Revised 2020 (Resolution 38) *

ACR–SAR PRACTICE PARAMETER FOR THE PERFORMANCE OF ADULT CYSTOGRAPHY AND URETHROGRAPHY

PREAMBLE

This document is an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. Practice Parameters and Technical Standards are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care[1]. For these reasons and those set forth below, the American College of Radiology and our collaborating medical specialty societies caution against the use of these documents 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 practitioner considering all the circumstances presented. Thus, an approach that differs from the guidance in this document, 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 this document when, in the reasonable judgment of the practitioner, such course of action is indicated by variables such as the condition of the patient, limitations of available resources, or advances in knowledge or technology after publication of this document. However, a practitioner who employs an approach substantially different from the guidance in this document may consider documenting in the patient record information sufficient to explain the approach taken.

The practice of medicine involves the science, and 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 the guidance in this document 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 purpose of this document is to assist practitioners in achieving this objective.

[1] Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing 831 N.W.2d 826 (Iowa 2013) Iowa Supreme Court refuses to find that the *ACR Technical Standard for Management of the Use of Radiation in Fluoroscopic Procedures* (Revised 2008) sets a national standard for who may perform fluoroscopic procedures in light of the standard's stated purpose that ACR standards are educational tools and not intended to establish a legal standard of care. See also, Stanley v. McCarver, 63 P.3d 1076 (Ariz. App. 2003) where in a concurring opinion the Court stated that "published standards or guidelines of specialty medical organizations are useful in determining the duty owed or the standard of care applicable in a given situation" even though ACR standards themselves do not establish the standard of care.

I. INTRODUCTION

This practice parameter is intended to assist radiologists performing cystography and urethrography in adult patients. Properly performed urethrography and cystography (either conventional or CT) are diagnostic radiological imaging tests that can provide information about the urethra and bladder. Application of the following practice parameter will maximize the diagnostic yield of these studies. Magnetic resonance imaging (MRI) or ultrasound may occasionally provide additional diagnostic information when clinically indicated.

The goal of cystography and/or urethrography is to evaluate the anatomy, function, and pathology of the lower urinary tract.

II. INDICATIONS AND CONTRAINDICATIONS

A. Indications

1. Indications for cystography include, but are not limited to, evaluation of the following:
   a. Recurrent urinary tract infections
   b. Vesicoureteral reflux [1]
   c. Bladder morphology and capacity
   d. Bladder diverticula [2]
   e. Leak from or tear of urinary bladder [3]
   f. Enterovesical, vesicouterine, vesicovaginal, and vesicocutaneous fistulae [4]
   g. Integrity of postoperative anastomoses or suture lines [5,6]
   h. Bladder outlet obstruction [7]
   i. Incontinence [7]
   j. Hematuria
   k. Neoplasia
   l. Evaluation for bladder leak after pelvic surgery
   m. Unexplained free intraperitoneal fluid following surgery or trauma

2. Indications for urethrography include, but are not limited to, evaluation of the following:
   a. Urethral diverticula [8]
   b. Urethral strictures [9]
   c. Bladder outlet or urethral obstruction
   d. Hematuria
   e. Suspected urethral injury following trauma [10]
   f. Recurrent urinary tract infections
   g. Diminished urinary stream
   h. Incomplete voiding
   i. Urethral foreign bodies
   j. Urethral mucosal tumors [11]
   k. Urethral fistula
   l. Postoperative urethral evaluation

B. Absolute contraindications: None

C. Relative contraindications

1. Pregnancy is a relative contraindication to cystography/urethrography because of radiation concerns for the fetus.
2. Urinary tract infection. Antibiotic prophylaxis should be considered in patients with a history of urinary tract infection. In patients with active urinary tract infection, consideration may be given to delaying cystography/urethrography until the infection has cleared.

3. Iodinated contrast allergy. The possibility exists for contrast media to be systemically absorbed during cystography or urethrography. This commonly occurs if there is extravasation of contrast media from the urethral or bladder lumen, and it may occur, though uncommonly, in the absence of frank extravasation.

See the ACR–SPR Practice Parameter for the Use of Intravascular Contrast Media [12] and the ACR Manual on Contrast Media [13].

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

See the ACR–AAPM–SIIM–SPR Practice Parameter for Digital Radiography [14].

IV. SPECIFICATION OF THE EXAMINATION

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

Documentation that satisfies medical necessity includes 1) signs and symptoms and/or 2) relevant history (including known diagnoses). The provision of 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. (ACR Resolution 35 adopted in 2006 – revised in 2016, Resolution 12-b)

Cystography and urethrography consist of imaging the bladder and/or urethra following administration of contrast media. The studies may be combined. These studies include cystography, cystourethrography, voiding cystourethrography, and urethrography (antegrade and retrograde). One or more scout images may be obtained before the infusion or injection of contrast for any of these studies.

Following administration of 300 mL of contrast or to the limit of the patient's tolerance, images are obtained in various projections appropriate to the indication for the study (eg, oblique, lateral, during rest and strain, and/or during voiding) accompanied by postvoid imaging of the bladder.

Fluoroscopy during the procedure may enhance diagnostic accuracy and is especially valuable in assessing the urethra, detecting contrast media extravasation from the bladder or urethra, and documenting the presence of vesicoureteral reflux.

A. Appropriate history and preprocedure screening should be performed by personnel familiar with the various risk factors, preparations, and premedication strategies. Either ionic or nonionic contrast media for injection may be used for cystography and urethrography.

See the ACR–SPR Practice Parameter for the Use of Intravascular Contrast Media [12] and the ACR Manual on Contrast Media [13].

B. If a urinary catheter is not in place, the urethra or bladder should be catheterized using aseptic technique. An appropriate volume of contrast should be administered to demonstrate the anatomic structures of interest. The examination should be tailored to the needs of the individual patient. Fluoroscopy can optimize diagnostic yield, especially during voiding studies. If a catheter has already been placed, another smaller catheter can be passed beside it to perform pericatheter urethrography to assess urethral integrity. Combined (simultaneous) voiding cystourethrography and retrograde urethrography can provide valuable treatment planning information in male

urethral stricture disease. Clinical judgment should guide decisions about contrast quantity and use of infusion or injection technique.

C. Appropriate images should be produced to demonstrate normal and abnormal findings with the minimum radiation dose necessary to achieve an optimal study. Radiologists and technologists should be trained in the correct positioning of the patient to obtain optimal images. In addition to the anteroposterior projection, bladder imaging is often enhanced by oblique and lateral views. Postvoid imaging of the bladder is helpful in assessing postvoid residual volume and can help in detecting small bladder leaks. If the examination is being performed to evaluate suspected bladder leak, particularly in a patient with pelvic trauma, it is essential to actively distend the bladder until a detrusor contraction occurs. Visualization of the male urethra is often best in a posterior oblique projection with extension of the penis to straighten the natural curve at the penoscrotal junction. Anteroposterior (AP) and lateral views of the anterior urethra may offer better characterization of the extent of an abnormality. Attempt should be made to reflux contrast past the external urinary sphincter to opacify the posterior urethra to the bladder for a complete examination. Imaging over the kidneys facilitates visualization and documentation of vesicoureteral reflux. Fluoroscopic spot films are useful in documenting reflux and of urethral anatomy.

CT cystography:

CT cystography consists of imaging the bladder following drainage of residual urine and retrograde filling of the bladder with at least 250 mL or to the limit of the patient's tolerance of 5% iodinated contrast material [12,13]. CT scan through the pelvis from the iliac crests to the lesser trochanter is obtained [15,16]. Multiplanar reformations or postdrainage images may be helpful in identifying bladder rupture, fistulae, and small bladder tumors [5,17]. Adjusting the window width and level settings may also be helpful in characterizing bladder injuries and intraluminal filling defects.

V. DOCUMENTATION

Reporting should be in accordance with the ACR Practice Parameter for Communication of Diagnostic Imaging Findings [18].

Equipment performance monitoring should be in accordance with the ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Radiographic Equipment [19] and the ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Fluoroscopic Equipment [20].

VI. RADIATION SAFETY IN IMAGING

Radiologists, medical physicists, non-physician radiology providers**,** radiologic technologists, and all supervising physicians have a responsibility for safety in the workplace by keeping radiation exposure to staff, and to society as a whole, "as low as reasonably achievable" (ALARA) and to assure that radiation doses to individual patients are appropriate, taking into account the possible risk from radiation exposure and the diagnostic image quality necessary to achieve the clinical objective. All personnel who work with ionizing radiation must understand the key principles of occupational and public radiation protection (justification, optimization of protection, application of dose constraints and limits) and the principles of proper management of radiation dose to patients (justification, optimization including the use of dose reference levels). https://www-pub.iaea.org/MTCD/Publications/PDF/PUB1775_web.pdf

Nationally developed guidelines, such as the ACR's Appropriateness Criteria®, should be used to help choose the most appropriate imaging procedures to prevent unnecessary radiation exposure.

Facilities should have and adhere to policies and procedures that require ionizing radiation examination protocols (radiography, fluoroscopy, interventional radiology, CT) to vary according to diagnostic requirements and patient body habitus to optimize the relationship between appropriate radiation dose and adequate image quality. Automated dose reduction technologies available on imaging equipment should be used, except when

inappropriate for a specific exam. If such technology is not available, appropriate manual techniques should be used.

Additional information regarding patient radiation safety in imaging is available from the following websites – Image Gently® for children (www.imagegently.org) and Image Wisely® for adults (www.imagewisely.org). These advocacy and awareness campaigns provide free educational materials for all stakeholders involved in imaging (patients, technologists, referring providers, medical physicists, and radiologists).

Radiation exposures or other dose indices should be periodically measured by a Qualified Medical Physicist in accordance with the applicable ACR Technical Standards. Monitoring or regular review of dose indices from patient imaging should be performed by comparing the facility's dose information with national benchmarks, such as the ACR Dose Index Registry and relevant publications relying on its data, applicable ACR Practice Parameters, NCRP Report No. 172, Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States or the Conference of Radiation Control Program Director's National Evaluation of X-ray Trends; 2006, 2009, amended 2013, revised 2023 (Res. 2d).

VII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION

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 appearing under the heading *ACR Position Statement on Quality Control and Improvement, Safety, Infection Control and Patient Education* on the ACR website (https://www.acr.org/Advocacy-and-Economics/ACR-Position-Statements/Quality-Control-and-Improvement).

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