

AIUM Practice Parameter for the Performance of Ultrasound Evaluations of the Prostate (and Surrounding Structures)

Introduction

The American Institute of Ultrasound in Medicine (AIUM) is a multidisciplinary association dedicated to advancing the safe and effective use of ultrasound in medicine through professional and public education, research, development of clinical practice parameters, and accreditation of practices performing ultrasound examinations.

The *AIUM Practice Parameter for the Performance of Ultrasound Evaluations of the Prostate (and Surrounding Structures)* was developed (or revised) by the American Institute of Ultrasound in Medicine (AIUM) in collaboration with other organizations whose members use ultrasound for performing this examination(s) (see “Acknowledgments”). Recommendations for personnel requirements, the request for the examination, documentation, quality assurance, and safety may vary among the organizations and may be addressed by each separately.

Ultrasound examination of the prostate and surrounding structures is used in the diagnosis of prostate cancer, benign prostatic enlargement, prostatitis, prostatic abscess, congenital anomalies, ejaculatory dysfunction, and male infertility, as well as for the treatment of prostatic cancer, abscess, and benign prostatic enlargement.¹ Ultrasound-guided biopsy of the prostate is useful for evaluating those patients who have abnormal digital rectal examinations or an abnormal serum prostatic-specific antigen (PSA) level, azoospermia, a low ejaculatory volume, and those in whom tissue diagnosis is needed for further management.

Ultrasound findings may be used to guide systematic biopsy of the prostate or guide a targeted biopsy approach, which is performed to supplement the standard systematic biopsy protocol in order to improve the positive cancer yield of prostate biopsy.^{2,3} Conventional ultrasound techniques using grayscale Doppler, color Doppler, and power Doppler imaging are not sufficient to confirm or exclude the presence of prostate cancer and they should not be used to preclude the performance of prostate

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biopsy.⁴⁻⁶ Although newer techniques using elastography and contrast-enhanced ultrasound may provide superior detection of prostate cancer, these techniques are not sufficiently established to be included as standard of care at this time.

This Practice Parameter is intended to provide the medical ultrasound community with recommendations for the performance and recording of high-quality ultrasound examinations. The parameter reflects what the AIUM considers the appropriate criteria for this type of ultrasound examination but is not intended to establish a legal standard of care. Examinations performed in this specialty area are expected to follow the parameter with recognition that deviations may occur depending on the clinical situation.

Indications

Indications for prostate ultrasound include, but are not limited to, the following:

1. Guidance for biopsy in the presence of an abnormal digital rectal examination or elevated PSA⁷ or a suspicious prostatic lesion detected on MR. This includes use of transrectal ultrasound (TRUS) biopsy as part of the TRUS/MRI fusion technique⁶
2. Assessment of prostate volume prior to medical, surgical, or radiation therapy^{8,9} and to calculate PSA density¹⁰
3. Real-time guidance for the placement of brachytherapy seeds¹¹
4. Assessment of lower urinary tract symptoms¹²
5. Assessment of congenital anomalies¹³
6. Infertility including azoospermia and a low ejaculatory volume
7. Hematospermia
8. Evaluation for suspected recurrence in the prostatectomy bed in patients who have undergone prostatectomy
9. Ejaculatory dysfunction or painful ejaculation

Qualifications and Responsibilities of Personnel

Physicians interpreting or performing this type of ultrasound examination should meet the specified

AIUM Training Guidelines in accordance with AIUM accreditation policies.

Sonographers performing the ultrasound examination should be appropriately credentialed in the specialty area in accordance with AIUM accreditation policies.

Physicians not personally performing the examination must provide supervision, as defined by the Centers for Medicare and Medicaid Services Code of Federal Regulations 42 CFR §410.32.

Request for the Examination

The written or electronic request for an ultrasound examination must originate from a physician or other appropriately licensed health care provider or under the provider's direction. The clinical information provided should allow for the performance and interpretation of the appropriate ultrasound examination and should be consistent with relevant legal and local health care facility requirements.

Specifications of the Examination

The following practice parameters describe the examination of the prostate and surrounding structures.

Prostate

The transrectal approach to ultrasound of the prostate is the method of choice because the resulting image quality is superior to transabdominal or transperineal examinations. In patients for whom the transrectal approach is not possible, a transperineal ultrasound examination may be used to direct a biopsy procedure.¹⁴ A transabdominal approach can be useful to obtain an estimate of prostate size in some settings.

The prostate should be imaged in its entirety in at least two orthogonal planes, sagittal and axial or longitudinal and coronal, from the apex to the base of the gland. An estimated volume is determined from measurements in three orthogonal planes (volume = length × height × width × 0.52).^{15,16} The volume of the prostate may be correlated with the PSA level. Alternatively, prostate volume can be calculated using prostate planimetry, which allows

greater accuracy by accommodating individual variations in prostate shape.¹⁷

The gland should be evaluated for focal mass, echogenicity, symmetry, and continuity of margins. Color and power Doppler sonography may be helpful in detecting areas of increased vascularity that can be used to select potential sites for biopsy.¹⁸ A cine loop survey scan, taken in both longitudinal and transverse projections, can be obtained and stored with the rest of the study. The periprostatic fat and neurovascular bundle should be evaluated for symmetry and echogenicity. Demonstration of any interruption in the normal fat plane along the anterior perirectal space may be particularly important to aid characterization of malignant lesions in the prostate and for evaluation of periprostatic spread of cancer. The course of the prostatic urethra should be documented when possible, and asymmetry between left and right periurethral tissues as well as any effect on the base of the bladder should be noted.

Seminal Vesicles, Vasa Deferentia, and Perirectal Space

The seminal vesicles should be evaluated for size, shape, position, symmetry, and echogenicity from their insertion into the prostate via the ejaculatory ducts to their cranial and lateral extents. Particular attention should be given to the normal tapering of the seminal vesicle as it joins the prostate. In patients being evaluated for infertility, the vasa deferentia must be evaluated. The presence and size of seminal vesicle, ejaculatory, müllerian, or utricle cysts or evidence of seminal vesicle or ejaculatory duct obstruction should be noted.

Documentation

Accurate and complete documentation is essential for high-quality patient care. Written reports and ultrasound images/video clips that contain diagnostic information should be obtained and archived, with recommendations for follow-up studies if clinically applicable, in accordance with the *AIUM Practice Parameter for Documentation of an Ultrasound Examination*.

Equipment Specifications

Equipment

Endorectal ultrasound of the prostate should be conducted with a transrectal (also termed endorectal) transducer using the highest clinically appropriate frequency (usually 6 MHz or higher), realizing that there is a trade-off between resolution and beam penetration. Both side-fire and end-fire transducers may be used. A lower-frequency transducer may be necessary for transabdominal and transperineal examinations, which may be performed with curvilinear or sector transducers. Ultrasound-guided prostate biopsy can be performed with side-fire probe, end-fire probe, or biplanar or triplanar transducer configuration, acknowledging that transducer selection may vary with specific anatomic considerations.¹⁹

Care of the Equipment

The transrectal probe, after ultrasound gel application, must be covered by a disposable sheath prior to its insertion. Additional gel should be applied after covering the probe with a disposable sheath to aid in comfort with probe insertion and optimizing transducer to target interface. Following the examination and disposal of the sheath, the probe must be disinfected. The method of disinfection may vary by manufacturer recommendations and institutional practices. It is optimal to use a high-level disinfection protocol. Disposable accessory items used during the study must be discarded after each examination. Reusable accessory items should be processed or sterilized according to appropriate guidelines and procedures.

Quality and Safety

Policies and procedures related to quality assurance and improvement, safety, infection control, and equipment performance monitoring should be developed and implemented in accordance with the *AIUM Standards and Guidelines for the Accreditation of Ultrasound Practices*.

ALARA (As Low as Reasonably Achievable) Principle

The potential benefits and risks of each examination should be considered. The ALARA principle should be observed for factors that affect the acoustic output and by considering the transducer dwell time and total

scanning time. Further details on ALARA may be found in the current AIUM publication *Medical Ultrasound Safety*.

Infection Control

Transducer preparation, cleaning, and disinfection should follow manufacturer recommendations and be consistent with the AIUM's *Guidelines for Cleaning and Preparing External- and Internal-Use Ultrasound Transducers and Equipment Between Patients, Safe Handling, and Use of Ultrasound Coupling Gel*.

Equipment Performance Monitoring

Monitoring protocols for equipment performance should be developed and implemented in accordance with the AIUM's *Standards and Guidelines for the Accreditation of Ultrasound Practice*.

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