



Guideline for

The Use of Prenatal Ultrasound First Trimester

This clinical practice guideline (CPG) was developed by an Alberta CPG working group and has been reviewed and revised in 2005 to reflect the most recent evidence. This guideline will undergo detailed review during the 2007-08 fiscal year.

GOAL

Obstetrical ultrasound in the first trimester accounts for approximately 30 percent of all obstetrical imaging. This guideline is intended to assist health care professionals caring for pregnant women in determining the appropriate use of prenatal ultrasound examination in the first trimester (up to 14 weeks gestation).

RECOMMENDATIONS

- ◆ Ultrasound as a routine examination in the first trimester is **NOT** recommended:
 - ◆ to diagnose pregnancy;
 - ◆ for dating when last menstrual period and physical examination are concordant.
- ◆ Ultrasound in the first trimester **IS** indicated:
 - ◆ to date pregnancy when last menstrual period date is unknown or uncertain;
 - ◆ to confirm suspected ectopic pregnancy, hydatidiform mole, or pelvic mass;
 - ◆ prior to planned termination of pregnancy or if medical intervention is anticipated.
 - ◆ when guided visualization is required during invasive diagnostic procedures i.e., amniocentesis, chorionic villus sampling, and selective reduction of multifetal pregnancies;

- ◆ when multiple gestation is suspected to allow for reliable determination of chorionicity / amnionicity;
- ◆ to assess threatened abortion. At this time no recommendation can be made to support or refute the use of serial ultrasound in the management of threatened spontaneous abortion;
- ◆ for nuchal translucency screening which should only be offered as part of a comprehensive prenatal screening and counseling program by experienced operators with appropriate quality assurance processes in place.

INTRODUCTION

Ultrasound's precise role in the first trimester is still in evolution. The advent of ultrasound has made an indisputable impact on assessment of clinical conditions in the first trimester. Controversies still exist over how some of the information obtained will affect medical management and outcome. This guideline was developed to focus on circumstances in which ultrasound in the first trimester may guide clinical management.

BACKGROUND

Ultrasound is a powerful tool in the first trimester. By six weeks gestation, ultrasound can usually identify the location and viability of the pregnancy as well as gestational age and pelvic structures.¹

Ultrasound as a routine examination in the first trimester is NOT recommended.

A randomized trial of routine prenatal ultrasound in the first trimester (10-12 weeks gestational age)

The above recommendations are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances. They should be used as an adjunct to sound clinical decision making.

showed no clinical benefit in low risk patients.² This trial was specifically aimed at assessing gestational age and detection of twins. The rate of post date inductions was not significantly different between the two groups and the number of twins was too small to draw conclusions. The high rate of detection by 24 weeks and the good outcomes of the “usual care” group was consistent with other studies in that there is no significant difference in birth weight, perinatal morbidity or mortality between the groups. The difference in total adverse outcomes rates in singleton pregnancies was not significant. Based on the cited trial, ultrasound is not a clinically effective nor cost effective method to diagnose pregnancy, and first trimester ultrasound is not indicated to date pregnancy when last menstrual period and physical examination are concordant.

Ultrasound in the first trimester is indicated to date pregnancy when the last menstrual period date is uncertain.

Accurate dating has been the strongest argument for routine early ultrasound.³ Crown rump length at 8 to 12 weeks is the most accurate method to date pregnancy.⁴ Accurate dating decreases the number of labour inductions for post-term pregnancy and is important in cases of planned deliveries to prevent iatrogenic prematurity.⁵⁻⁶ Accurate dating is also important to assess fetal growth and interpret maternal serum screening.⁷

Ultrasound in the first trimester may be beneficial for certain complications including suspected ectopic pregnancy, suspected hydatidiform mole, and pelvic mass.

Ectopic Pregnancy

The value of ultrasound in aiding diagnosis of ectopic pregnancy has been repeatedly demonstrated.^{8,9} Women over the age of 35 or with a history of pelvic inflammatory disease, intrauterine device use, and artificial insemination are at increased risk of ectopic pregnancy.¹⁰ The incidence of ectopic pregnancies continues to rise and although only 1% of pregnancies are ectopic they account for 10 - 26% of maternal deaths.¹¹ In the presence of these risk factors or if there is clinical suspicion based on history and physical examination, ultrasound can correctly diagnose ectopic pregnancy in 80 to 100% of cases.¹²⁻¹⁴ False positive results range from 0.54% to 17.6%.¹⁴

Hydatidiform Mole

Ultrasonography has been accepted as a sensitive and reliable method for diagnosing of complete molar

pregnancy.¹⁵ In cases of suspected hydatidiform mole on the basis of clinical signs of hypertension, proteinuria and/or the presence of ovarian cysts felt on pelvic examination or expulsion of hydropic villi, ultrasound permits accurate diagnosis and differentiation of this neoplasm from fetal death¹⁶ and can be used to monitor the ovaries as they return to normal following evacuation of the mole.¹⁷ An early diagnosis of hydatidiform mole is desirable, since there is evidence that diagnostic delay is associated with a greater risk for maternal morbidity and postmolar trophoblastic disease.¹⁸

Pelvic Mass

If a pelvic mass is discovered, ultrasound can detect both the location and nature of the pelvic mass and aid in its diagnosis.¹⁶

Ultrasound in the first trimester is indicated for planned termination of pregnancy or planned cervical cerclage where a single ultrasound is needed to ensure accurate dating.¹⁹

Elective First Trimester Terminations

Second trimester termination carries increased morbidity over first trimester procedures.²⁰ Inadvertent misdiagnosis can occur when the operator begins a procedure believing the gestation to be in the first trimester, only to discover it is actually in the second trimester. This difficult situation can be completely avoided by ultrasound examination prior to termination procedure.²¹

Planned Cervical Cerclage

The National Institute of Health Consensus Conference concluded that ultrasound aids in timing and proper placement of the cerclage for patients with incompetent cervix.¹⁶ Ultrasound may be of particular use in the placement of a cerclage in the patient with a hypoplastic cervix secondary to intrauterine diethylstilbestrol exposure, cone biopsy, or cervical trauma.²²

Ultrasound in the first trimester is indicated during invasive diagnostic/therapeutic procedures where visualization is required, e.g., amniocentesis, chorionic villus sampling and selective reduction of multifetal pregnancies.

Invasive Diagnostic/Therapeutic Procedures

First trimester genetic diagnosis using chorionic villus sampling has become a widely accepted alternative to

second trimester procedures and has been proved as safe as amniocentesis.^{23,24} However, the success of early transabdominal and transcervical chorionic villus sampling depends upon the reliable identification of placental location and detection of embryonic cardiac activity using high resolution ultrasound.²⁵⁻²⁷ If amniocentesis is performed in the first trimester, ultrasound monitored technique adds to the ease and expediency of the amniocentesis and reduces the frequency of bloody and dry taps and multiple needle insertions.^{28,29} In selective reduction of multi-fetal pregnancies colour flow imaging can delineate all the vascular connections between siblings in utero and aid in directing the reduction procedure.³⁰

Multiple Gestation

First trimester ultrasound to identify multiple gestation should be considered when there is :

- ◆ assisted reproduction technologies
- ◆ a uterine size greater than suggested by the last normal menstrual period
- ◆ hyperemesis gravidarum
- ◆ a family history of multiple gestation.

With multiple gestation, the ultrasound examination should include number of fetuses, confirmation of life, crown-rump length and /or biparietal diameters, chorionicity and amnionicity, and if expertise is available, nuchal translucency assessment. Ultrasound can define chorionicity and amnionicity most reliably in the first trimester.³¹ Accurate diagnosis of a monoamniotic twin pregnancy is important because of the risk of perinatal loss from cord entanglement. In this circumstance, fetal surveillance and elective preterm delivery are indicated.³² The accurate diagnosis of a monochorionic, diamniotic twin pregnancy is important because it selects a subgroup of twin pregnancies at higher risk for twin-to-twin transfusion syndrome, congenital anomalies, intrauterine growth restriction and perinatal mortality.^{33,34} Specific fetal surveillance is indicated in these circumstances.

At this time no recommendation can be made to support or refute the use of serial ultrasound in the management of threatened spontaneous abortion. However, first trimester ultrasound may be used for assessment of threatened abortion to document fetal viability or for incomplete abortion to identify retained products of conception.

Threatened abortion is usually the most common perceived indication for first trimester ultrasound. Vaginal bleeding affects approximately 50% of women.³⁵⁻³⁶

Bleeding in early pregnancy without abdominal pain and cervical dilation can cause intense anxiety for the woman and some degree of clinical uncertainty for the physician. Women having experienced vaginal bleeding in the first trimester can be reassured by having a scan and seeing a live fetus moving.^{21,37-38} Conversely, absence of fetal heart activity allows the woman to dissociate herself from the non-viable fetus.³⁹ Women with vaginal bleeding, accompanied by pain and passage of blood clots, are likely to have evidence of a dilating cervix. Pelvic examination may permit immediate diagnosis of an evolving miscarriage. In this instance, abortion is inevitable and there is no reason to perform an ultrasound. When an abortion is thought to be incomplete an ultrasound scan can detect the presence of retained products of conception. If no retained products are detected, the examination saves the woman from undergoing a dilation and curettage.⁴⁰ In regards to threatened miscarriage, the quantity and the quality of the literature is such that at this time there is little evidence to support or deny the value of selective prenatal ultrasound in the first trimester and therefore no recommendations can be made to support or refute the use of ultrasound in the management of threatened miscarriage. However, serial ultrasounds for threatened miscarriage should be discouraged.

Fetal Genetic (Nuchal Translucency) Screening

Ultrasound at 10 to 13 6/7 weeks (the so-called 11–14 week scan) or with crown–rump length from 45 mm to 84 mm, can quantify the risk of Down syndrome and other genetic abnormalities using nuchal translucency (NT) measurement. The term describes a sonolucent area in the posterior fetal neck. Increased NT is associated with trisomy 21,⁴¹⁻⁴⁷ 18,⁴⁷⁻⁴⁹ and 13,⁴⁷⁻⁵¹ certain other chromosomal^{47,52,53} or developmental abnormalities, and numerous genetic syndromes.⁵⁴ In particular, for chromosomally normal fetuses with increased nuchal translucency, there is a higher risk of congenital heart disease, and a properly timed and careful review of fetal heart anatomy is recommended.⁵⁵

Large differences have been reported in aneuploidy detection using nuchal translucency,^{41,56} and in the ability to achieve appropriate and consistent measurements.⁵⁷⁻⁶⁰ The best results are obtained by centres where sonographers and sonologists have been trained specifically for NT screening, and where strict guidelines with quality assurance processes are used.⁴⁷ Nuchal translucency screening should only be offered as part of a comprehensive prenatal screening and counselling program. Combining nuchal translucency with maternal serum biochemistry significantly improves the detection

rate, and thus is encouraged as a program of either concurrent or sequential screening.^{48,61}

Conclusion

First trimester ultrasound should only be offered for the specific clinical indications listed in this document.

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TOWARD OPTIMIZED PRACTICE

(TOP) PROGRAM

The successor to the Alberta Clinical Practice Guideline (CPG) program, TOP is an initiative directed jointly by the Alberta Medical Association, Alberta Health and Wellness, the College of Physicians and Surgeons, and Alberta's Health Regions. The TOP Program promotes appropriate, effective and quality medical care in Alberta by supporting the use of evidence-based medicine.

TOP Leadership Committee

Alberta Health and Wellness
 Alberta Medical Association
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TO PROVIDE FEEDBACK

The Working Group for Prenatal Ultrasound is a multi-disciplinary team composed of family physicians, obstetricians, a perinatologist, neonatologists, a geneticist, radiologist, pathologist, sonographer, midwife, prenatal educator, consumer and Alberta Health representative. The team encourages your feedback. If you have difficulty applying this guideline, if you find the recommendations problematic, or if you need more information on this guideline, please contact:

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