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Determination of Gestational Age by Ultrasound

This clinical practice guideline has been prepared by the Diagnostic Imaging Committee, reviewed by the Family Physician Advisory Committee, and approved by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada.

PRINCIPAL AUTHORS

Kimberly Butt, MD, Fredericton NB

Ken Lim, MD, Vancouver BC

DIAGNOSTIC IMAGING COMMITTEE

Ken Lim, MD (Chair), Vancouver BC

Stephen Bly, MD, Ottawa ON

Kimberly Butt, MD, Fredericton NB

Yvonne Cargill, MD, Ottawa ON

Greg Davies, MD, Kingston ON

Nanette Denis, RDMS, Saskatoon SK

Gail Hazlitt, RN, RDMS, Winnipeg MB

Lucie Morin, MD, Montreal QC

Annie Ouellet, MD, Sherbrooke QC

Shia Salem, MD, Toronto, ON

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Abstract

Objective: To assist clinicians in assigning gestational age based on ultrasound biometry.

Outcomes: To determine whether ultrasound dating provides more accurate gestational age assessment than menstrual dating with or without the use of ultrasound. To provide maternity health care providers and researchers with evidence-based guidelines for the assignment of gestational age. To determine which ultrasound biometric parameters are superior when gestational age is uncertain. To determine whether ultrasound gestational age assessment is cost effective.

Evidence: Published literature was retrieved through searches of PubMed or MEDLINE and The Cochrane Library in 2013 using appropriate controlled vocabulary and key words (gestational age, ultrasound biometry, ultrasound dating). Results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies written in English. There were no date restrictions. Searches were updated on a regular basis and incorporated in the guideline to July 31, 2013. Grey (unpublished) literature was identified through searching the websites of health technology assessment and health technology-related agencies, clinical practice guideline collections, clinical trial registries, and national and international medical specialty societies.

Values: The quality of evidence in this document was rated using the criteria described in the Report of the Canadian Task Force on Preventive Health Care (Table 1).

Benefits, harms, and costs: Accurate assignment of gestational age may reduce post-dates labour induction and may improve obstetric care through allowing the optimal timing of necessary interventions and the avoidance of unnecessary ones. More accurate dating allows for optimal performance of prenatal screening tests for aneuploidy. A national algorithm for the assignment of gestational age may reduce practice variations across Canada for clinicians and researchers. Potential harms include the possible reassignment of dates when significant fetal pathology (such as fetal growth restriction or macrosomia) result in a discrepancy between ultrasound biometric and clinical gestational age. Such reassignment may lead to the omission of appropriate—or the performance of inappropriate—fetal interventions.

Summary Statements

1. When performed with quality and precision, ultrasound alone is more accurate than a "certain" menstrual date for determining gestational age in the first and second trimesters (≤ 23 weeks) in spontaneous conceptions, and it is the best method for estimating the delivery date. (II)
2. In the absence of better assessment of gestational age, routine ultrasound in the first or second trimester reduces inductions for post-term pregnancies. (I)

Keywords: ultrasound, gestational age, dating

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Table 1. Key to evidence statements and grading of recommendations, using the ranking of the Canadian Task Force on Preventive Health Care

Quality of evidence assessment*	Classification of recommendations†
I: Evidence obtained from at least one properly randomized controlled trial	A. There is good evidence to recommend the clinical preventive action
II-1: Evidence from well-designed controlled trials without randomization	B. There is fair evidence to recommend the clinical preventive action
II-2: Evidence from well-designed cohort (prospective or retrospective) or case–control studies, preferably from more than one centre or research group	C. The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making
II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category	D. There is fair evidence to recommend against the clinical preventive action
	E. There is good evidence to recommend against the clinical preventive action
III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees	L. There is insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making

*The quality of evidence reported in these guidelines has been adapted from The Evaluation of Evidence criteria described in the Canadian Task Force on Preventive Health Care.[118]

†Recommendations included in these guidelines have been adapted from the Classification of Recommendations criteria described in the Canadian Task Force on Preventive Health Care.[118]

3. Ideally, every pregnant woman should be offered a first-trimester dating ultrasound; however, if the availability of obstetrical ultrasound is limited, it is reasonable to use a second-trimester scan to assess gestational age. (I)
4. Notwithstanding Summary Statements 1, 2, and 3, women vary greatly in their awareness of their internal functions, including ovulation, and this self-knowledge can sometimes be very accurate. (III)

Recommendations

1. First-trimester crown-rump length is the best parameter for determining gestational age and should be used whenever appropriate. (I-A)
2. If there is more than one first-trimester scan with a mean sac diameter or crown-rump length measurement, the earliest ultrasound with a crown-rump length equivalent to at least 7 weeks (or 10 mm) should be used to determine the gestational age. (III-B)
3. Between the 12th and 14th weeks, crown-rump length and biparietal diameter are similar in accuracy. It is recommended that crown-rump length be used up to 84 mm, and the biparietal diameter be used for measurements > 84 mm. (II-1A)
4. Although transvaginal ultrasound may better visualize early embryonic structures than a transabdominal approach, it is not more accurate in determining gestational age. Crown-rump length measurement from either transabdominal or transvaginal ultrasound may be used to determine gestational age. (II-1C)
5. If a second- or third-trimester scan is used to determine gestational age, a combination of multiple biometric parameters (biparietal diameter, head circumference, abdominal circumference, and femur length) should be used to determine gestational age, rather than a single parameter. (II-1A)
6. When the assignment of gestational age is based on a third-trimester ultrasound, it is difficult to confirm an accurate due date. Follow-up of interval growth is suggested 2 to 3 weeks following the ultrasound. (III-C)

INTRODUCTION

The accurate dating of pregnancy is critically important for pregnancy management from the first trimester to delivery, and is particularly necessary for determining viability in premature labour and in post-dates deliveries.[1] Prior to the widespread use of ultrasound, caregivers relied on a combination of history and physical examination to clinically determine gestational age. Ultrasound gave clinicians a method to measure the fetus and therefore to estimate gestational age. Much of our current clinical practice is based on studies from the 1980s and 1990s. As new information emerges in fields, such as reproductive biology, perinatal epidemiology, and medical imaging, our current clinical practice is being challenged. "Certain" menstrual dating, for example, is less certain than previously thought.

When ultrasound is performed with quality and precision, there is evidence to suggest that dating a pregnancy using ultrasound measurements is clinically superior to using menstrual dating with or without ultrasound, and this has been advocated and adopted in other jurisdictions.[2–6]

GESTATIONAL AGE ESTIMATES USING CLINICAL DATING

The clinical estimate of gestational age typically relies on clinical history (menstrual cycle length, regularity, and recall of the first day of the last menstrual period), followed by confirmation by physical examination or other signs and symptoms.[7–9]