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OB Anatomy Ultrasound Protocol

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Last Reviewed: February 2019

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General

Cardiac activity: M-mode tracing for all; CINE of HR at discretion of technologist

- Note any abnormal heart rate or rhythm
- If HR <120, > 160 bpm: At least 2 separate M-mode tracings to confirm persistence
 - On worksheet, document both HR measures and average

Presentation:

- For multiple gestations, document chorionicity and amnionicity

Fluid:

- Subjective on all anatomy examinations: normal, high, low
- Semi-quantitative
 - Optional on routine anatomy
 - REQUIRED when:
 1. Detailed anatomy
 2. Subjectively *abnormal*
 - If oligohydramnios, include measurement of deepest pocket

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3. Anatomic abnormalities identified: especially, abdominal wall defect, kidney, bladder, stomach/intestines/esophagus, spinal cord or intracranial
4. Late anatomy/prenatal care, ≥ 24 weeks
5. AFI specifically requested

DETAILS on semi-quantitative:

- Singleton: Amniotic fluid index (AFI = calculated based on 4 quadrants)
- Multiples: Maximum/deepest vertical pocket (MVP/DVP) for each

Contact the radiologist for NEW oligohydramnios, defined as:

- AFI ≤ 5 cm (singleton)
- Single deepest vertical pocket ≤ 2 cm (singleton + multiples)

Placenta: location, appearance, relationship to internal os (still images acceptable unless abnormality detected or other at tech discretion)

→ Origin of cord *shown in 2 planes*, required on all studies.

→ Images should be in **greyscale and color**

- *Add CINE if abnormality detected* (unless only eccentric origin)
- Document cord origin for all cases as one of the following:
 - Normal = central
 - Abnormal/other:
 - Eccentric (but > 2 cm from the edge)
 - Marginal (≤ 2 cm from the edge)
 - Velamentous
 - Other (with description)

→ ***It is critical to document to presence or absence of previa on all OB US***

- Show *at least 1 still image of most inferiorly extending part of the placenta, with label*; include the internal os (if possible, depending on placental position)
- *Add CINE if abnormal*

→ Add TV if: suspect accreta, evaluating previa

→ Accepted verbiage:

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-Low-lying: 0-2 cm from internal os (note that “marginal” no longer used)

-Previa: covering internal os (does not matter how much)

**Add CINE through placenta in 2 planes IF:

- Abnormality is detected
- Clinical concern for abruption
- Technologist discretion

Umbilical cord: document number of vessels, placental origin and fetal insertion on all anatomy examination

→ 2 umbilical arteries around bladder is required for all cases, **shown with color**

→ Cross-sectional view of cord optional

→ Placental origin (2 planes, greyscale & color – details above)

→ Fetal insertion (greyscale required; color optional)

→ Ensure no other structures, such as fetal limbs, are obscuring the lateral margins of the insertion)

→ **When to do umbilical artery Doppler at time of anatomy examination:**

1. Requested
2. Late survey (≥ 24 weeks) + IUGR (sonographic estimated fetal weight $< 10\%$)
or worrisome change in weight
3. New oligohydramnios
4. Optional: Cord abnormality – discuss with radiologist prior to performing

See end of document for S/D Ratio Reference Ranges

→ What to provide: **4 total** spectral tracings = **2 of each umbilical artery**

-Each umbilical artery should be sampled at **both fetal insertion and placental origin**

-NOTE: If unable to get adequate tracings for both umbilical arteries or there is a 2-vessel cord, provide additional 3rd spectral tracing of the one that is visible

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- Additional tracings can be acquired as necessary
- Range of S/D ratios (*not average*)
- Comment on absent or reversed diastolic flow

Cervix: document length if possible

→ Provide image with and without color

→ *If appears shortened* (specifically, 16-28 weeks: <30 mm) or abnormal on routine TA: Empty bladder and do TV (see end of document for best technique)

- If TV contraindicated or declined: translabial/transperineal imaging (with empty bladder) should be performed for accurate length
- If concerning findings at 28-32 weeks, discuss with radiologist regarding need for TV

****If ordered to specifically assess for cervical length in addition to anatomy or pre-term labor in addition to anatomy: required TV (with empty bladder) regardless of transabdominal length unless otherwise specified****

EFW/Dating: measure HC, BPD, AC, FL (this should be an average of 2 to 3 measures for each)

→If there is a >10 day discrepancy between HC and BPD, measure occipital-frontal distance (OFD)

--> This will allow the *radiologist* to calculate “corrected BPD”

[For your information: $\text{Corrected BPD} = \text{square root of } (\text{BPD} \times \text{OFD} / 1.265)]$

Anatomy: Routine vs. Detailed

ROUTINE:

REQUIRED CINES:

- Nose/lips
- Heart (see below for details)

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-Spine (transverse)

-Intracranial structures (transverse to include CSP, choroids and posterior fossa)

Head: shape

Intracranial structures:

-Lateral ventricles (measure but not provided in report)

-Choroid plexus

-Midline falx

-Cavum septum pellucidum

-Cerebellum (measure but not provided in report)

-Cisterna magna (measure but not provided in report)

-CINE required: transverse → MUST include CSP, choroids and posterior fossa

Face:

-Profile: ensure nasal bone (with overlying skin) + chin are clearly seen

-Nose/upper lip: CINE

-Orbit/lens

Neck: show

-Measure nuchal fold on views of the posterior fossa (but not provided in report) up to 24 weeks

Chest: Document diaphragm in at least 2 images

Heart:

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1. 4-chamber view: Perpendicular to the interventricular septum to show it to be intact
2. LVOT: show wall of LVOT in line with IV septum
3. RVOT: transverse view (showing pulmonary artery bifurcation)

→ NECESSARY CINE for all: single **transverse** sweep through heart from diaphragm through great vessels

→ POSSIBLE CINE for some: if static images of 4-chamber and outflow tracts are good (clear, well-defined anatomy), then CINE of each (4-chamber, RVOT, LVOT) is NOT required. However, if statics are inadequate (or result in unclear images) for any of the structures, then CINE is recommended (just for what is not well seen on statics).

NOTE: This means, if there are good 4-chamber, RVOT and LVOT statics, only a SINGLE CINE is required per the protocol (i.e., transverse diaphragm to great vessel sweep).

Abdomen:

- Stomach (presence, situs)
- Intestines
- Cord insertion

Kidneys: measure renal pelvis if = > 4mm

- If kidneys are difficult to visualize, show renal arteries
- Do not need to show renal arteries if otherwise normal

Bladder: document 2 umbilical arteries around bladder with color

Spine: Osseous structures and overlying skin

- Sagittal: cervical/thoracic/lumbar/sacral spine
- Transverse: representative STILL views of cervical/thoracic/lumbar/spine

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→ Transverse CINE through spine

-Clear images showing skin covering the entire spine

Extremities: document presence of each femur, each humerus and representative images of presence of each tib/fib, each radius/ulna, hands and feet

→ If possible, show relationship of extremity/foot and open hands

Document sex of fetus: Ask patient if she wants to know before telling her or typing “XX or “XY”

DETAILED:

REQUIRED CINES:

- Nose/lips
- Heart (see below for details)
- Diaphragm
- Spine (transverse)
- Intracranial structures (transverse to include CSP, choroids and posterior fossa)

Head: shape

Intracranial structures:

- Lateral ventricles (measure and report)
- Choroid plexus
- Midline falx

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- Cavum septum pellucidum
- Cerebellum (measure and report)
- Cisterna magna (measure and report)
- CINE required: transverse
 - MUST include CSP, choroids and posterior fossa

Face:

- Profile: ensure nasal bone (with overlying skin) + chin are clearly seen
- Nose/upper lip: CINE
- Orbit/lens

Neck: show

- Measure nuchal fold on views of the posterior fossa (report measurement) up to 24 weeks

Chest: Document diaphragm in at least 2 images

- CINE through diaphragm

Heart: STILL images:

1. 4-chamber view: Perpendicular to the interventricular septum to show it to be intact
2. LVOT: show wall of LVOT in line with IV septum
3. RVOT: transverse view (showing pulmonary artery bifurcation)
4. Aortic arch
5. Ductal arch

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6. Three vessel view (3VV)

CINE series (4 total REQUIRED):

1. **Transverse** sweep through heart from diaphragm through great vessels
2. RVOT
3. LVOT
4. 4-chamber heart
5. Aortic and ductal arches (sagittal sweep to include the ductus arteriosus and great vessels)

Abdomen:

- Stomach (presence, situs)
- Intestines
- Cord insertion

Kidneys: measure renal pelvis if = > 4mm

- Show renal arteries

Bladder: document 2 umbilical arteries around bladder with color

Spine: Osseous structures and overlying skin

- Sagittal: cervical/thoracic/lumbar/sacral spine
- Transverse: representative STILL views of cervical/thoracic/lumbar/spine
 - Transverse CINE through spine
- Clear images showing skin covering the entire spine

Extremities: document and label each femur, tibia/fibula (must show separate from each other), feet (show sagittal view of tibia/fibula relationship to foot) and humerus, radius/ulna (must show separate from each other), hands (showing separate thumb; open hand views)

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→Measure (and report) humerus length

Document sex of fetus: Ask patient if she wants to know before telling her or typing “XX or “XY”

Maternal Anatomy:

-Evaluate uterus and adnexa/ovaries

-Do not need to include kidneys unless there is specific indication in order

Best technique for measuring cervical length

-If request is for cervical length in addition to anatomy, use TV technique unless otherwise specified by ordering clinician (or discussed with radiologist).

-If cervical length is abnormal on transabdominal exam, add TV to evaluate. Discuss with radiologist if unsure.

For most accuracy:

1. Empty maternal bladder

-Full/partially full bladder = falsely elongates cervix

2. Zoom-in: cervix should take up 75% of image

-Entire canal should be seen on 1 image

3. Be careful with transducer pressure: anterior thickness of cervix should be same as posterior thickness

-Anterior echogenicity should be same as posterior echogenicity

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-Too much pressure = falsely elongates cervix

4. Ensure measurement is from internal os (not membrane) to external os (not vaginal wall)

-Take 3 measurements

5. When curved: do NOT trace, use 2 (or more) LINEAR measurements

-Report shortest measurement with best technique

6. If shortened and patient is in triage/L & D, assess for funneling: apply gentle fundal pressure for 15 seconds and observe for funneling. This should not be done for routine outpatients.

7. Always provide an image with color to document presence/absence of overlying umbilical vessels