



ISUOG Basic Training

Obtaining & Interpreting Heart Views Correctly

Learning objectives

At the end of the lecture you will be able to:

- Describe how to assess cardiac situs
- Describe the key features of the 4 planes required to assess the fetal heart correctly
- Recognise the differences between the normal & most common abnormal cardiac ultrasound appearances of the 4 planes

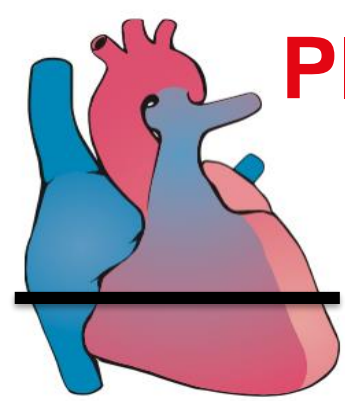
Key questions

1. What are the key ultrasound features of plane 7 (chest)?
2. What probe movements are required to move through the 4 cardiac planes correctly?
3. What are the key ultrasound features of plane 10 (3VT)?
4. Which abnormalities should be excluded after correct assessment of planes 7 (chest), 8 (LVOT), 9 (RVOT) & 10 (3VT)?

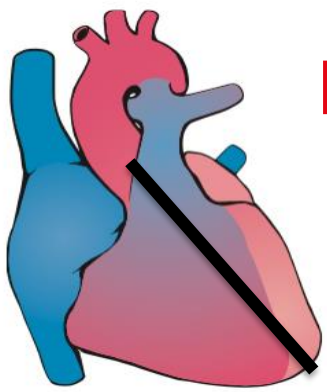
The 20 + 2 planes

Plane	Description
1	Sagittal complete spine with skin covering
2	Coronal complete spine
3	Coronal section of body
4	Transventricular plane*
5	Transthalamic plane*
6	Transcerebellar plane*
7	Lungs, 4 chamber view of heart
8	Left ventricular outflow tract (LVOT)
9	Right ventricular outflow tract (RVOT) & crossover of LVOT
10	3 vessel trachea (3VT) view of heart

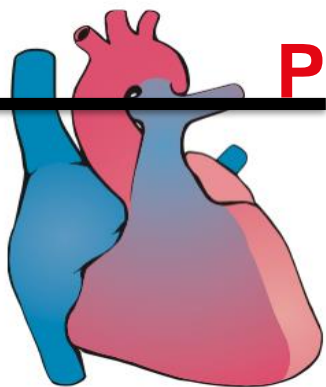
Plane 7 (chest) - Four-chamber view



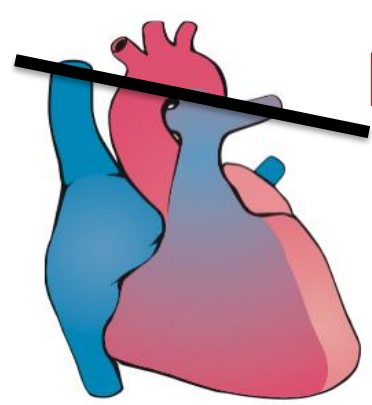
Plane 8 (LVOT) - Left ventricular outflow



Plane 9 (RVOT) - Right ventricular outflow



Plane 10(3VT) – Three vessel trachea

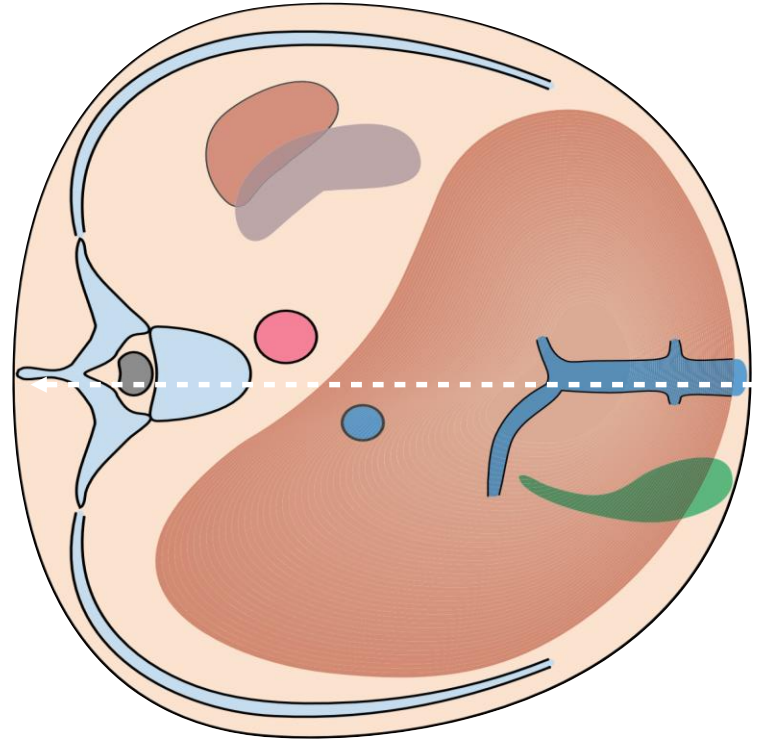
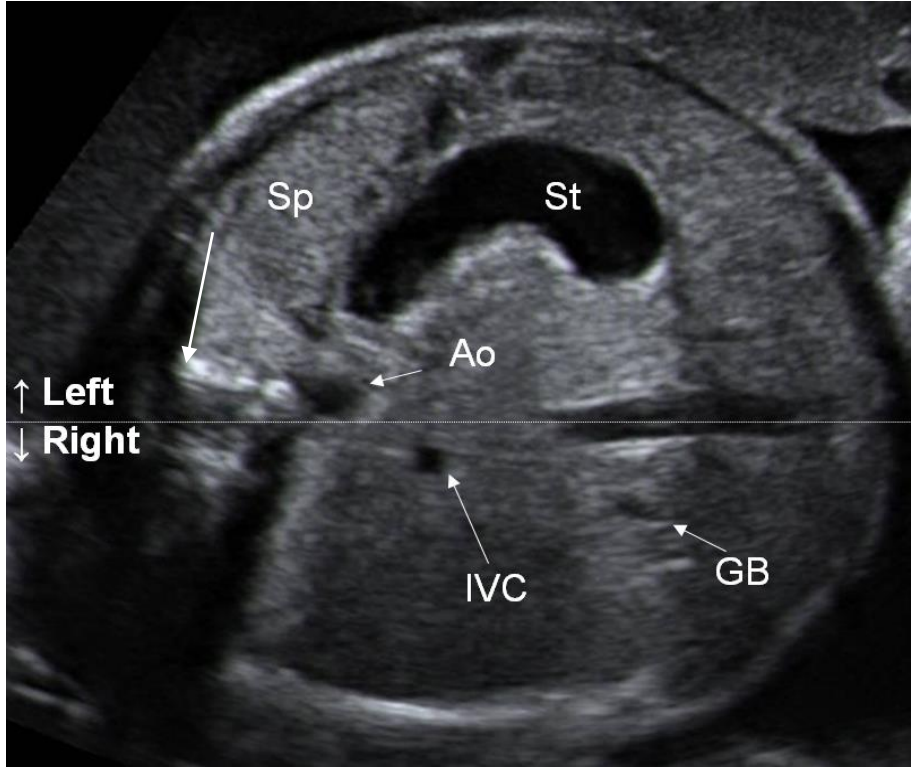




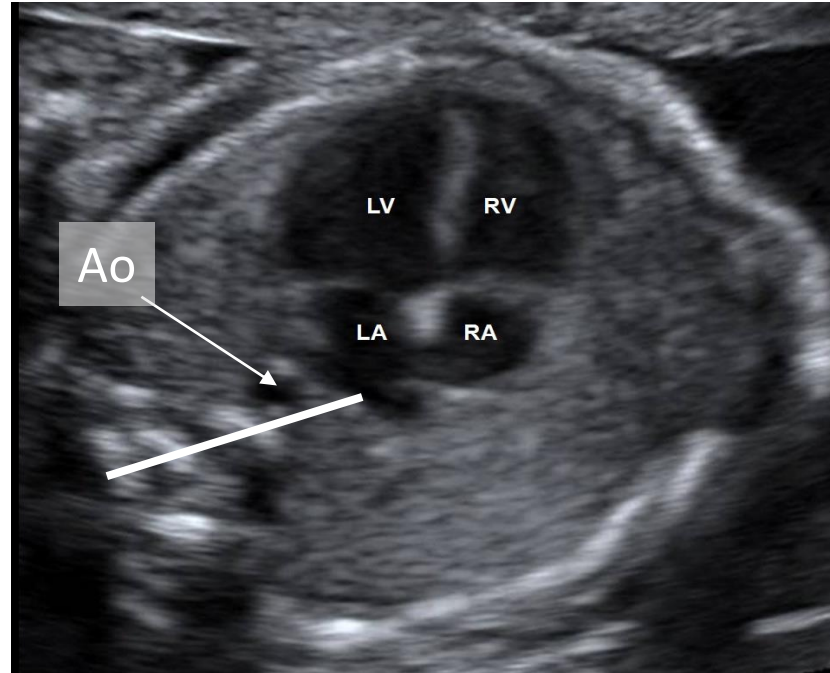
Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left

Normal situs – abdominal circumference



Normal situs - Chest



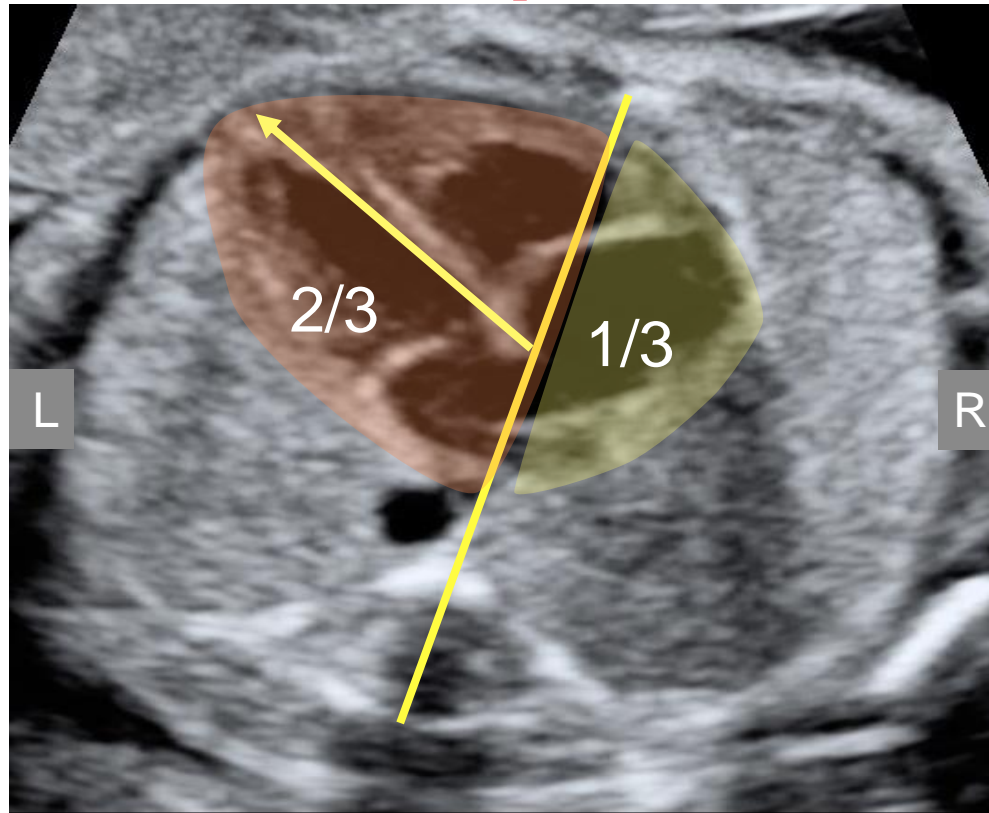
Abuhamad, Chaoui: A Practical Guide To Fetal Echocardiography (2) 2012: 315



Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest

Cardiac position





Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^{\circ} \pm 20^{\circ}$ relative to the vertical



Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^{\circ} \pm 20^{\circ}$ relative to the vertical
- Four chambers present

Four chamber view



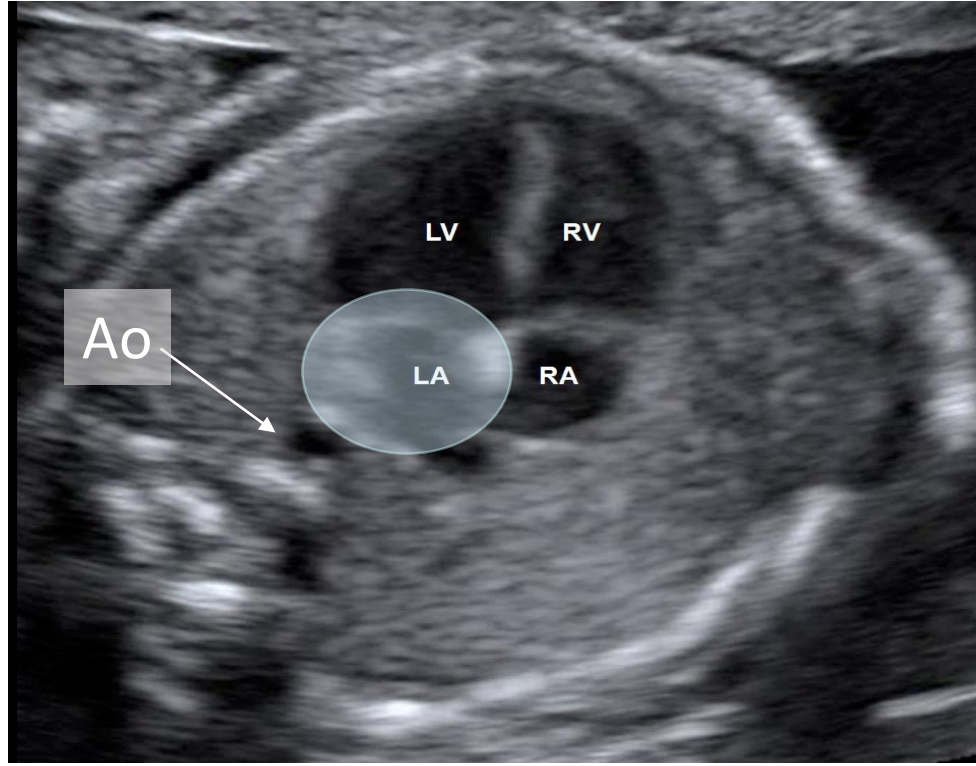
Four chamber view



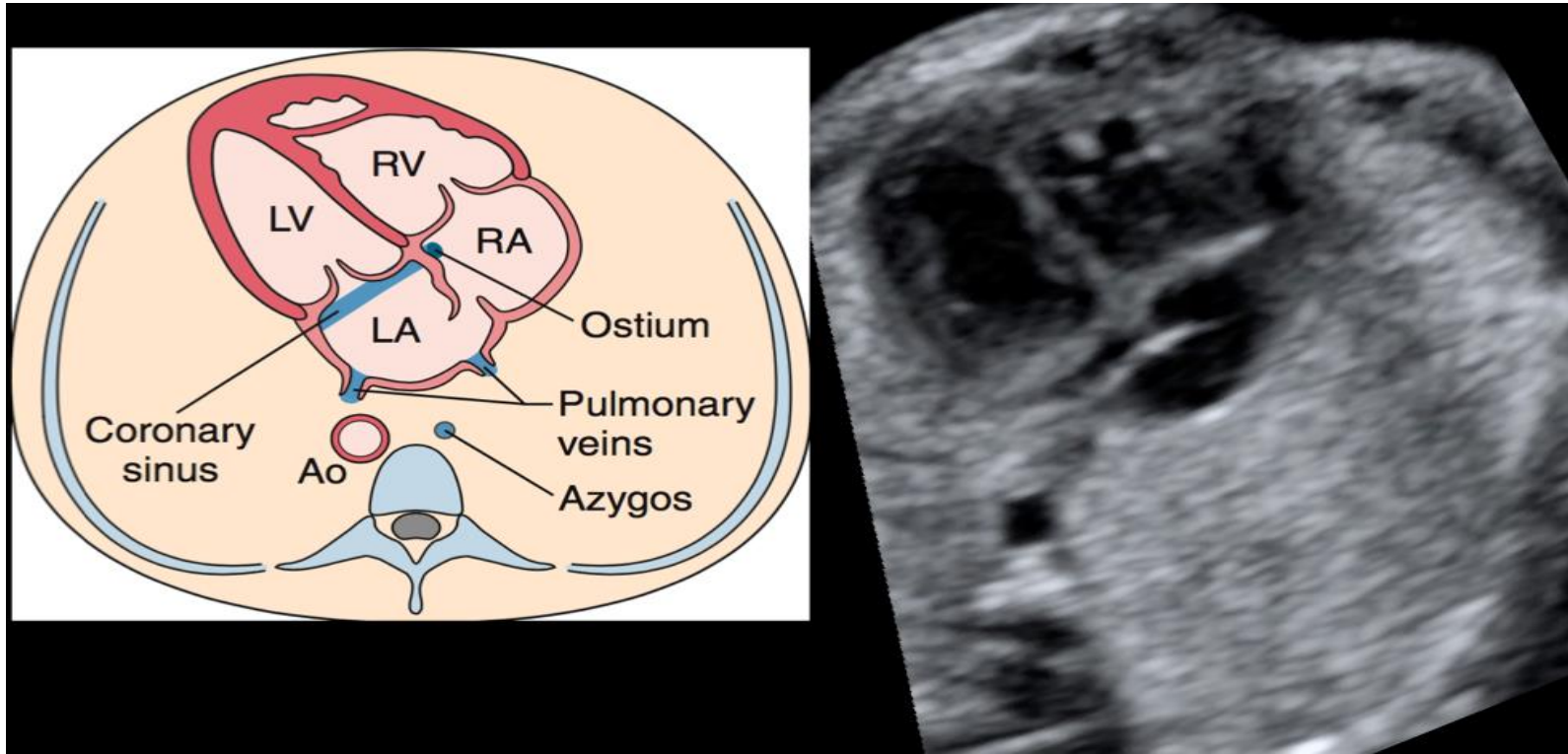
Atrial Chambers

- Two atria, approximately equal in size
- Foramen ovale seen flapping in left atrium
- Atrial septum primum present (adjacent to crux)
- Pulmonary veins entering left atrium

Left atrium

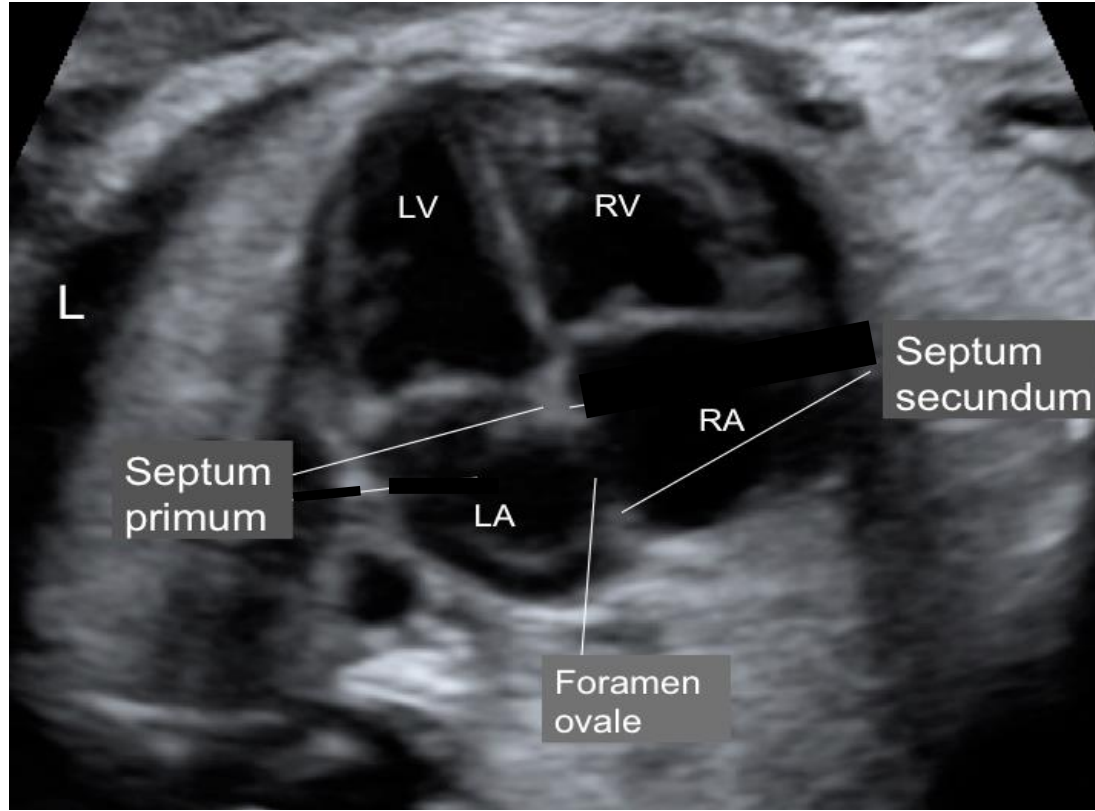


Right atrium



Abuhamad, Chaoui: A Practical Guide To Fetal Echocardiography (3), 2012

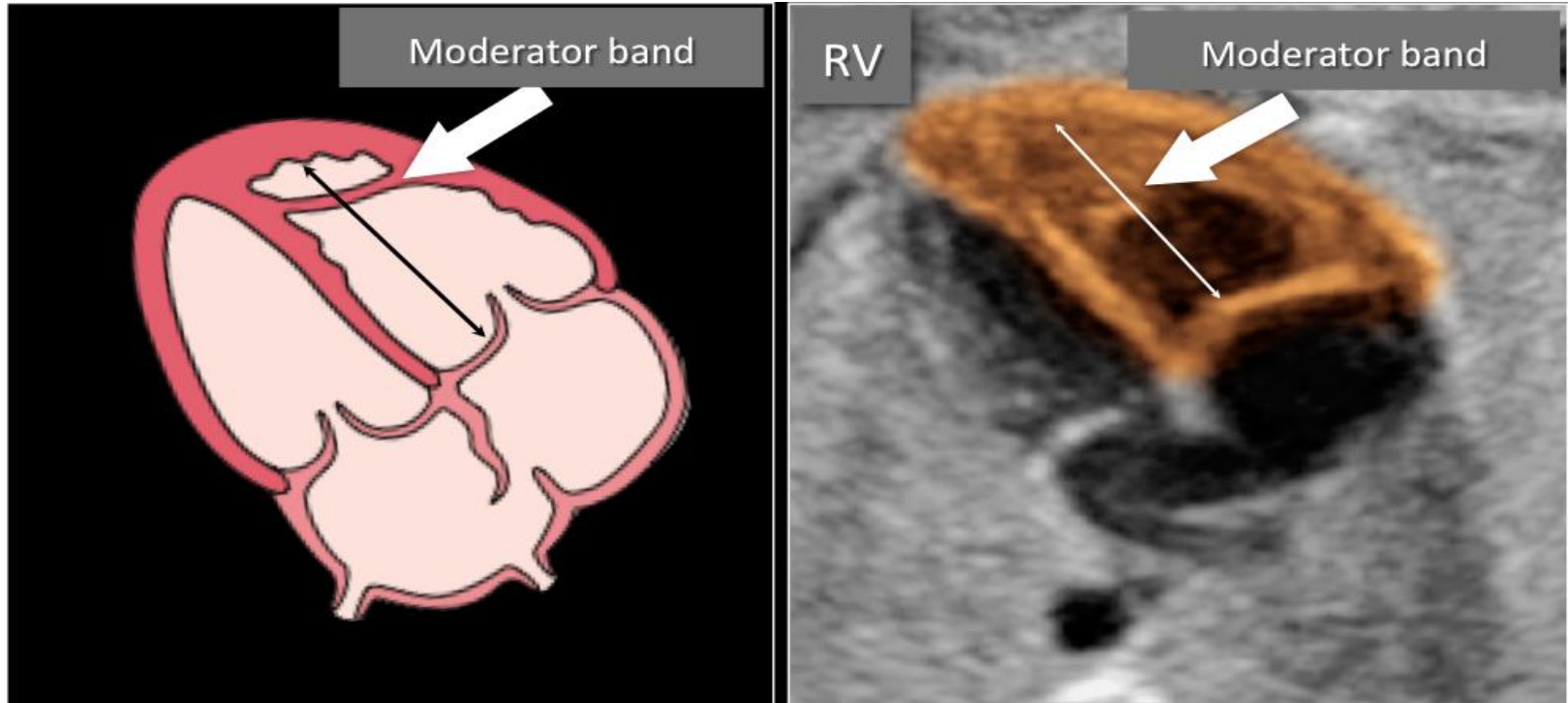
Interatrial septum



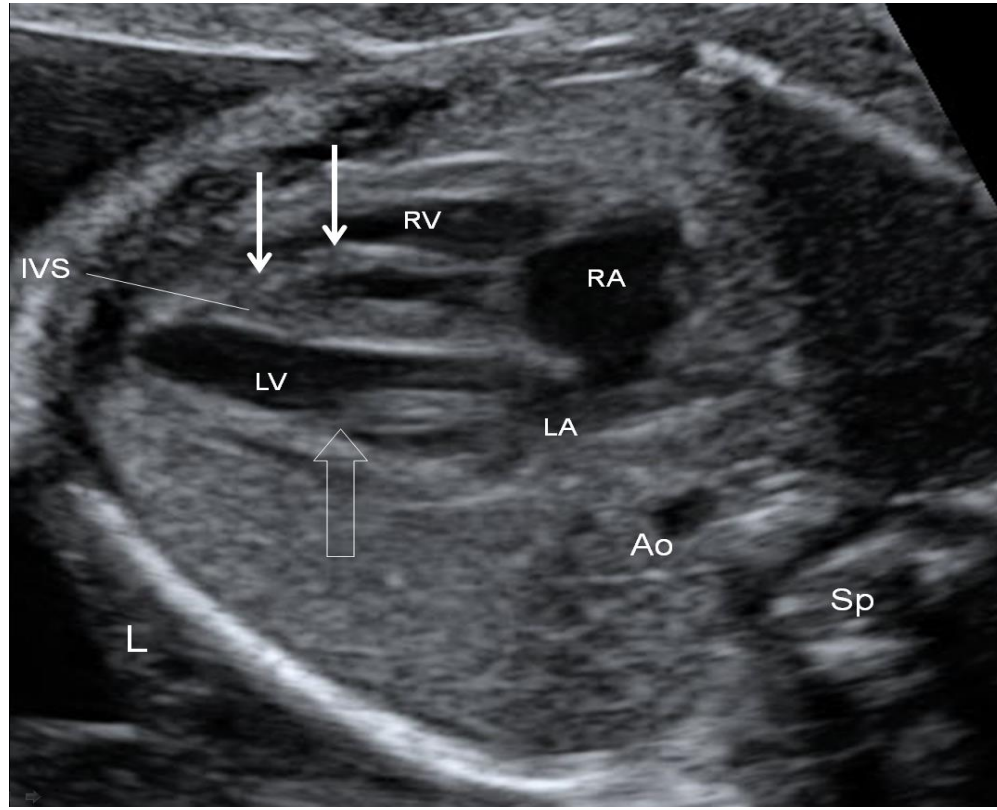
Ventricular chambers

- Two ventricles, approximately equal in size
- No ventricular wall hypertrophy
- Moderator band at right ventricular apex
- Ventricular septum intact (apex to crux)

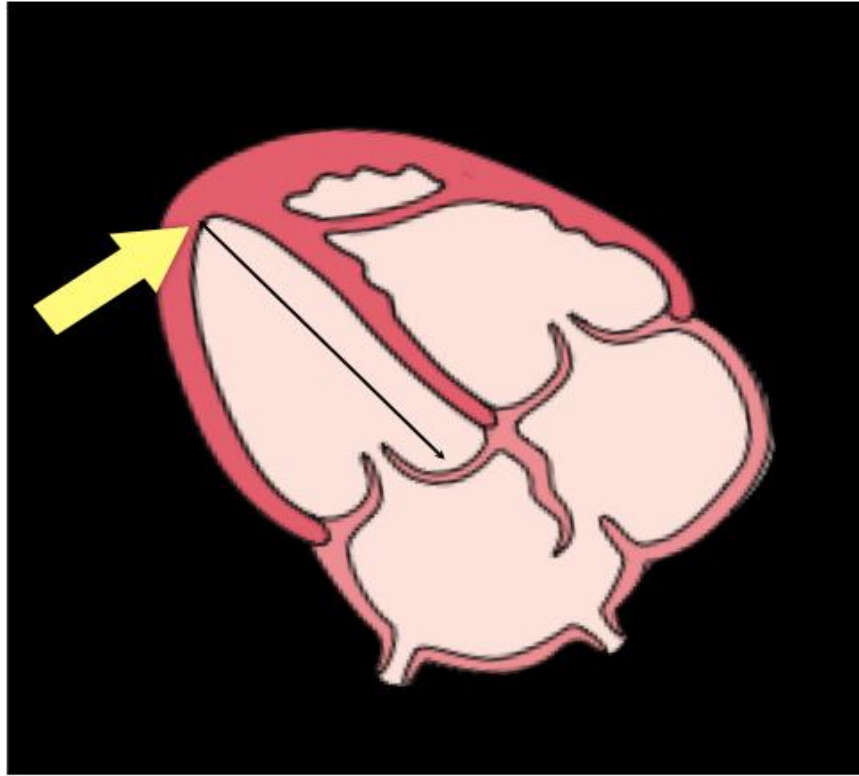
Right ventricle



Right ventricle



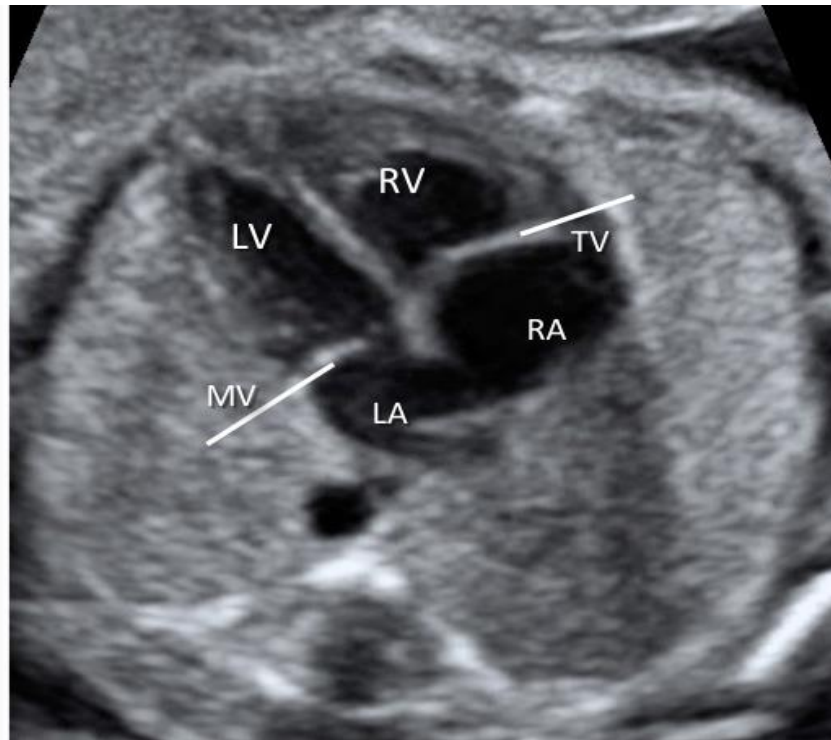
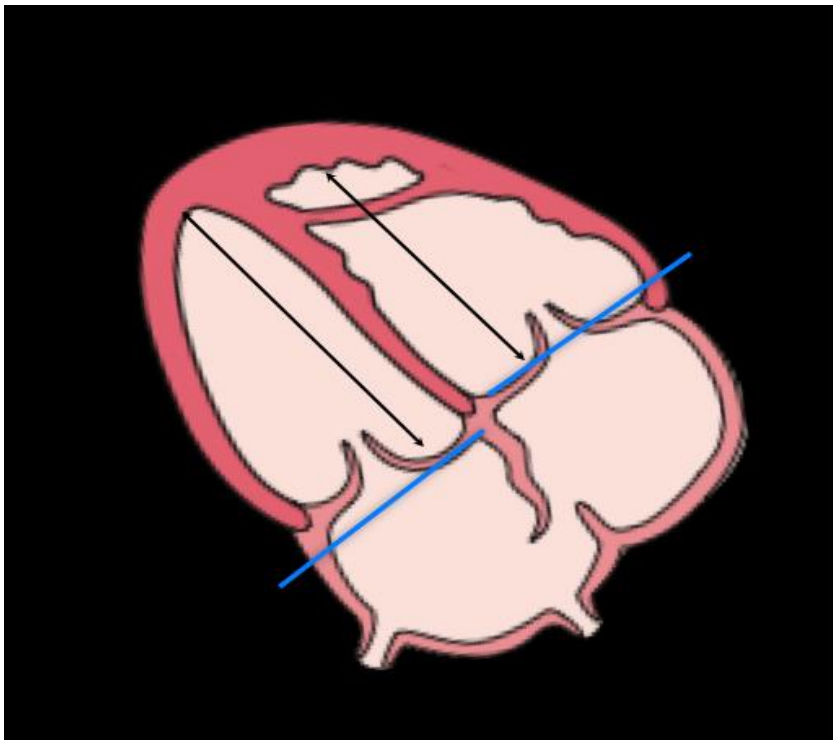
Left ventricle



Atrioventricular junction & valves

- Intact cardiac crux
- Two atrioventricular valves open, close & move freely
- Differential offsetting: tricuspid valve leaflet inserts on ventricular septum closer to cardiac apex than the mitral valve

Atrioventricular valves

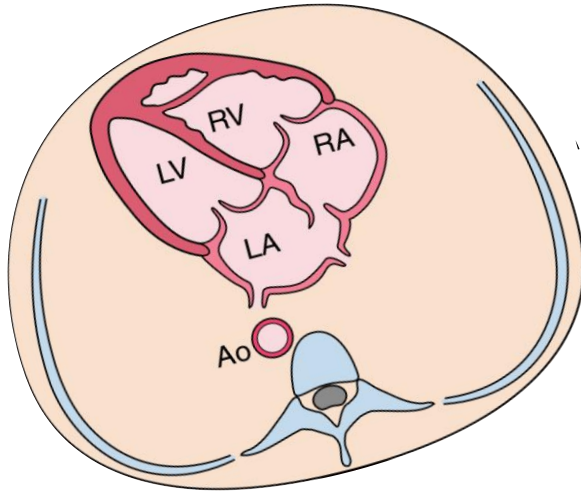




Four chamber view

- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^{\circ} \pm 20^{\circ}$ relative to the vertical
- Four chambers present
- Regular cardiac rhythm

Regular cardiac rhythm

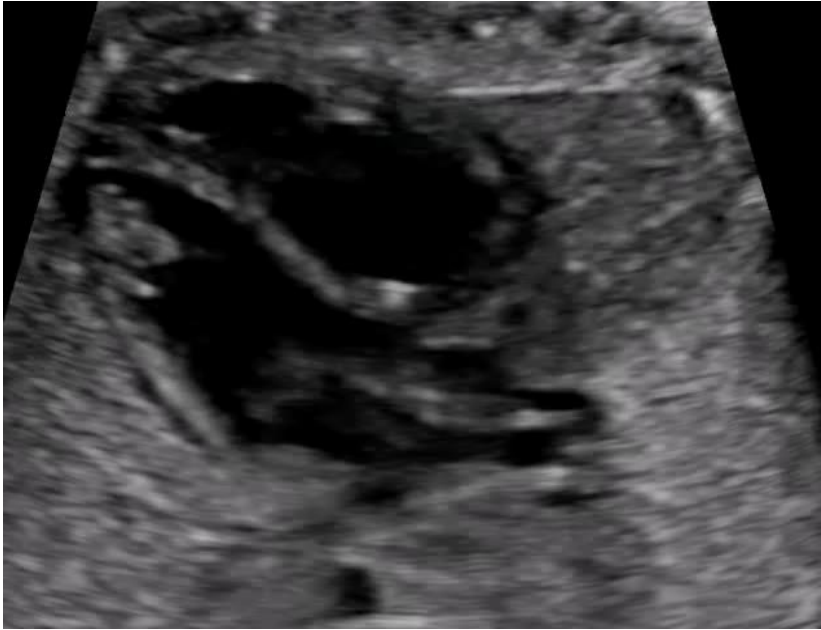




Four chamber view

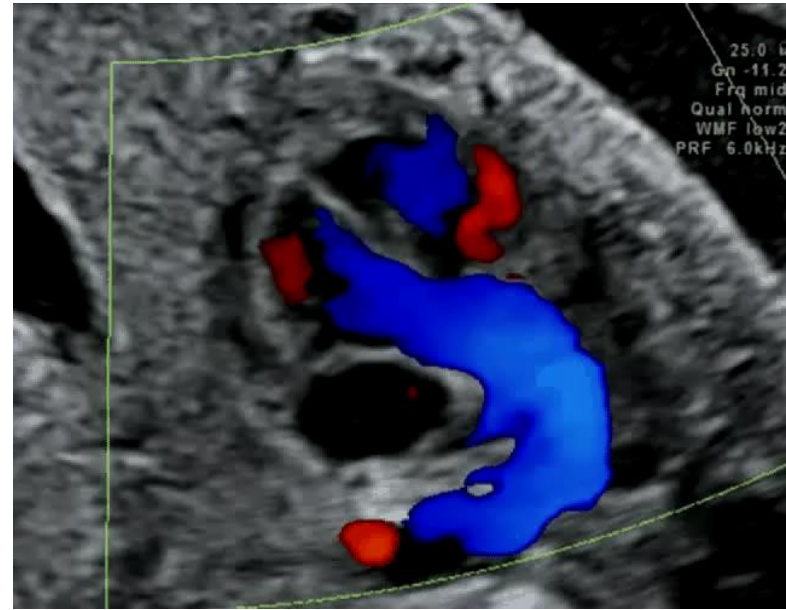
- Fetal laterality (identify right & left sides of fetus)
- Stomach & heart on left
- Heart occupies one third of chest
- Majority of heart in left chest
- Cardiac axis (apex) points to left by $45^{\circ} \pm 20^{\circ}$ relative to the vertical
- Four chambers present
- Regular cardiac rhythm
- No pericardial effusion

Four chamber view - detectable anomalies



Muscular - ventricular septal defect (VSD)

Four chamber view - detectable anomalies



Perimembranous VSD

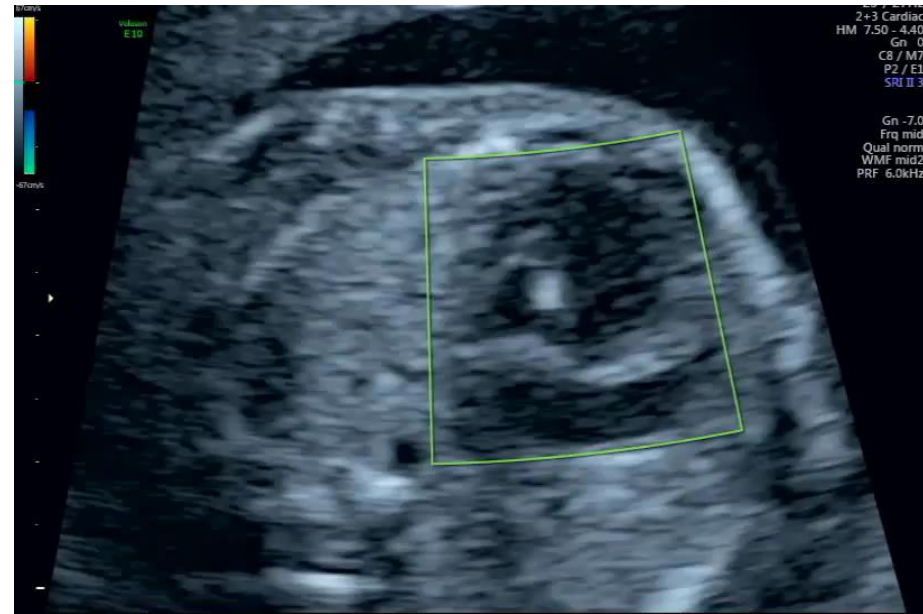
Four chamber view - detectable anomalies

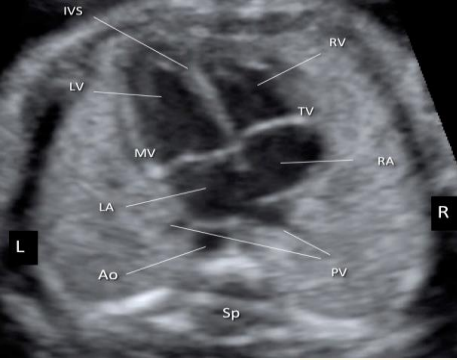
AVSD



Four-chamber view – detectable anomalies

Hypoplastic left ventricle –
univentricular heart





Plane 7- Four chamber view

Normal-size heart in chest

Transverse plane of fetal chest with one complete rib on each side of fetal lateral chest wall

Descending aorta in front and to the left of the fetal spine

Apex of fetal heart pointing to the left upper chest at about a 45-degree angle

Atria equal in size

Foramen ovale in midsection of atrial septum with leaflet of foramen ovale in left atrium

Two inferior pulmonary veins, seen as slitlike opening in posterior wall of left atrium

Patent atrioventricular valves

Tricuspid valve septal leaflet more apically inserted on the septum than mitral valve

Ventricles equal in size and contractility

Intact ventricular septum

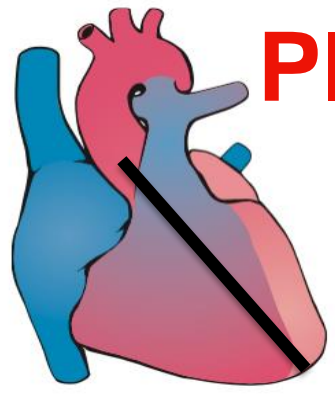
Moderator band in right ventricular apex

Abuhamad, Chaoui: A Practical Guide To Fetal Echocardiography (3), 2012

Plane 7 anomalies excluded

4 chamber view

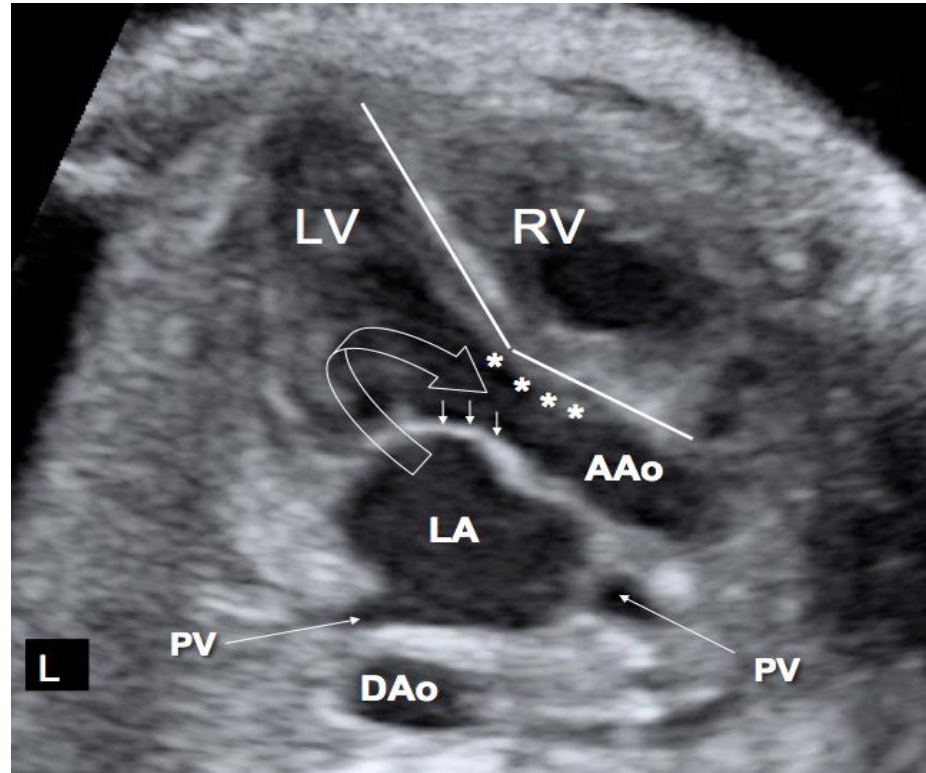
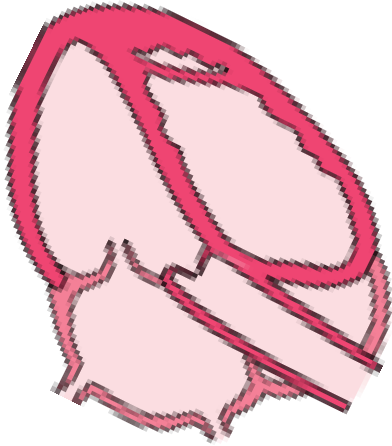
- Situs abnormality
- Ectopia cordis
- Univentricular heart
- Atrioventricular defect (AVSD)
- Pericardial effusion > 4mm



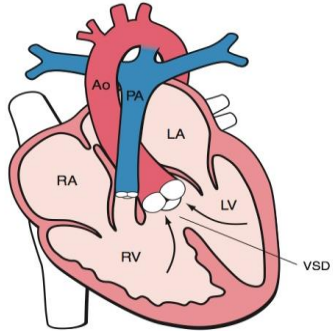
Plane 8 - Left ventricular outflow



Left ventricular outflow

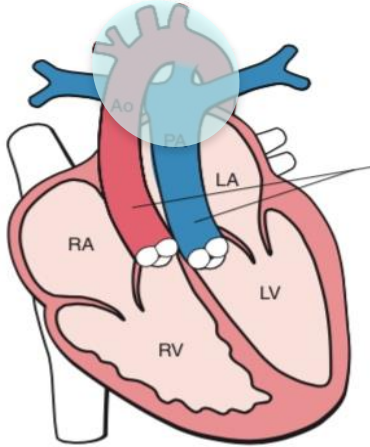


Left ventricular outflow



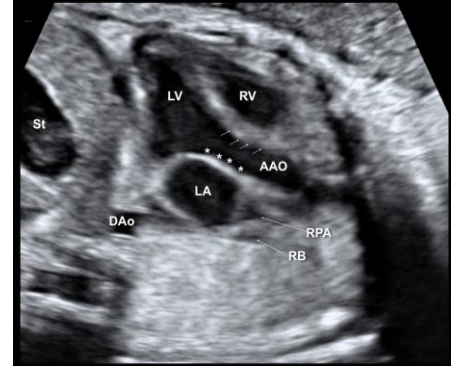
Left ventricular outflow

Transposition of
the great arteries
(TGA)



Left ventricular outflow

- Mitral - aortic continuity
- Aorta completely within left ventricle
- Angle of ascending aorta with ventricular septum, & towards right shoulder
- Aorta does not divide
- Close observation of aortic valve



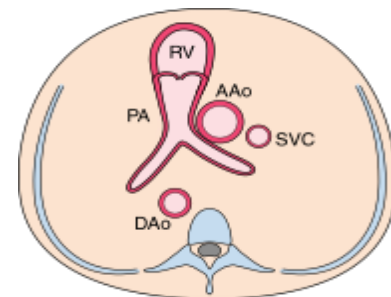
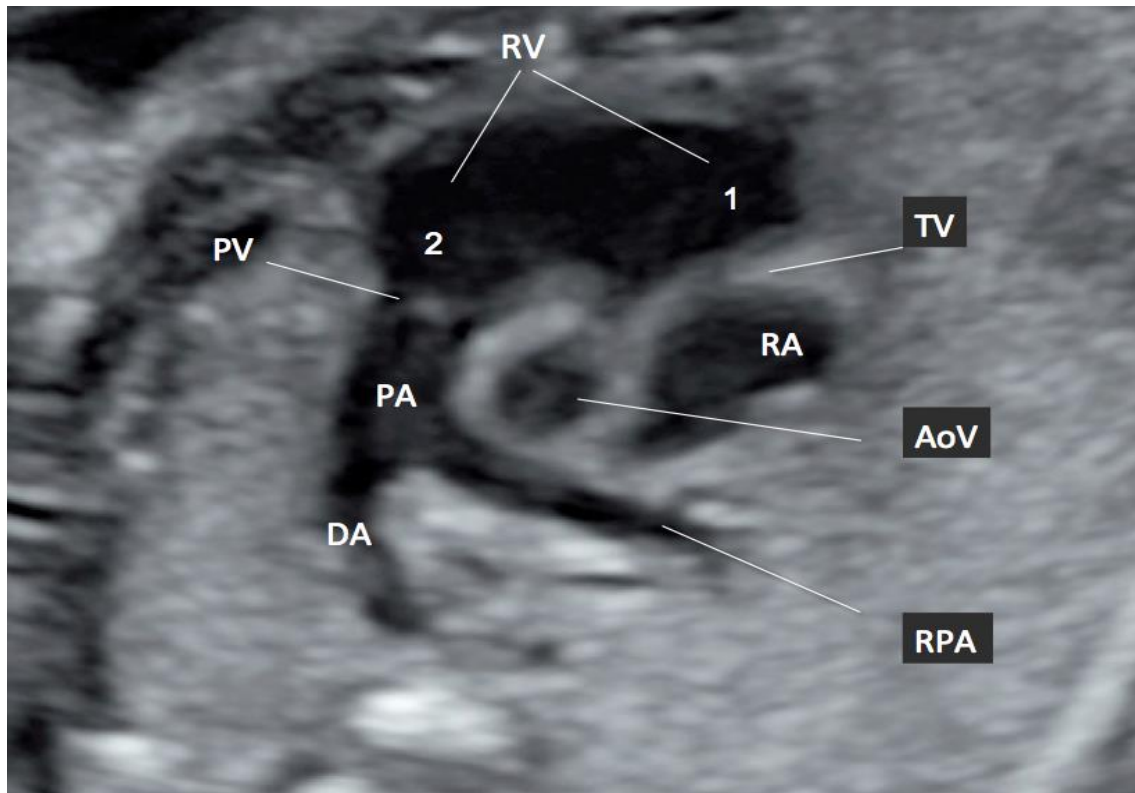
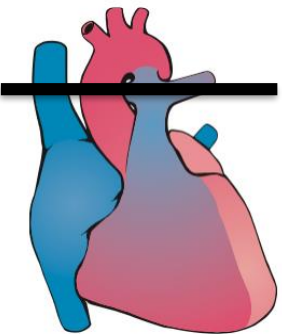
Plane 8 (LVOT) anomalies excluded

Left Ventricular Outflow Tract

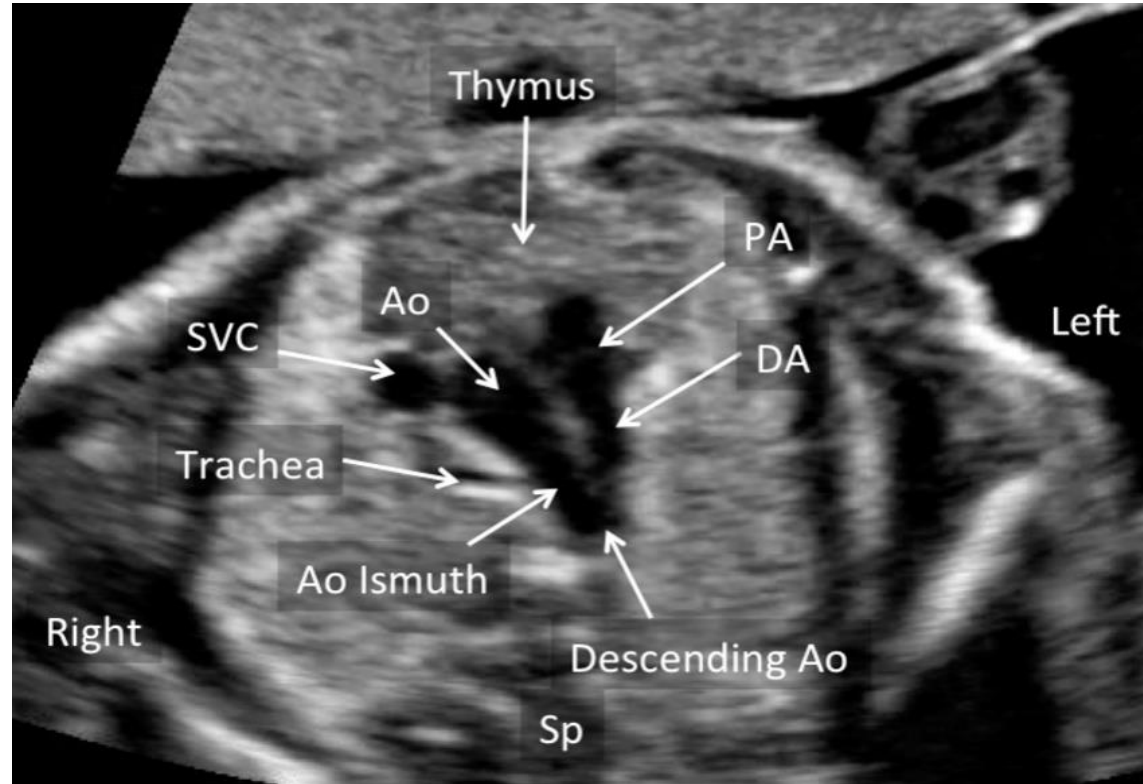
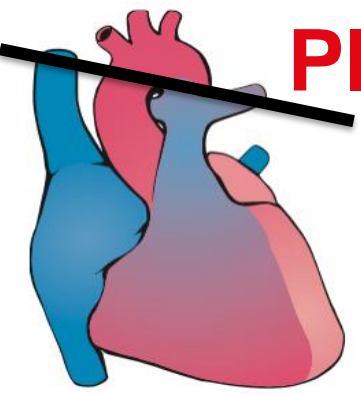
- Overriding aorta
- TGA



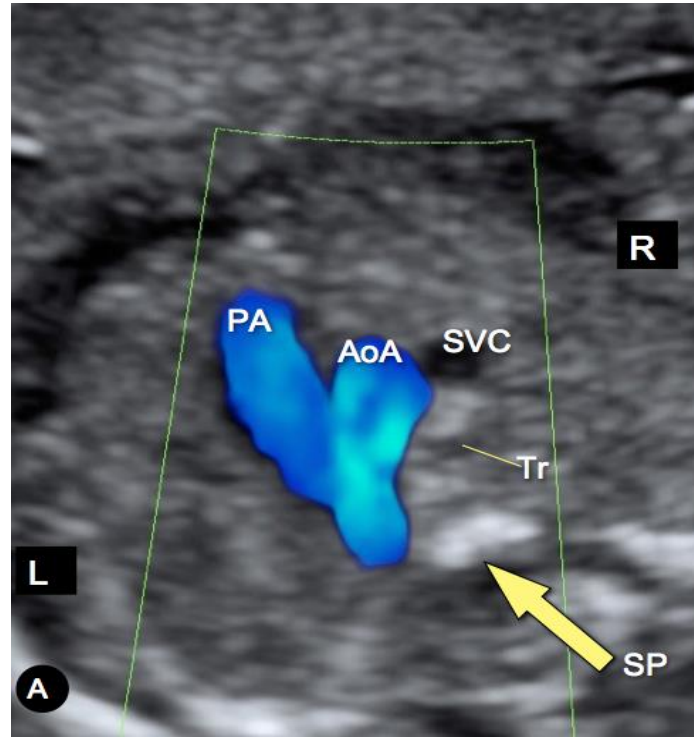
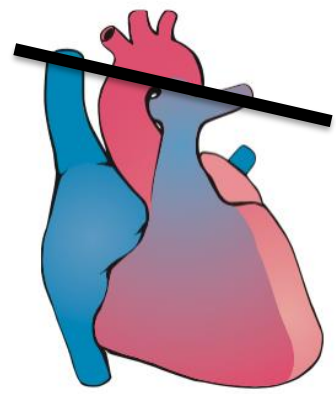
Plane 9 (RVOT) - Right ventricular outflow



Plane 10 (3VT) – Three vessel trachea

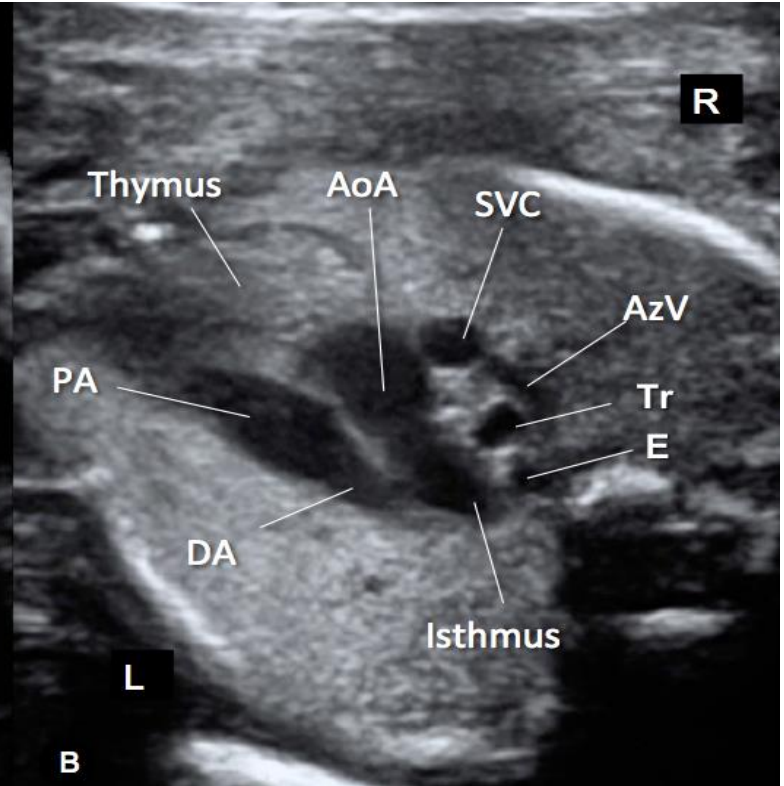
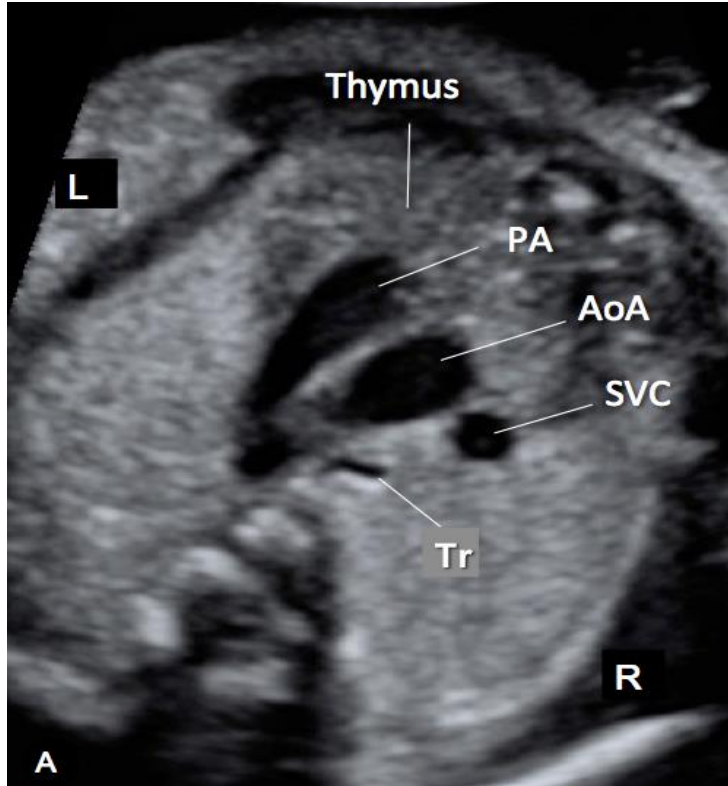
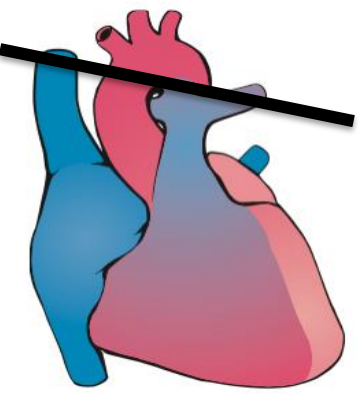


Three vessel trachea



Blood flows towards the spine

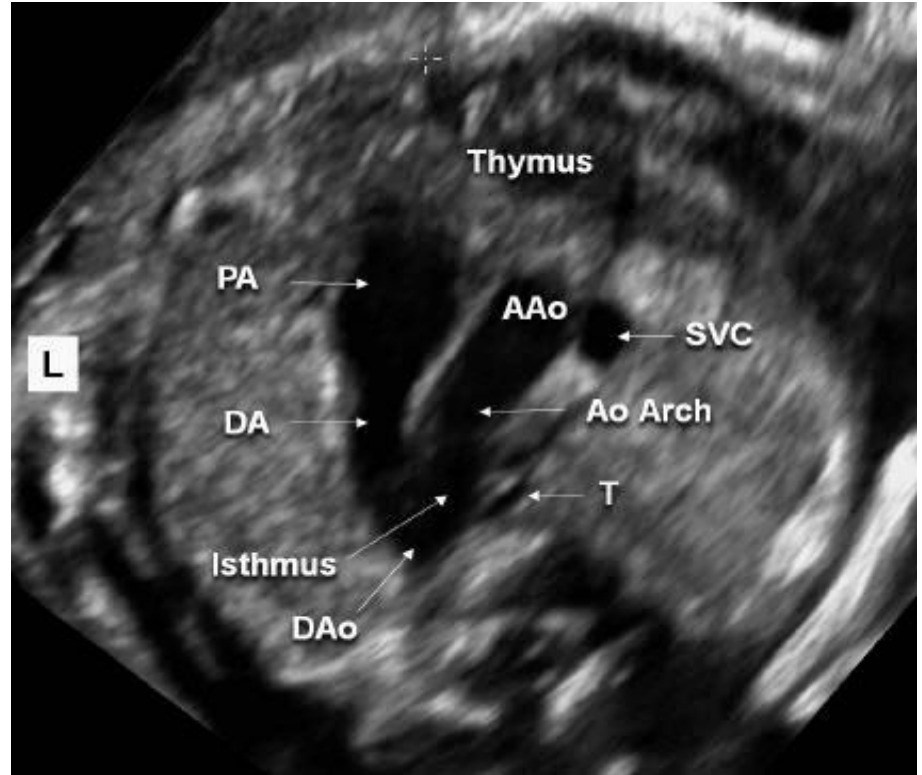
Three vessel trachea

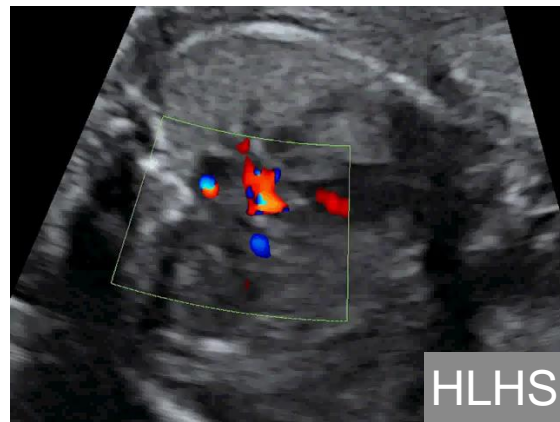
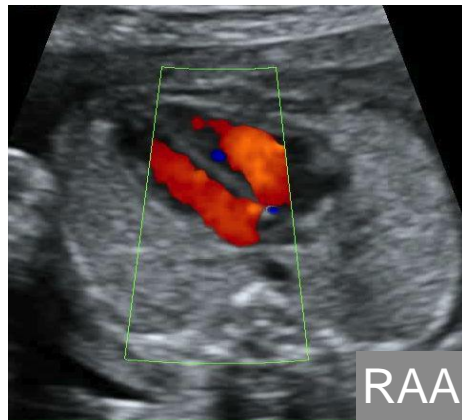


Three vessel trachea – detectable anomalies

3 vessel trachea view

- Severe aortic stenosis (AS)
- Severe pulmonary stenosis (PS)
- Transposition of the great arteries (TGA)
- Truncus
- Hypoplastic left heart syndrome (HLHS)
- Right aortic arch (RAA)
- Interrupted aortic arch (IAA)
- Tetralogy of Fallot (TOF)





Key points



- Normal situs
- Normal axis
- Ventricles equal in size & contractility



- LVOT to right shoulder
- LVOT does not divide
- Aortic valve normal action



- PA anterior to aorta
- PA & Ao similar size
- pulmonary valve normal action



- 3 vessels seen
- PA & Ao similar size
- DA & Ao Arch to left of trachea



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