

## [#ASEchoJC](#) Twitter Chat

Tuesday, April 13, 2021 – 8 PM ET

- [Recommendations for the Adult Cardiac Sonographer Performing Echocardiography to Screen for Critical Congenital Heart Disease in the Newborn: From the American Society of Echocardiography](#)

**Moderators:** Ritu Thamman (@iamritu) with moderators Pushpa Shivaram (@PushpaShivaram) Jennifer Co-Vu (@DrJenniferCo\_Vu) and Edward Gill (@edwardagill)  
**Co-Authors:** Melissa Wasserman (@MelisWasserman) and Bruce Landeck (@bifflandeck)

**Introduction and Welcome:** Welcome to #ASEchoJC Tonight we will be discussing the @ASE360 guidelines on scanning for critical congenital heart disease in the newborn Baby w authors @MelisWasserman @bifflandeck & my co moderators @PushpaShivaram @DrJenniferCo\_Vu @edwardagill #echofirst

**Tweetorial:** <https://twitter.com/iamritu/status/1382081584006889473?s=20>

**Q1: What determines if Congenital Heart Disease (CHD) is 'critical'?**

### **A1 Notable Responses:**

**@iamritu:** A1. Critical means it MUST be picked up or else these neonates can suffer irreversible damage from hypoxemia

**@bifflandeck:** C-CHD is a congenital heart defect requiring intervention in the first year of life

**@DrJenniferCo\_Vu:** A1. Agree with answers @iamritu and @bifflandeck Determination of Critical Congenital Heart Disease (C-CHD) is crucial in patient's outcomes and is could be time sensitive. Communication with #CHD experts is key

**@DavidWienerMD:** 100%. The guideline has sections on storage and transmission of images and on structured communication

**@bifflandeck:** Structured communication is key. The pediatric cardiologist is your friend when you're struggling with what you're seeing on a new baby with C-CHD. Don't hesitate to pick up the phone and call!

**@MelisWasserman:** CHD that cause severe hemodynamic instability at birth and requires a surgical or interventional procedure to live

**@pushpashivaram:** Also critical heart disease is where the neonates are dictaphone dependent for pulmonary or systemic circulation.. it's critical we pick up these lesions and manage

**@Bravo\_MD:** Critical CHD: those requiring surgery or intervention in the first YEAR of life. Neonatal screening using pulse-oximetry after 24h life and before discharge is effective detecting these patients. Developed countries have widespread use but what about developing countries?

**@JohnJairoArauj1:** CHD that cause severe hemodynamic instability at birth and requires a surgical or interventional procedure to live

**Q2: What are some types of Critical CHD that can be reliably detected by pulse oximetry screening (POS)? What are drawbacks of pulse oximetry screening?**

**A2 Notable Responses:**

**@iamritu:** A2. Some of the drawbacks include can't identify obstructive lesions such as coarctation of aorta or aortic valve stenosis which require hypoxemia for diagnosis

**@edwardagill:** Sensitivity only 70%, but specificity excellent at 99%

**@iamritu:** Still widely used as it's a cost effective simple first step screening #ASEchoJC False-positive screens that required further eval happen in only 0.05% of infants screened after 24 hours

**@bifflandeck:** Pulse ox isn't perfect, and it's a challenge in high altitude (like Denver where I work), but it has helped identify a lot of disease early in life, which helps outcomes

**@MelisWasserman:** d-TGA, TAPVR, pulmonary atresia, coarctation. Drawbacks are POS also detects hypoxemia due to non-CHD causes

**Q3A: What can be done to improve image quality on a newborn?**

**A3A Notable Responses:**

**@iamritu:** A3A. Make sure you have the right transducer frequency: Near-field imaging high-frequency transducer, typically b/w 10 - 12 MHz & for anatomy need depth so use mid range-frequency transducers 6-9 MHz

**@rajdoc2005:** I have scanned children back home in India and during @ASE360 global outreach events. But never scanned a newborn!!! Sounds tricky - So I am eager to learn!!

**@DrJenniferCo\_Vu:** A3. Swaddle the baby as suggested by @MelisWasserman. There is a 2 swaddle technique to expose the chest while doing the neonatal #echo!

**Q3B: What are the nonstandard views obtained in performance of a new neonatal or pediatric echocardiogram?**

**A3B Notable Responses:**

**@iamritu:** A. Adult sonographers need to get familiar w these views: Subcostal SAX, Ductal, abdominal

**@MelisWasserman: non-standard views**

Non-standard views			
Subcostal SAX (Video 2 available at <a href="http://www.onlinejase.com">www.onlinejase.com</a> )	Probe placed in subcostal position, index marker rotated 90 degrees from subcostal 4-chamber view, sweeping from base to apex	2D visualization of all cardiac structures from a SAX cut with optimal angle for color and Doppler interrogation of atrial and ventricular level shunting	
Ductal (Video 3 available at <a href="http://www.onlinejase.com">www.onlinejase.com</a> )	High left parasternal sagittal view visualizing the MPA and DAo. If a PDA is present, visualization of the PDA vessel connecting the MPA and DAo	2D visualization of the PDA size and course. Optimal angle for color and spectral Doppler interrogation of PDA shunt direction. Add in sweep from DAo to PA.	Right-to-left ductal shunting can be mistaken for LPA
Abdominal aorta (Video 4 available at <a href="http://www.onlinejase.com">www.onlinejase.com</a> )	Subcostal short-axis plane of the abdominal aorta in long axis	Color (demonstrated in Video 4 available at <a href="http://www.onlinejase.com">www.onlinejase.com</a> ) and spectral Doppler interrogation of the abdominal aortic pulsations. Will demonstrate low-velocity and/or continuous diastolic flow in the setting of proximal obstruction (coarctation).	Angulation of the probe ensuring aortic flow is parallel to the direction of sampling is imperative to obtain accurate spectral Doppler waveforms. Also, important to isolate descending aorta from SMA and celiac artery

**@bifflandeck:** Suprasternal notch and subcostal/subxiphoid. These can be tough. The key is slow, deliberate sweeps.

**@DrJenniferCo\_Vu:** Especially tough with moving/crying/ uncooperative babies and kids!!

**Q4: Why are subcostal views so helpful to image a newborn for critical CHD?**

**A4 Notable Responses:**

**@iamritu:** A. Subcostal view is free from lung artifact, & can see relational orientation more readily

**@MelisWasserman:** Free from lung artifact!!

**@DrJenniferCo\_Vu:** A4. Sometimes, you can identify the #CHD with a single subcostal view sweep! Saves valuable time to call for #CHDexpert help if needed!

**@iamritu:** Sweep is 10-20 seconds generally- any major impact on storage space? #ASEchoJC

**@bifflandeck:** It will impact storage space, but it's worth the impact because structural relationships are the keystone of CHD and sweeps are the best way to show them

**@DrJenniferCo\_Vu:** 100% agree with @bifflandeck ! Worth the storage space especially in diagnosing complex #CHD and identifying segmental anatomy. For experienced sonographers/imagers, 5-10 second sweeps can be informative.

**@bifflandeck:** Subcostal views show cardiac position in the chest and a slow sweep can show all the structures without lung artifact. You can find any associated defects

**@Hragy:** If the baby is not sedated subcostal views should be kept to the end, because that's when they are more likely to start crying. #TipsForNewSongraphers

**Q5: Is right to left shunting across the atrial septum concerning? Why?**

**A5 Notable Responses:**

@DrJenniferCo\_Vu: A5. Some Differential diagnosis for R-L shunting in newborns

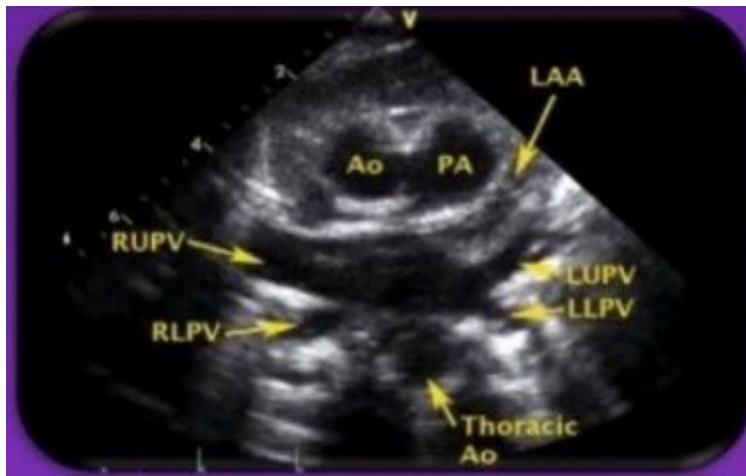
- Anatomical heart Tricuspid atresia
- Anatomical heart Pulmonary atresia intact ventricular septum
- Anatomical heart Pulmonary hypertension
- Anatomical heart “Hypoplastic Right Heart” Variants

@rskk86: Total anomalous pulmonary veins

**Q6A: What is the best view to identify all pulmonary veins?**

**A6 Notable Responses:**

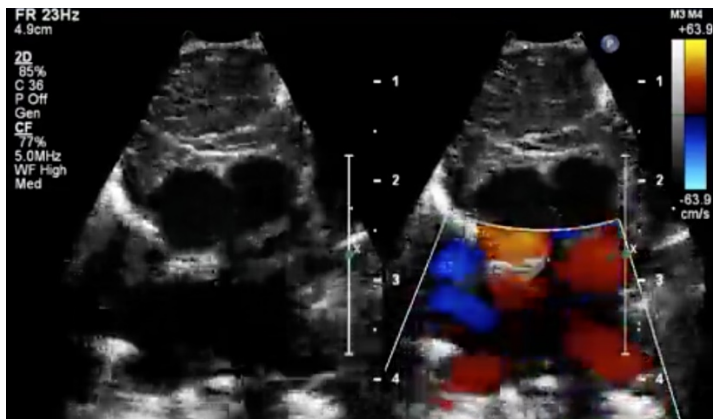
@iamritu: A6. A. #crabview legs of crab 🦀 =Pulm veins & body of crab 🦀 =Left atrium #ASEchoJC



@PushpaShivaram: Make sure you don't see a chamber behind the left atrium.. sometimes they can form a confluence behind left atrium and drain somewhere else

@rajdoc2005: Dont want to miss anything in a new-born!! Just call for help - if unsure!

@MelisWasserman: Crab view!

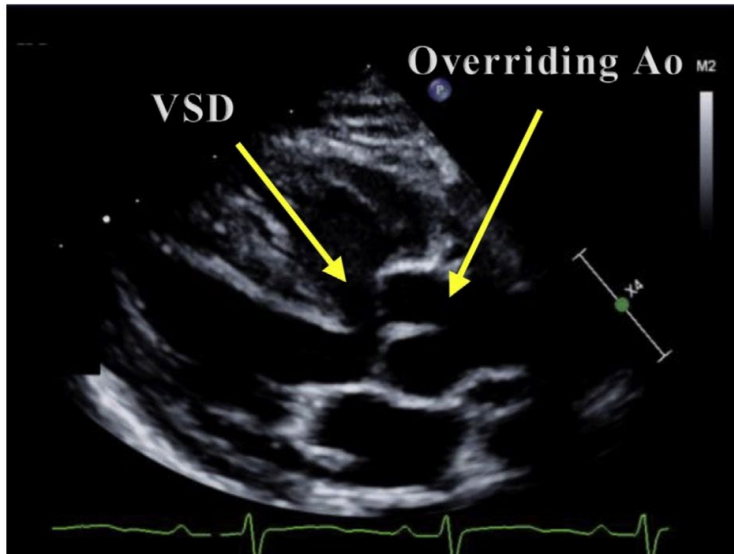


**Q6B: What are typical features of echocardiography in Tetralogy of Fallot?**

**A6B Notable Responses:**

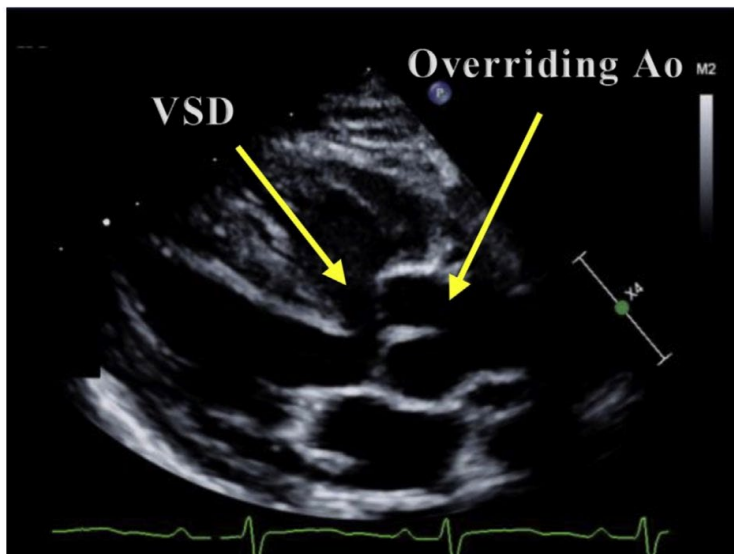
**@iamritu:** VsD, overriding aorta, RVH, some degree of PS/subpulmonic stenosis w L to R shunting in branch PA

TOF



**@MelisWasserman:** Over-riding aorta, VSD, RVH, Pulmonary stenosis

TOF



**@rajdoc2005:** That looks clear on the PLAX view! Have come across many adults with un-repaired TOF while in training. These days we don't see these in adults - most are already repaired!

**@AntonioBarros\_:** AVSD+ TOF Old examination, performed on a newborn patient with trisomy 21.(  
Video here: [https://twitter.com/AntonioBarros\\_/status/1382137583405256710?s=20](https://twitter.com/AntonioBarros_/status/1382137583405256710?s=20) )

**@cardiopedhnn:** Very nice study showing the common AV junction w IA (ASD I) & IV communication (PM-inlet VSD) typical of #AVSD.

Also, the VSD has an outlet extension w anterior malignment of infundibular septum (#TOF).

TOF w AVSD is a very rare association in patients non-trisomy 21.

**@DrJenniferCo\_Vu:** A6B: You can also remember the features of Tetralogy of Fallot with the mnemonic PROVE:

P- Pulmonary stenosis

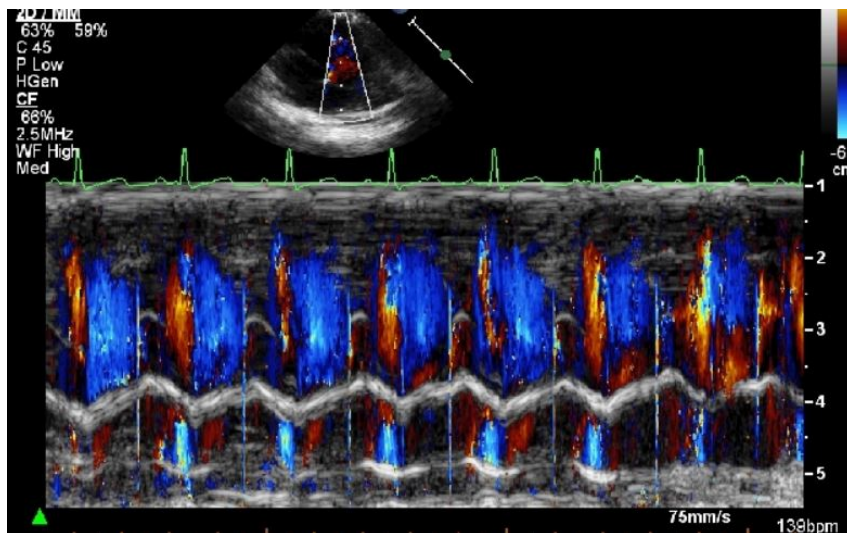
R- RVH

O- Overriding Aorta

V – VSD

e

**@Siwa23288585:** VSD →RL shunt



**Q6C: What are the typical features of echocardiogram findings in D-transposition of aorta?**

**A6C Notable Responses:**

**@iamritu:** A. #ASEchoJC Side-by-side (parallel) great vessels

AoV - anterior & rightward, Pulmonary valve - posterior & leftward

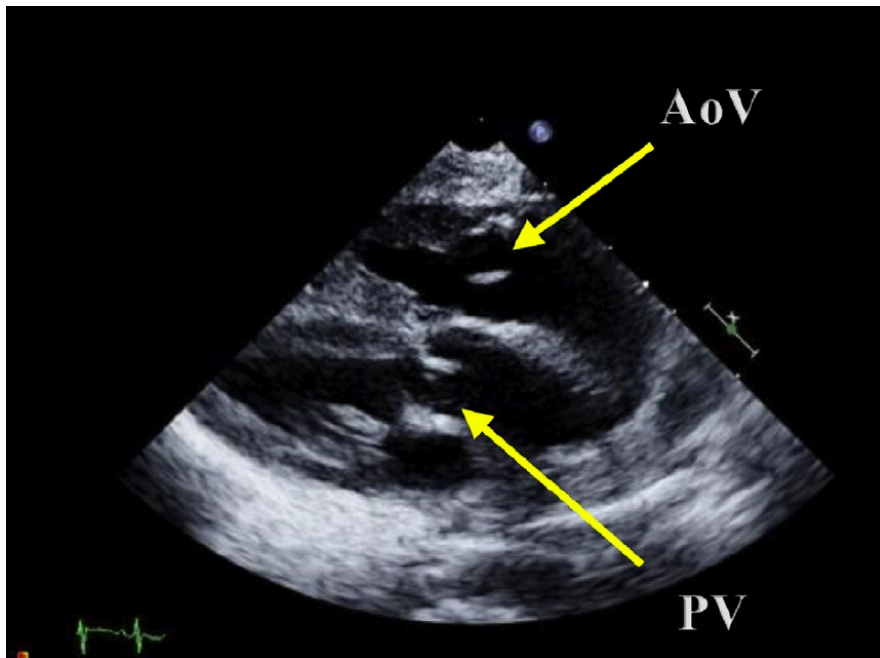
PFO w L/R shunting

MPA arising from LV

**@MelisWasserman:** PLAX of d-TGA - side-by-side great vessels



@BiffLandeck: Parallel great vessels in parasternal long axis view



**Q7: What is a common pitfall when performing spectral Doppler on the abdominal aorta to evaluate for coarctation?**

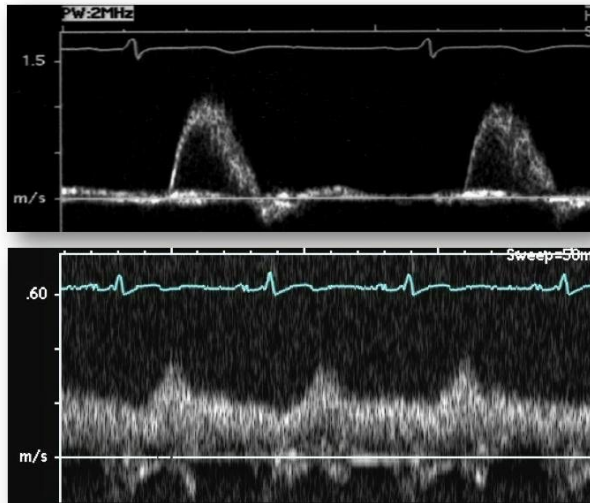
**A7 Notable Response:**

@iamritu: If you place doppler PW sample gate on SMA or celiac artery you'll get a false positive "sawtooth" pattern

@MelisWasserman: Making sure the sample volume is parallel to flow

@DrJenniferCo\_Vu: A7. Spectral Doppler Pattern on the abdominal aorta in normal versus Coarctation of the aorta. Note the diastolic flow continuation aka "sawtooth pattern". \*H/T @garvankane for slide

## Abdominal Aorta PW Doppler



Normal

Abnormal  
Coarctation

**@bifflandeck:** The key here is getting low on the abdomen and aiming cranially to get a parallel angle for PW Doppler - and don't be fooled by the SMA!

**@bifflandeck:** An obstructive pattern in the abd aorta looks like a sawtooth (diastolic continuation) - but if there's an open ductus it can look falsely reassuring.

**@PushpaShivaram:** <https://twitter.com/i/status/1382133352505999360>

**Q8: What is the differential diagnosis in the finding of retrograde filling of the ascending aorta from the PDA?**

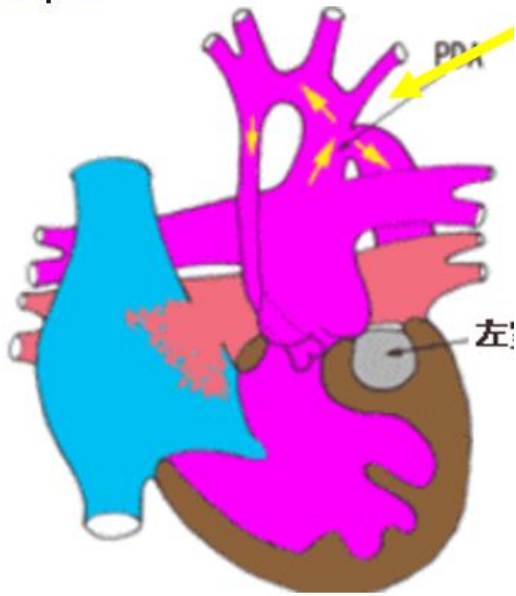
### A8 Notable Responses:

**@DrJenniferCo\_Vu:** A8. Differential diagnosis of retrograde filling of the ascending aorta from PDA:

- Aortic Atresia
- Critical Aortic Stenosis
- Hypoplastic Left Heart Syndrome

**@Slwa23288585:** HLHS





**Q9: What does 'ductal dependent' mean?**

**A9 Notable Responses:**

**@bifflandeck:** If the patient needs a ductus as their only source of pulmonary or systemic blood flow, they're ductal dependent.

**@DrJenniferCo\_Vu:**

- Ductal dependent lesion means that #CHD type depends on -a patent ductus arteriosus (PDA) for pulmonary or systemic flow.
- Typically, the PDA will normally close within hours-5 days in normal newborns.
- IV prostaglandins (PGE1) is needed to keep PDA open

**@Slwa23288585:**

1. Pulmonary flow decrease, such as TOF
2. Mix, artery and vein blood such as d-TGA
3. Keep being renal flow, such as Coarctation

**Q10A: Side-by-side great vessels are seen in which forms of Critical CHD?**

**A10A Notable Responses:**

**@DrJenniferCo\_Vu:** A10. Side-by-side great vessels are seen in:

- D-transposition of great arteries
- DORV with malposed great arteries/"Taussig Bing" anomaly

**Q10B: What CHD lesions can be missed with just a 4 chamber view scan?**

**A10B Notable Responses:**

**@MelisWasserman:** d-tga, interrupted aortic arch, coarctation

**@DrJenniferCo\_Vu:** A10B: Some #CHD lesions missed with 4 Chamber echo view scan:

- Tetralogy of Fallot
- D-TGA
- Coarctation of the Aorta
- Interrupted Aortic Arch
- Truncus Arteriosus
- Double Outlet RV
- Aortic Stenosis/Atresia
- Pulmonary stenosis/Atresia
- Etc

**Q11: How to identify normal chamber and great vessel size in neonatal/pediatric population?**

**A11 Notable Responses:**

**@iamritu:** Z score can calculate @ChildrensPhila has a great calculator online

The Children's Hospital of Philadelphia® RESEARCH INSTITUTE

### Pediatric Z-Score Calculator

**Instructions**

This web page allows you to calculate the body mass index (BMI) of your patients between the ages of 2 and 20 years, as well as the exact BMI percentile and z-score (standard deviation), based on the Center for Disease Control (CDC) growth charts. Z-scores are particularly useful to monitor changes in patients with a BMI above the 99th percentile or below the 1st percentile.

**All fields are required. Please enter a value for every field. The default unit values are kg and cm.**

Please enter the patient's weight - be sure to indicate if kilograms or pounds

Weight:  kg or lb?  kg  lb

Please enter the patient's height - be sure to indicate if centimeters or inches

Height:  cm or in?  cm  in

Please enter the patients gender.

male  female

Please enter the patient's date of birth (MM/DD/YYYY).

Please enter the date of patient's OFFICE VISIT (MM/DD/YYYY).

**@bifflandeck:** The infamous Z-score (or zed score for my friends across the pond)! Measurements are indexed to BSA, Z is the number of SD away from the mean.

**@MelisWasserman:** z-scores! the deviation of a given measurement form the mean

@DrJenniferCo\_Vu: A11. Due to variations of pt sizes fr neonates to young adults, it's impt to use Z-scores to determine normal valve, chamber, artery & vein dimensions.

Normal fall into the [-2 or -2.5 to +2or +2.5] range:

< -2 or 2.5 is Hypoplastic

> +2 or 2.5 is Dilated

@Slwa23288585: Boston children calculator <https://zscore.chboston.org>

**Q12: How to identify the ventricle(right or left) while scanning for Critical CHD?**

**A12 Notable Responses:**

@MelisWasserman: Moderator band in RV is helpful! Important to remember the RV is not always on the patient's right

@bifflandeck: RV features - coarse trabeculations, moderator band, septal papillary muscle for TV

LV features - smoother walls, bullet shape, septophobic papillary muscles for MV

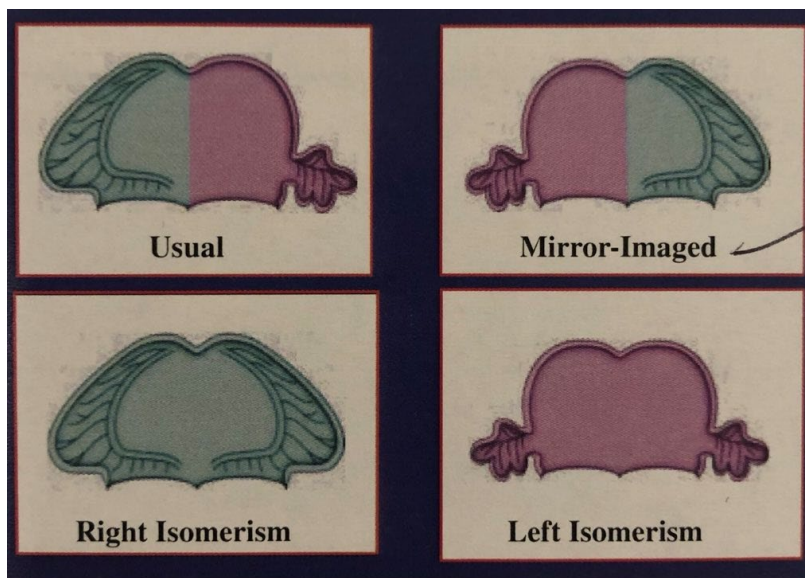
@iamritu: valves always go w ventricles, sequential segmental analysis starts w Atrial appendages

Shape:L=map of India upside down, R= snoopy's ear

Junction:broad R, narrow neck L

Extent pectinate muscles only inside LAA(LA wall smooth)Squared vs RAA pectinate extend into RA

<https://bit.ly/2BgCeZn>



@DrJenniferCo\_Vu: I also use Snoopy's Ear, Snoopy's Nose analogy for atrial appendages