

# *Pediatric Pearls for the Adult Echocardiographer*

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# Pearl

- ♥ A hard object produced within the soft tissue of a shelled mollusk



# Pearl #1

- ♥ If you are going to image a patient with suspected congenital heart disease, think about the common things first



# Congenital Heart Disease

## Spectrum of Congenital Heart Disease - Frequency

| <u>Cardiac Malformation</u> | <u>% of CHD</u> | <u>M:F Ratio</u> |
|-----------------------------|-----------------|------------------|
| Ventr. Septal Defect        | 18-28           | 1:1              |
| Patent Ductus Arter.        | 10-18           | 1:2-3            |
| Tetralogy of Fallot         | 10-13           | 1:1              |
| Atrial Septal Defect        | 7-8             | 1:2-4            |
| Pulmonary Stenosis          | 7-8             | 1:1              |
| Transp. of Grt. Art.        | 4-8             | 2-4:1            |
| Coarctation of Aorta        | 5-7             | 2-5:1            |
| Atrioventric. Canal         | 2-7             | 1:1              |
| Aortic Stenosis             | 2-5             | 4:1              |
| Truncus Arteriosus          | 1-2             | 1:1              |
| Tricuspid Atresia           | 1-2             | 1:1              |
| Tot. Anom Pulm Veins        | 1-2             | 1:1              |



# Pearl #1

- ♥ Possibilities can be age specific if you are imaging children
  - More likely to discover congenital defects in the first week of life
  - Most heart murmurs in the 1-5 year age group are innocent and the heart is normal
    - \* Defects in children which may escape detection early are subtle and asymptomatic that you need to look for – ASD, bicuspid aortic valve
  - Chest pain in teenagers is virtually never heart pain – echo is normal
    - \* Know how to image coronary artery anatomy



## Pearl #2

- ♥ If you are imaging adults with congenital heart disease, someone has probably been there before you



# Congenital Heart Disease in Adults

- ♥ 85% of children with CHD survive to adulthood
  - ♥ Currently >1 million patients over age 18 with CHD are alive in this country
  - ♥ There are estimated to be more adult patients with CHD now than pediatric (<18 yrs) patients
  - ♥ This increases at ~3% per year
  - ♥ 20,000 cardiac surgical procedures for CHD/year
- 
- ♥ **The majority of adult CHD patients getting an echo will be post-op**



# Congenital Heart Disease

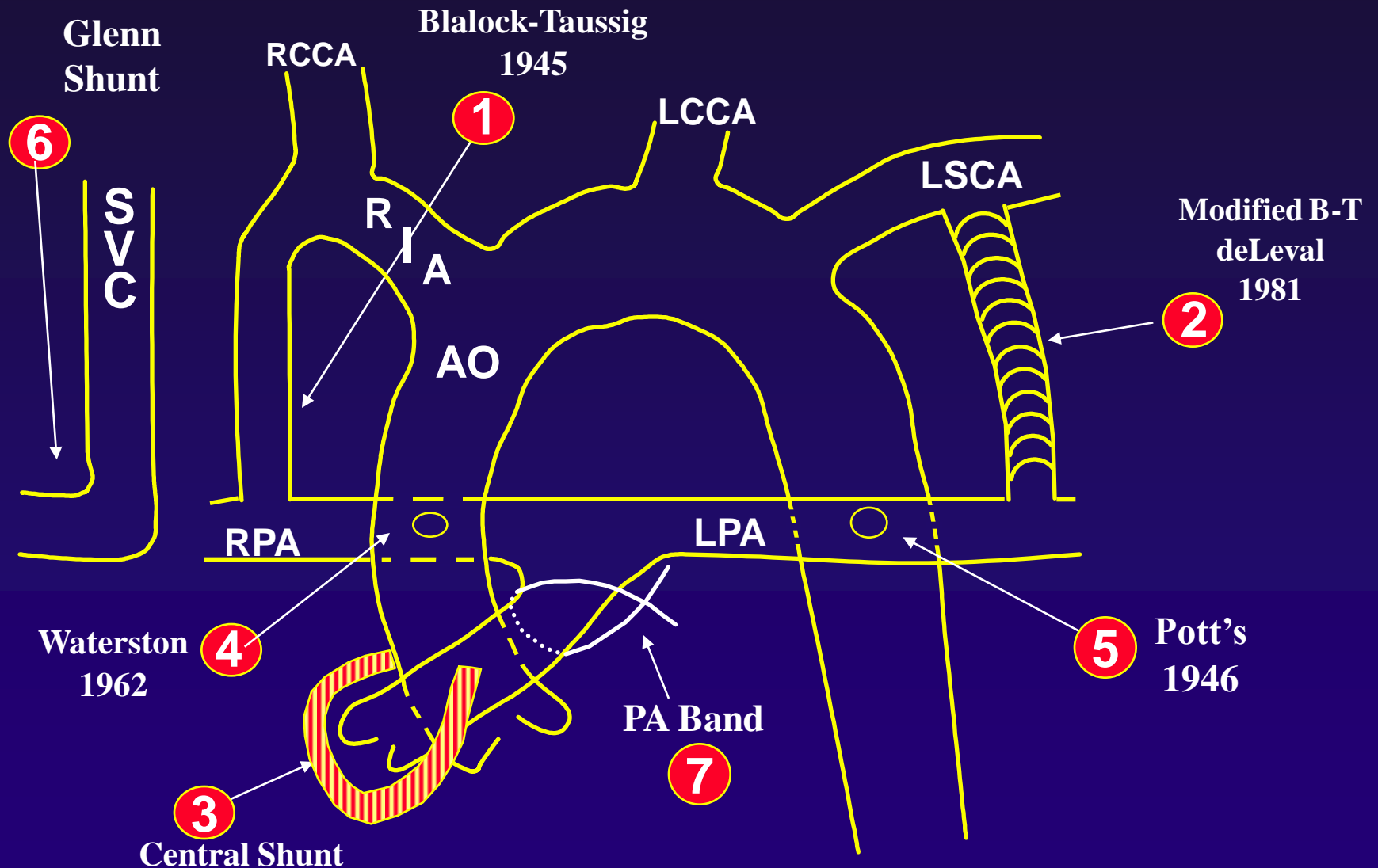
## A Brief History of Operations

| <u>Year</u> | <u>Physician</u>  | <u>Procedure</u>              |
|-------------|-------------------|-------------------------------|
| 1938        | Gross             | Ligation of PDA               |
| 1944        | Blalock, Taussig  | Syst.-pulm. shunt             |
| 1945        | Gross, Crafoot    | Repair of coarctation         |
| 1952        | Muller            | Pulm. artery band             |
| 1953        | Gibbon            | Repair of ASD                 |
| 1954        | Lillehei          | Repair of VSD                 |
| 1954        | Glenn             | SVC-PA shunt                  |
| 1954        | Mustard           | Atrial correction of TGA      |
| 1955        | Lillehei, Kirklin | Repair of tetralogy of Fallot |
| 1960        | Waterston         | Aorta-pulmonary shunt         |
| 1964        | Rastelli          | Conduit replacement of PA     |
| 1967        | Rashkind          | Balloon atrial septostomy     |
| 1971        | Fontan, Kreutzer  | Repair of tricuspid atresia   |
| 1976        | Jatene            | Arterial switch for TGA       |
| 1978        |                   | Cold blood cardioplegia       |





# Palliative Operations



# Pearl #2

- ♥ If adult patients have had only one operation, they probably have 4 chambers
- ♥ If they have had multiple operations, at least one of them was palliative – and they may or may not have 4 chambers
- ♥ If they have had a palliative operation, it probably had something to do with the pulmonary blood flow
  - Concentrate on the pulmonary arteries and the RV pressure



# Pearl #2 - Before you start to examine

- ♥ History
- ♥ History
- ♥ History

\* History includes old records

The adult patient is often unaware of details



# Pearl #3

- ♥ Before you get out the TEE probe, think about what you are trying to image



# Congenital Heart Disease

## Role of Transesophageal Echo (TEE)

- ♥ Helpful in hard-to-image adult patients
  - ♥ Views are more limited than transthoracic
  - ♥ Best for atrial, posterior, intracardiac structures
  - ♥ Not as helpful for extracardiac defects and structures
  - ♥ Needs a skilled examiner
- \* Helpful, not perfect, and should not be a “knee-jerk” reaction

(Still have to know what to look for)

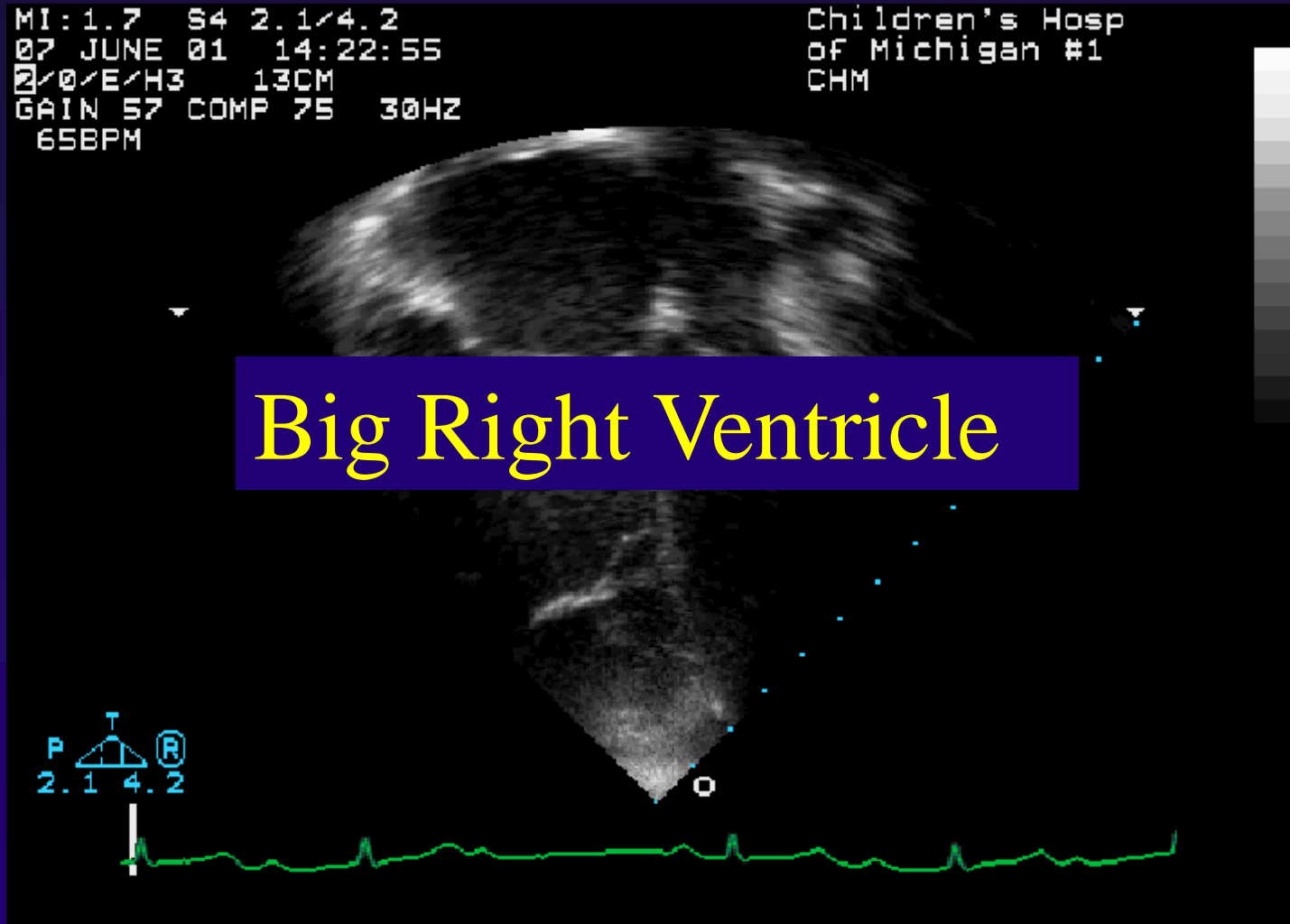


# Pearl #4

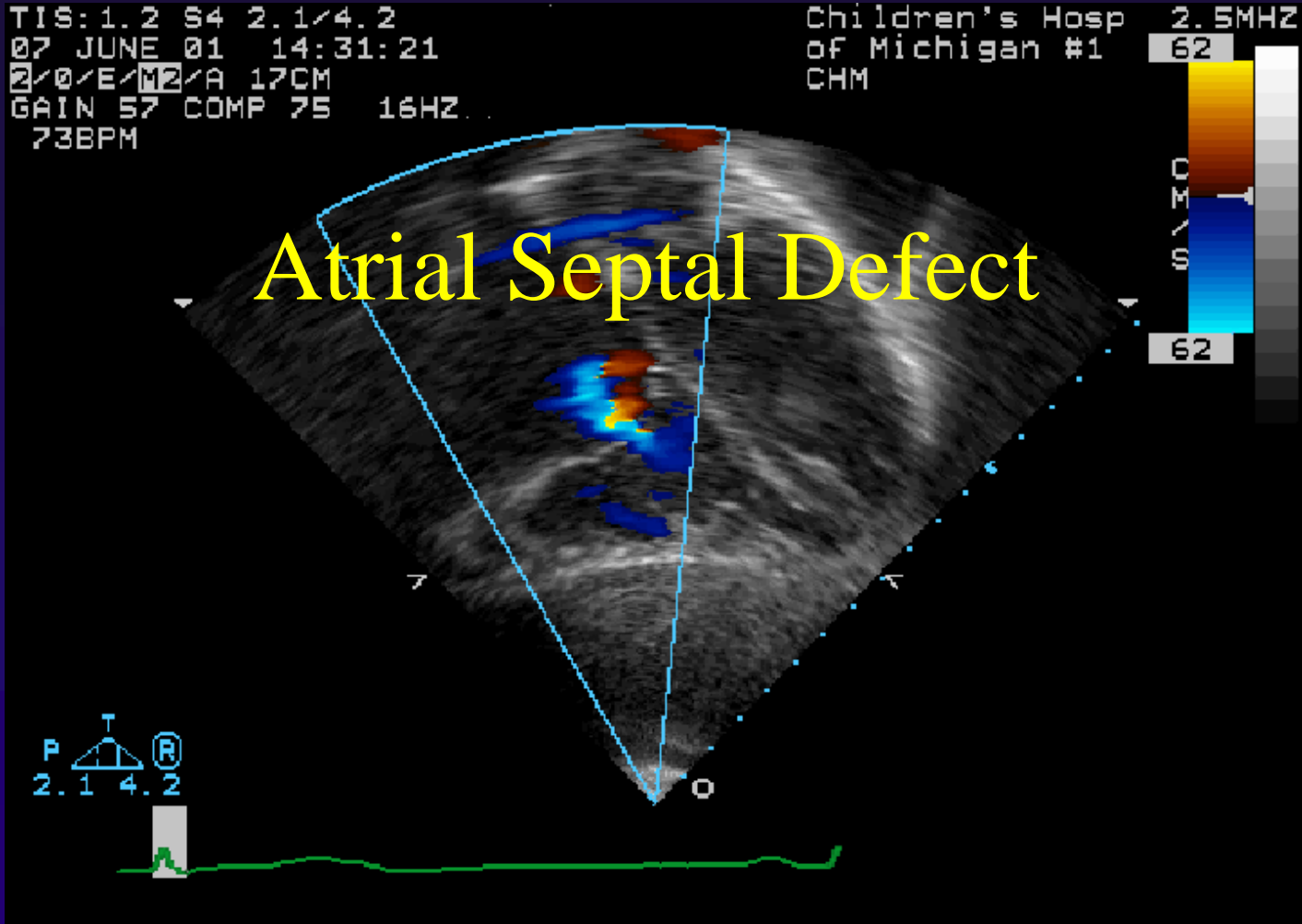
- ♥ Congenital defects often make the heart look different. Use these differences to help you.



# What's wrong with this picture?



# What's the diagnosis?





But again, think about what you are looking for and trust what you see.



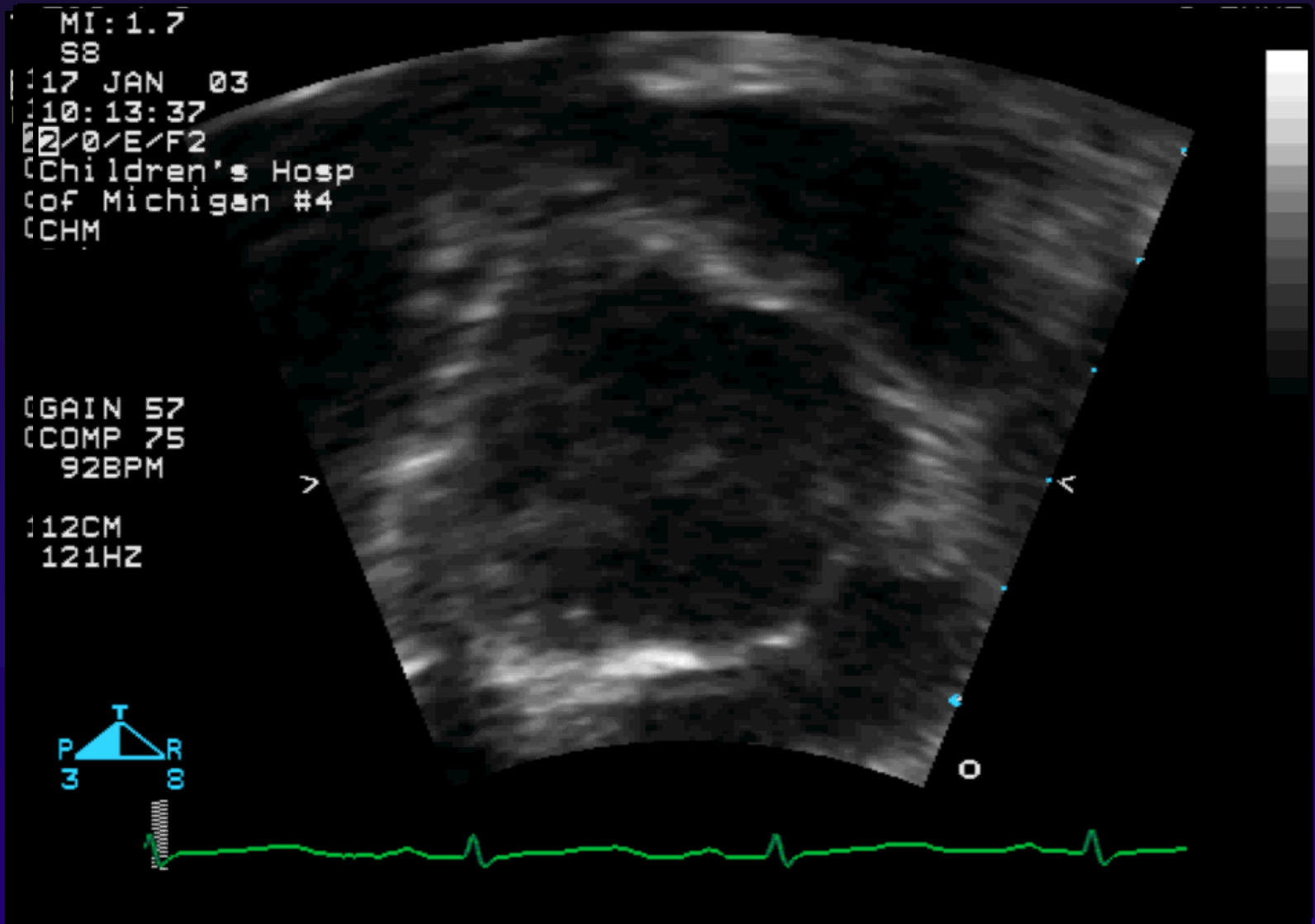
# Case



Stop. Think. Look other places and  
trust what you see.



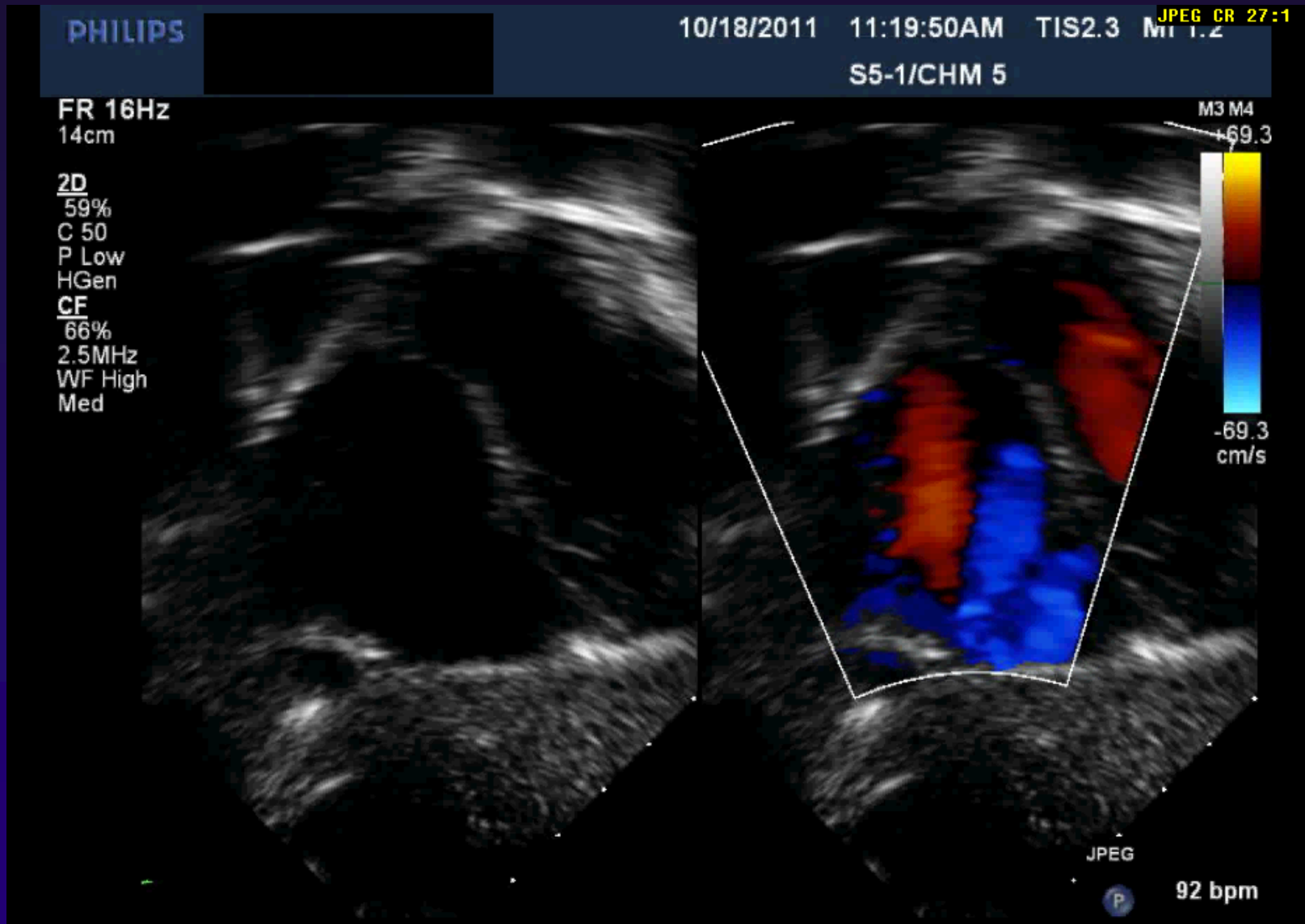
# Case



Stop. Think. Look other places and  
trust what you see.



# Case



# Pearl #5

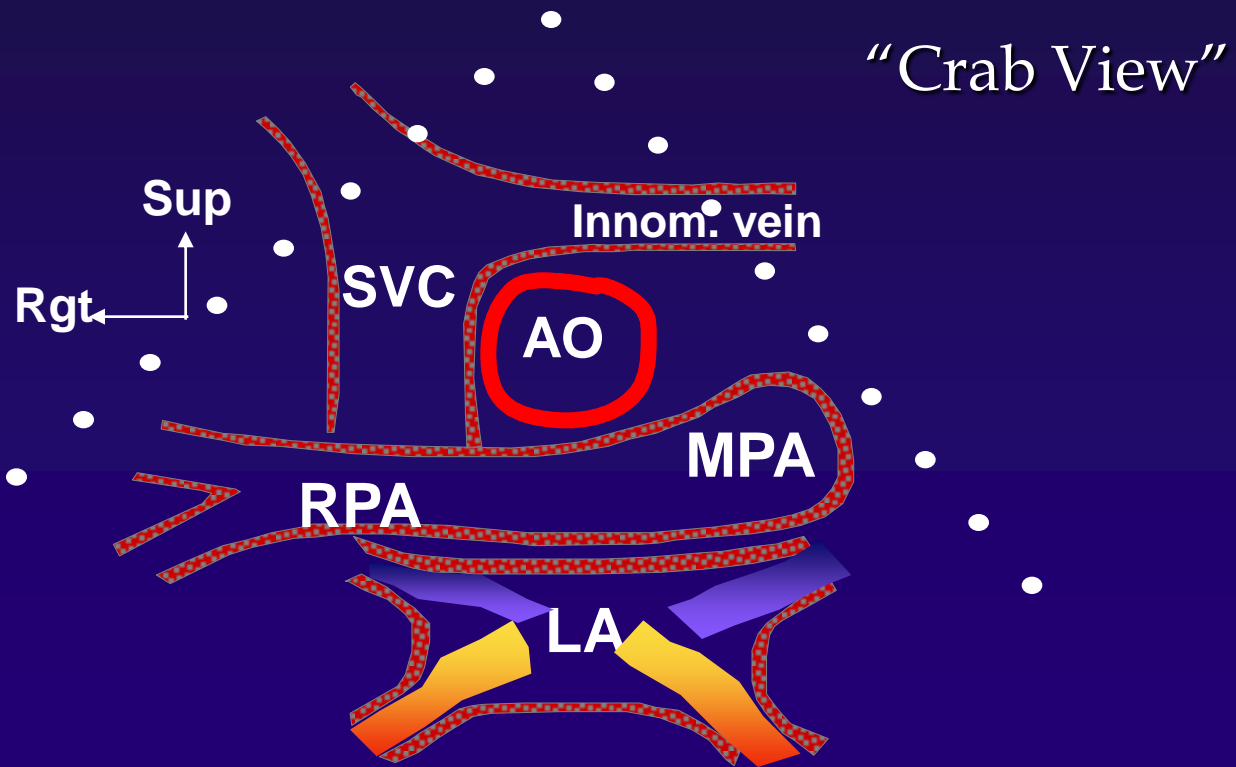
- ♥ Know (and practice) some of our “special” views
- ♥ Crab
- ♥ Caval
- ♥ Suprasternal
- ♥ Ductal
- ♥ Short axis sweep



# Congenital Heart Disease

## Special Pediatric Views

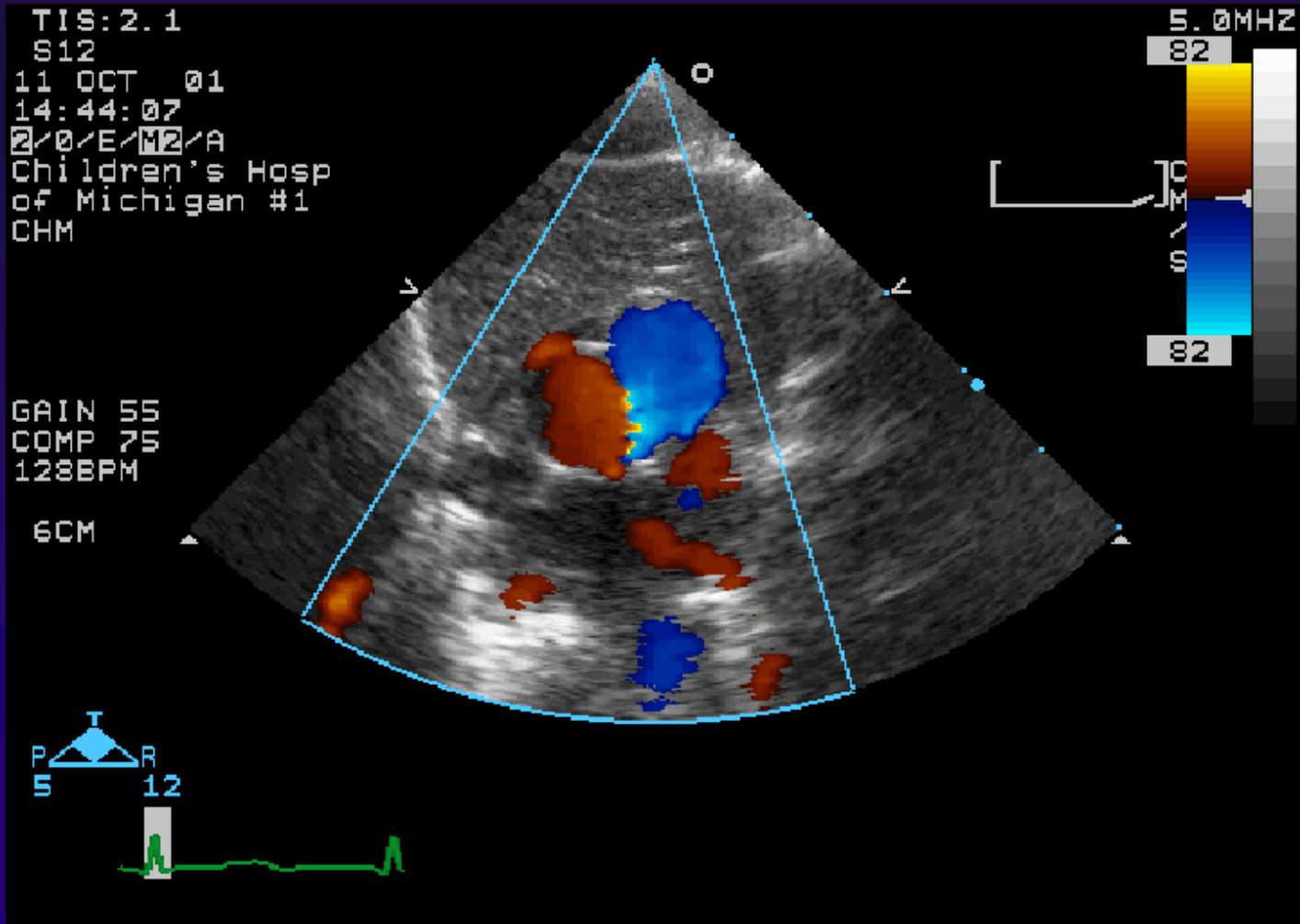
### Suprasternal Short Axis View





# Congenital Heart Disease

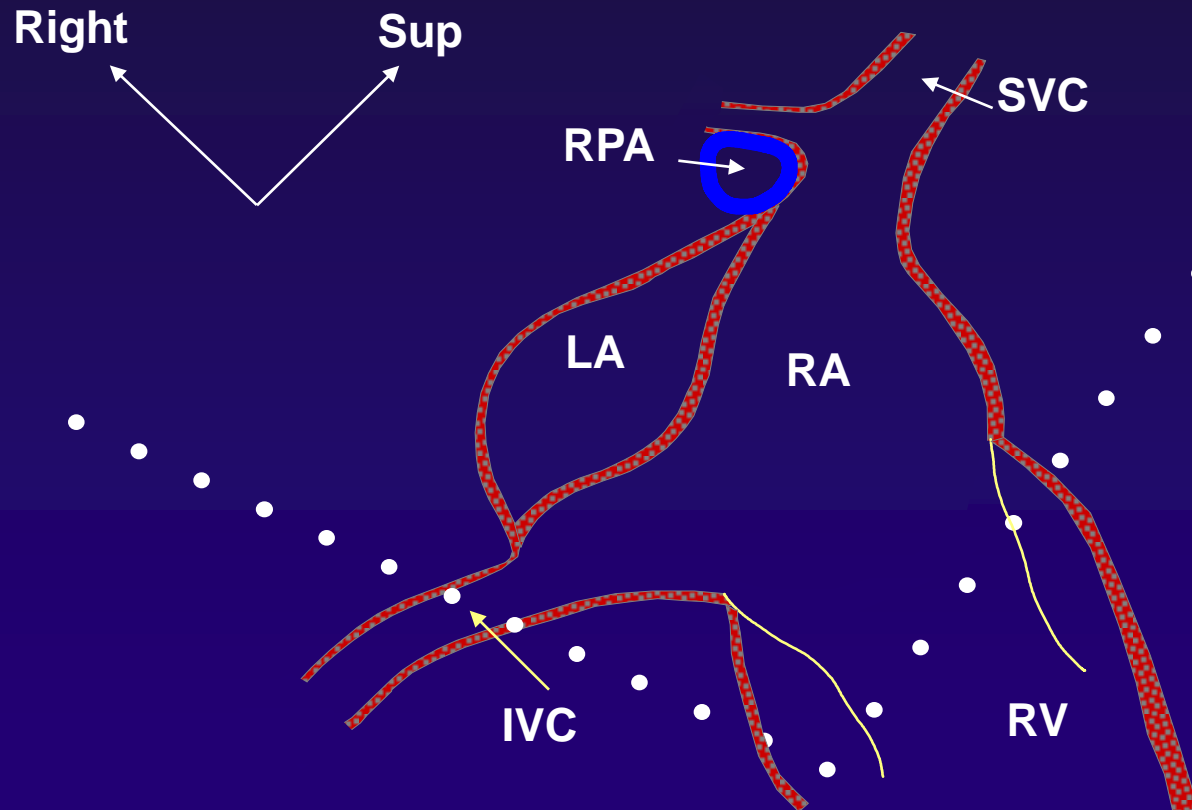
## Suprasternal Short Axis View



# Congenital Heart Disease

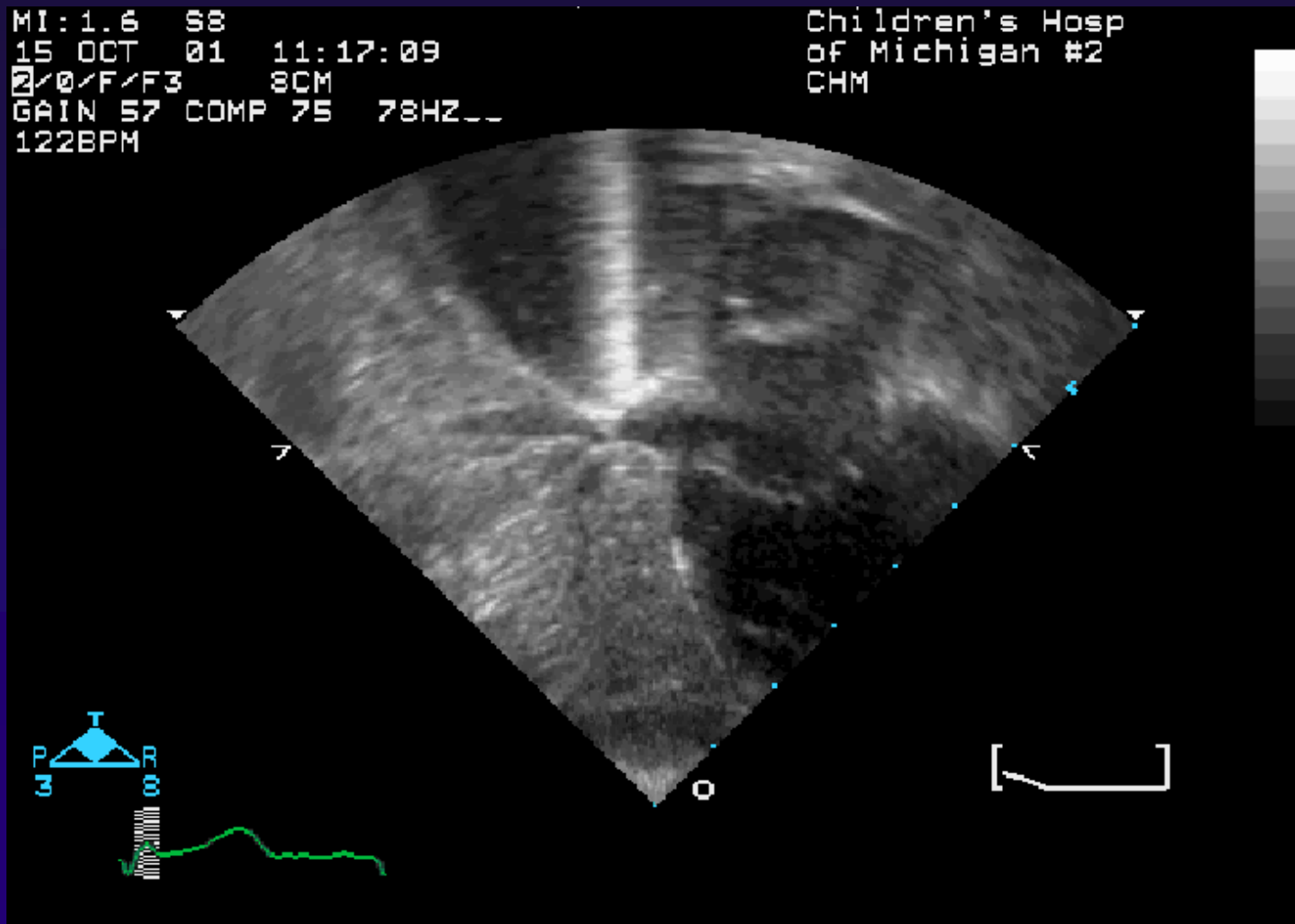
## Special Pediatric Views

### Subcostal Caval View



# Congenital Heart Disease

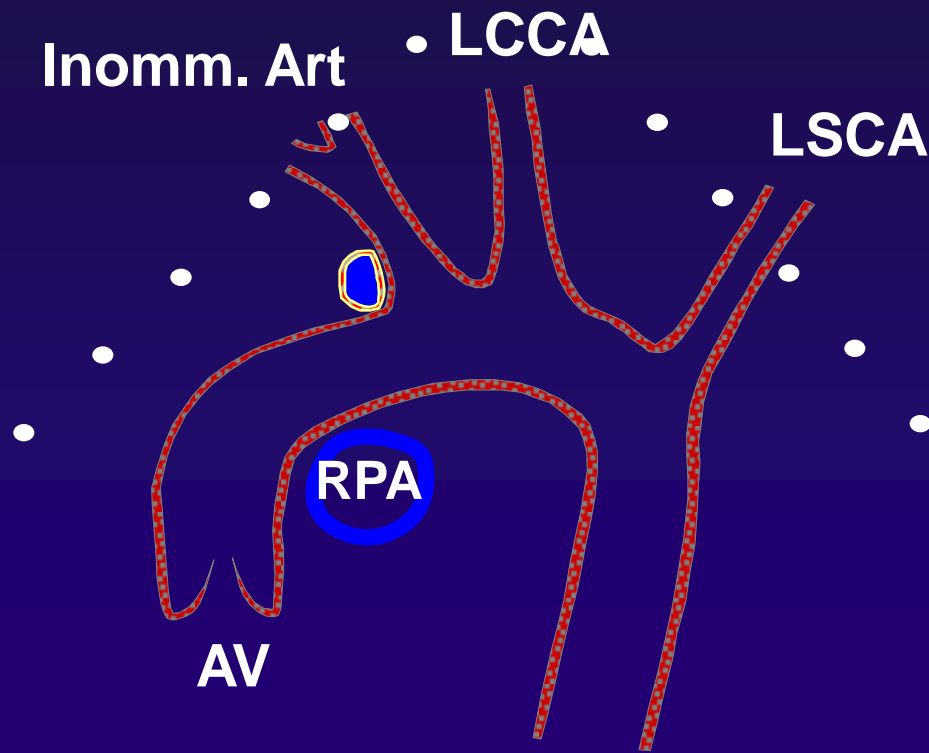
## Subcostal Caval View



# Congenital Heart Disease

## Special Pediatric Views

### Suprasternal Long Axis View



In infants this view may also be obtained from left and right parasternal locations

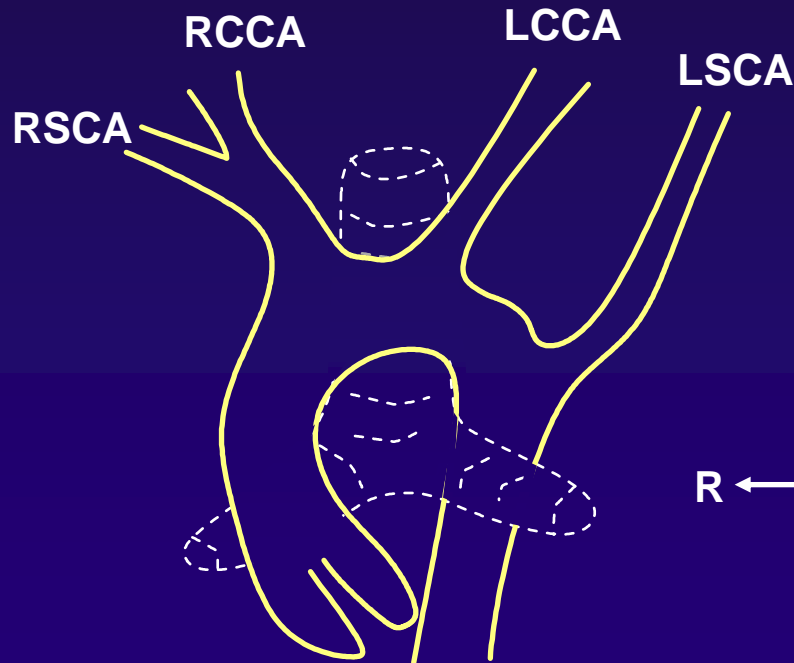


# Congenital Heart Disease

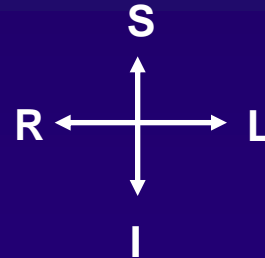
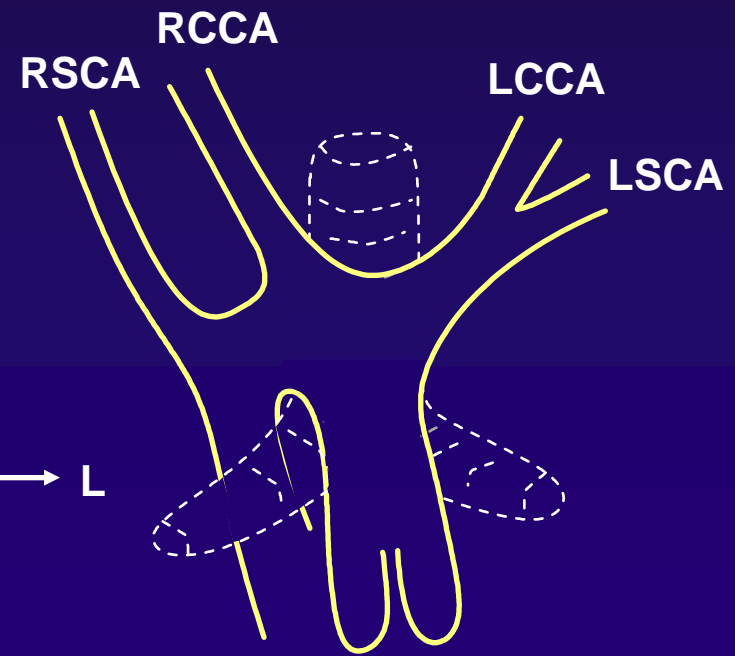
## Special Pediatric Views

### Arch Position Anatomy

#### LEFT ARCH

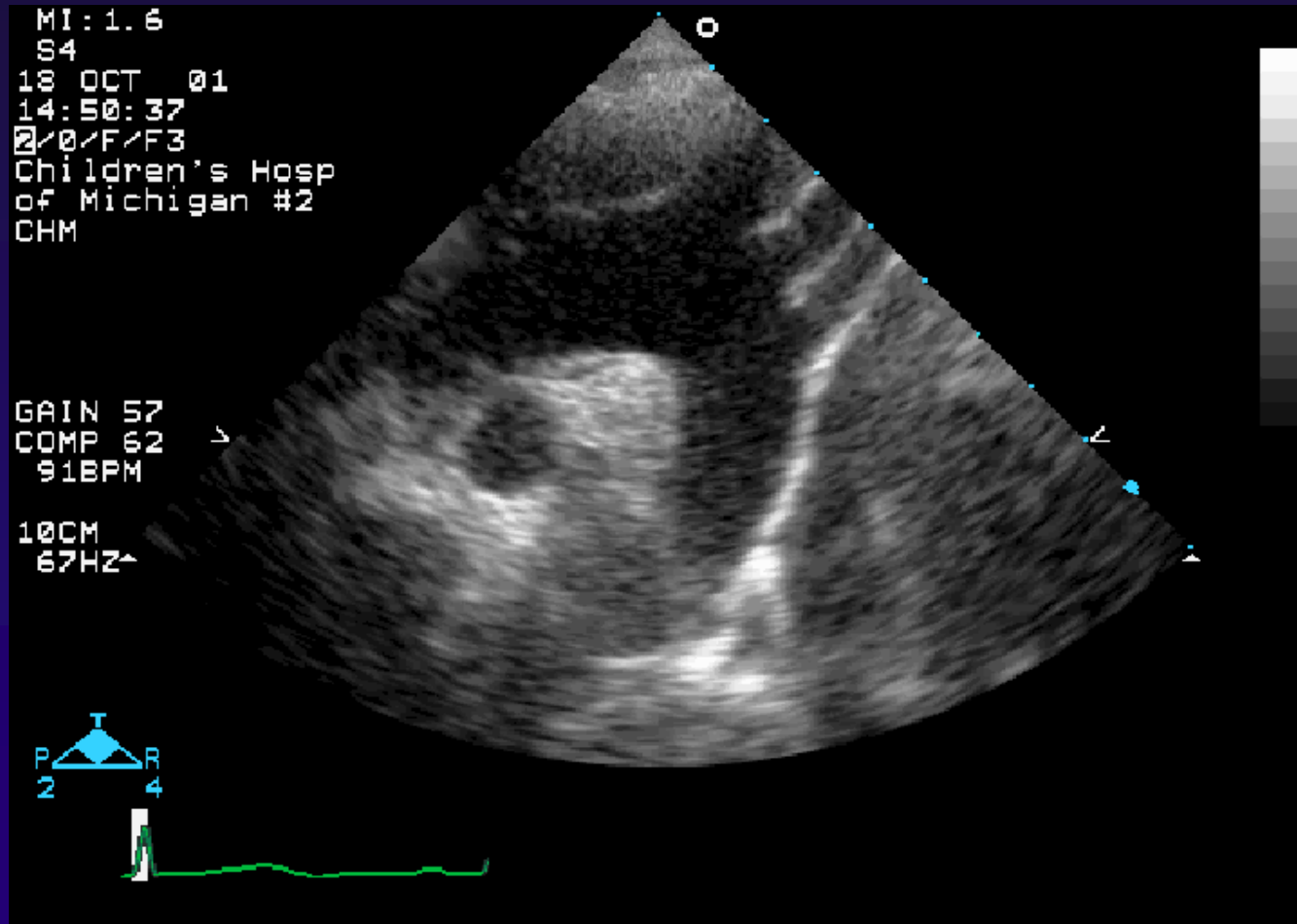


#### RIGHT ARCH



# Congenital Heart Disease

## Suprasternal Long Axis View

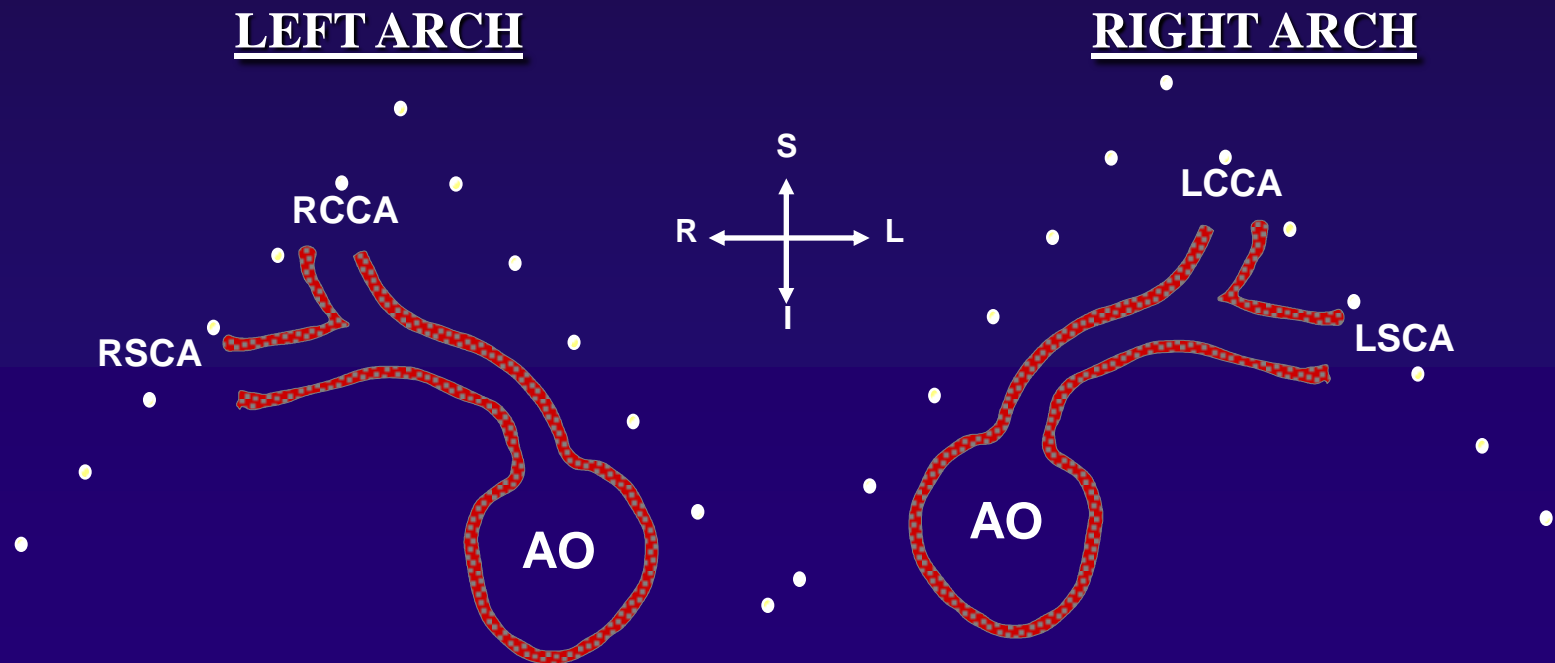


# Congenital Heart Disease

## Special Pediatric Views

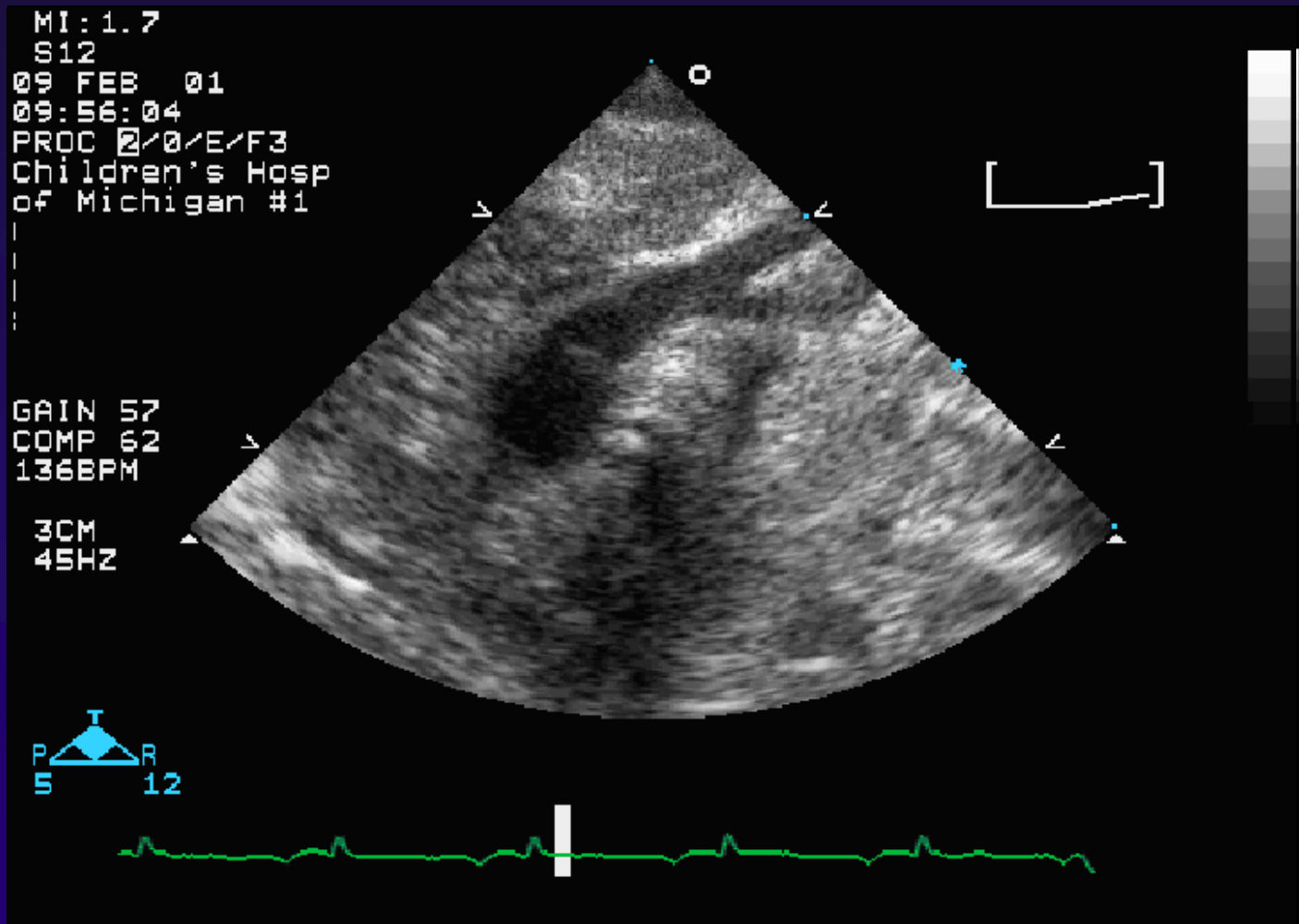
### Arch Position

### Suprasternal Short-axis View



# Congenital Heart Disease

## Suprasternal Short Axis – Arch Position



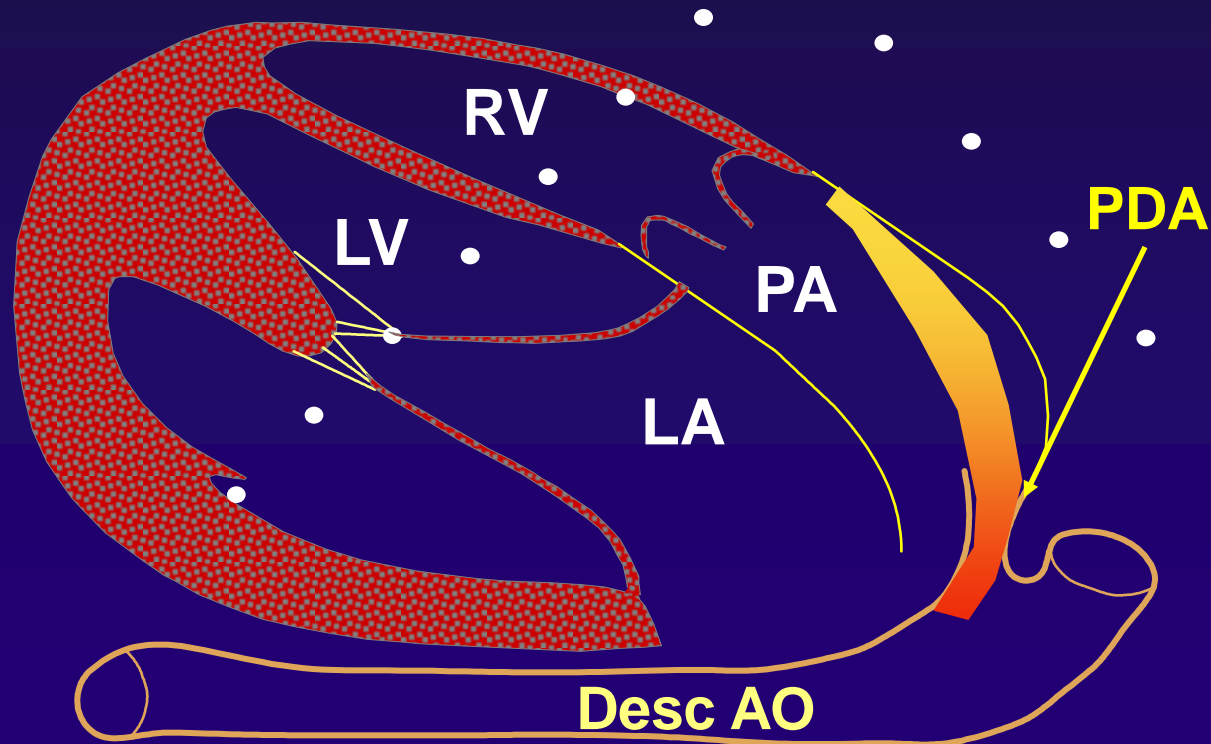


# Congenital Heart Disease

## Special Pediatric Views

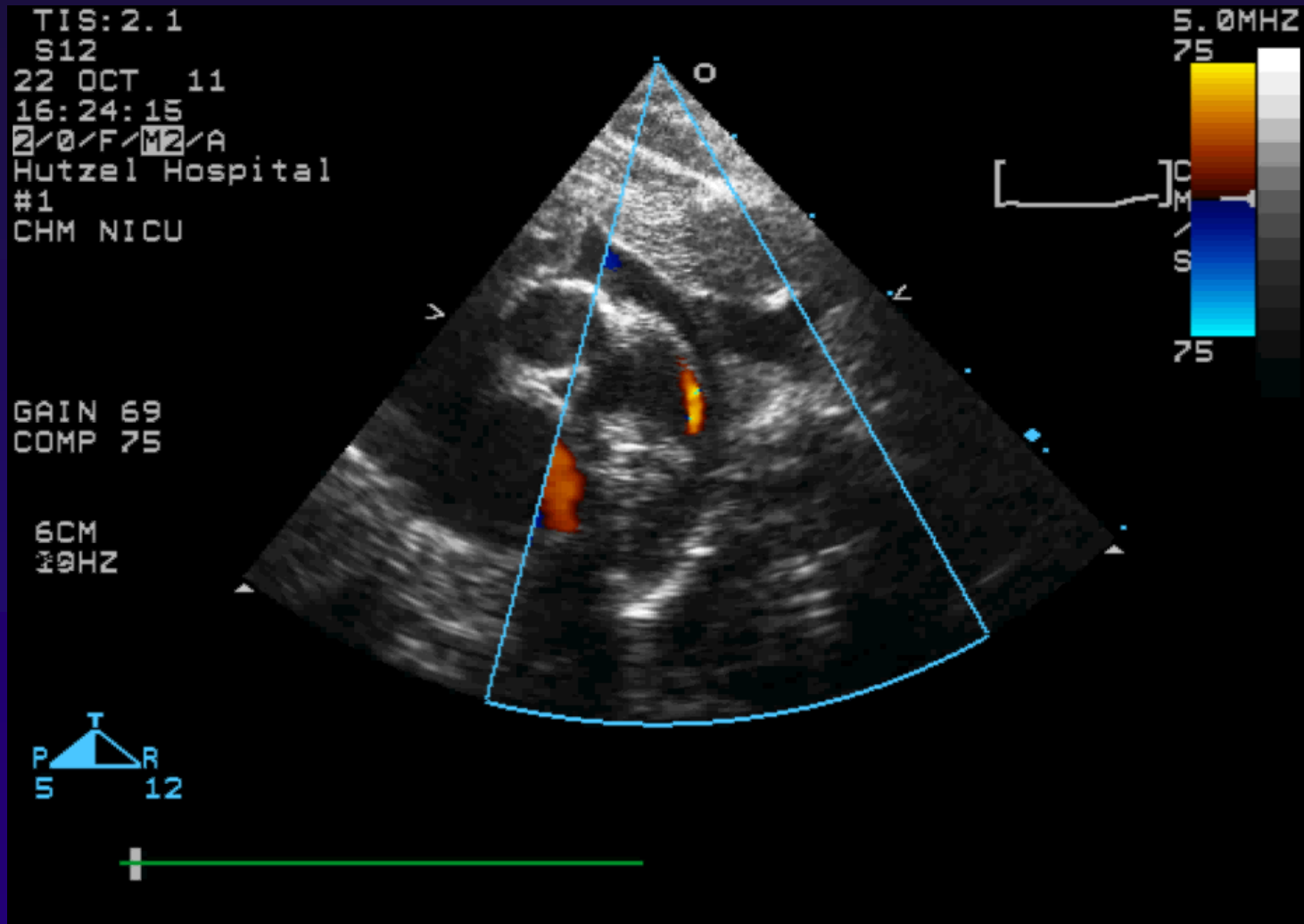
Parasternal Ductal View

- (High Left Parasternal)



# Congenital Heart Disease

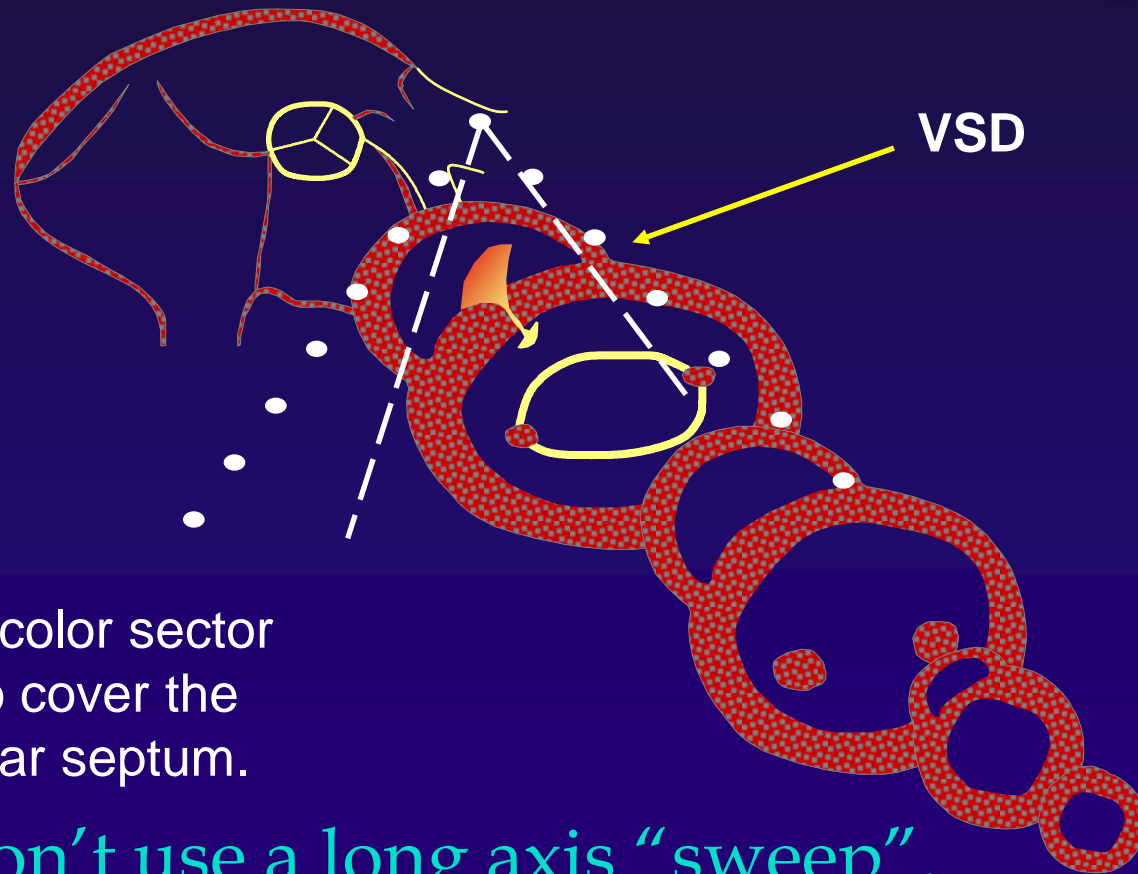
## Ductal View



# Congenital Heart Disease

## Special Pediatric Views

### Parasternal Short-Axis "Sweep"



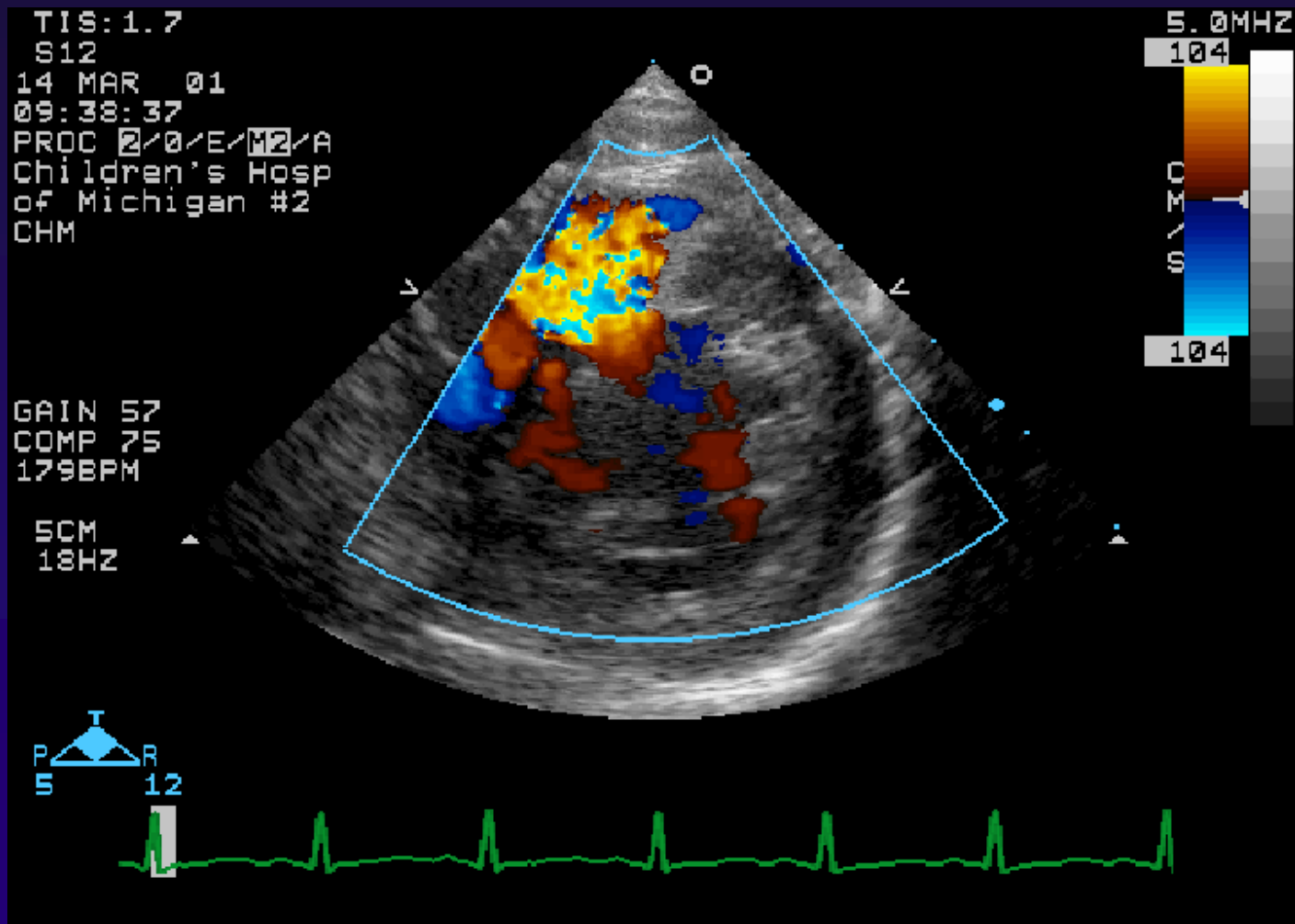
Open the color sector widely to cover the ventricular septum.

\* Don't use a long axis "sweep".



# Congenital Heart Disease

## Parasternal Short Axis Sweep



# Pearl #6

- ♥ Keep things simple and don't over think things. A good basic echo exam will give you at least 99% of what you need to know.
- ♥ Adults moan and have tough images
- ♥ Babies cry and have great images
- ♥ It all balances out in the end



*Thank You*



# Pearl #5

- ♥ Sometimes it's not what you see, it's what you don't see



# Pearl #6

- ♥ Sometimes what you see can have more than one explanation. It all has to make sense.





# Case

- ♥ 17 year old seen early in life for a heart murmur.
- ♥ Evaluated by a cardiologist and told that there was a “hole in the heart”, but no intervention advised
- ♥ At age 2-3 told that no further follow-up was needed.
- ♥ Recently moved to our area, saw a new doctor and asked us to re-evaluate

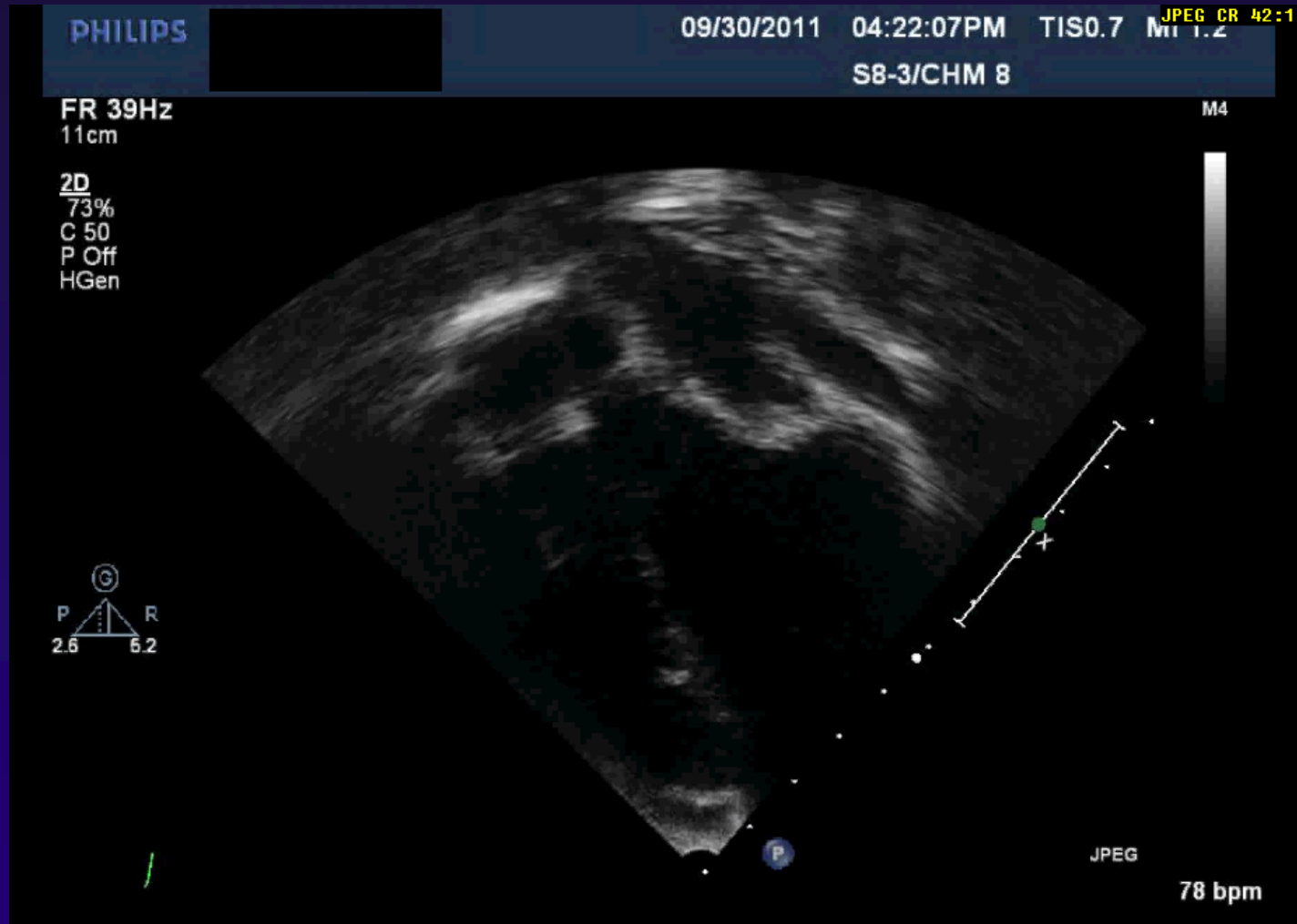


# Case

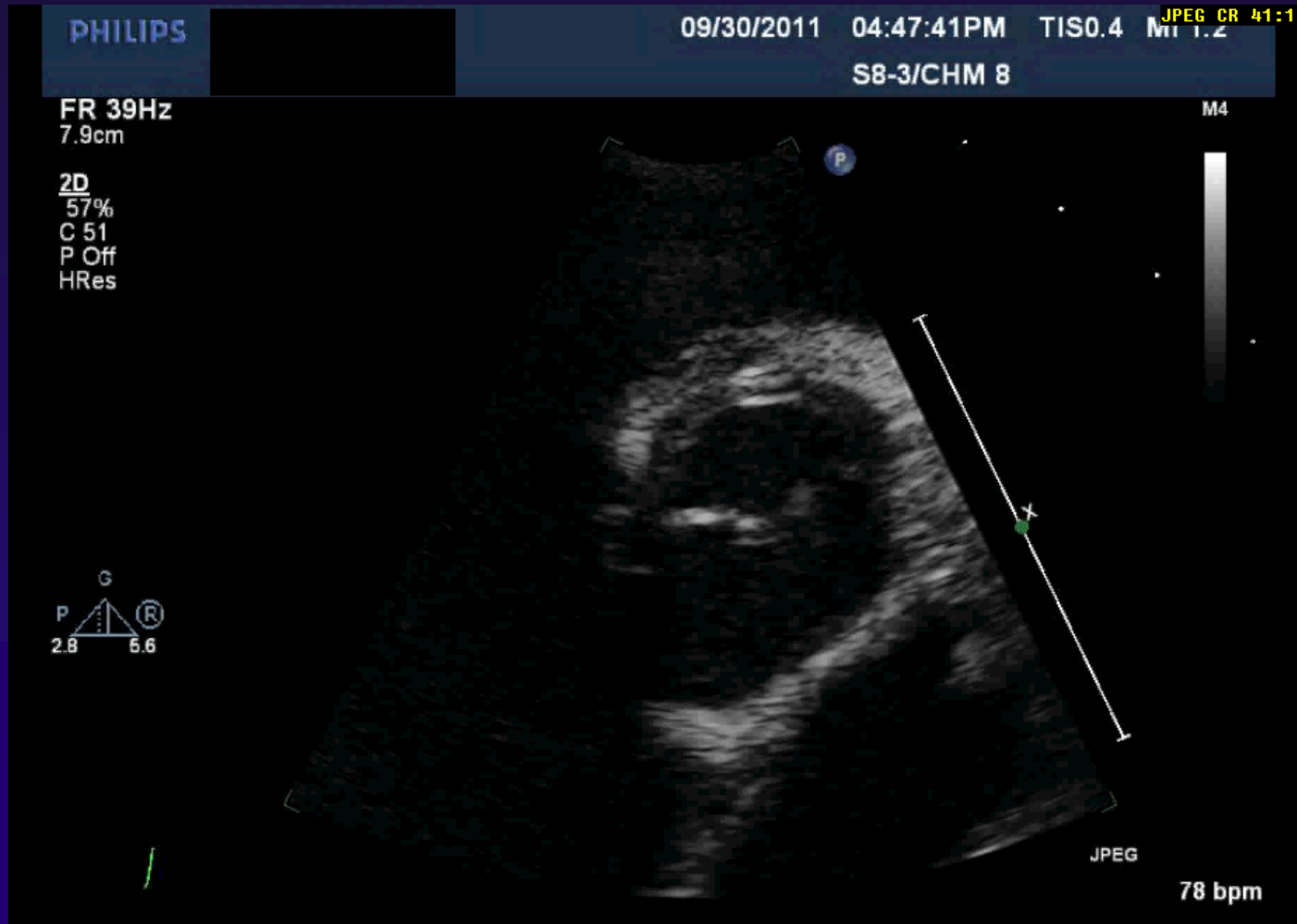
- ♥ Clinically doing well
- ♥ 3/6 holosystolic murmur at mid-LSB,  
no diastolic murmurs



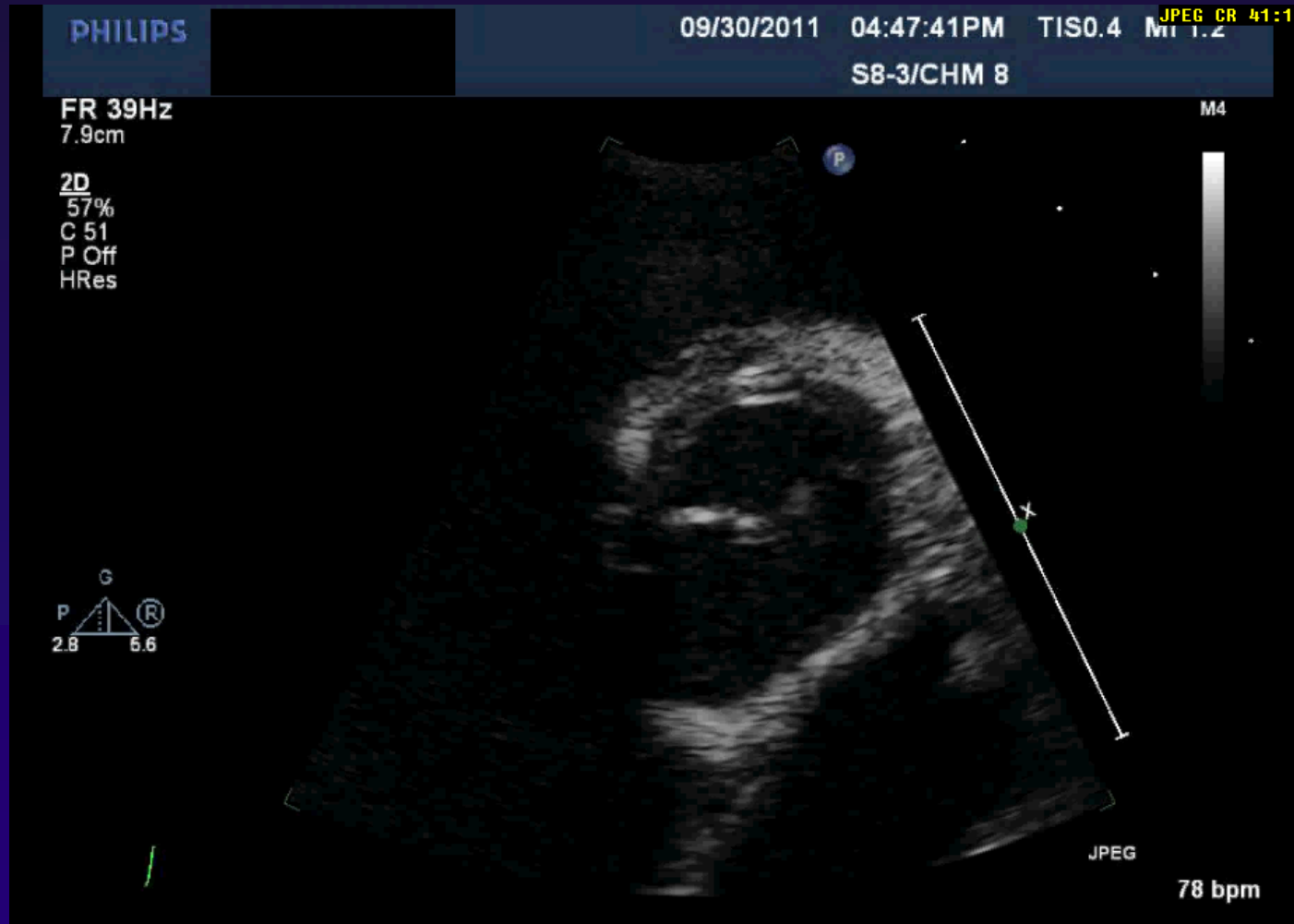
# Case - Echocardiogram



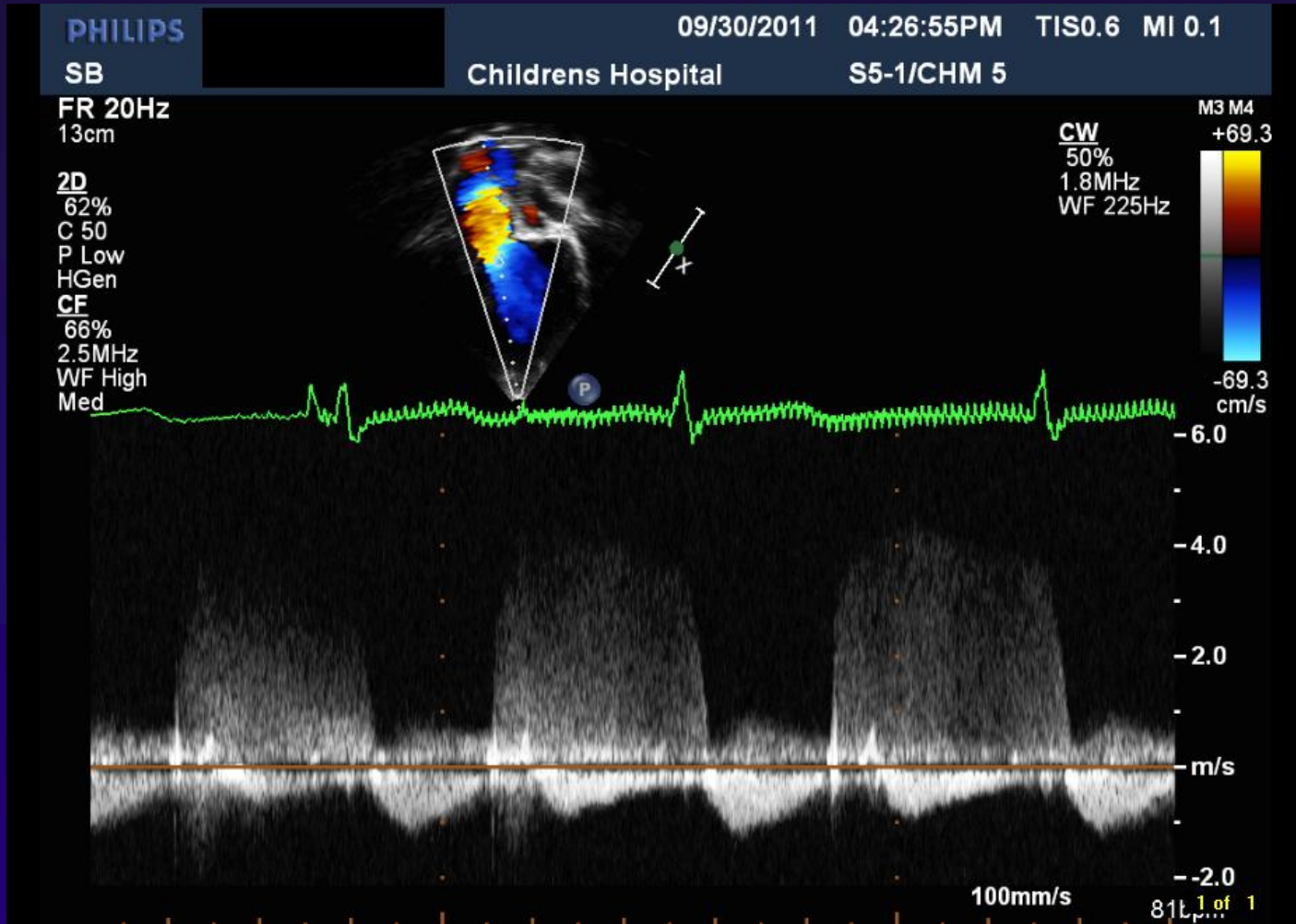
# Case 1 - Echocardiogram



# Case - Echocardiogram



# Case - Echocardiogram



# Case – Echocardiogram - Finale

