COMPREHENSIVE EVALUATION OF FETAL HEART

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Disclosure

- No Relevant Financial Relationships with Commercial Interests
Fetal Echo: How to do it?

- **Timing of Study**
  - optimally between 22-24 weeks
  - earliest 4 chamber view: 14-15 weeks
  - transvaginal: 12-14 weeks
  - beyond 32-34 weeks—ratio of amniotic fluid to fetal size decreases, limiting the acoustic window, hence image quality may worsen
Segmental Analysis of the Fetal Cardiovascular System

- Viscero-atrial situs
- Systemic veins
- Pulmonary veins
- Atria
- Atrioventricular connections
- Ventricles
- Outflow tracts
- Great vessels
- Ductal and aortic arches
Published Guidelines For The Performance of Fetal Echocardiogram

- 2004- American society of Echocardiogram (ASE)
- 2008- International Society of ultrasound in obstetrics and gynecology (ISVOG)
- 2010- American institute of Ultrasound in Medicine (AIUM) in conjunction with American college of obstetrics and Gynecology (ACOG), the society of Maternal fetal Medicine (SMFM) and American college of Radiology.
2-Dimensional Imaging

- Cardiac size; Cardiothoracic ratio
- Cardiac axis (levocardia, dextrocardia)
- Cardiac position (dextroposition, levoposition)
- Visceral and atrial situs determination
- Systemic venous anatomy/connections
- Pulmonary venous anatomy/connections
- Qualitative atrial size and atrial septal morphology/localization of defect if present
2-Dimensional Imaging

- AV connections
- Tricuspid and mitral valve morphology and size
- Ventricular morphology, looping determination, size
- Ventricular septal morphology localization of defect if present ventricular-arterial connections
- Ventricular arterial connections
- Pulmonary and aortic valve morphology and size
2-Dimensional imaging

- Great artery relationship and size
- Aortic and ductal arch morphology
- 3 vessel and tracheal view
- Aortic/ductal relationship relative to the trachea
- Proximal right and left branch pulmonary arteries
- Assessment for pericardial or pleural effusions
2-Dimensional imaging

- Tricuspid and mitral annulus diameters
- Atrial dimensions
- Ventricular length and width
- Pulmonary and aortic valve annulus diameters
- Main pulmonary artery and ascending aorta diameters
- Ductus arteriosus diameter
- Aortic transverse arch diameter
- Branch pulmonary artery diameters
Color flow map imaging

- Tricuspid and mitral valves/ventricular inflow
- Pulmonary and aortic outflows/ventricular outflows
- Aortic arch/ductal arch
- Ventricular and atrial septal flow
- Superior and inferior vena cavae
- Pulmonary veins
- Ductus venosus
- Proximal branch pulmonary arteries
- Umbilical vein
- Umbilical artery
Rhythm assessment

- Heart rate
- A-V relationship/rhythm
- Mechanical PR (A-V) interval
- Description of A-V relation including arrhythmia onset/offset duration
Pulsed Doppler Interrogation

- Tricuspid and mitral inflows
- Pulmonary and aortic outflows
- Ductus venosus
- Pulmonary veins
- Umbilical vein and artery
- Aortic and ductal arches
- Superior/Inferior vena cavae
- Branch pulmonary arteries
- Middle Cerebral Doppler
Continuous-wave Doppler

- Valvar insufficiency (if present)
- Ventricular outflows (if pulse Doppler abnormal)
- Ductus arteriosus (If pulse Doppler abnormal)
Ventricular function parameters

- Exclusion of Hydrops
- Exclusion of cardiomegaly
- Qualitative assessment of ventricular contractility
- Systemic venous Doppler examination
- Pulmonary venous Doppler examination
- Ventricular Doppler inflow examination
- Right and left ventricular cardiac output
- Ventricular shortening fraction
- Isovolumic contraction and relaxation time
- Myocardial performance index
- Cardiovascular profile score
Fetal cardiac and abdominal situs
Fetal position & situs
Cardio thoracic ratios

C/T circumference ratio of 0.45 at 17 weeks and 0.5 at term.

C/T area ratio is constant 0.25-0.35
Fetal cardiac long and short axis
4 chamber view anatomy
Fetal echo 4 chamber view
Fetal Upper Abdomen
Five chamber view-specimen
Five chamber view Ultrasound

- Septal-aortic continuity
- Ventricular septum
- MV
- AAO
- Mitral-aortic continuity
Three vessel view
Three vessel view
Ductus Arteriosus view
Ductus Arteriosus view
Aortic arch transverse view
Aortic arch transverse view
Aortic and Ductal arches-specimen
Aortic and ductal arches
Summary of transverse views
Long axis views.....
Bicaval view
Aortic arch view
Ductus Arteriosus Arch
The arches..
LVOT long axis view
RVOT LONG AXIS VIEW
Fetal Doppler
Mitral and Tricuspid valve inflow
Pulmonary vein inflow Doppler
MPA and Aorta Dopplers
Ductus Venosus Doppler

VTI = 0.174 m
MnPG = 0.8 mmHg
TAMx = -0.440 m/s
Max = -0.553 m/s
Min = -0.192 m/s
PI = 0.82
RI = 0.65
Abnormal Ductus Venosus Doppler
Umbilical Cord Doppler
Abnormal Umbilical Artery Doppler