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The American College of Radiology will periodically define new practice guidelines and technical standards for radiologic practice to help advance the science of radiology and to improve the quality of service to patients throughout the United States. Existing practice guidelines and technical standards will be reviewed for revision or renewal, as appropriate, on their fifth anniversary or sooner, if indicated.

Each practice guideline and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review, requiring the approval of the Commission on Quality and Safety as well as the ACR Board of Chancellors, the ACR Council Steering Committee, and the ACR Council. The practice guidelines and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice guideline and technical standard by those entities not providing these services is not authorized.

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ACR PRACTICE GUIDELINE FOR THE PERFORMANCE OF ABDOMINAL RADIOGRAPHY

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources, or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation, and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment.

Therefore, it should be recognized that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

Abdominal radiography is a proven and useful procedure for evaluating the gastrointestinal tract, abdominal (peritoneal) cavity, urinary tract, retroperitoneum, pelvic structures, and abdominal wall. Abdominal radiography consists of views in supine and/or horizontal beam (upright, decubitus, or cross-table lateral) projections. Additional views in other projections are occasionally used to supplement the basic views. In some clinical situations a single image is appropriate. The examination may be performed on a bedside (portable) basis when clinically appropriate. Abdominal radiography should be performed only for a valid medical reason and with the minimum radiation dose necessary to achieve a diagnostic study. While it is not possible to detect all abnormalities using abdominal radiography, adherence to the following guideline will maximize the diagnostic yield.

(For pediatric considerations, see Sections II and IV.B.)

II. INDICATIONS/CONTRAINDICATIONS

Indications for abdominal radiography include, but are not limited to:

1. Abdominal, flank, or pelvic pain.
2. Vomiting.
3. Abdominal distention, bloating, or increased girth.
4. Evaluation for and follow-up of bowel obstruction or nonobstructive ileus.
5. Constipation.
6. Diarrhea.
7. Evaluation for necrotizing enterocolitis in the premature newborn.
8. Palpable abdominal mass or organomegaly.
9. Evaluation of congenital abnormalities.
10. Follow-up of the postoperative patient.
11. Hematuria.
12. Obstructive voiding symptoms.
13. Evaluation for and follow-up of urinary tract calculi.
14. Blunt or penetrating abdominal trauma.
15. Search for foreign bodies.
16. Assessment of residual contrast in the gastrointestinal tract that might interfere with a planned imaging examination.
17. Evaluation of suspected calcifications found on other imaging studies.
18. Evaluation of the position of medical devices.
19. Evaluation for pneumoperitoneum.
20. Follow-up to contrast examinations of the gastrointestinal or urinary tract.

There are no absolute contraindications to abdominal radiography. However, in many clinical situations other imaging modalities such as ultrasonography, computed tomography, nuclear medicine, magnetic resonance imaging, barium studies, or angiography may be more appropriate as the initial or only examination for a patient with abdominal disease.

All imaging facilities should have policies and procedures to reasonably attempt to identify pregnant patients prior to the performance of any examinations involving ionizing radiation. If the patient is known to be pregnant, the potential radiation risk to the fetus and clinical benefits of the procedure should be considered before proceeding with the study. (1995, 2005 - ACR Resolution 1a)

Pregnancy is a relative contraindication to abdominal radiography because the uterus is within the primary beam for almost all examinations. If diagnostically appropriate, ultrasound should be considered as an alternative imaging modality.

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

See the [ACR Practice Guideline for General Radiography](#).

Physicians whose residency or fellowship training did not include the above may still be considered qualified to

interpret abdominal radiographs providing the following can be demonstrated:

1. The physician has supervised and interpreted abdominal radiographs for at least 2 years.
2. An official interpretation (final report) was generated for each study.

IV. SPECIFICATIONS OF THE EXAMINATION

The written or electronic request for abdominal radiography should provide sufficient information to demonstrate the medical necessity of the examination and allow for its proper performance and interpretation.

Documentation that satisfies medical necessity includes 1) signs and symptoms and/or 2) relevant history (including known diagnoses). Additional information regarding the specific reason for the examination or a provisional diagnosis would be helpful and may at times be needed to allow for the proper performance and interpretation of the examination.

The request for the examination must be originated by a physician or other appropriately licensed health care provider. The accompanying clinical information should be provided by a physician or other appropriately licensed health care provider familiar with the patient's clinical problem or question and consistent with the state scope of practice requirements. (2006 - ACR Resolution 35)

Appropriate clinical history and the reason for the examination must be provided by the requesting provider or his/her authorized agent.

A. Patient Selection and Preparation

No prior preparation of the patient is required for abdominal radiography. However, for some clinical indications such as evaluation of urinary tract calculi, bowel preparation with controlled diet, laxatives, and/or enemas may be desirable. Extraneous or artifactual densities external to the patient should always be removed whenever possible. Immobilization of the patient may occasionally be required.

B. Examination Technique

1. Technical factors

In adults, abdominal radiography is usually performed on a 35 x 43 cm (14 x 17 inch) film or image receptor. For children the film size should be adjusted to the size of the patient. When the patient can cooperate, the film is exposed at end expiration. Low kVp technique is preferable, although kVp should be appropriate to patient

size and clinical problem. The exposure time should be kept as short as practical to minimize motion artifact. A grid (moving or stationary) is desirable for adults and larger pediatric patients. Proper collimation is required for all patients. Gonadal shielding should be used for all male pediatric patients and where appropriate in adults.

2. Examination components

The abdominal radiography examination typically consists of views in supine AP and/or horizontal beam (upright, decubitus, or cross-table lateral) projections. Some institutions also use an upright PA or AP chest radiograph as part of an abdominal series to evaluate for pneumoperitoneum or causes of referred abdominal pain.

- a. The supine film is obtained in the AP projection and should include the area from the pubic symphysis inferiorly to the upper abdomen, at least to the superior margin of the kidneys and ideally to the level of the diaphragm. Both flanks should be included. The film is centered at the level of the iliac crest with the central ray perpendicular to the film. In larger patients, more than one film may be needed to encompass the entire abdomen.
- b. The upright, decubitus, or cross-table lateral film is obtained with the X-ray beam parallel to the floor and perpendicular to the film or image receptor, to optimize the visualization of small amounts of pneumoperitoneum. Most institutions prefer the upright projection for adults and older children when the patient's condition permits. However, some institutions may routinely obtain both a left lateral decubitus film and an upright film. The lateral decubitus position is also used when the patient cannot be placed upright; this position is especially useful for infants and young children who are unable to stand or cooperate. The left lateral decubitus position is preferred to the right lateral decubitus position as pneumoperitoneum is more readily detected adjacent to the liver. When possible, the patient should be placed in the upright or decubitus position for at least 5 minutes before exposing the radiograph to allow free air to accumulate in the elevated part of the peritoneal cavity.

- i. The upright film may be obtained in the anterior-posterior (AP) or posterior-anterior (PA) projection. The film is centered 5 cm (2 inches) above the iliac crest in the adult patient. The AP projection will provide better visualization of the kidneys, but the PA projection will reduce gonadal dose. The most superior part of the diaphragm must be included on the upright film, and in larger patients a second film centered lower in the abdomen may be needed to demonstrate other air-fluid levels.
 - ii. The left lateral decubitus film is obtained in the AP projection. The most superior part of the right side of the abdomen must be included on the radiograph, and it should include the area from the right hemidiaphragm to the pelvis with the center of the film at or above the iliac crest. If the patient cannot be placed on the left side, the right lateral decubitus position may be used as an alternative; in such cases the most superior part of the left side of the abdomen must be demonstrated, including the hemidiaphragm.
 - iii. The cross-table lateral film is seldom used for adults and older children, except for critically ill patients when an upright or decubitus film cannot be obtained. However, for neonates, many institutions use this projection rather than a decubitus film as it may have an increased sensitivity for detecting free air in this patient population and does not require repositioning the patient.
- c. When abdominal radiography is performed for urinary tract abnormalities such as calculi, an upright film is typically not obtained. However, oblique or other views may be appropriate.
 - d. Additional projections of the entire abdomen or coned views of a selected portion of the abdomen to provide improved detail in an area of concern may be used occasionally to supplement the standard examination. Oblique and lateral views may be helpful to localize foreign bodies or calcifications and to assess for calcification and aneurysms of the abdominal aorta. In infants and children, prone views may be used to demonstrate the

distribution of bowel gas and evaluate conditions such as anal atresia or intussusception.

- e. In selected patients a limited examination not including the entire abdomen or consisting of an upright radiograph only may be acceptable. Examples include checking the position of medical devices, following up of known localized abnormalities, and evaluating for pneumoperitoneum following a medical or surgical procedure.

C. Radiographic Quality Control

1. A qualified physician or technologist should review all radiographs for positioning and diagnostic quality before the patient is released. Repeat radiographs should be performed when necessary for diagnostic quality.
2. All radiographic studies should be permanently labeled with patient identification and the date of the examination. The time of the examination should be included, if relevant, especially when more than one examination is performed on the same date. The right or left side of the patient should be indicated on the radiograph.

V. DOCUMENTATION

An official interpretation (final report) of the examination should be included in the patient's medical record. Whenever possible, new films should be compared with prior abdominal examinations and/or other pertinent studies that may be available.

Reporting should be in accordance with the [ACR Practice Guideline for Communication of Diagnostic Imaging Findings](#).

VI. EQUIPMENT SPECIFICATIONS

See the [ACR Practice Guideline for General Radiography](#).

VII. RADIATION SAFETY IN IMAGING

Radiologists, medical physicists, radiologic technologists, and all supervising physicians have a responsibility to minimize radiation dose to individual patients, to staff, and to society as a whole, while maintaining the necessary diagnostic image quality. This is the concept "As Low As Reasonably Achievable (ALARA)".

Facilities, in consultation with the medical physicist, should have in place and should adhere to policies and

procedures, in accordance with ALARA, to vary examination protocols to take into account patient body habitus, such as height and/or weight, body mass index or lateral width. The dose reduction devices that are available on imaging equipment should be active or manual techniques should be used to moderate the exposure while maintaining the necessary diagnostic image quality. Patient radiation doses should be periodically measured by a medical physicist in accordance with the appropriate ACR Technical Standard. (2006 - ACR Resolution 17)

VIII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION CONCERNS

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education Concerns appearing elsewhere in the ACR Practice Guidelines and Technical Standards book.

Equipment monitoring should be in accordance with the [ACR Technical Standard for Diagnostic Medical Physics Performance Monitoring of Radiographic and Fluoroscopic Equipment](#).

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