

## Anatomical Survey Standards Outline

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1. The anatomical survey- what is it and what are we evaluating?
  - Second trimester exam typically performed around 20 weeks gestation.
  - Exam will assess both maternal and fetal structures for anomalies
  - Fetal measurements will be recorded from a cephalic to caudal direction to see if the fetus is developing within “normal” parameters.
  - In addition to documenting growth we will document the location of the placenta within the maternal uterus
  - Assessment of amniotic fluid index to r/o polyhydramnios or oligohydramnios.
2. Maternal Assessment-Remember we always have at least two patients!
  - Complete a full survey of the cervix, checking for competency with transabdominal,transvaginal, or translabial approach.
  - Measure the cervix from internal to external cervical os
    1. **Cervix typically measures between 3-4cm**
    2. Cervix < 2.5cm may be incompetent
    3. Cervix > 5cm may hide cervical incompetence- check for distended bladder, may measure smaller after post void.
  - Notate any uterine anomalies-Septate,Sub-septate, Bicornuate etc.
  - Check implantation site of the placenta
    1. Document whether placenta is seen in the uterine fundus, is low lying, marginal previa, or complete previa
    2. If multiple gestations are present document the placental number
  - Note the fetal position within the uterus-is baby presenting breech, vertex, or transverse.
  - Evaluate both ovaries and the adnexa for abnormalities-corpora lutea should have long regressed at this point
1. Anatomy of the Fetal Head
  - Scan through entire fetal brain to check for abnormalities
    1. Survey the cerebellum, choroid plexus, cisterna magna, lateral ventricles, midline falx, cavum septum pellucidum, corpus callosum and thalamus.

2. Presence of essential structures can r/o conditions like hydrocephalus, dandy walker syndrome and agenesis of cranial anatomy.

1. Measurement of the Biparietal diameter

- Determinant of fetal age beginning at twelve weeks through the rest of the pregnancy
  1. Thought to be up to 95% accurate predicting gestational age within 10-14 days
- **Obtained in the transverse view at the level of the thalamus and cavum septum pellucidum**
- **Always taken from the outer calvarium to the inner calvarium**

1. Measurement of Fetal Head Circumference

- **Taken at the same level as the biparietal diameter**
  1. Should use the outer edge to calculate the circumference, which is accomplished by using the ellipse tool
- Calvarium should be smooth and symmetrical for most accurate measurements.

1. Anatomy of the Fetal Face

- Examination should include all aspects of the fetal face including orbits, nose, lips, soft palate, and chin.
  1. Visualization of abnormalities such as cleft lip/palate must be documented in addition to absence of important structures
  2. Orbits may be measured for both outer and inner orbital distance to r/o hypotelorism and hypertelorism.
  3. Facial movement should be observed including fetal eye movement

2. Anatomy of the Fetal Neck & Spine

- Many congenital anomalies involve the central nervous system directly. A thorough evaluation of the fetal neck & spine should be performed.
  1. Neural tube defects are anomalies that commonly occur within the brain & spinal cord—these include Spina Bifida and Anencephaly.
- Anomalies detected in the neck could determine the form of delivery for the expectant mother.

- Fetal neck should be carefully scanned looking wrapping of the umbilical cord.
  1. Normal to see cord around the neck once, anything greater may be a cause for concern.
    - ❖ Use color doppler as a way to see how many times the cord may be wrapped.
- The spine should be imaged in the coronal, sagittal, and transverse scan planes to properly view the vertebrae for defects along the cord.

### 3. Anatomy of the Fetal Chest

- Complete survey of the fetal chest should verify presence of all organs within the chest cavity.
  1. Sonographer should note the bilateral fetal lungs, the diaphragm to assess for breathing, and the fetal heart for cardiac activity.
  2. Heart should be positioned 45° to the left & occupy 1/3 of the chest cavity.
  3. **Exams should include a 4 chamber view, LVOT, & RVOT.**
    - ❖ Visualization of both atria, ventricles, valves, and septums
  4. **Use M-mode to document cardiac activity**
    - ❖ Normal Heart rate should be between 120-160 BPM

### 1. Anatomy of Fetal Upper Extremities

- Examine both sides of fetal extremities looking for symmetry & complete development of normal anatomy
- Measurements of fetal humerus are sometimes used as another source to calculate fetal age.

### 1. Anatomy of Fetal Abdomen

- Survey the abdomen in all three scan planes
  1. By early 2nd trimester most abdominal organs should be visualized sonographically. These include the liver, kidneys, adrenal glands, gallbladder, stomach and major blood vessels.
  2. Sometimes seen less frequently may be the fetal spleen and pancreas
  3. Stomach should be seen on the left side, inferior to the fetal heart

4. View the site of umbilical cord insertion into the fetal abdomen
  - ❖ Color doppler can be used to ensure a three vessel cord is present (2 Arteries, 1 Vein).

1. Measurement of Fetal Abdominal Circumference

- Measurement should be taken in a transverse plane
  1. To properly quantify the abdominal circumference the sonographer should place calipers only when specific sonographic landmarks are visible.
  2. **Above the level of umbilical insertion the union of the umbilical vein and portal vein should be seen.**
    - ❖ **The junction formed between the umbilical and portal vein seen within the fetal liver gives rise to the “J” or “Hockey Stick” sign. It is at this level measurements should be taken.**
  1. Measurements may be taken by using either the ellipse function or using 2 perpendicular diameters, side to side and Anterior to posterior.
- Abdominal circumference can be used for fetal age but is most important in determining fetal weight.
- **Calipers should be placed along the skin line-important not to underestimate this value.**

1. Determining Fetal Genitalia

- May not be a requirement on all protocols
- Can help narrow down gender specific anomalies
- **Three white lines indicates female labia**
- **“Turtle” sign represents male scrotum and penis**

2. Anatomy of Fetal Lower Extremities

- Sonographic scan of the lower extremities should include the fetal femur, tibia, fibula, and feet.
  1. All bony structures of the lower extremities should be bilateral and symmetrical.
  2. Tibia will be thicker and medial, while fibula is lateral

3. Carefully examine the feet to ensure the baby has all five toes, and document any abnormalities like club foot or polydactyly.

1. Measurements of Fetal Femur Length

- One of the most widely used parameters to estimate gestational age.
- Thought to be more accurate than using the Biparietal diameter measurements.
- **Includes the length of femoral diaphysis (shaft) and excluding the femoral head and distal epiphysis.**
  1. The femoral shaft should appear straight, even throughout, and symmetrical to contralateral femur.
  2. **Measurements are taken with calipers placed on the bones end from outer to outer.**
- Fetal femur should grow approximately 3mm per week during the second trimester.
  1. As the pregnancy continues the accuracy of this calculation decreases.
- Femoral length can vary depending on the weight, height, and ethnicity of the mother.

1. Quantifying Amniotic Fluid Index

- Amniotic fluid should appear anechoic but echogenic material called Vernix may be seen floating within it.
- Assessment of fluid index is meant to estimate the sum of AF contained within the amniotic sac.
  1. Begin by drawing an imaginary line down and across the maternal uterus, forming equal quadrants.
  2. **Measure the largest vertical pocket in each quadrant- not to include the umbilical cord or fetal body parts.**
  3. The sum of all quadrants will provide you with the Amniotic Fluid Index.
  4. **Normal AFI ranges from 8-24 cm**, with the lower end representing the third trimester.
    - ❖ **AFI < 5cm signals oligohydrannios, while an AFI <25cm could mean polyhydrannios.**

## 1. Survey of the Placenta

- Evaluation of placenta location should have been performed at the start of the exam.
- Locate the point of umbilical cord insertion into the placenta
  1. Umbilical cord may be placed centrally into the placenta
  2. Battledore insertion is near the edge of the placenta
  3. Velamentous insertion is within the chorioamniotic membrane
- Examine placental thickness
  1. **Placenta thickness should not measure < 5 cm at any point of the pregnancy.**
  2. Around 20 week mark placenta may be less than 2cm
- Placenta grading may be performed depending on your site
  1. **Placenta grading has a scale from 0-3**
  2. Grade 0 should be seen during 20 week anatomy scan
  3. Most full term pregnancies typically have grade 1 or 2 placentas