OBJECTIVES

Alberta obstetric care providers will understand the benefits of and requirements for a second trimester detailed anatomic study and act promptly and appropriately on abnormal results.

- Diagnostic imaging providers will include standard exam components on all reports, and communicate abnormal results appropriately.

TARGET POPULATION

All pregnant women in the second trimester

EXCLUSIONS

None

This Clinical Practice Guideline (CPG) was informed by the 2009 Content of a Complete Routine Second Trimester Obstetrical Ultrasound Examination and Report,[1] the 2005 Fetal Soft Markers: Society of Obstetricians and Gynecologists of Canada (SOGC) Guidelines,[2] the 2017 Joint SOGC-CCMG Guideline: Update on Prenatal Screening for Fetal Aneuploidy, Fetal Anomalies, and Adverse Pregnancy Outcomes,[3] and the knowledge and experience of radiology, obstetrical maternal fetal medicine experts in Alberta.

KEY MESSAGES

- A detailed survey of the fetal anatomy with ultrasound should be performed in all pregnancies.
- The ideal timing for this ultrasound exam is at 18 to 20 weeks gestation. However, a detailed anatomic survey exam should still be attempted if the patient first presents later in pregnancy, or misses the usual time window for whatever reason.
- The majority of major structural fetal anomalies can be detected by a mid-gestational fetal anatomical survey, however;
    - The 18 to 20 week scan has limitations and cannot detect all structural fetal abnormalities.
    - The implications of 'fetal soft markers' are evolving and clinicians should be aware of the changes.
- In utero diagnosis permits appropriate consultation and management in utero, and is associated with improved neonatal outcomes.

RECOMMENDATIONS

✓ Recommend a detailed survey of fetal anatomy between 18 and 20 weeks gestation for all pregnancies.

- ✓ All patients should have the opportunity to have their anatomical survey completed before 21 weeks.
- ✓ Diagnostic imaging providers are responsible for arranging any patient recalls required for initially incomplete exams, and endeavoring to complete evaluations prior to 21 weeks to permit early and urgent management of abnormal findings.
- ✓ Although challenging given some limitations (e.g., maternal body habitus), suggest a minimum of one and maximum of two recalls to optimally visualize a given structure before 21 weeks, otherwise refer to Maternal Fetal Medicine (MFM).
- ✓ If there is a significant abnormality suspected, ensure that the ordering provider has received the report and is aware of the findings. Timely referral to a MFM centre for assessment is required.
- ✓ Abnormal exams should be referred to MFM ideally prior to 21 weeks wherever possible, and within one week otherwise.

> **PRACTICE POINT**
>
> *The need to have scans completed by 21 weeks is to ensure adequate time for MFM consultation (including amniocentesis and referral to other specialists) and time for patient decision-making ideally before 23 weeks, otherwise management options available to the patient become more restricted.*

THE ULTRASOUND REPORT

- ✓ The ultrasound report should include a summary and opinion with a clearly communicated outcome of the findings, including one of:
  - Complete detailed anatomic survey – no fetal structural anomalies seen.
  - Survey now complete, in combination with prior attempt(s) – no fetal structural anomalies seen.
  - Incomplete survey, and the planned follow-up study is booked.
    - Clearly document what was not adequately seen and requires further imaging (versus what was adequately seen to date and is normal).
  - Abnormality requiring urgent referral to MFM.
    - If there is a clear finding warranting referral, DO NOT delay management for recall of an otherwise incomplete survey.
- ✓ The ultrasound report should be easy to read and include all ultrasound information necessary for appropriate management of the pregnancy.
- ✓ The ultrasound report should include a description of findings in a “checklist” format, and be uploaded to Alberta Netcare.
- ✓ Images of all items in the anatomic survey should be recorded. Still images and/or cineloops are acceptable.

PRACTICE POINT

A province-wide standardized form including all recommended elements should ideally be developed and incorporated into the various IT platforms used for radiologist reporting.

Table 1: Standard Ultrasound Report Checklist[1]

Standard Ultrasound Report Checklist[1]
✓ The ultrasound report should include the following preamble: o Demographics: ▪ Examination date ▪ Patient full name ▪ Second patient identifier, e.g., date of birth (DOB), Alberta Health Services (AHS) facility identification, Alberta Health Care Insurance Plan (AHCIP) ▪ Name of requesting physician/other provider and contact information ▪ Providers to receive copies of report ▪ Date of final report ▪ Name of interpreting/reporting physician o Relevant event history: ▪ Indication for ultrasound ▪ Prior relevant ultrasound(s) exams from this pregnancy ▪ If no prior assessment, start date of last menstrual period (if available) o Determination of the expected gestational age on the day of the exam, AND of the estimated date of delivery: ▪ Based on prior ultrasound, or current ultrasound if no prior ultrasound. See Toward Optimized Practice Determination of Gestational Age by Ultrasound Clinical Practice Guideline (CPG).
✓ The ultrasound report should include the following general findings: o Number of fetuses ▪ For twins and multiples, refer to Toward Optimized Practice Ultrasound for Twin and Multiple Pregnancies CPG. o Fetal viability and heart rate o Ultrasound assessment of fetal size by gestation age (+/- estimated fetal weight when ≥21 weeks size) o Fetal Biometry: ▪ Biparietal diameter (BPD) ▪ Head circumference (HC) ▪ Abdominal circumference (AC) ▪ Femur length (FL) ▪ Humerus length (HL)

Standard Ultrasound Report Checklist[1]
✓ The ultrasound report should include a detailed anatomic survey and must include: o Each structure in the standard anatomic survey list in a 'checklist' format ✓ The report must indicate if each of these structures was: o Normal o Abnormal o Not adequately seen (and if so, why)
Fetal Head ✓ Assess and document the following anatomical landmarks: o Shape of the fetal skull o Cavum septum pellucidum o Midline falx o Choroid plexus o Lateral cerebral ventricles: measure width in mm, report in mm if abnormal (10 mm or greater) o Cerebellum: measure width in mm, report in mm if abnormal o Cisterna magna: measure depth in mm, report in mm if abnormal (10 mm or greater) o Nuchal fold: measure thickness in mm, report in mm if abnormal (6 mm or greater)
Face ✓ Assess and document the following anatomical landmarks: o Orbits o Profile o Nose/Lips
Thorax (heart and lungs) ✓ Examine the fetal heart including: o Relationship with chest (axis, size, and position) o Four chamber view o Relationships of the outflow tracts: left/right ventricular outflow tract (LVOT / RVOT) o Three vessel view o Observe fetal cardiac motion and rhythm, and record fetal heart rate. ✓ Demonstrate intact right and left diaphragm and normal/symmetric lung echogenicity.
Fetal abdomen ✓ Survey the position, presence and situs of the stomach. ✓ Demonstrate intact abdominal wall with a normal umbilical cord insertion ✓ Identify the number of umbilical cord vessels using color Doppler at the level of the fetal bladder, and (if abnormal) in cross-section of a free loop of cord.

Standard Ultrasound Report Checklist[1]
○ **If a single umbilical artery (2-vessel cord) is identified, recommend referral to MFM for detailed anatomical survey, a fetal echocardiogram, as well as follow-up for fetal growth at 28 weeks (increased risk of growth restriction).** ✓ Visualize the bowel, bladder, and two kidneys. ✓ Renal pyelectasis: if renal pelvis is >5 mm in the AP plane at 18-23 weeks: ○ Rule out associated fetal renal abnormality. ○ Follow-up imaging at 28 weeks – consider MFM referral. ○ If persistent, a neonatal renal ultrasound after the 1st week of life is indicated.
Fetal spine ✓ View the fetal spine throughout its length in sagittal, coronal, and transverse planes if possible.
Genitalia ✓ Assess the fetal genitalia if possible (as per AHS policy # DIUWE 1.2). ○ Do not repeat or prolong study if no anatomic abnormalities are seen, but sex determination is inconclusive. ○ If fetal sex has been determined, the patient's request for disclosure should be respected, either directly or in the report to the referring health provider. ✓ Gender determination is needed for accurate interpretation of estimated fetal weight percentiles later in pregnancy.
Limbs ✓ Assess bone size (by percentile) for femur and humerus. Subjectively assess bone shape and mineralization. ○ If long bones appear shortened or abnormal, recommend MFM referral to assess for risk of aneuploidy and skeletal dysplasia. ✓ Confirm that there are four limbs, 12 long bones, two normal hands and two normal feet. ✓ Confirm opening of hands, and normal foot-ankle orientation.
The ultrasound report should include assessment of fetal environment/maternal structures: **Amniotic fluid**[4] ✓ Qualitatively assess the amniotic fluid volume and report as: normal, increased, decreased, or absent. ✓ Use the Chamberlain classification of amniotic fluid for initial assessment of amniotic fluid during routine obstetrical scanning to define: ○ Normal: single deepest pocket (SDP) of 2-8cm ○ Oligohydramnios: SDP < 2 cm in depth by 1 cm wide ○ Polyhydramnios: SDP >8 cm in depth by 1 cm wide

Standard Ultrasound Report Checklist[1]

Placenta

- ✓ Examine the placenta for position, appearance and presence or absence of abnormalities.
  - Assess placental echotexture for lesions such as sub-chorionic or retroplacental hemorrhages, infarction, echogenic cystic lesions, placental masses, etc.
  - Assess placental shape (i.e., globular vs. normal) and thickness (i.e., >40 mm in thickness is abnormal).
  - Assess the placental implantation for irregularities such as sub-chorionic or retro-placental hemorrhages, and invasive placentation. *Note: patients with a prior C-section are at increased risk of invasive placentation*.
  - When there is a low lying anterior placenta or placental previa in patients with a prior C-section, specifically evaluate for ultrasound signs of invasive placentation (placenta accrete/increta/percreta) and/or recommend referral to MFM for assessment).
- ✓ Visualize and document the placental cord insertion (central/eccentric, marginal [<20 mm from the edge], or velamentous.) This assessment is important for all pregnancies, and essential for placentas near the internal os.
  - Refer to MFM if velamentous cord insertion is seen or suspected. Velamentous cord insertion (particularly in the lower uterus) increases the risk for vasa previa.
  - Marginal placental cord insertion may have association with fetal growth restriction. A follow-up ultrasound at 28 weeks gestation is recommended.
- ✓ Assess and document the placental location and its relationship to the internal cervical os:
  - If less than 20 mm distance by transabdominal scanning, recommend always confirming placental cord insertion and proceeding with endovaginal (EV) evaluation at the same visit.
  - Apply color Doppler over the os to exclude fetal vessels in the membranes (vasa previa).
  - Placental position is preferentially described by mm away from or overlapping the internal cervical os:
    - 20 mm or more from the os is normal.
    - 1-19 mm from the os is low-lying (but likely to resolve as pregnancy progresses).
    - 0 mm from the os is marginal placenta previa.
    - 1 mm or more overlap is complete placenta previa.
  - If the placenta is not previa on EV ultrasound at 18-20 weeks (placental margin is 1 mm or more from the internal os), no further assessment is needed in the absence of vaginal bleeding later or other obstetric complication in the pregnancy (likely to resolve, delivery can be planned vaginally). However, follow-up at 26-28 weeks may still be requested by the obstetric care provider for reassurance.
  - If the placenta is <20 mm from the os trans-abdominally at 18-20 weeks and EV ultrasound is not available or feasible, recommend follow-up EV ultrasound

Standard Ultrasound Report Checklist[1]
assessment at 26-28 weeks gestation, or sooner if any vaginal bleeding. **Cervix** ✓ The cervix should measure at least 3 cm in length by transabdominal scanning, and appear closed. ✓ If cervical shortening is suspected (<3 cm), recommend EV scanning to assess more accurately and manage accordingly (See the *Cervical Insufficiency and Cervical Cerclage* SOGC clinical practice guideline no. 301).[5] If EV ultrasound is not available or feasible, recommend clinical assessment with Obstetrics and possible referral to MFM. **Adenexae** ✓ Consider screening for significant adnexal lesions which may require antepartum or intrapartum management.

FETAL SOFT MARKERS[2]

KEY MESSAGES

- Soft markers are findings on ultrasound that are considered variants of normal because they are seen in both normal and abnormal pregnancies.
- Soft markers are not considered abnormalities themselves, but because they have previously been observed in greater frequency in genetically abnormal pregnancies, they could indicate an increased risk that fetal aneuploidy may be present.
- Until recently, management of soft markers has been based on the 2005 SOGC Fetal Soft Markers in Obstetric Ultrasound Guideline. However, patient care in these cases is currently evolving as more sophisticated prenatal tests are adopted (see 2017 SOGC No 348 Update on screening for fetal aneuploidy, fetal anomalies, and adverse pregnancy outcomes).[3]
- There is regional variation in Alberta of not only the available first and second trimester prenatal genetic screening, but also in test performance in terms of sensitivity/detection rate of aneuploidy. While available privately, non-invasive prenatal testing (NIPT) is not yet publically funded in Alberta, and thus patient access to this sophisticated screening test is limited. These two local factors influence both the implications and management of soft markers of fetal aneuploidy in Alberta.
- At present, soft markers for fetal aneuploidy should still be identified and reported at the 18-20 week ultrasound.
- If there has been a negative NIPT screen prior to the detailed ultrasound, the presence of any soft marker does not alter the NIPT aneuploidy risk assessment.
- Echogenic Intracardiac focus (EICF; a weak marker for Trisomy 21) and choroid plexus cyst(s) (CPCs; a weak marker for Trisomy 18) are not associated with other fetal abnormalities or obstetric complications.

  - When either of these soft markers is present in isolation, the obstetric care provider should assess the patient's *a priori* and adjusted risk (as applicable) for aneuploidy considering the relevant lab, ultrasound, and clinical parameters available including the sensitivity/detection rate of any preceding prenatal screening tests performed.
  - Pending this clinical assessment and local experience/practice, options for follow-up of either of these two markers may include genetic counselling, MFM referral, non-invasive prenatal testing (NIPT), amniocentesis, and/or no follow-up needed.
  - If there is any question or concern about how to proceed, it is best to contact MFM for further advice.

- Many soft markers will continue to warrant referral to MFM for further evaluation as they could be associated with other fetal abnormalities and/or obstetric complications in addition to aneuploidy, specifically including the following soft markers:
  - Shortened long bones (femur or humerus <2.5th percentile for GA or <0.9 of predicted length by BPD)
  - Echogenic bowel (at least as bright as bone)
  - Mild ventriculomegaly (either lateral ventricle >10mm)
  - Thickened nuchal fold (>6 mm)
  - Absent or hypoplastic nasal bone (<2.5th percentile)
- Whenever multiple soft markers are identified, a referral to MFM is always recommended.
- If there has been a negative NIPT screen prior to the detailed ultrasound, the presence of soft markers does not alter the risk of fetal aneuploidy.
- Timely referral for confirmation, counselling, and investigation is required to maximize management options (ideally <21 weeks) when indicated.

MANAGEMENT OF ULTRASOUND FINDINGS AT THE 18 TO 20 WEEK ULTRASOUND:

- ✓ Same day referral to be assessed clinically by obstetrician-gynecologist (likely with further ultrasound assessment by MFM) either at Labour & Delivery (>20 weeks) or the Emergency Department (<20 weeks) should be triggered by the following:
  - Suspected cervical insufficiency (<1.5 cm in length on EV) or open/hour-glassing membranes
  - Shortened cervix (<2.5 cm), with history of preterm labour or cervical insufficiency
  - Oligohydramnios (SVP <2 cm, and/or AFI <5cm)
  - Severe polyhydramnios (AFI >35cm)
  - Hydrops fetalis
  - Early-onset severe fetal growth restriction with evidence of fetal compromise
  - Fetal tachy or brady arrhythmia
  - Monochorionic diamniotic (MCDA) twins with twin to twin transfusion syndrome (TTTS) (See Toward Optimized Practice Twins and Multiple Pregnancies CPG.)
  - Other concern for imminent fetal demise without intervention
- ✓ Referral to MFM (and to an obstetrician-gynecologist if patient is in low-risk care) within one week should be triggered by any of the following:
  - IUGR / SGA (composite measurement >10 days different than expected fetal size, EFW or AC <10th percentile)
  - Any anatomic defect/structural abnormality
  - Fetal soft marker(s) for aneuploidy identified conferring an increased risk for aneuploidy, fetal anomaly, or obstetric complications, as per the guidance above

CONTACT INFORMATION MATERNAL FETAL MEDICINE (MFM)

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GUIDELINE COMMITTEE

The committee consisted of representatives of family medicine, obstetrics and gynecology, diagnostic radiology and maternal-fetal medicine.

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