

The Basic Cardiac Exam



Mary T. Donofrio, MD, FAAP, FACC, FASE
 Associate Professor of Pediatrics
 Director of the Fetal Heart Program and Complex Delivery Service
 Children's National Medical Center

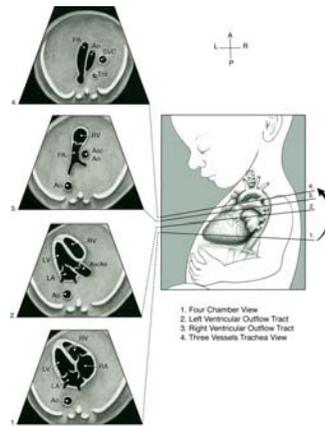


Basic Fetal Echocardiogram

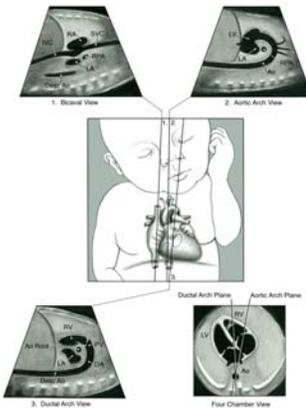
- ♥ Goal
 - Diagnose congenital heart disease
- ♥ General Recommendations:
 - Study performed (usually) between 18-22 weeks
 - Segmental approach to cardiac assessment
 - Still frame imaging of structures using standard views
 - » Measurement of valves, chamber lengths
 - Real-time imaging with video clips
 - Doppler assessment of valves, vessels, and shunts
 - Heart rate and rhythm assessment
 - Heart function assessment

Segmental Approach

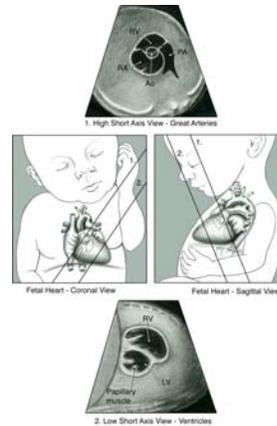
- ♥ Segments- defined anatomically, not spatially
 - **Atria and visceral situs**
 - Atrial anatomy, foramen ovale
 - Venous connections
 - **AV Junction (anatomy and valve function)**
 - **Ventricles**
 - Ventricular morphology (right vs. left), position, and connections to atria
 - Relative and absolute size
 - Ventricular septum
 - Function
 - **Ventriculoarterial Junction (anatomy and valve function)**
 - **Great arteries including the aorta, PAs, ductus arteriosus**
 - Position, connections to ventricles
 - Vessel size, patency, and flow (both velocity and direction)



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Fetal Echo: Measurements

- ♥ Pulmonary and aortic diameters at the valve annulus (systole)
 - $PV > AoV$
- ♥ Tricuspid and mitral valve diameters (diastole)
 - $TV > MV$
- ♥ Right and left ventricular length
 - $RV = LV$
- ♥ Additional
 - Aortic arch and isthmus diameter measurements
 - End-diastolic ventricular diameter just inferior to the AV valve
 - Thickness of the ventricular free-wall and interventricular septum just inferior to the AV valves
 - Systolic dimensions of the ventricles
 - Transverse dimensions of the atria
 - Diameter of branch pulmonary arteries

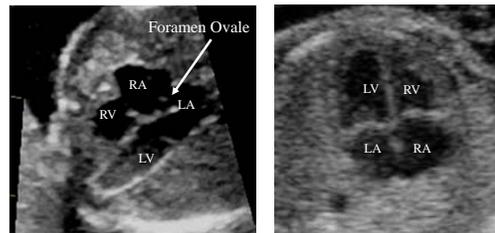
Fetal Echo: Color and Pulsed Doppler

- ♥ Valves
 - Atrioventricular valves
 - Aortic and pulmonary valves
- ♥ Veins
 - Systemic veins: superior and inferior vena cava
 - Ductus venosus
 - Pulmonary veins
- ♥ Arteries
 - Aorta
 - Pulmonary
 - Ductus arteriosus
- ♥ Septae
 - Ventricular
 - Foramen ovale

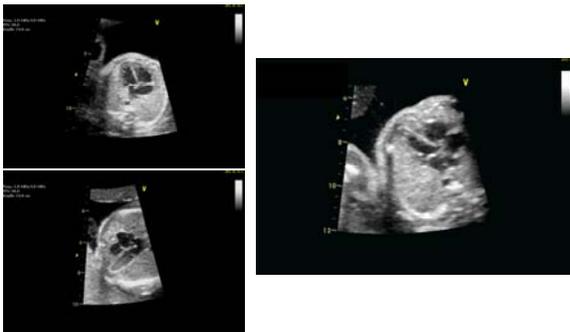
Left/Right Orientation and Situs



Fetal Echocardiogram: 4 Chamber View



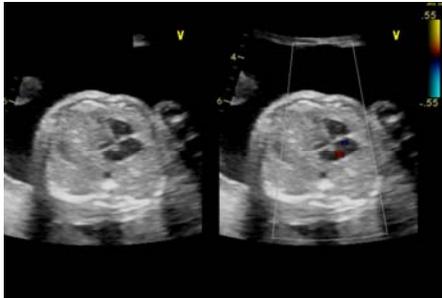
Fetal Echocardiogram: 4 Chambered View



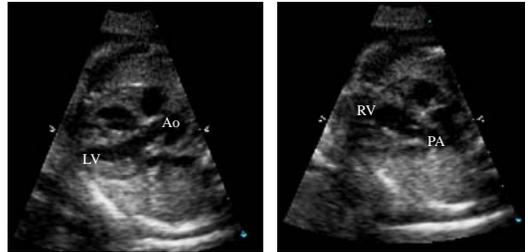
Fetal Echocardiogram: 4 Chambered View with Color



Fetal Echocardiogram:
4 Chambered Sweep with Outflows



Fetal Echocardiogram:
Long Axis with Outflow Tracts



Fetal Echocardiogram:
Long Axis with Outflow Tracts

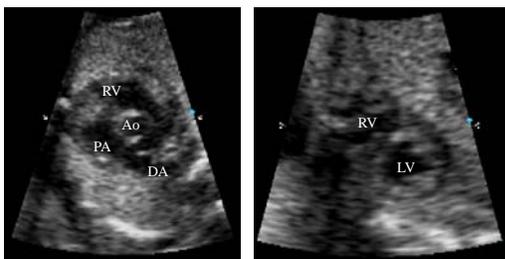


Remember:
"Normal crossing outflow tracts"
is a screening tool

Fetal Echocardiogram:
3 Vessel View with Trachea



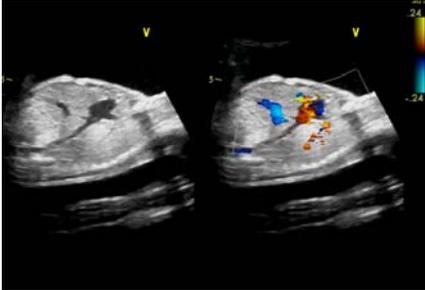
Fetal Echocardiogram:
Short Axis



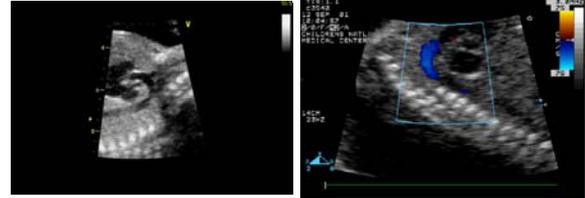
Fetal Echocardiogram:
Short Axis



Fetal Echocardiogram: SVC and IVC

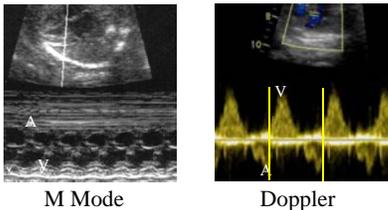


Fetal Echocardiogram: The Arches



Remember:
"Candy cane and hockey stick" is a
screening tool

Fetal Echocardiogram: Rate and Rhythm



M Mode

Doppler

The Fetal Cardiac Exam..... More Advanced

- ♥ Goal
 - What is the exact cardiac defect?
 - Comprehensive assessment with attention to key details to enable accurate and complete up to date counseling and determine postnatal plan of care
- ♥ CHD categories
 - Lesions that can be repaired
 - Lesions that require palliation
 - Lesions that cannot be repaired
 - Lesions that result in distress in-utero
 - Lesions that result in distress in the delivery room

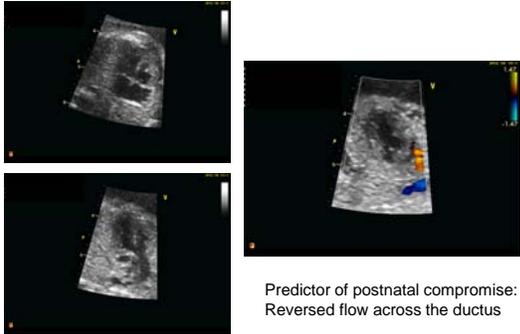
Prediction of Postnatal Physiology

- ♥ Physiology
 - Normal? Transposition? Obstructed flow? Single ventricle?
 - Heart function? Rhythm?
 - In-utero predictors of postnatal physiology
 - Ductus- Reversed flow suggests ductal dependent pulmonary flow
 - Foramen ovale/aortic arch- Reversed flow suggests ductal dependent systemic flow
- ♥ Specialized delivery room transitional care
 - Prostaglandin?
 - Support of cardiac output?
 - Treatment of pulmonary hypertension?
 - Rhythm management?
 - Immediate intervention? Catheter vs. surgical

Case Studies

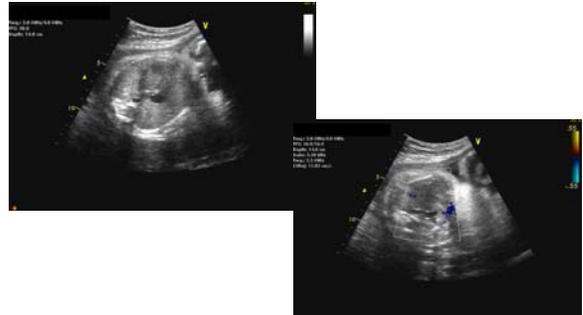
- ♥ Tetralogy of Fallot
- ♥ Transposition of the great arteries
- ♥ Hypoplastic left heart syndrome
- ♥ Heterotaxy with complex single ventricle

Tetralogy of Fallot

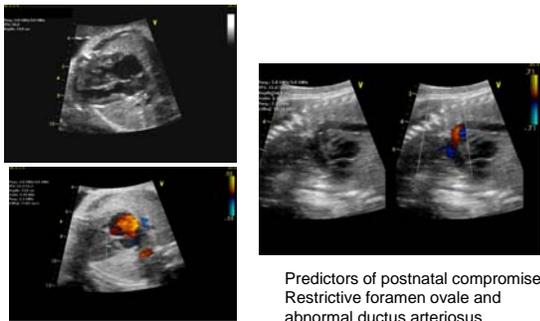


Predictor of postnatal compromise:
Reversed flow across the ductus

Transposition of the Great Arteries



Transposition of the Great Arteries

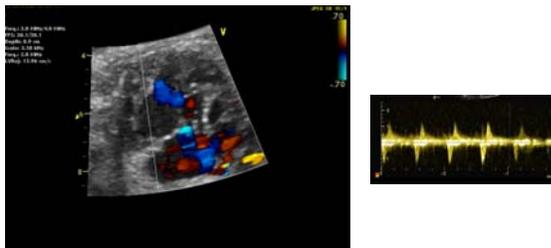


Predictors of postnatal compromise:
Restrictive foramen ovale and
abnormal ductus arteriosus

Hypoplastic Left Heart Syndrome



Hypoplastic Left Heart Syndrome

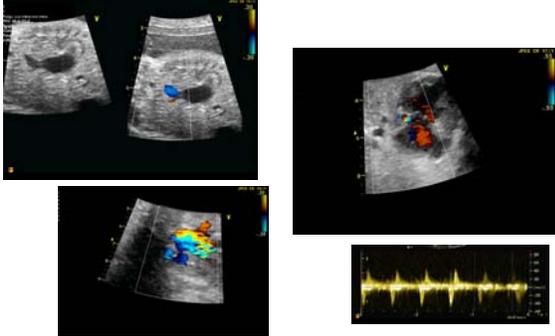


Predictor of postnatal compromise:
Restrictive foramen ovale and
abnormal pulmonary vein flow

Heterotaxy: Complex Single Ventricle



Heterotaxy: Complex Single Ventricle



Heterotaxy: Complex Single Ventricle

- ♥ Levocardia, rightward stomach
- ♥ Double outlet RV with ventricular inversion and small RV {A, L, L}
- ♥ Unbalanced AV canal to the LV with common atrium and large VSD
- ♥ Aortic atresia with hypoplastic aortic arch
- ♥ Normal SVC with interrupted IVC and azygous continuation to SVC
- ♥ Intact atrial septum
- ♥ Normal pulmonary venous drainage into LA
- ♥ Obstructed pulmonary venous return with small LA decompressing vein

Summary

- ♥ Basic cardiac exam
 - Diagnose CHD
 - 2D and color/Doppler examination
 - Measure valves
 - Assess rhythm function
 - Video clips
- ♥ Extended cardiac exam
 - Confirm CHD
 - Add information regarding
 - Severity
 - Management
 - Outcome