	OB >14 Weeks (including BPP, growth, etc)		
	Reviewed:	Date: 1/4/2022	
	Revised:	Date: 1/4/2022	

PURPOSE

Practice parameter for the performance of diagnostic ultrasound for obstetrics in the second and third trimester.

SUPPORTIVE DATA

- Obtain a written, verbal, or electronic order from provider
- Verify that written orders are scanned into Epic
- Previous relevant imaging procedures

INDICATIONS

Indication for an obstetrics screening ultrasound examination include but are not limited to:

- Screening for fetal anomalies
- Evaluation of fetal anatomy
- Estimation of gestational age
- Evaluation of fetal growth
- Evaluation of vaginal bleeding
- Evaluation of abdominal or pelvic pain
- Evaluation of cervical insufficiency
- Determination of fetal presentation
- Evaluation of suspected multiple gestation
- Evaluation of significant discrepancy between uterine size and clinical dates
- Evaluation of pelvic mass
- Evaluation of suspected hydatidiform mole
- Suspected ectopic pregnancy
- Suspected fetal death
- Suspected uterine abnormality
- Evaluation of fetal well-being
- Suspected amniotic fluid abnormalities
- Suspected placental abruption
- Evaluation of premature rupture of membranes and/or premature labor

- Evaluation of abnormal biochemical markers
- Follow-up evaluation of a fetal anomaly
- Follow-up evaluation of placental location for suspected placenta previa
- History of previous congenital anomaly
- Evaluation of fetal condition in late registrants for prenatal care
- Assessing for findings that may increase the risk for aneuploidy

CONTRAINDICATIONS

- There are no absolute contraindications.

EQUIPMENT LIST

- Real-time ultrasound scanner with transducer of appropriate frequency
 - **Transducers:** 4C2 or 6C2 curved probes for all OB exams, exception for extremely obese patients in which 4V1 is an appropriate selection.
- Gel
- Towels
- Patient gown (if applicable)

SAFETY

- Universal precautions for bodily fluids should be observed as per hospital protocol.
- All ultrasound carts are annually checked and are up to date with all state and manufacturer guidelines.
- Exams will be prioritized according to ordering status (STAT, ASAP or Routine)

PATIENT PREPARATION

- Patient should drink 16-20oz of water prior to exam time. Having a partially full bladder helps get a more accurate cervical measurement.

PROCEDURE

1. Check provider's orders for reason for exam and any comments.
2. Review report of patient's most recent ultrasound, relevant imaging or relevant labs if applicable.
3. Start exam in Epic
4. Verify patient by 2 patient identifiers (name, DOB, wristband).
5. Review questionnaire asking if the patients wishes to know the gender.
6. Process should be explained to patient.
7. Have patient change into gown if appropriate
8. Perform imaging procedure

9. If possible and wanted by the patient, reveal the gender
10. Once the exam is completed with appropriate views, we allow additional family to come in the ultrasound room, this should be the last 5-10 minutes of the exam. At this time, the sonographer should indicate that recording is allowed but only of the ultrasound viewing monitor.
11. Provide patients with 5-8 pictures to take home with them to keep as mementos.
 - Pictures to give the parents:
 - Face
 - Profile
 - Hand / Arm
 - Feet
 - Gender
 - Nose/Lips
12. End exam in Epic

IMAGING PROCEDURE

A standard obstetrical exam in the second and third trimester includes an evaluation of the fetal presentation, amniotic fluid index, cardiac activity, placental position, fetal biometry and fetal number, plus an anatomic survey. The maternal cervix and adnexa should be examined as well.

- See limited protocol for specialized examinations
- See Standard Measurements section and Anatomic Survey Details sections for detailed instructions

Standard OB Complete Anatomy Required Images

Head

1. Midline falx
2. CSP
3. Cerebellum
4. Cisterna magna
5. Orbits
6. Lips/nose
7. Lateral ventricles

Chest

1. 4 chamber heart
2. RVOT
3. LVOT (must include Cine clips of all heart views)

Abdomen/Pelvis

1. Stomach
2. Cord insert
3. Umbilical arteries
4. Bladder
5. Kidneys
6. Gender if possible

Spine

1. Cervical
2. Thoracic
3. Lumbar
4. Sacral (sagittal and transverse of all sections)

Extremities

1. Upper and lower sections of both arms and legs

Diaphragm

Fetal Lie

Placenta

1. Location
2. Relation to internal os with measurement in cases of suspected previa
 - Placental cord insertion should be documented
 - Always transvaginal marginal or suspected previas

Additional Images

1. Document pathological findings with all appropriate additional views to include color doppler and/or pulsed wave doppler

Standard OB Complete Anatomy Required Measurements

Biometry

1. BPD
2. HC
3. AC
4. FL

Heart Rate

1. M-mode only (presence or absence)

Cervix

AFI

Lateral Ventricle

1. Atrial measurement

Cisterna Magna

Nuchal Fold

1. Do not measure after 24 weeks or before 18 weeks

Once all required images and measurements are obtained, sonographer is to complete corresponding obstetrical worksheet. Information regarding prior imaging relevant to procedure should be included on worksheet ie. Prior report with EDD. Without a prior report, we will use EFW derived on current exam biometric parameters, this date should never be changed.

Document anytime a patient is held, include the radiologist the reviewed the case. Document preliminary findings verbally discussed with patient's provider and/or support staff, include first/last name and the time.

US OB Limited

A limited OB ultrasound exam is performed to answer a specific clinical question. The following indications are appropriate for an OB Limited exam

1. AFI
2. Cervical Length (if precise cervical length measurement is requested, a transvaginal measurement of the cervix should be performed)
3. Fetal Presentation
4. FHR
5. Placenta location for c-section planning or abruption

US OB Follow Up / OB Growth

An OB Follow Up / OB Growth is appropriate when:

- When anatomical survey can't be performed on a 14-18 week fetus
- Patients who require serial ultrasounds that have already had a complete anatomy ultrasound, with the need to reassess fetal size needed for clinical management
- Reevaluation of any fetal organ system abnormality noted on a previous ultrasound

A standard OB Follow Up / OB Growth should include:

1. AFI
2. Cervical length
3. Fetal Presentation
4. FHR
5. Placenta (location for c-section planning, abruption)
6. Growth parameters

BPD

HC

AC

FL

AND/OR (could be both in certain circumstances)

1. Reevaluation of fetal organ system abnormality

US Biophysical Profile with Umbilical Doppler

A Biophysical Profile with Umbilical Doppler should include:

1. Fetal Presentation
2. Cervical Length <35 weeks
3. Placenta Sag & Trans

Document any previa, use transvag if needed

4. FHR
5. Fetal Stomach
6. Fetal Bladder
7. Fetal Kidneys
8. Diaphragm
9. AFI
10. S/D Ratio for Umbilical Cord Doppler (put in calc package)

**Observations Normal (score +2)
& Scoring:**

Abnormal (score 0)

Fetal Posture and Tone 1 episode of active extension and flexion of limb(s) or open and closing hand Absent flexion extension

Fetal Movement 3 discreet body/limb movements in 30 minutes Less than 3 episodes in 30 minutes

Qualitative AFI 1 pocket of fluid >2cm in vertical pocket No pocket in vertical access

Fetal Breathing 1 episode of >30 sec fetal breathing movement in a 30 minute period Absent breathing in 30 minute period

*Put scores in calc package

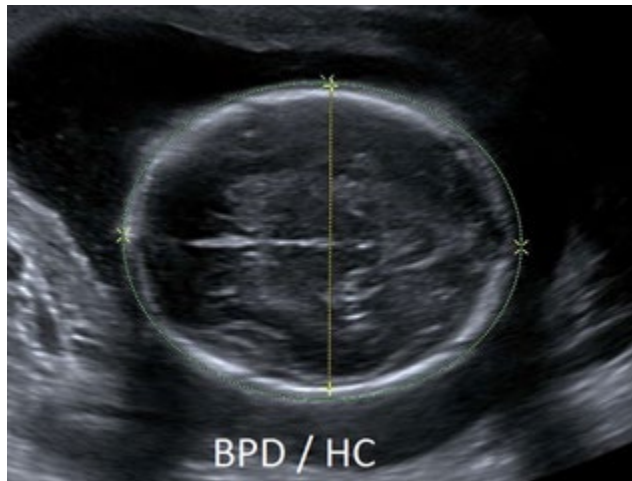
Standard Measurements

The pregnancy should not be redated after an accurate earlier scan has been performed and is available for comparison.

- **BPD:** Biparietal diameter is measured at the level of the thalami and cavum septi pellucidi or columns of the fornix. The cerebellar hemispheres should not be visible in this scanning plane. The measurement is taken from the outer edge of the proximal skull to the inner edge of the distal skull.

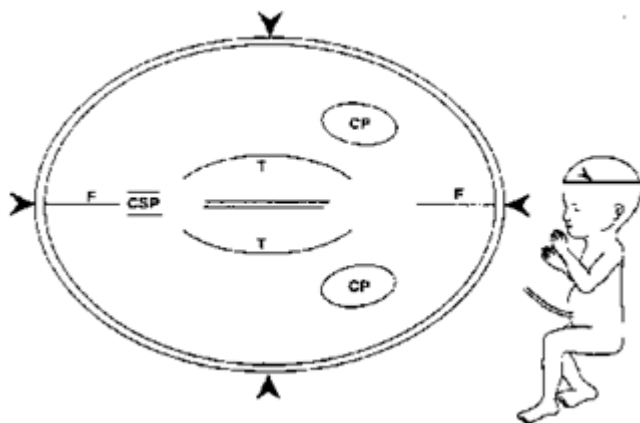
Head shape may be flattened (dolichocephaly) or rounded (brachycephaly) as a normal variant. Under these circumstances, certain variants of normal fetal head development may make measurement of the head circumference more reliable than biparietal diameter for estimating gestational (menstrual) age.

- **HC:** Head circumference is measured at the same level as the biparietal diameter, around the outer perimeter of the calvarium. This measurement is not affected by head shape.



Correct Placement of calipers head of 20 week

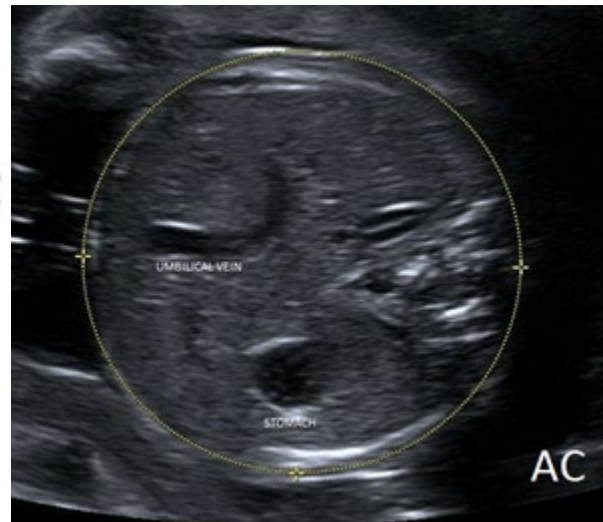
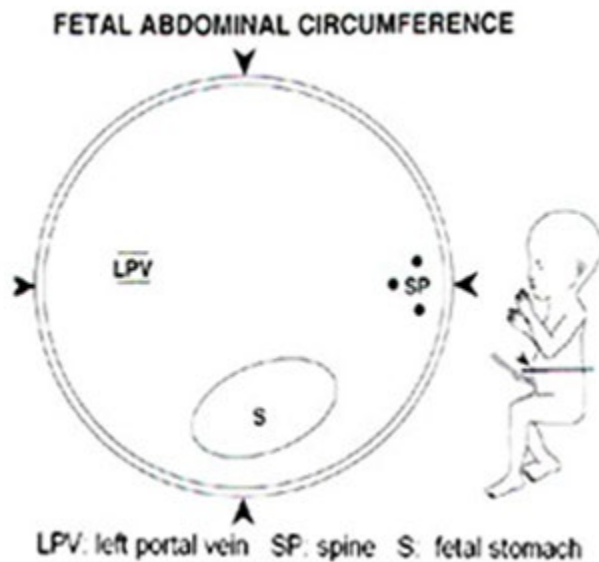
Fetal Head Measurements (BPD, HC)



fetus
BPD/AC measurements

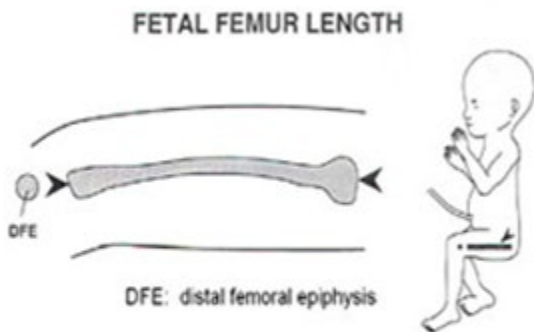
Correct level of fetal brain landmarks for

- **AC:** Abdominal circumference of average abdominal diameter should be determined at the skin line on a true transverse view at the level of the junction of the umbilical vein, portal sinus and fetal stomach when visible.
 - Abdominal circumference is used with other biometric parameters to estimate fetal weight and may allow detection of intrauterine growth restriction or macrosomia.



Appropriate scan plane for AC measurement

- **FL:** Femoral diaphysis length can be reliably used after 14 weeks' gestational age. The long axis of the femoral shaft is most accurately measured with the beam of insonation being perpendicular to the shaft, excluding the distal femoral epiphysis.
 - When femur length is <math><10^{\text{th}}</math> percentile, measure all long bones, ie. Humerus, tibia, fibula, take out of measurement package once complete



Source: Callen, Peter, "Ultrasonography in Obstetrics and Gynecology", 3rd edition, 1994, WB Saunders Company, Philadelphia.



Femur length measurement accurately excluding the distal epiphysis

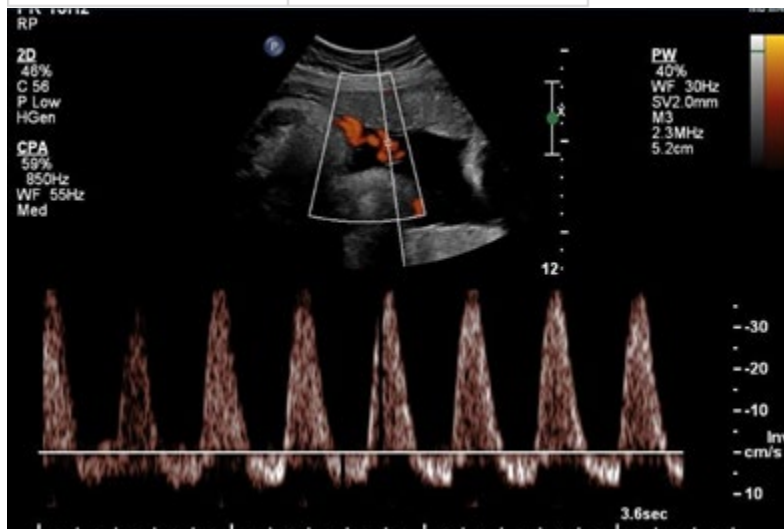
Fetal Weight Measurements

- Fetal weight is estimated by obtaining measurements BPD, HC, AC, and FL
- If previous studies have been performed, appropriateness of growth should be documented. Scans for growth evaluation can typically be performed at least 2-4 weeks apart. A shorter scan interval may result in confusion as to whether measurement changes

are truly due to growth as opposed to variations in the technique itself and is not recommended.

- Fetal weight should be estimated and compared with expected fetal weight for the fetus's gestational age. Currently, even the best fetal weight prediction methods can yield errors as high as +/- 15%. This variability can be influenced by factors such as the nature of the patient population, the number and types of anatomic parameters being measured, technical factors that affect the resolution of ultrasound images, and the weight range being studied.
 - Macrosomia is suspected when the EFW is in the 95th percentile
 - IUGR is suspected when the EFW is in the 5th percentile
- **Umbilical cord Doppler needs to be done for all suspected IUGR cases. Hold patient and call radiologist**
 - Three umbilical cord Doppler samples should be taken and documented. The cord Doppler is most accurate at the placental insertion site. This site is easiest to replicate. If unable to see the CI into the placenta, mid cord can be taken. The cord Doppler at the abdominal CI is the least accurate and should not be taken here. Samples taken at this site are more likely to have falsely elevated S/D ratios.

Gestational age	Abnormal S/D Ratio
< 28 Weeks	≥ 5
28-34 Weeks	≥ 4
> 34 Weeks	≥ 3.5



Abnormal umbilical cord Doppler.

Note the reverse flow in diastole. This is indicative of IUGR.

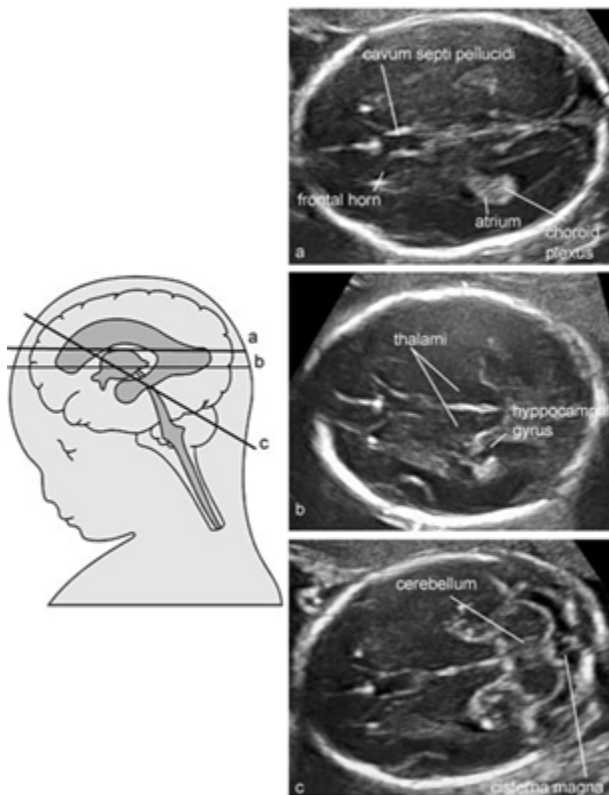
Anatomic Survey Details

Head, Face, and Neck

- Cerebellum

- Choroid plexus
- Cisterna magna
- Lateral cerebral ventricles
- Midline falx
- Cavum septum pellucidum
- Upper lip & nose
- Orbits
- Profile (include nasal bone)

Nuchal Fold measurement is not accurate after 24 weeks



The cerebellum and cisterna magna could be measured at the level of C on the diagram – The CM measurement should be taken at midline. The nuchal skin thickness can be measured in this plane as well.



Abnormal nuchal thickness measurement

The cerebellum and cisterna magna could be measured at the level of C on the diagram – The CM measurement should be taken at midline.

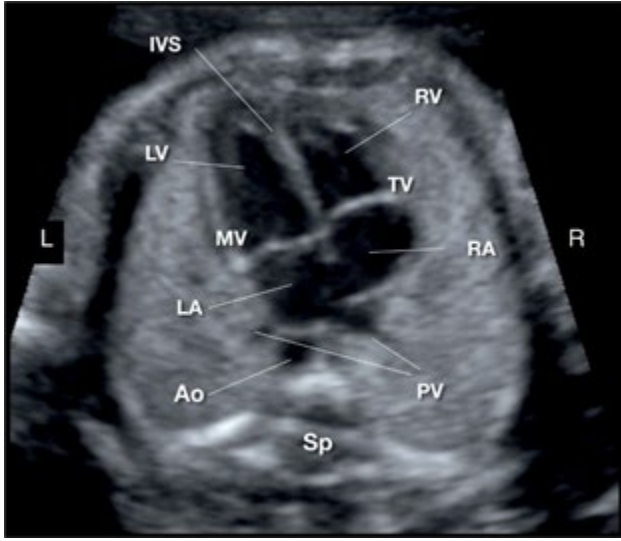
The nuchal skin thickness can be measured in this plane as well.

Chest

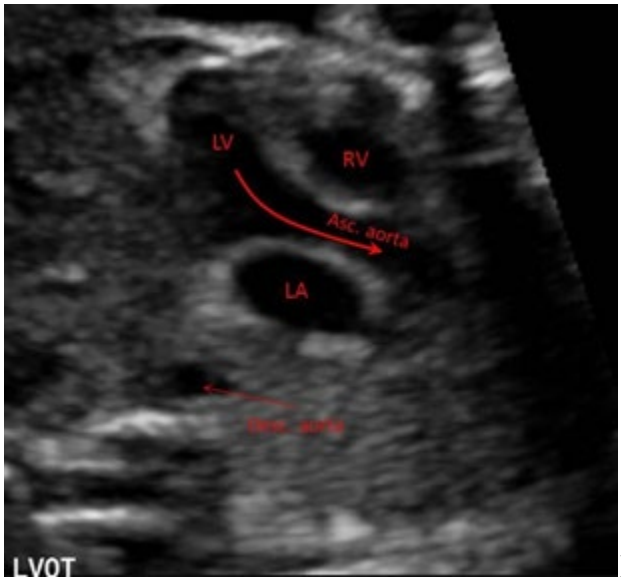
The chest should include evaluation of the heart and surround tissues. The heart should be assessed for situs and size. The basic four chamber heart view should include:

- Interventricular septum (IVS)
- Pulmonary Veins (PV)
- Left ventricle (LV)
- Right Ventricle (RV)
- Left Atrium (LA)
- Right Atrium (RA)
- Foramen ovale
- Mitral valve – left (MV)
- Tricuspid valve – right (TV)
- M-mode for heart rate
- Cine clip of 4 chamber
 - In addition to the 4 chamber view, outflow tract views as described below should be imaged.
 - RVOT (include pulmonary bifurcation)
 - LVOT

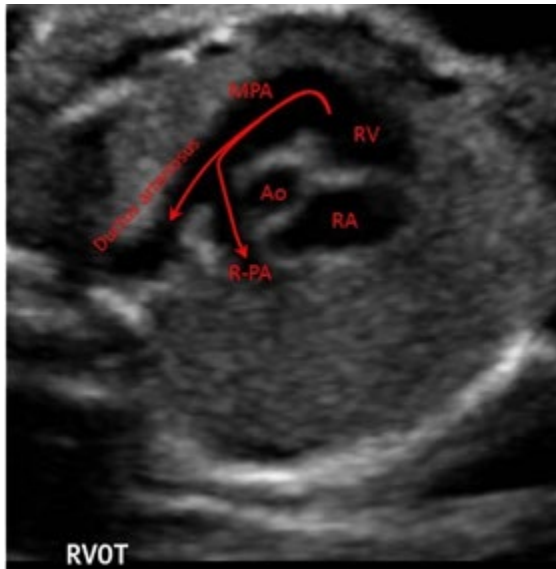
- Cine clip RVOT
- Cine clip LVOT



4 Chamber heart view



LVOT with ascending aorta



RVOT with pulmonary bifurcation: In this view, the right ventricle and pulmonary trunk should be in continuity and the aorta posterior to the right ventricle. This view can be achieved by adjusting the transducer beam while a good 4 chamber view is obtained, towards the right shoulder of the fetus.

Abdomen/Pelvis

- Stomach
- Kidneys measure all pyelectasis
 - Up to 4mm in normal until 32 weeks
 - Up to 7mm is normal after 32 weeks
- Bladder
 - Color over the bladder to document 3V cord
- Umbilical cord insertion site into fetal abdomen
- Umbilical cord vessel number
- Long image of the cord with color to show patency
- Spine
 - Cervical, thoracic, lumbar, and sacral spine must be imaged in longitudinal and transverse planes
- Extremities
 - Both the humerus, ulna and radius should be imaged on all exams – try to include hands
 - Both the femurs, the tibia, and fibulas should be imaged on all exams
 - The ankle image is the most important to show if clubbed feet are present
 - The bottoms of the feet view is helpful to prove or disprove a clubbed foot

- Gender
 - In multiple gestations and when medically indicated

PLACENTA

- Placenta cord insert
 - A velamentous (membranous) placental cord insertion that crosses the internal os of the cervix is vasa previa and should be documented
- Placenta
 - Placental location should be documented on all exams with both sagittal and transverse views. Sagittal images best demonstrate the relationship of the placenta to the internal os. This view is necessary to diagnosis placenta previa.
 - Low lying placenta – Less than 3cm
 - Marginal placenta – Less than 2cm
 - Partial – Covering part of internal os
 - Complete – Covering entire internal os
 - A full bladder or focal myometrial contraction can make the placenta appear closer to the internal cervical os than it actually is (particularly on a 2nd trimester scan). Postvoid images should always be obtained if previa is suspected.
 - When marginal, partial or complete previa is suspected, additional transperineal or transvaginal views should be obtained.

•AMNIOTIC FLUID INDEX

- AFI
 - Required on all 2nd and 3rd trimester exams. AFI measurement is achieved by taking a measurement in all 4 quadrants. DO NOT include fetal limbs or umbilical cord, use color box to make sure no cord is present.
 - Twin gestations use an overall 4 quadrant method AND single largest vertical pocket in each amniotic sac. (Mono-Mono only overall AFI required)
 - The normal range is 5-20cm. If under 5cm call the Radiologist and hold the patient.

MATERNAL ANATOMY

- Uterus
 - The presence and number of leiomyomata should be documented with measurements of the largest and/or any potentially clinically significant leiomyomata. The cul-de-sac should be evaluated for the presence or absence of fluid. Uterine anomalies should be documented.
- Adnexal structures
 - The presence, location, appearance, and size of adnexal masses should be documented

- Cervix
 - Cervical measurements should always be attempted. If the cervix cannot be visualized transabdominally, a transperineal or transvaginal scan is required. If the cervix measures less than 2.5cm hold the patient and call the Radiologist. After 35 weeks if cervix is not well seen, no additional imaging is required unless dictated by provider.
 - Document any cervical funneling, hold patient and call radiologist

Abnormal Findings

When to hold the patient

- Cervix under 2.5cm
- AFI under 5cm
- Fetal distress is present (no movement, etc)
- No heart rate
- Heart rate under 100bpm or over 180bpm
- Hydrops is present
- Abnormalities that will change the management of pregnancy
- Macrosomia >95th percentile
- IUGR <5th percentile

Abnormal measurements

- Macrosomia >95th percentile
- IUGR <5th percentile
- Renal pyelectasis over 4mm before 32 weeks and over 7mm after 32 weeks
- Cisterna magna over 1cm
- Nuchal fold >6mm
- Lateral ventricle measurement over 1cm
- AFI under 5cm or over 20cm
- Femur length <10th percentile, measure additional long bones. Not calculated with EFW.
- S/D ratio >5 for <28 weeks, S/D ratio >4 at 28-34weeks, >3.5 at >34 weeks

DOCUMENTATION

1. Written, verbal, or electronic order from provider
2. The worksheet and images need to be scanned into PACS under appropriate exam and put online.
3. Ultrasound images should be labeled with anatomy imaged and orientation (SAG or TRANS)

4. All images are submitted with above documentation for dictation and stored in PACS
5. For all STAT, ER and Urgent Care ultrasound exams, call radiologist for preliminary report to give to ordering provider
6. If it is between 2200 - 0700, submit exam along with proper documentation to teleradiology

REFERENCE

- Approved by Pharmacy and Therapeutics Board on 08/14/2020
- Approved by Medical Executive Team on 09/11/2020
- Approved by Medical Director, Dr. Muneer Desai, on 08/20/2020
- Approved by Radiology Protocol Committee on 3/9/2020
- [ACR Practice Parameters Resolution 27 \(2018\)](#)

References

Reference Type	Title	Notes
Documents referenced by this document		
Referenced Documents	ACR Practice Parameters Resolution 27 (2018)	