Complete Summary

GUIDELINE TITLE

ACR Appropriateness Criteria™ for growth disturbances: risk of intrauterine growth restriction.

BIBLIOGRAPHIC SOURCE(S)

American College of Radiology (ACR), Expert Panel on Women's Imaging. Growth disturbances: risk of intrauterine growth restriction. Reston (VA): American College of Radiology (ACR); 2001. 10 p. (ACR appropriateness criteria). [18 references]

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SCOPE

DISEASE/CONDITION(S)

Intrauterine growth restriction (IUGR)

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Family Practice
Obstetrics and Gynecology
Radiology

INTENDED USERS

Health Plans
Hospitals

Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for intrauterine growth restriction (IUGR)

TARGET POPULATION

Pregnant women with a risk of intrauterine growth restriction (IUGR)

INTERVENTIONS AND PRACTICES CONSIDERED

1. Obstetrical sonogram
    - Fetal measurement and (if prior scan) growth
    - Amniotic fluid volume
    - Fetal activity patterns
    - Biophysical profile (BPP)
2. Doppler evaluation
    - Umbilical arteries
    - Uterine arteries
    - Cerebral arteries
    - Cerebral to uterine artery ratio
3. Nonstress test/fetal heart rate monitoring
4. Fetal movement counts
5. Karyotyping (amniocentesis or cordocentesis)

Note: It is beyond the scope of this guideline to compare these methods and rate the relative effectiveness of the many individual parameters testable alone or in various combinations. Instead, the guideline ranks the relative utility of these broad categories of fetal assessment once a risk of intrauterine growth restriction (IUGR) and potential fetal compromise has been established.

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of recent peer-reviewed medical journals, primarily using the National Library of Medicine's MEDLINE database. The developer identified and collected the major applicable articles.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Delphi Method)
Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the Appropriateness Criteria. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty (80) percent agreement is considered a consensus. If consensus cannot be reached by this method, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria and the Chair of the ACR Board of Chancellors.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria™

Clinical Condition: Growth Disturbances

Variant 1: Risk of IUGR justifies evaluation.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Risk Factor for IUGR		
Size smaller than dates by LMP or prior sonogram	9	
Poor maternal weight gain	8	
Maternal hypertension or pre-eclampsia	8	Other maternal conditions known to predispose to IUGR, such as systemic lupus erythematosus, and prior pregnancy history of small-for-gestational-age babies, may also be indications for IUGR evaluation.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Abbreviations: IUGR, intrauterine growth restriction; LMP, last menstrual period

Variant 2: Risk of IUGR: initial evaluation.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Obstetrical Sonogram		
Fetal measurement and (if prior scan) growth	9	
Amniotic fluid volume	9	Oligohydramnios is a risk factor for fetal morbidity or mortality.
Anatomic survey	9	Fetal anomalies may indicate an underlying syndromic cause, such as aneuploidy, for the growth restriction.
Fetal activity patterns	7	
Biophysical profile (BPP)	4	BPP, Doppler, and other tests are not, in general, indicated for the initial assessment to determine if there is (probable) IUGR, but if the first scan is done at a stage of potential viability and IUGR is suspected by the findings, these tests may be useful, and should be applied as in the following tables.
Doppler Evaluation		See above comment. A variety of fetal and maternal blood vessels have been evaluated by Doppler wave form analysis to assess the risk of adverse perinatal outcome. The most commonly interrogated vessels are the umbilical arteries.
Umbilical arteries	4	
Uterine arteries	3	
Cerebral arteries	3	
Cerebral to uterine artery ratio	3	
Other		
Nonstress test/fetal heart rate monitoring	2	See above comment

Radiologic Exam Procedure	Appropriateness Rating	Comments
Daily fetal movement counts	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Variant 3: Small fetus, low or low normal fluid, follow-up studies.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Follow-up Sonograms		
Every 4 weeks	9	The maximum reasonable interval for a follow-up growth scan when there is evidence of IUGR is 4 weeks, but as the pregnancy enters the third trimester and approaches the time of possible (urgent) delivery, shorter scanning intervals may be indicated.
Every 3 weeks	8	
Every 2 weeks	7	
Biophysical profile (BPP)	8	Some form of surveillance for fetal well-being is indicated. The BPP, or selected component tests of the BPP, generally including a marker of acute condition, (e.g., breathing activity or heart rate reactivity), and amniotic fluid volume as a marker of more chronic status, is/are the most frequent primary formal test(s) of fetal status. Tests for fetal well-being are generally done once or twice weekly, but in severe situations may be indicated more frequently.
Doppler	8	Doppler may provide important ancillary data to the BPP, but is not, in general, a stand- alone test.
Heart rate monitoring	8	Heart rate monitoring, if reactive, may obviate the need for the complete BPP, but periodic surveillance of the amniotic fluid volume is still indicated as well.
Fetal movement counts	8	Daily fetal movement counting by the mother is an important adjunct to

Radiologic Exam Procedure	Appropriateness Rating	Comments
		periodic formal testing of fetal well-being.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Variant 4: Very small fetus, normal fluid.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Follow-up Sonograms		The smaller the fetus, the greater is the concern for life-threatening compromise. The interval of growth assessment should diminish both as the fetal size estimate drops from 10% to 5% and below, and as the pregnancy advances into third trimester and toward possible (urgent) delivery. It is uncommon for a fetus to be significantly growth restricted due to uteroplacental insufficiency and still have normal amniotic fluid volume. Inaccurate dating is the most common cause for this combination, and can be confirmed by follow-up scans for growth. Fetal aneuploidy may also present in this fashion. See below.
Every 3 weeks	9	
Every 4 weeks	8	
Every 2 weeks	8	
Biophysical profile (BPP)	9	Testing for fetal well-being is indicated from the point of potential viability onward. The primary testing should be by the BPP or selected component tests of the BPP.
Doppler	8	Doppler may provide important ancillary data to the BPP.
Heart rate monitoring	8	Heart rate monitoring, if reactive, may obviate the need for the complete BPP.
Fetal movement	8	

Radiologic Exam Procedure	Appropriateness Rating	Comments
counts		
Karyotyping (amniocentesis or cordocentesis)	6	Presence of normal amniotic fluid volume may indicate that fetal growth restriction is on a basis other than uteroplacental insufficiency. A fetus with aneuploidy, especially trisomy 13, trisomy 18, or triploidy, may have severe, symmetrical, early onset IUGR.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Variant 5: Normal sized fetus, low or absent fluid, follow-up studies.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Follow-up Sonograms		Absence or reduction of amniotic fluid is a risk factor for fetal morbidity/mortality, even with a normally grown fetus, due to possible umbilical cord compression. Periodic assessment of fetal growth is indicated. Low or absent fluid with a normal size fetus may indicate premature rupture of membranes or a fetal urinary tract abnormality. Evaluation for these possibilities is also indicated.
Every 2 weeks	9	
Every 3 weeks	6	
Every 4 weeks	5	
Biophysical profile (BPP)	9	Some form of surveillance for fetal well-being is indicated. The BPP, or selected component tests of the BPP, generally including a marker of acute condition, e.g., breathing activity or heart rate reactivity, and amniotic fluid volume as a marker of more chronic status, is/are the most frequent primary formal test(s) of fetal status. Tests for fetal well-being are generally done once or twice weekly, but in severe situations

Radiologic Exam Procedure	Appropriateness Rating	Comments
		may be indicated more frequently.
Doppler	8	Doppler may provide important ancillary data to the BPP, but is not, in general, a stand-alone test.
Heart rate monitoring	8	Heart rate monitoring, if reactive, may obviate the need for the complete BPP, but periodic surveillance of the amniotic fluid volume is still indicated, as well.
Fetal movement counts	8	Daily fetal movement counting by the mother is an important adjunct to periodic formal testing of fetal well-being.
Karyotyping (amniocentesis or cordocentesis)	3	There is a low probability of aneuploidy presenting with a normally grown fetus and oligohydramnios.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Summary

Once a probability of intrauterine growth restriction (IUGR) has been established, and uteroplacental insufficiency is considered to be a likely mechanism based on ultrasound (US) findings and clinical setting, there are a series of possible therapeutic interventions that can be used to improve fetal growth and prevent the development of fetal distress. Assessment of fetal well-being is essential to the management of such pregnancies. This testing is aimed at determining if there is life-threatening fetal compromise, and whether urgent premature delivery offers a better chance at survival and avoidance of morbidity than does continued exposure to an increasingly hostile intrauterine environment.

Periodic fetal biometry, evaluation of amniotic fluid volume, use of the biophysical profile (BPP) or a selected subset of its component tests, Doppler ultrasound, fetal heart rate monitoring, and fetal movement counting can all contribute to the determination of fetal compensation or compromise. It is beyond the scope of this guideline to compare these methods and rate the relative effectiveness of the many individual parameters testable alone or in various combinations. Instead, the guideline ranks the relative utility of these broad categories of fetal assessment once a risk of IUGR and potential fetal compromise has been established.

The biophysical profile has been and remains the mainstay of fetal well-being evaluation. It consists of four parameters variably sensitive to the acute exposure of the fetus to hypoxemia: fetal breathing movements, fetal limb and body

movement, fetal tone and heart rate reactivity demonstrated on a nonstress test (NST), and an assessment of amniotic fluid volume as an indicator of chronic hypoxemia. The NST can be used alone as a test of acute status, but it is often coupled with amniotic fluid measurement, a valuable reflection of fetal hypoxemic exposure over the past week. Alternatively, the four sonographic BPP components can be used without the NST. Scores of 8-10 on the BPP are strong indicators of a well-compensated fetus, but there are many false-positives when the fetus fails one or two of the acute marker tests. Reduced amniotic fluid volume is an important predictor of intrapartum fetal distress, much of which is attributable to umbilical cord compression events, and the fluid should be periodically checked in pregnancies suspected to have IUGR. Testing strategies usually evaluate one or more of the acute status parameters at least weekly, and often twice weekly, from the point of potential postnatal viability onward. Amniotic fluid is usually assessed weekly, but more often if it is approaching severely low levels. Daily or even more frequent testing by BPP or NST may be indicated in critical situations.

Extensive research on Doppler analysis of uterine, umbilical, and various intrafetal vessels confirms a strong correlation between high resistance arterial wave form patterns (e.g., low, absent, or reversed diastolic flow in the umbilical artery) and subsequent IUGR, hypoxemic fetal morbidity, and mortality. The correlation is greatest in high-risk pregnancies, but insufficiently predictive in general, low-risk populations to be useful as a primary screening test. Some have argued that since Doppler appears to be applicable primarily in a population already defined as high risk, the clinical decisions as to when a fetus is distressed and requires emergent delivery will be made based on the BPP and heart rate monitoring, making the Doppler superfluous. A recently published meta-analysis of 20 controlled trials of Doppler ultrasonography found, however, that there is "compelling evidence" that knowledge of the Doppler findings improved perinatal outcome in high-risk pregnancies, reducing antenatal admissions, inductions of labor, and cesarean sections for fetal distress, and reducing the odds of perinatal death by 38%.

An additional test of value in IUGR and other high-risk pregnancies is daily (or even more frequent) fetal movement counting by the mother. Frequent and vigorous fetal movements are evidence of well-being, providing reassurance to the mother, while diminishing fetal activity can provide an early warning of a deteriorating fetal status. The testing is easy and costs nothing, but provides benefit in addition to the formal fetal surveillance protocols.

The specific variant conditions included in this Appropriateness Criteria guideline require several additional comments.

A fetus small for dates compared with an earlier ultrasound study in which amniotic fluid volume was low or low normal, is the typical setting in which uteroplacental insufficiency is the most likely mechanism for IUGR. Repeat ultrasound for biometry is indicated, with the frequency adjusted by the severity of the growth restriction and the gestational age. Mild growth lag prior to 28-30 weeks can be remeasured in 4 weeks, while severe IUGR after 33 weeks may be best remeasured in 2 weeks. Some formal testing protocol for fetal well-being should be initiated on a weekly or twice-weekly schedule. Daily fetal movement counts are indicated.

IUGR caused by uteroplacental insufficiency is unusual when a normal amniotic fluid volume is present with a small or very small fetus. A first consideration should be inaccurate dating of the pregnancy. This can be confirmed by follow-up ultrasound biometry that demonstrates appropriate interval growth of the fetal measurement parameters for the number of weeks intervening between the first and second examination. With a symmetrically very small fetus for dates, particularly if detected in second or even first trimester, however, the possibility of aneuploidy, especially trisomy 18, trisomy 13, and triploidy, must be considered. Needless to say, presence of fetal anomalies will raise the concern for chromosomal abnormality considerably. Diagnosis is generally accomplished by amniocentesis, but if a rapid karyotype is needed (e.g., to avoid a cesarean section for fetal distress of a fetus with a lethal condition) cordocentesis or placental biopsy can often provide an answer in 48-72 hours.

When there is low or absent amniotic fluid with a normally grown fetus, causes of oligohydramnios other than IUGR must be considered. These include obstruction or nonfunction of the fetal urinary tract, premature rupture of membranes, and tocolysis of preterm labor by ibuprofen. Regardless of its etiology, oligohydramnios is an important risk factor for perinatal morbidity and mortality, due largely to umbilical cord compression but in early and long-standing oligohydramnios also, to the possible occurrence of pulmonary hypoplasia. Close monitoring of fetal condition is indicated along with periodic imaging evaluation of the fetus to check growth and chest configuration for degree of lung compression.

In summary, intrauterine growth restriction, with its inherent risks of fetal morbidity and mortality from the hypoxemia of inadequate uteroplacental function, must be considered a major abnormality of pregnancy. When it is suspected on the basis of clinical and sonographic findings, urgent management decisions may be necessary, including the possibility of emergent preterm delivery. A protocol of frequent fetal surveillance is indicated to guide patient management and the timing of delivery.

CLINICAL ALGORITHM(S)

An algorithm is provided for growth disturbances/growth restriction.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Appropriate selection of radiologic exam procedures for growth disturbances, risk of intrauterine growth restriction (IUGR)
- Reduction of fetal morbidity and mortality

POTENTIAL HARMS

Sonographic fetal measurements may render false positive or false negative results

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American College of Radiology (ACR), Expert Panel on Women's Imaging. Growth disturbances: risk of intrauterine growth restriction. Reston (VA): American College of Radiology (ACR); 2001. 10 p. (ACR appropriateness criteria). [18 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1996 (revised 2001)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria.™

GUIDELINE COMMITTEE

ACR Appropriateness Criteria™ Committee, Expert Panel on Women's Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Harris Finberg, MD; Ellen Mendelson, MD; Marcela Böhm-Vélez, MD; Robert Bree, MD; Elliot K. Fishman, MD; Hedvig Hricak, MD, PhD; Faye Laing, MD; Amy Thurmond, MD; Steven Goldstein, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline. It updates a previous version.

The ACR Appropriateness Criteria™ are reviewed every five years, if not sooner, depending on the introduction of new and highly significant scientific evidence. The next review date for this topic is 2004.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- American College of Radiology ACR Appropriateness Criteria™ introduction. Reston (VA): American College of Radiology; 6 p. Available in Portable Document Format (PDF) from the ACR Web site.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on June 28, 2002. The information was verified by the guideline developer on October 1, 2002.

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