

Fetal Echocardiogram

Complete transabdominal fetal echocardiograms

Purpose:

To provide a standard for performing quality fetal echocardiograms.

General Guidelines:

- No fetal echocardiograms will be performed without an electronic order. The electronic order will contain the indication for the echocardiogram.
- All fetal echocardiograms will be captured digitally and stored in the Syngo Dynamics (Siemens Medical Solutions) digital imaging system.
- All initial and the majority of follow-up fetal echocardiograms at Seattle Children's Hospital are complete studies.
- A limited follow up study is generally only performed when the patient has recently undergone a complete fetal echocardiogram and there is no reason to suspect any changes outside the area of interest.
- Machine settings, transducer selection, and patient position will be adjusted as needed to optimize image acquisition, color and spectral Doppler.
- All fetal echocardiograms will contain the images and Doppler measurements listed under "Routine Fetal Echocardiogram" unless a focused, limited examination is requested. In addition, the sonographer will obtain any images and/or Doppler measurements pertinent to the particular pathology. If the sonographer is unable to obtain an image, the attempt will be documented.
- Three second digital clips will be obtained of each 2-D and color Doppler view. Still frame captures will be obtained of each 2-D measurement and spectral Doppler waveform.
- The zoom feature will be used when obtaining clips and still frame captures the majority of the time.

- Images will be obtained from standard on-axis imaging planes whenever possible, acknowledging fetal movement and position may limit planes of evaluation. Measurements will be obtained from standard views.

Patient Preparation:

- Patient charts, including referral indication and outside imaging reports, are available for physician and sonographer review.
- The sonographer and physician discuss the indication for referral prior to beginning the examination.
- The patient is escorted to the examination room.
- Patient identity is verified according to hospital procedure.
- The sonographer introduces herself to the patient.
- The procedure is explained to the patient.
- The patient is positioned in the supine position if tolerated.
- Towels are used to cover the patient's chest and lower abdomen during scanning.
- The reading/counseling physician is able to view the echocardiogram real time (video linkage) from the reading room.

Routine Fetal Echocardiogram:

1) Fetal position

1. Maternal transverse sweep (fundus to cervix) to determine fetal position and lie (breech, vertex or transverse)

2) Establish cardiac and abdominal situs

1. Position of the heart and stomach: (standard method: image the fetus in long axis with the head to the right of the screen, rotate the transducer 45° clockwise into a short axis view of the fetus, assess the location of the heart and the stomach)

3) Atria and interatrial septum

1. Qualitative assessment of atrial size
2. Assess the atrial septum from multiple imaging planes
3. Document the position of the foramenal flap
4. Use color Doppler to assess the direction of shunting across the atrial septum *and interrogate with spectral Doppler when applicable*

4) Ventricles

1. Determine morphology of ventricular chambers (4C view)
2. Qualitative assessment of ventricular size and function
3. Obtain a short axis sweep from the cardiac base (lvl of the aortic valve) to the apex
4. Measure the short axis diameter of both ventricles (2D)
5. Measure the LV and RV length at end-diastole (2D) from the 4C view
6. *Measure the ventricular wall thickness if indicated*

5) Atrioventricular valves

1. Measure the mitral and tricuspid valve annuli at end-diastole from the 4C view
2. Demonstrate atrioventricular valve integrity by color and spectral Doppler
3. Obtain a short axis “en face” view of both atrioventricular valves

6) Interventricular septum

1. Image the interventricular septum from multiple imaging planes (4C and short axis at a minimum) utilizing 2D
2. Evaluate the interventricular septum utilizing color Doppler
3. *Use spectral Doppler when applicable*

7) Semilunar valves and great vessel orientation

1. Document great vessel relationship
2. Measure the semilunar valve annuli during systole (AV in the long axis and PV in the 3 vessel view)
3. Demonstrate semilunar valve integrity by color and spectral Doppler

8) Aortic and ductal arches and branch pulmonary arteries

1. Obtain a long axis “candy cane” view of the aortic arch by 2D. Measure the ascending aorta, transverse arch, and aortic isthmus
2. Assess the aortic arch with color and spectral Doppler
3. Obtain a long axis view of the ductal arch
4. Assess the ductus arteriosus with color Doppler and spectral Doppler
5. Establish continuity of the branch pulmonary arteries and measure the main and branch pulmonary artery diameter

9) Systemic and pulmonary venous return

1. Obtain a bicaval view of the systemic venous return
2. Interrogate the systemic veins with color *and spectral Doppler if indicated*
3. Document at least one right pulmonary vein and one left pulmonary vein by 2D and color Doppler, *utilize spectral Doppler if indicated*
4. Obtain the "3 vessel view" to evaluate for the presence of a L-SVC

10) Heart rate and rhythm

1. Measure heart rate by using the spectral Doppler signal from one of the semilunar valves (aortic valve is preferred)
2. Establish heart rhythm utilizing a single spectral Doppler of mitral inflow / aortic outflow
3. *If an arrhythmia exists, document with multiple clips. Utilize both spectral Doppler and m-mode.*
4. *Obtain a mechanical P-R when applicable*

11) Fetal well-being

1. Obtain a short axis of the umbilical cord and determine the number of umbilical arteries
2. Obtain spectral Doppler of an umbilical artery and the umbilical vein
3. Obtain spectral Doppler of the ductus venosus
4. Obtain spectral Doppler of the middle cerebral artery
5. Obtain images of the thoracic space, abdomen, and skin and evaluate for extracardiac fluid or edema

12) Use of fetal z-scores

1. Place all 2D measurements into the table in the report which will calculate the corresponding z-score

13) Fetal growth

1. Obtain biparietal diameter and head circumference
2. Obtain femur length
3. Obtain abdominal circumference
4. Obtain the cardiac and thoracic area and calculate the cardio-thoracic ratio