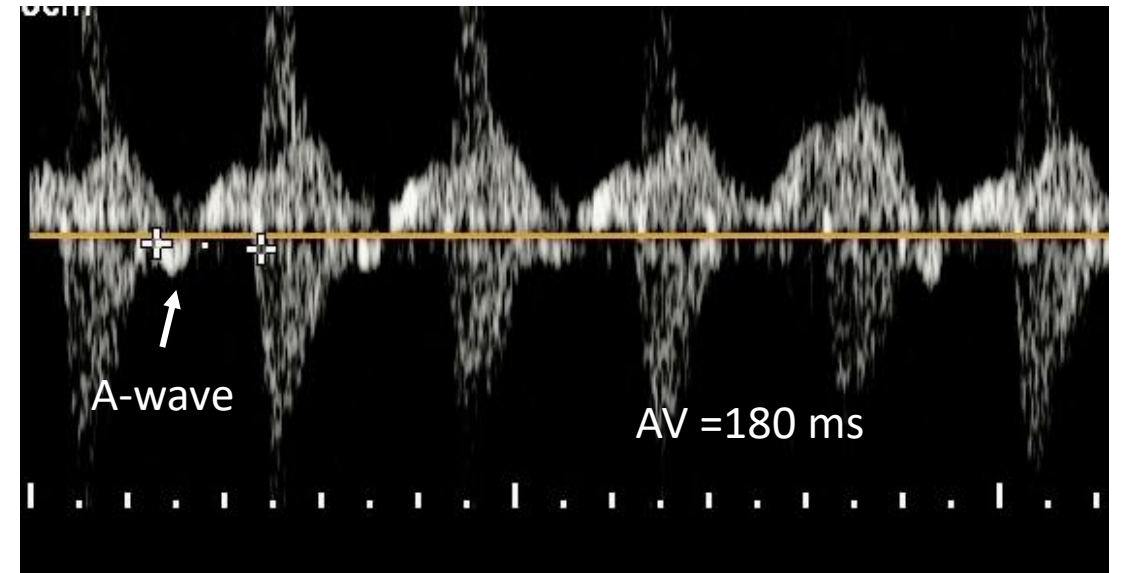


1° AV block: Mono- and Bi-phasic Inflow E and A-waves have equal velocities



# Prolonged AV interval

SVC/Ao





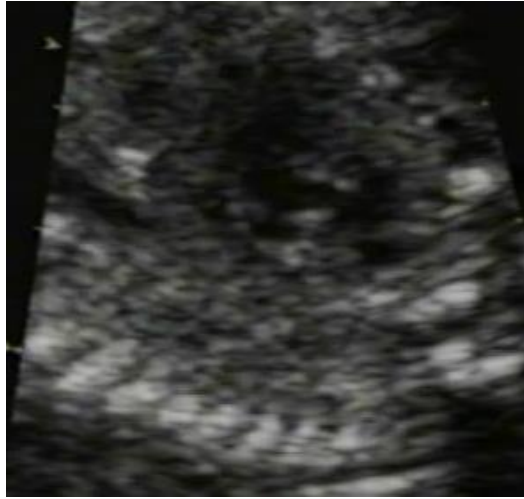
# Extra-nodal Anti-Ro disease

Endocardial Fibroelastosis (EFE)



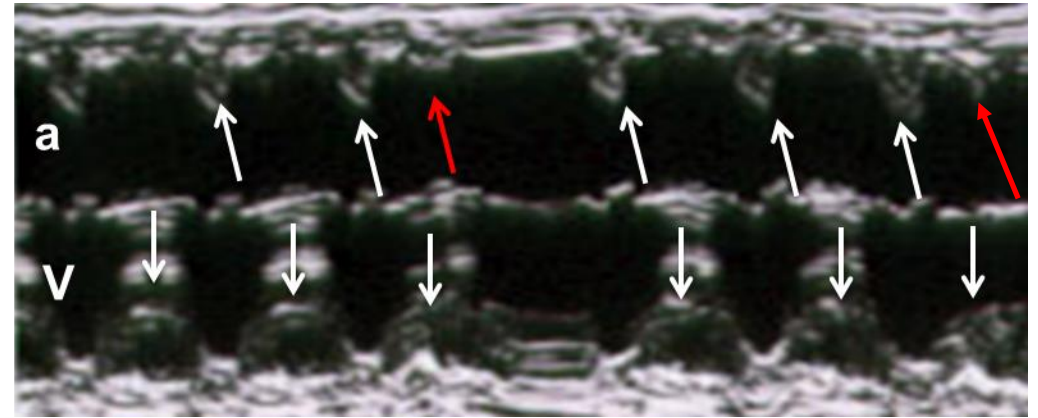
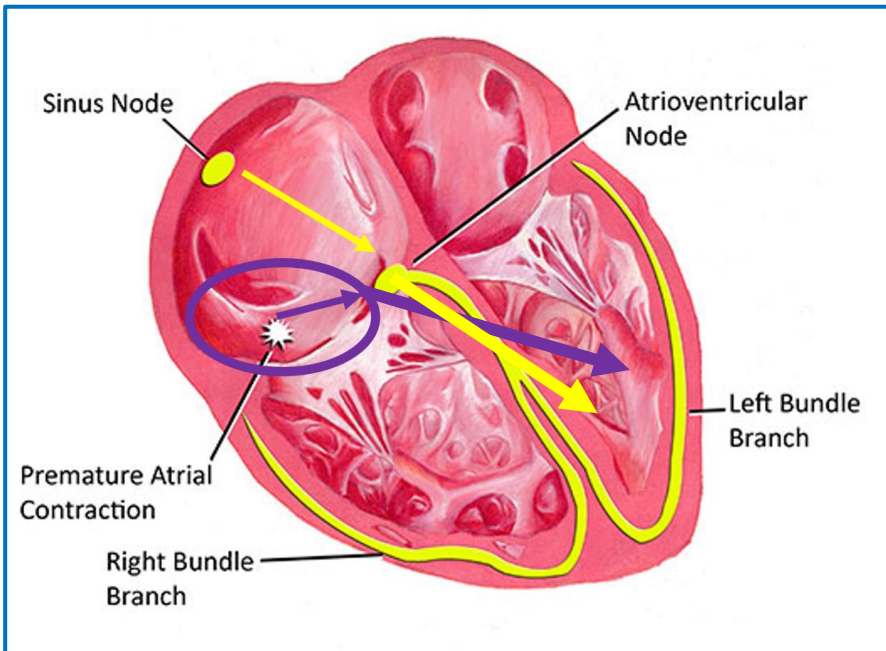
# Extra-nodal Anti-Ro disease

AV valve Insufficiency

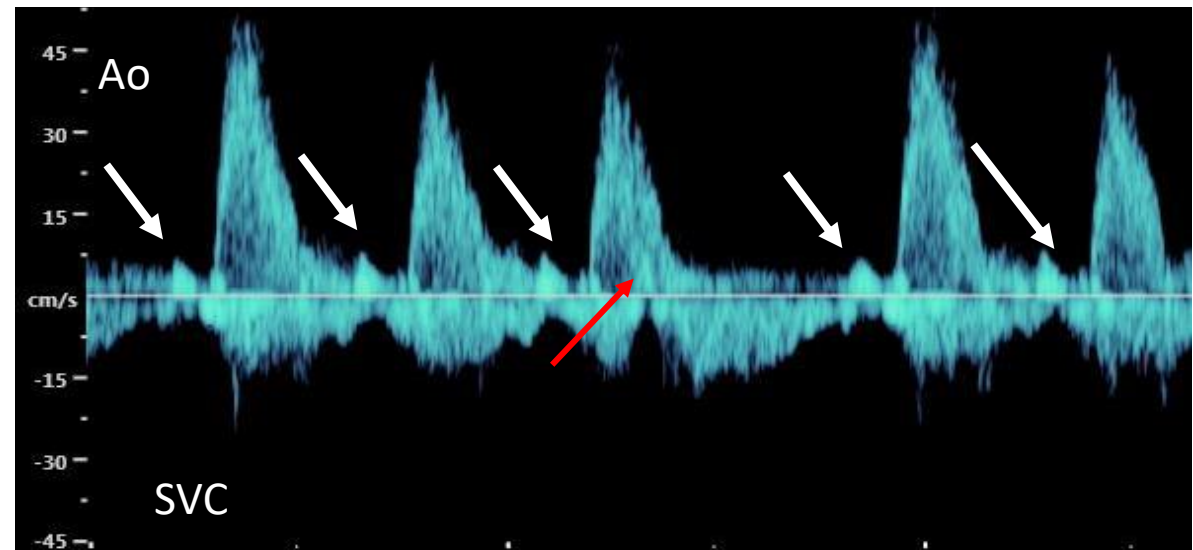


# Irregular rhythm 1

Premature Atrial Contractions (PAC)



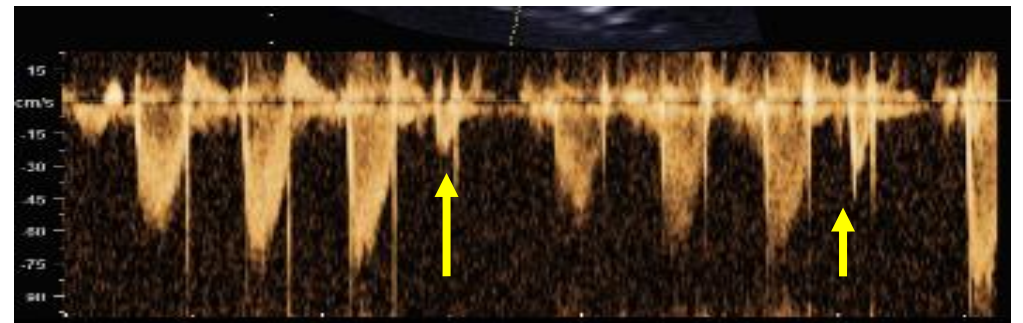
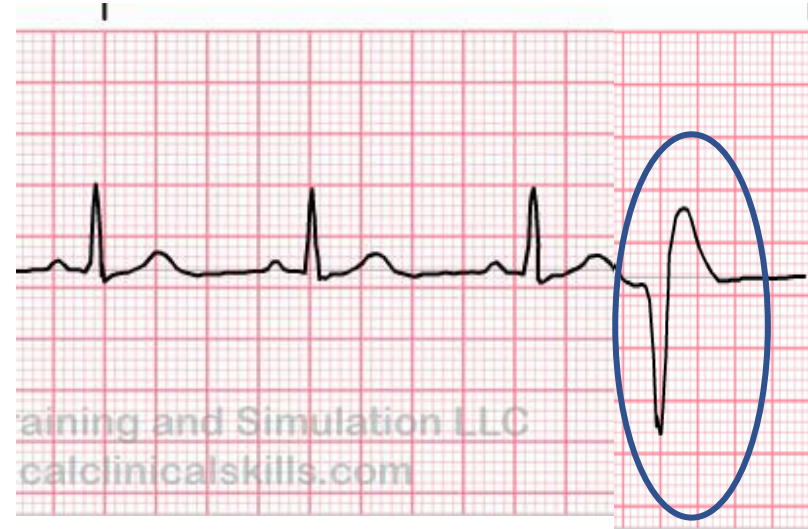
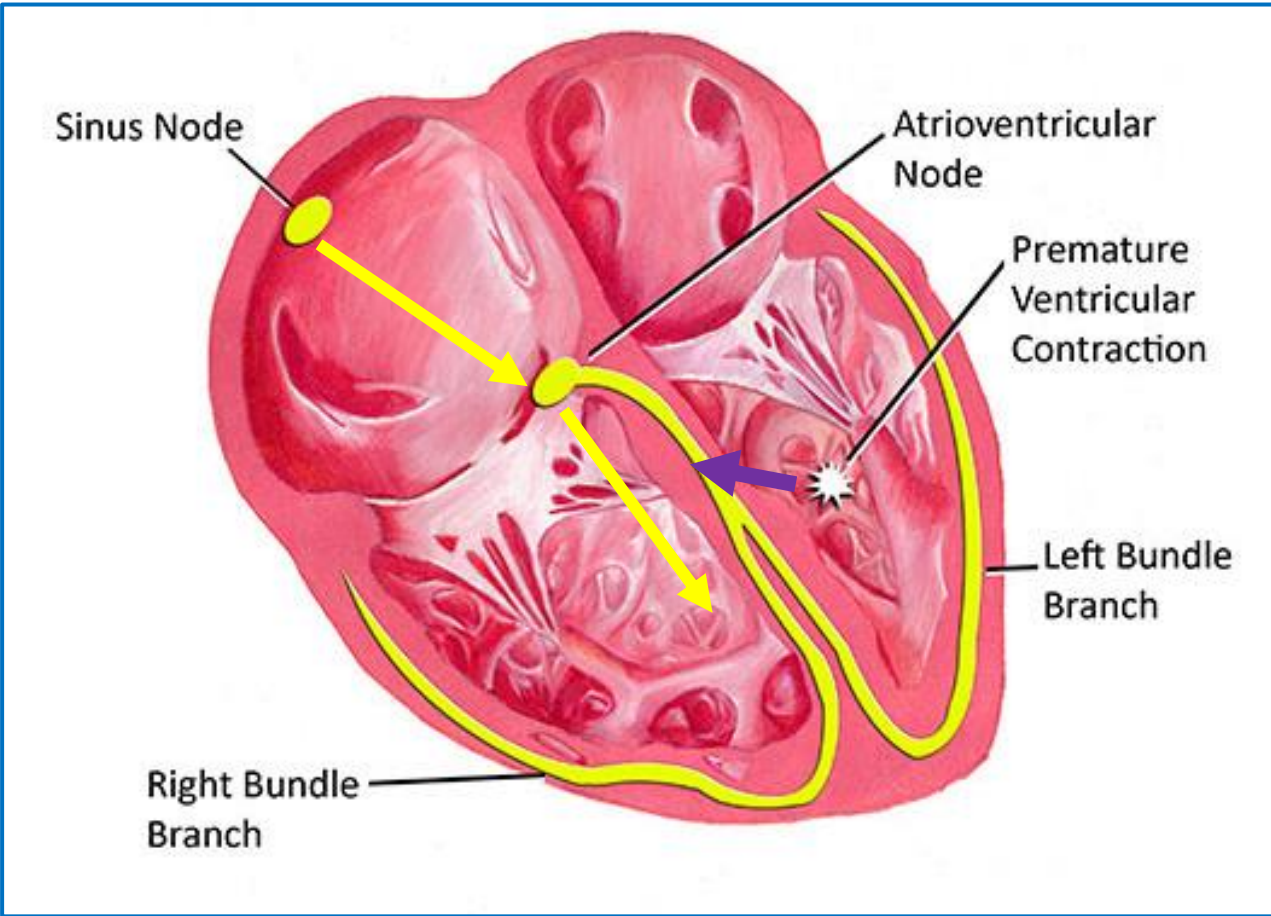
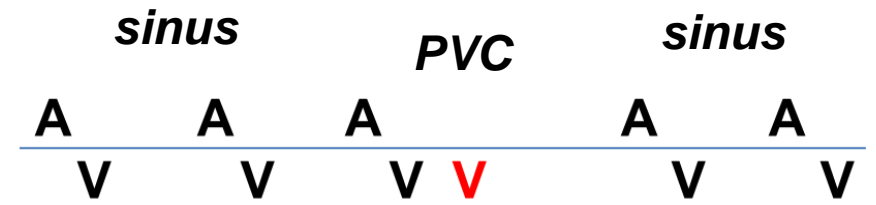
A	A	A	A	A	A	A
V	V	V	V	V	V	V



# Irregular rhythm 2

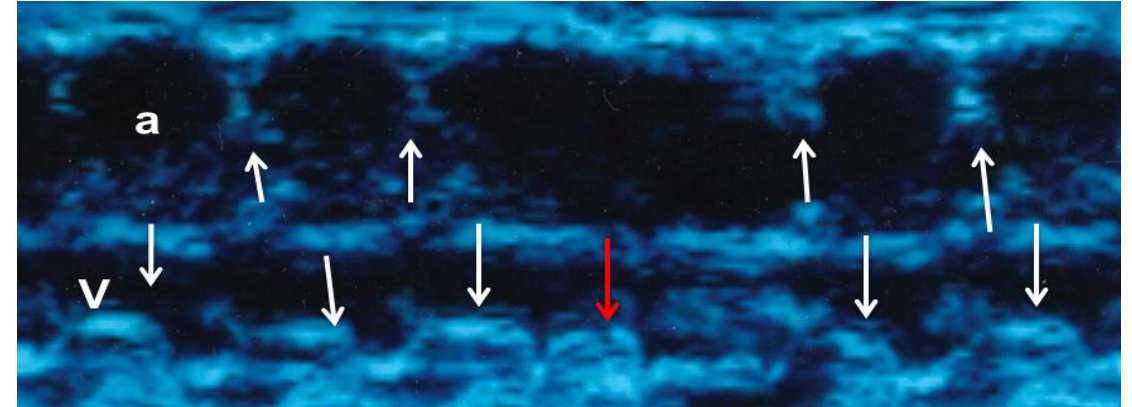
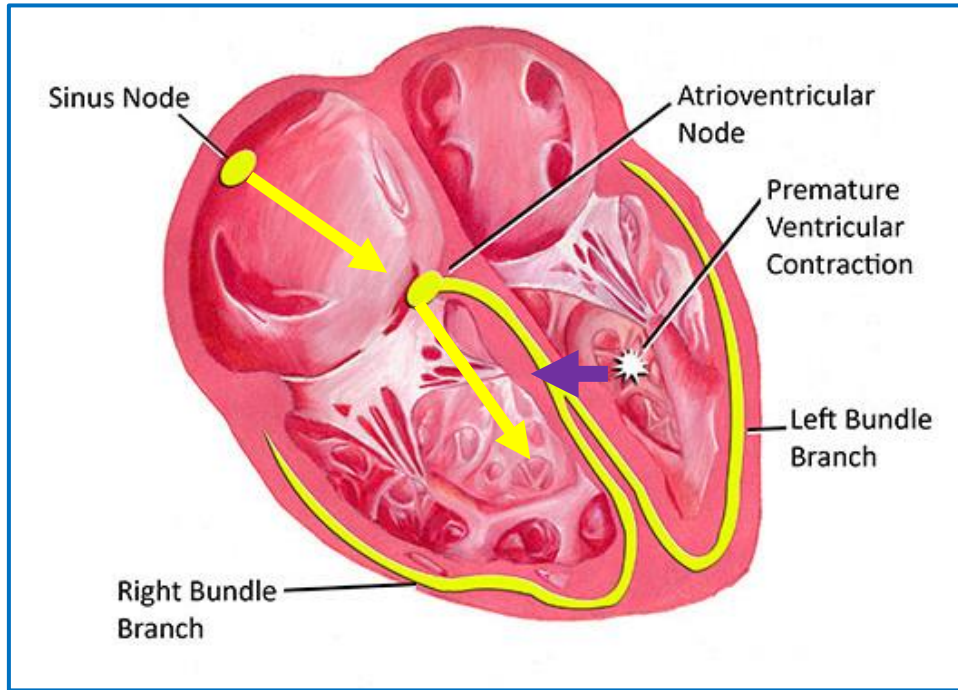
Premature Ventricular Contractions

# Premature Ventricular Contractions

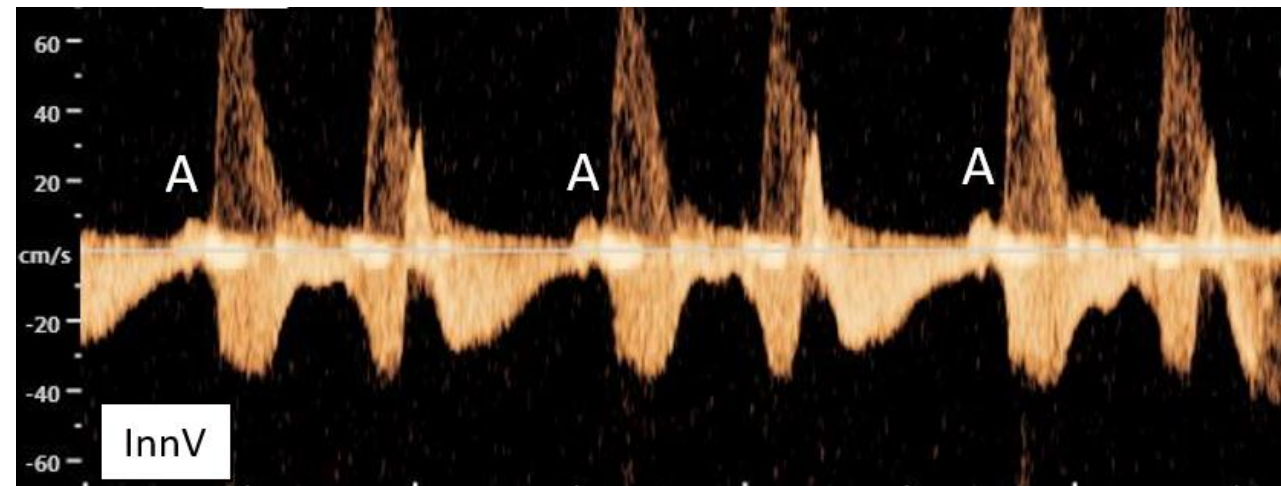




# Atrial (top, "a") and ventricular (bottom, "V") M-mode of PVC



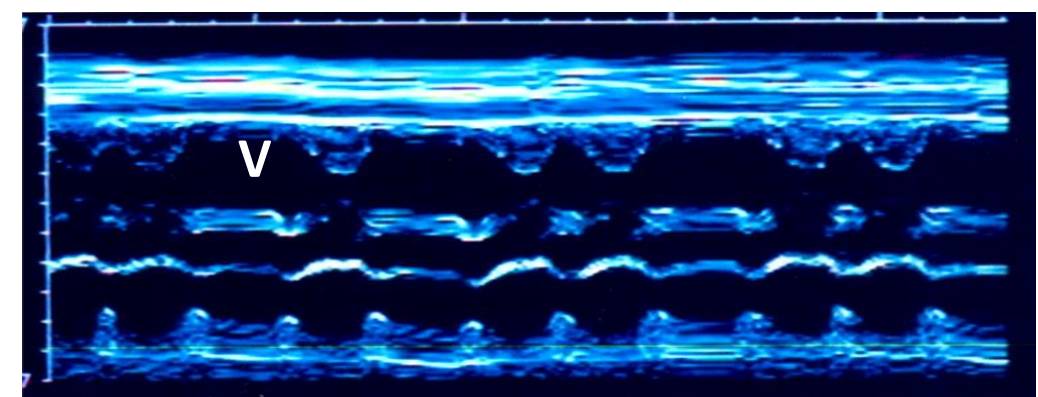
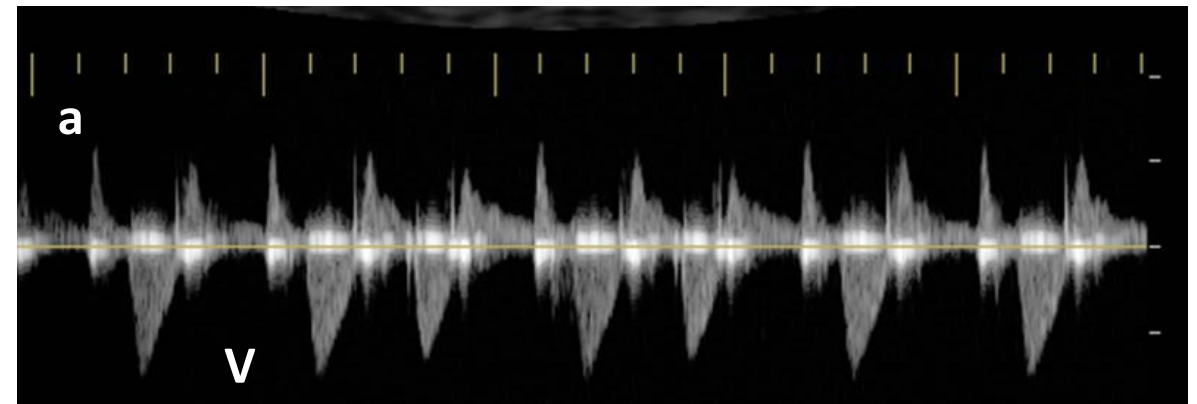
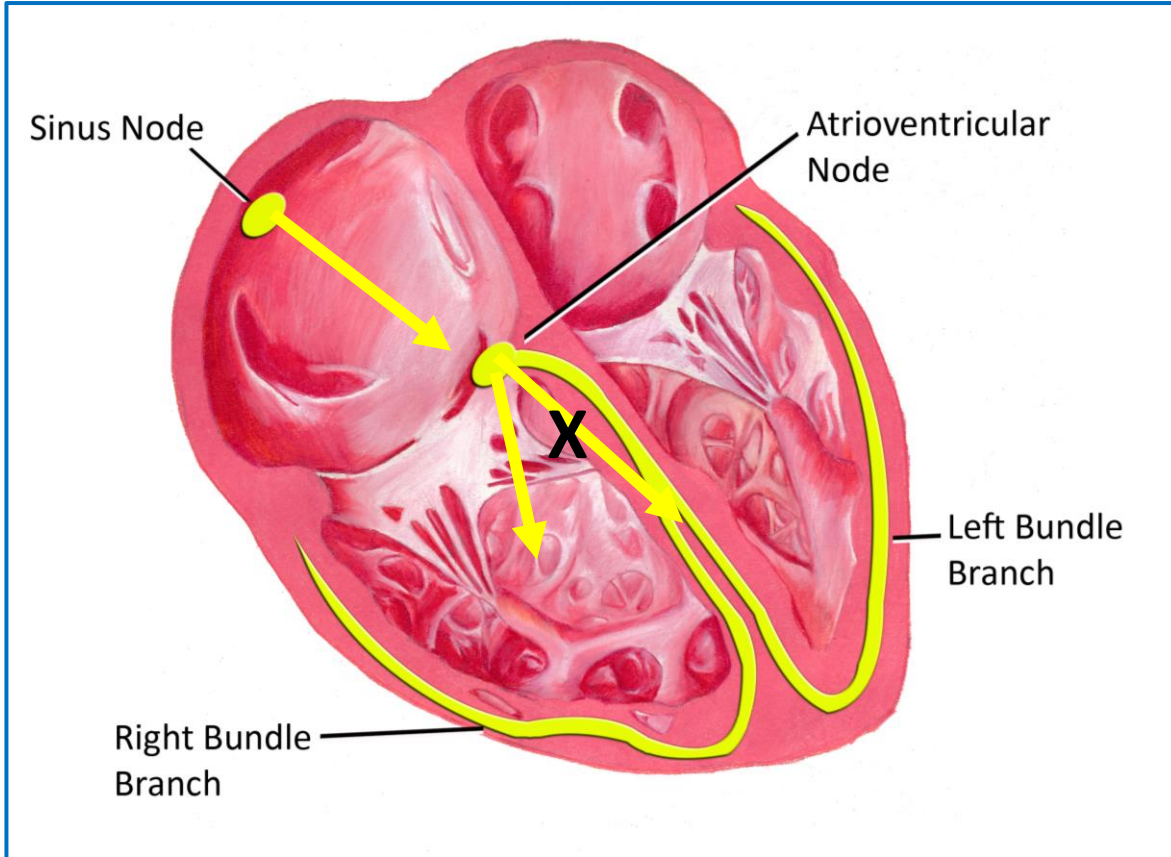
Aorta (above baseline) innominate vein (below baseline) spectral Doppler of PVCs



# Irregular rhythm 3

Type 1 or intermittent type 2° AV Block

# Another cause for irregular rhythm: Mobitz 1 or intermittent Mobitz 2, 2° AV block



- If the AV node is abnormal, atrial impulses are **intermittently conducted (2° AV block)**

Bradycardia

# Bradycardia with 1:1 AV conduction

## Sinus Bradycardia

Can occasionally occur with anti-Ro/SSA antibodies

maintains sinus brady throughout gestation

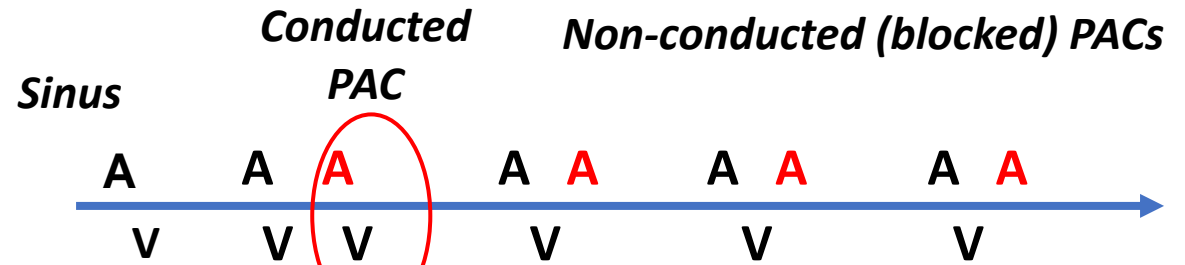
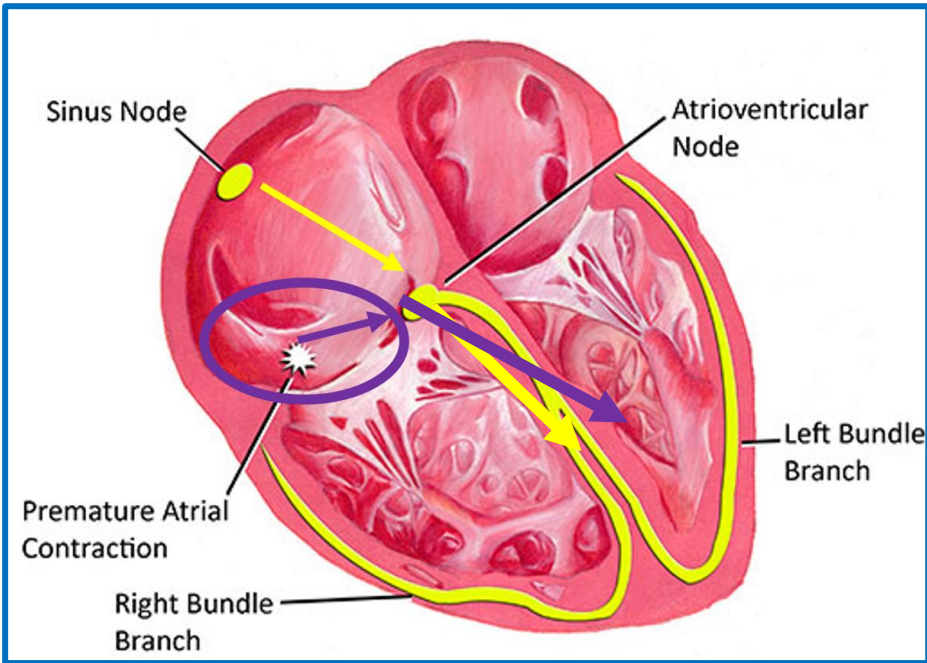
other conduction system disease can occur before delivery

Would be considered “extra-(AV) nodal” disease for our purposes and managed per site

# Bradycardia with $>1:1$ Conduction

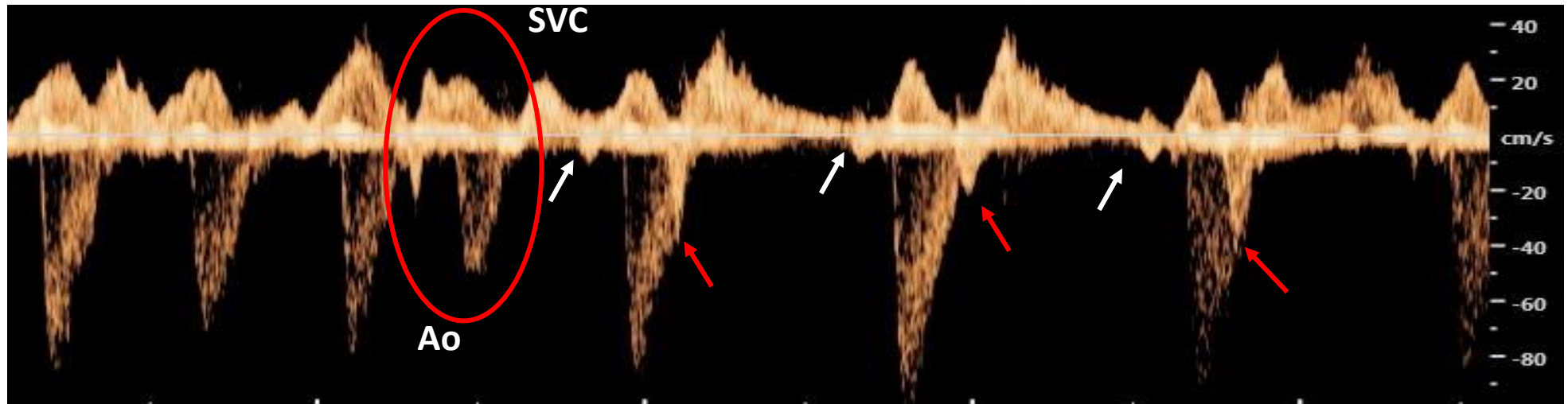
1. Blocked atrial bigeminy
2. Atrioventricular Block (Type 2, 2° AVB or 3° AVB)

# Conducted and Non-conducted PACs



Conducted PAC

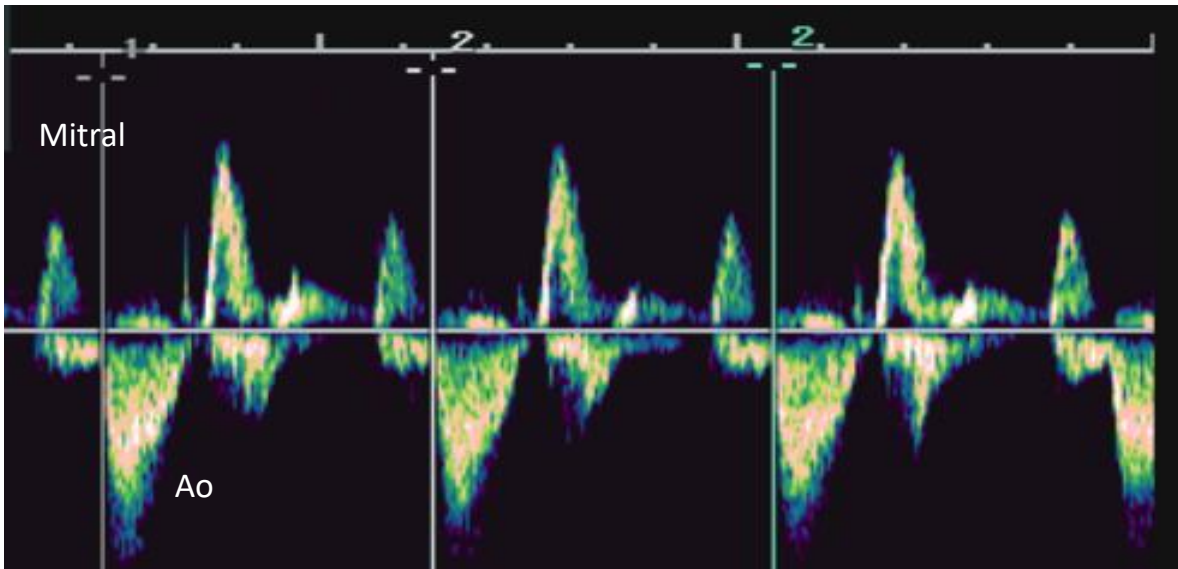
Non-conducted PACs



# Definitions of AV Block

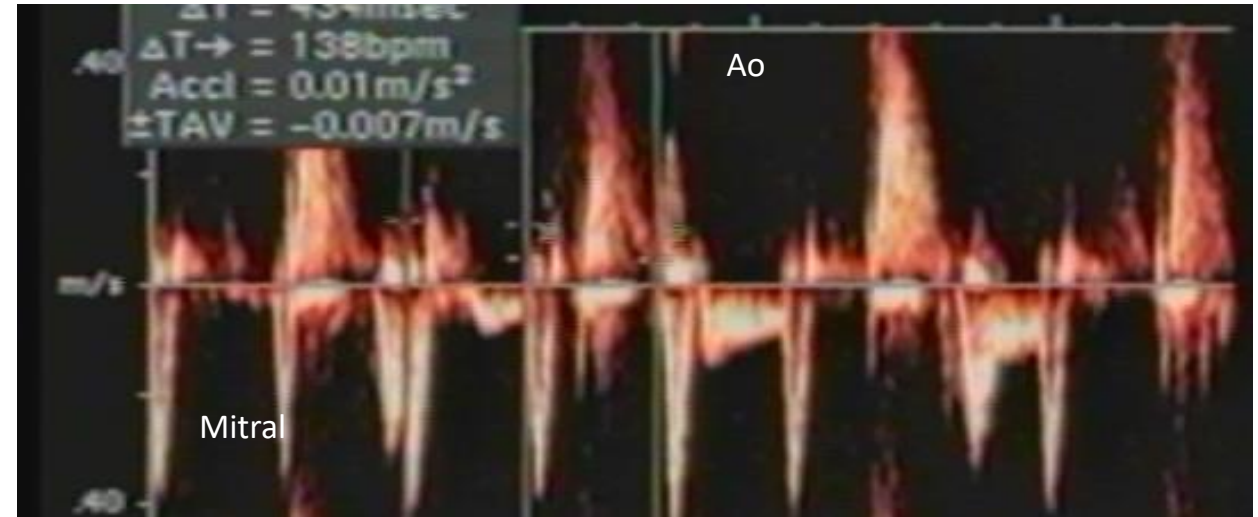
## Type 2, 2°

- Regular rhythm and slow rate
- Every other atrial beat is conducted
- AV interval of conducted beat does not vary
- A-A interval duration consistent



## 3° (Complete )

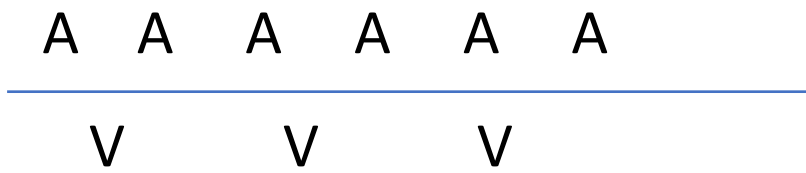
- Regular rhythm and slow rate
- No relationship between atrial and ventricular beats
- AV intervals vary
- A-A interval duration consistent



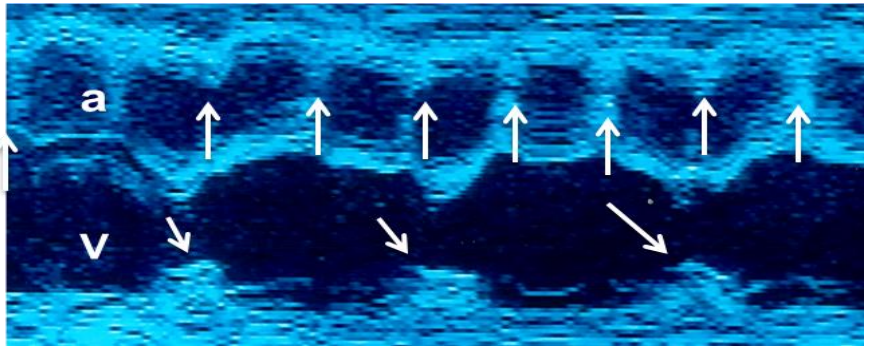
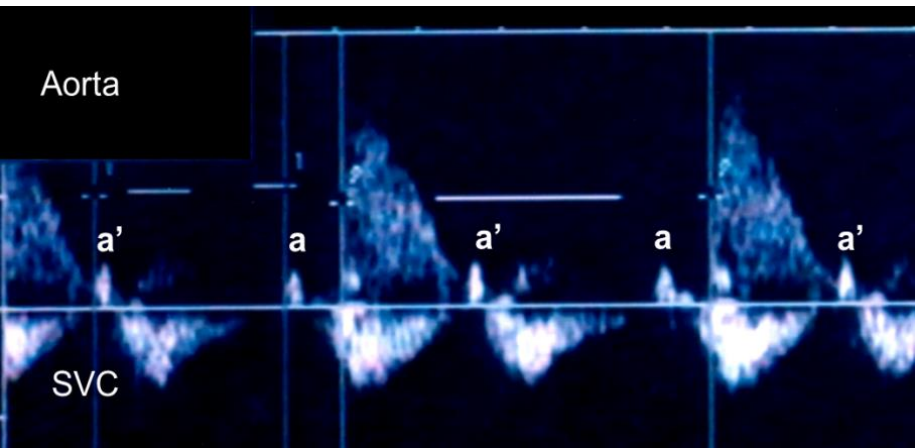
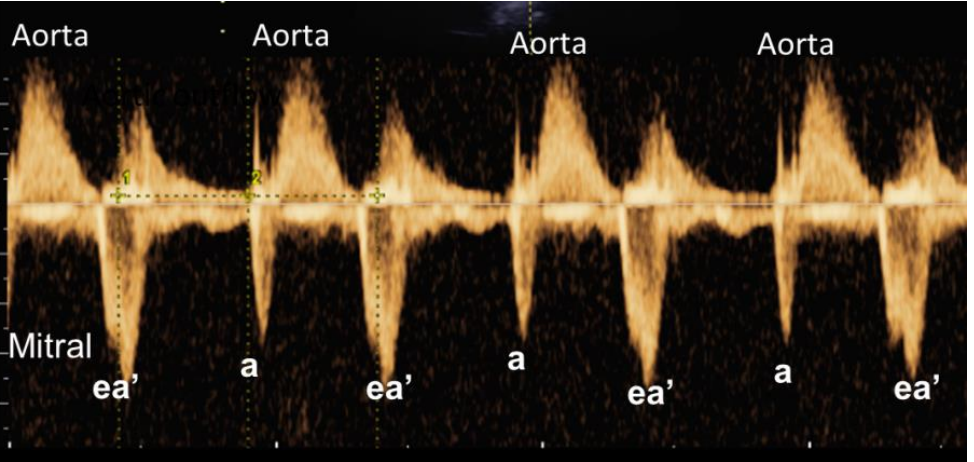


# 2° AV Block

“The real thing”

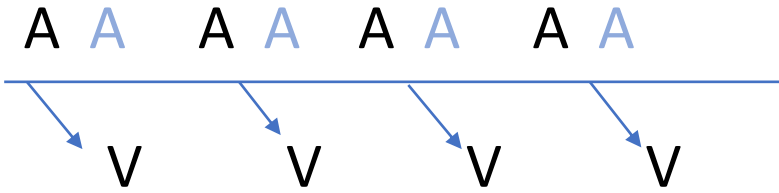


Ventricular rate = 70 bpm

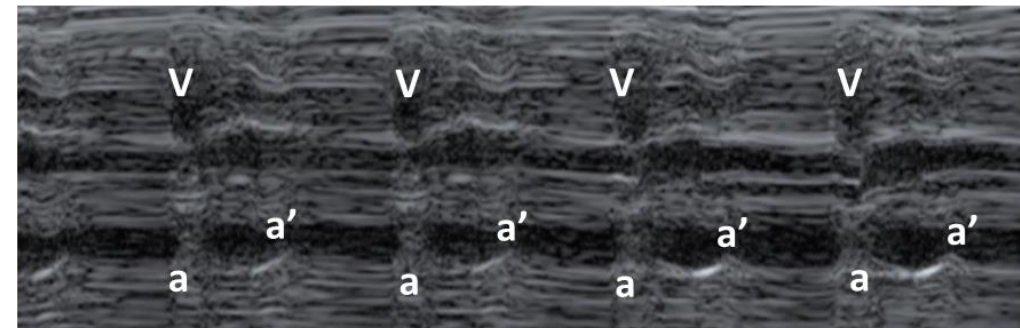
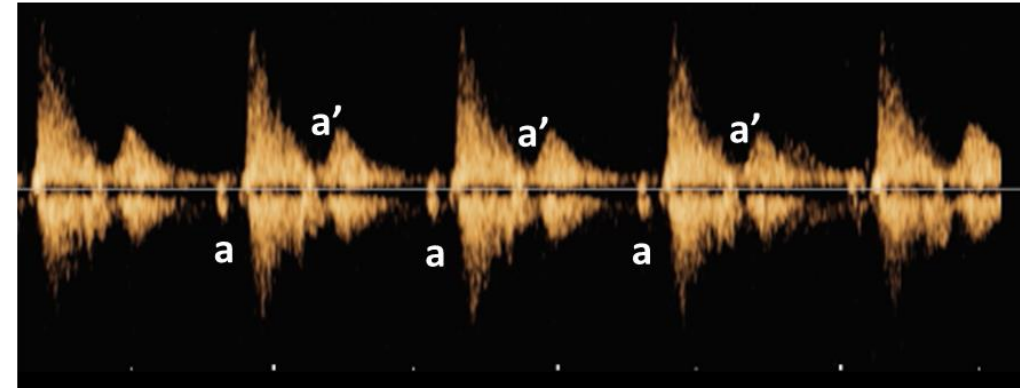
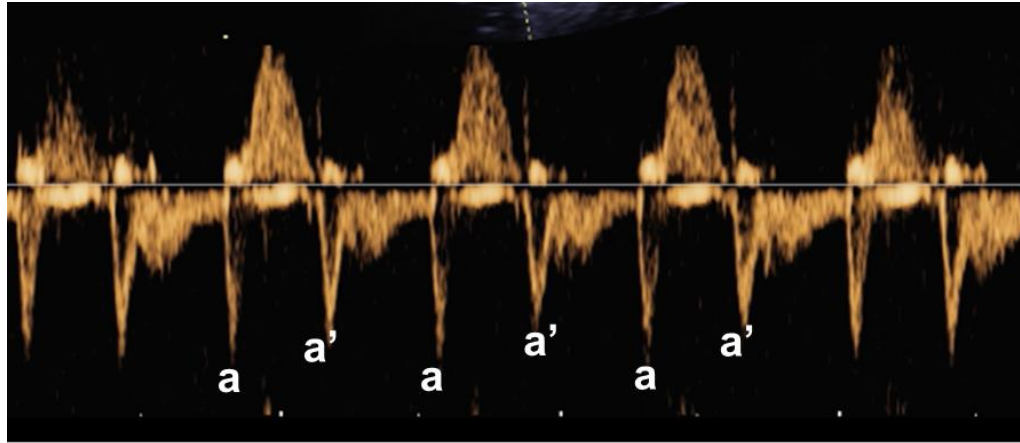


# Blocked Atrial Bigeminy

“The great pretender”



Ventricular rate = 70 bpm

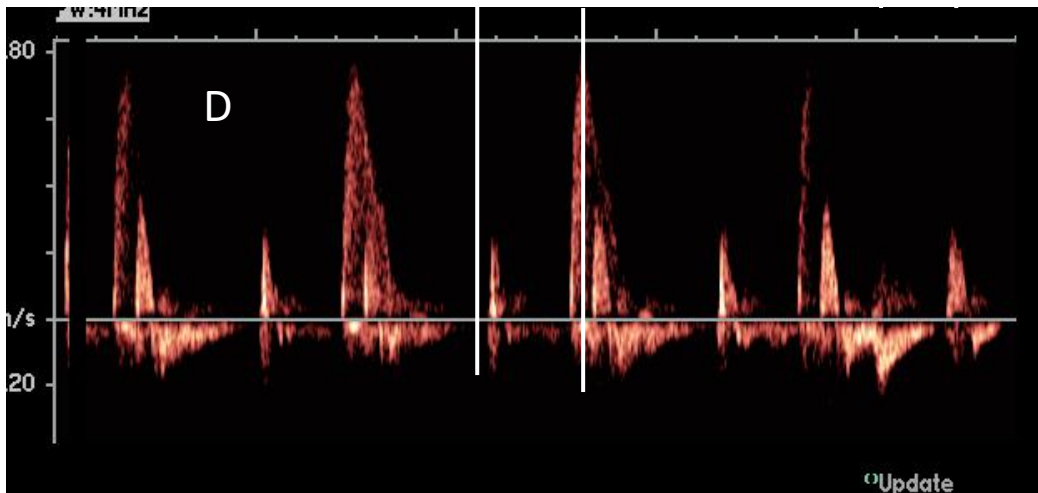
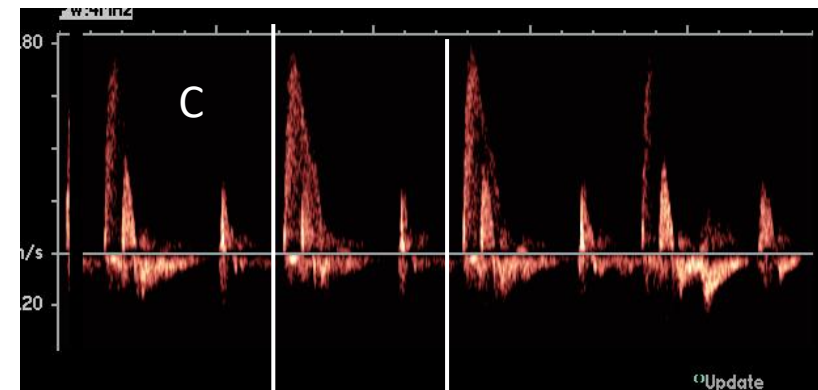
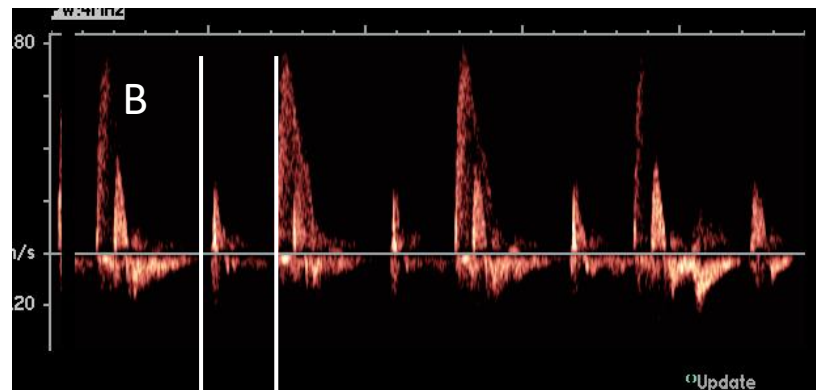
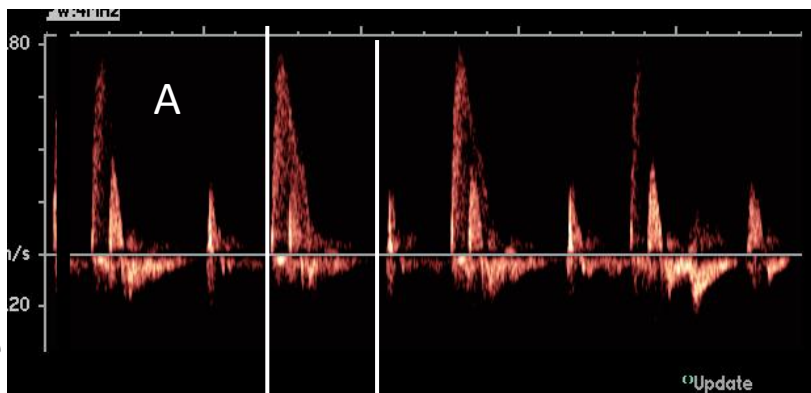


A to A' interval DOES NOT EQUAL A' to A interval!

STOP BLOQ quiz

Match the what is being measured by the calipers in the tracing.  
SVC/Ao Doppler

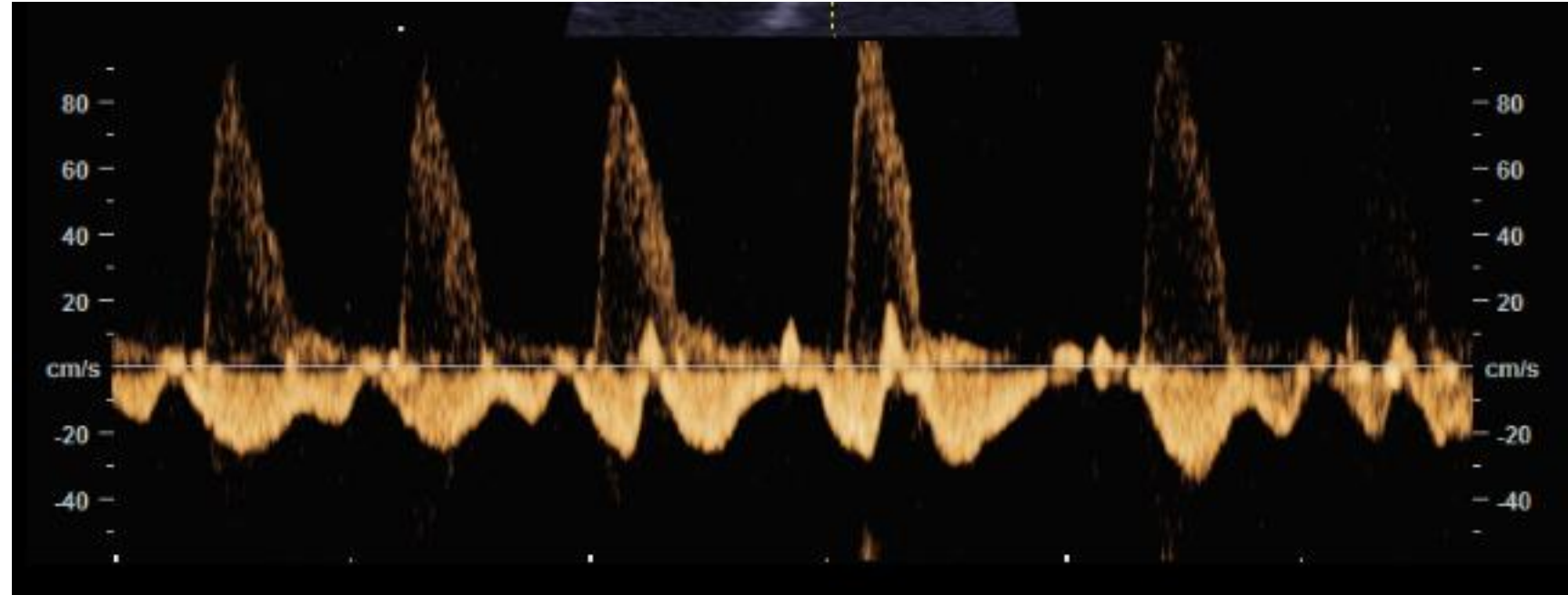
1. Atrial rate
2. Ventricular rate
3. AV interval
4. VA interval



# Irregular Rhythm: What is the Diagnosis?

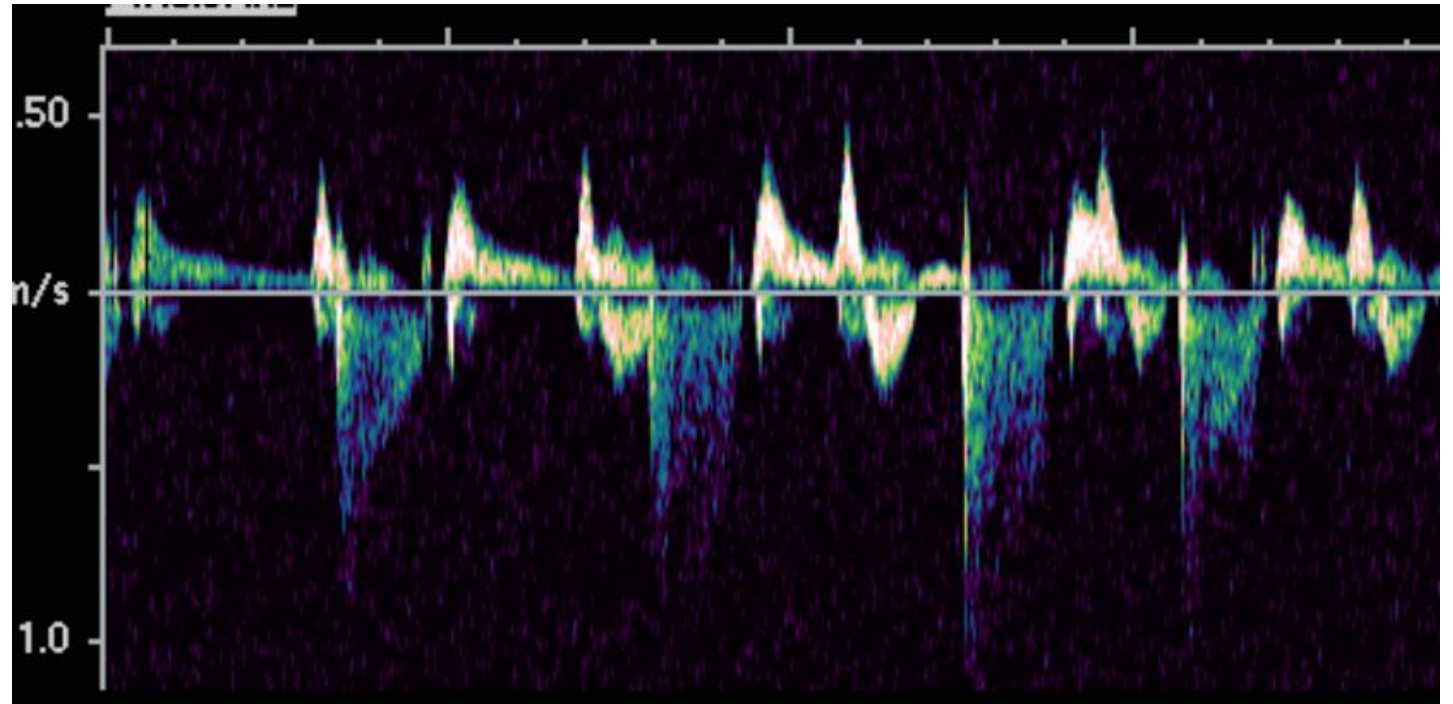
Simultaneous Aortic (top tracing) and SVC (bottom tracing)

- A. Premature atrial contraction
- B. Premature ventricular contraction
- C. Type 1, 2° AV block
- D. Intermittent type 2, 2° AV block



# What is the rhythm?

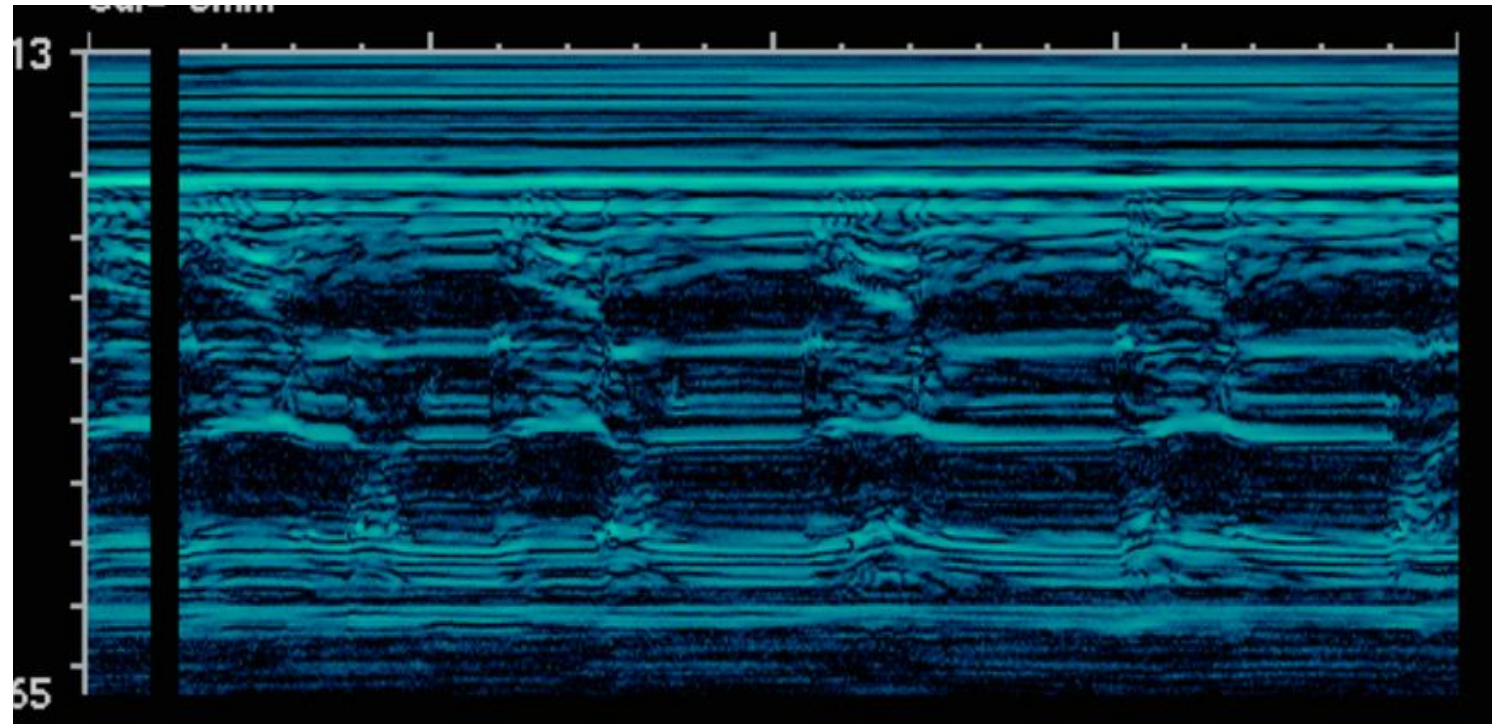
1. Sinus bradycardia
2. Complete AV block
3. Junctional ectopic tachycardia
4. Blocked atrial bigeminy



# What is the rhythm?

1. Sinus bradycardia
2. Complete AV block
3. Junctional ectopic tachycardia
4. Complete AV block with sinus node dysfunction

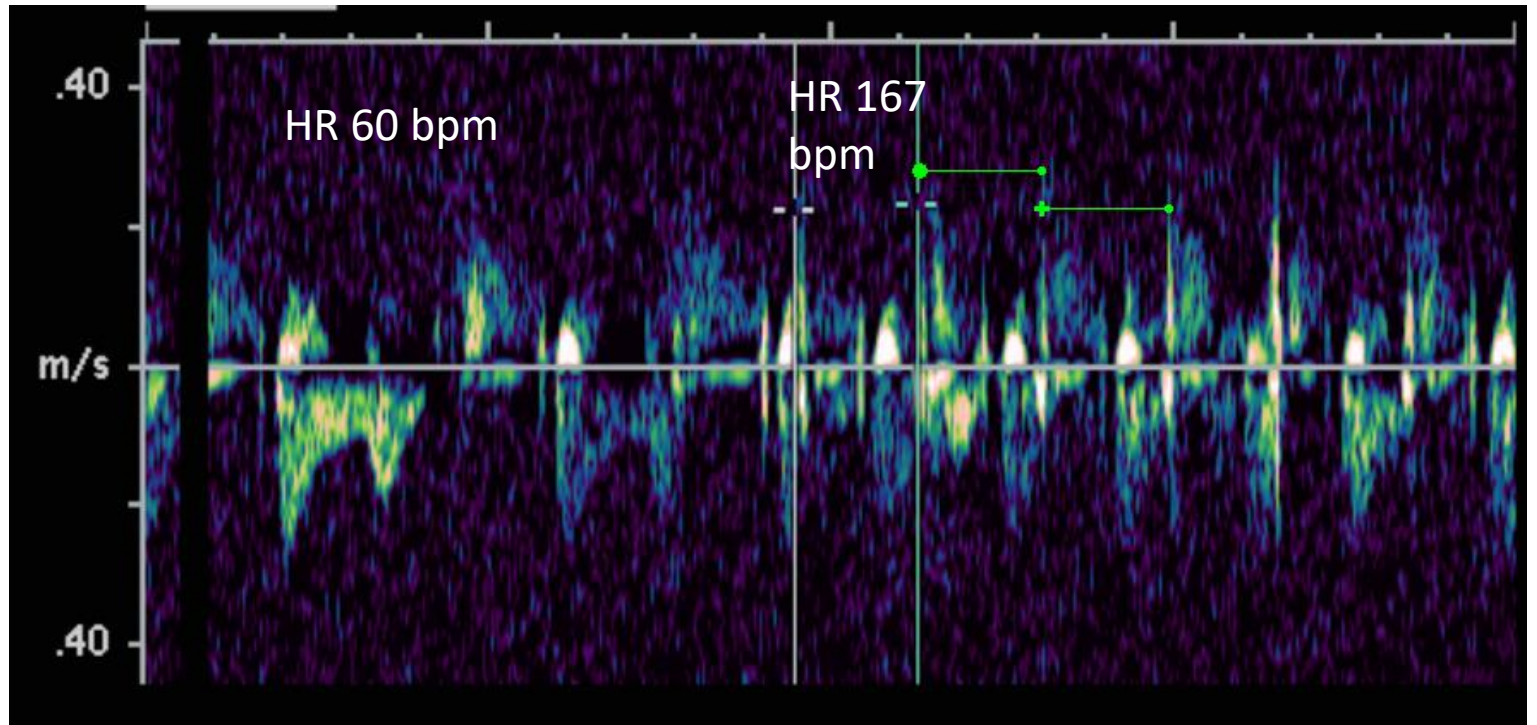
Simultaneous Ventricular (top)  
and atrial (bottom) M-Mode  
R-R (V-V) interval is 1000 ms



# What Is the rhythm?

Mitral inflow (below baseline) and aortic outflow (above baseline)

- A. Sinus bradycardia followed by normal sinus rhythm
- B. An episode of AV block with resumption of normal sinus rhythm
- C. An episode of AV block followed by junctional ectopic tachycardia

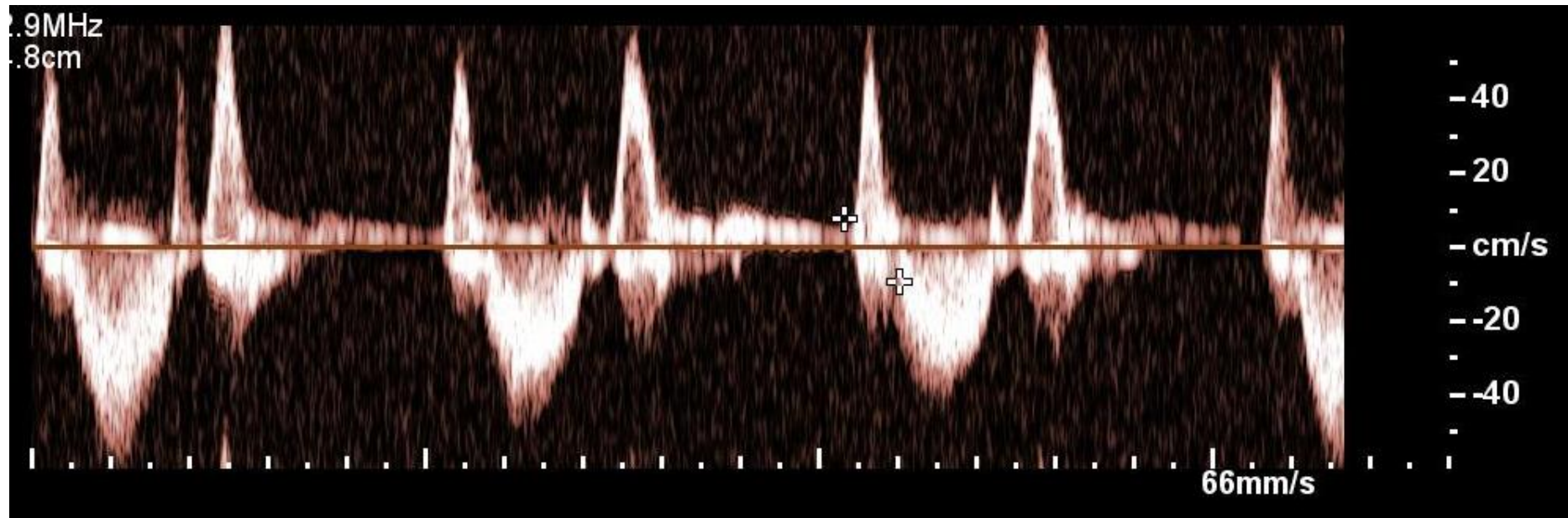




# Bradycardia: What is the rhythm?

Pulsed Doppler of Mitral inflow (above baseline) and aortic outflow (below baseline)

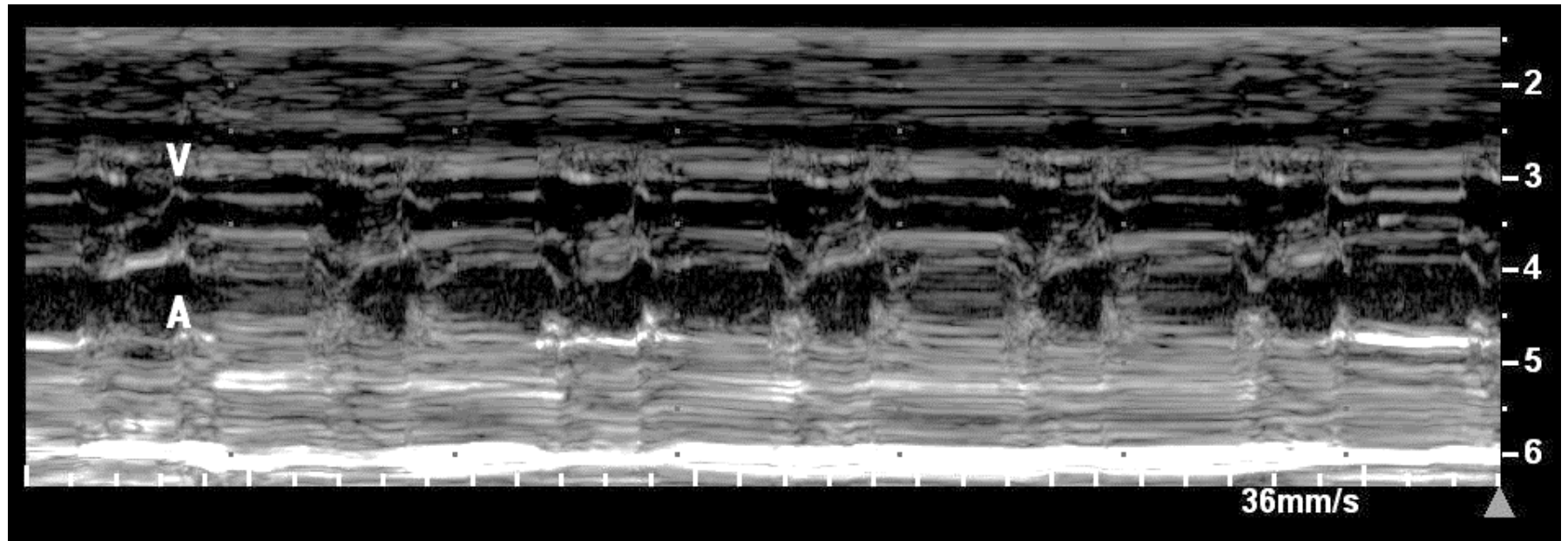
- A. Blocked atrial bigeminy
- B. 2° AV block
- C. 3° AV block
- D. Sinus bradycardia.



# Bradycardia: What is the diagnosis

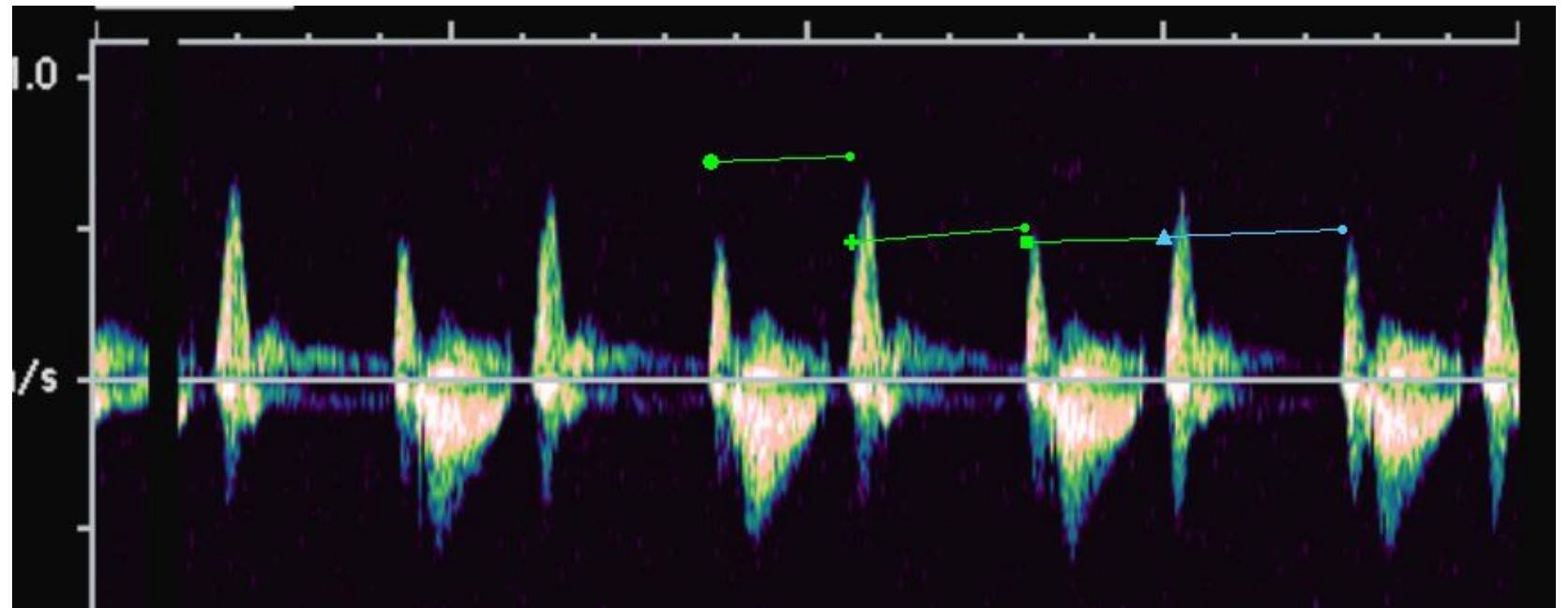
Simultaneous ventricular (top, "V") tracing and atrial (bottom, "A") M-Mode

- A. Blocked atrial bigeminy
- B. 2° AV block
- C. 3° AV block
- D. Sinus bradycardia.



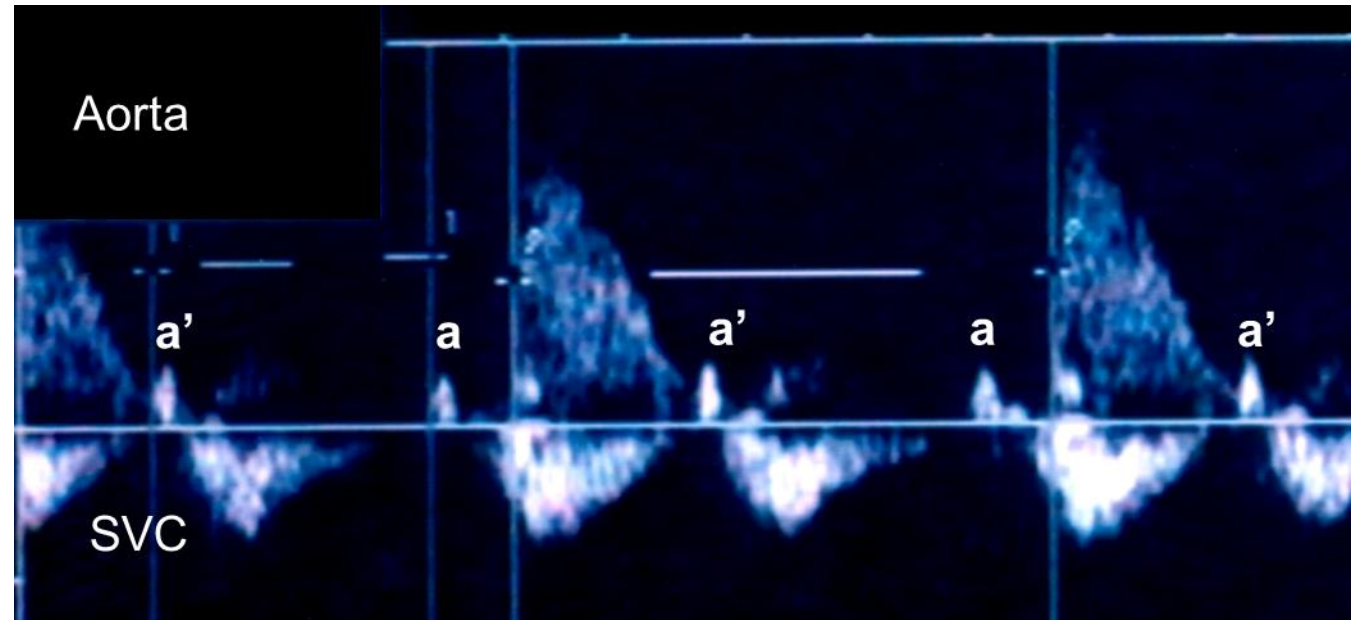
# Bradycardia: What is the diagnosis?

- A. Blocked atrial bigeminy
- B. 2° AV block
- C. 3° AV block
- D. Sinus bradycardia.



# Bradycardia: What is the diagnosis?

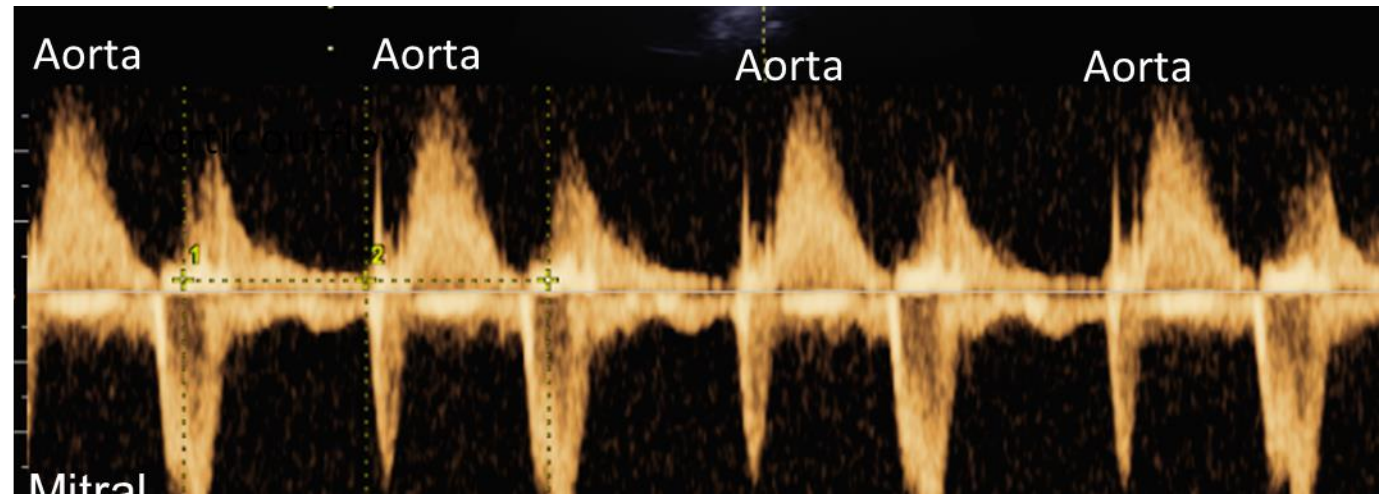
- A. Blocked atrial bigeminy
- B. 2° AV block
- C. 3° AV block
- D. Sinus bradycardia.



# Bradycardia: What is the diagnosis?

Simultaneous mitral inflow (below baseline) and aortic outflow (above baseline) spectral Doppler

- A. Blocked atrial bigeminy
- B. 2° AV block
- C. 3° AV block
- D. Sinus bradycardia.



# What is the rhythm?

- A. Normal sinus rhythm
- B. Intermittent 1° AV block
- C. 2° AV block
- D. 3° AV block

Simultaneous mitral inflow (below baseline) and aortic outflow (above baseline) spectral Doppler

