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The American College of Radiology will periodically define new practice parameters 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 parameters and technical standards will be reviewed for revision or renewal, as appropriate, on their fifth anniversary or sooner, if indicated.

Each practice parameter 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 and approval. The practice parameters 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 parameter and technical standard by those entities not providing these services is not authorized.

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ACR–AIUM–SPR–SRU PRACTICE PARAMETER FOR THE PERFORMANCE OF A THYROID AND PARATHYROID ULTRASOUND EXAMINATION

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 care¹. 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 physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the practice parameters, 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 practice parameters when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations of available resources, or advances in knowledge or technology subsequent to publication of the practice parameters. However, a practitioner who employs an approach substantially different from these practice parameters 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 practice parameters 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

¹ *Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing*, ___ N.W.2d ___ (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.

and safe medical care. The sole purpose of these practice parameters is to assist practitioners in achieving this objective.

I. INTRODUCTION

The clinical aspects contained in specific sections of this practice parameter (Introduction, Indications, Specifications of the Examination, and Equipment Specifications) were revised collaboratively by the American College of Radiology (ACR), the American Institute of Ultrasound in Medicine (AIUM), the Society of Pediatric Radiology (SPR), and the Society of Radiologists in Ultrasound (SRU). Recommendations for physician requirements, written request for the examination, procedure documentation, and quality control vary among the organizations and are addressed by each separately.

This practice parameter is intended to assist practitioners performing sonographic evaluations of the thyroid gland, parathyroid glands, and adjacent soft tissues. Occasionally, an additional and/or specialized examination with another modality may be necessary. While it is not possible to detect every abnormality, adherence to the following practice parameters will maximize the probability of detecting most abnormalities that occur in the thyroid and parathyroid glands.

II. INDICATIONS

Indications for a thyroid and parathyroid ultrasound (US) examination include, but are not limited to [1]:

1. Evaluation of the location and characteristics of palpable neck masses, including an enlarged thyroid.
2. Evaluation of abnormalities detected by other imaging examinations e.g., a thyroid nodule detected on computed tomography (CT), positron emission tomography (PET)-CT, magnetic resonance imaging (MRI), or seen on other ultrasound examination of the neck (e.g., carotid ultrasound).
3. Evaluation of laboratory abnormalities.
4. Evaluation of the presence, size, and location of the thyroid gland.
5. Evaluation of patients at high risk for occult thyroid malignancy.
6. Follow-up imaging of previously detected thyroid nodules, when indicated.
7. Evaluation for regional nodal metastases in patients with proven or suspected thyroid carcinoma prior to thyroidectomy.
8. Evaluation for recurrent disease or regional nodal metastases after total or partial thyroidectomy for thyroid carcinoma.
9. Evaluation of the thyroid gland for suspicious nodules prior to neck surgery for nonthyroid disease [2].
10. Evaluation of the thyroid gland for suspicious nodules prior to radioiodine ablation of the gland.
11. Identification and localization of parathyroid abnormalities in patients with known or suspected hyperparathyroidism [3,4].
12. Assessment of the number and size of enlarged parathyroid glands in patients who have undergone previous parathyroid surgery or ablative therapy with recurrent symptoms of hyperparathyroidism.
13. Localization of thyroid/parathyroid abnormalities or adjacent cervical lymph nodes for biopsy, ablation, or other interventional procedures.

14. Localization of autologous parathyroid gland implants.

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

Each organization addresses this requirement individually. ACR language is as follows:

See the [ACR–SPR–SRU Practice Parameter for Performing and Interpreting Diagnostic Ultrasound Examinations](#).

IV. WRITTEN REQUEST FOR THE EXAMINATION

Each organization addresses this requirement individually. ACR language is as follows:

The written or electronic request for a thyroid and parathyroid ultrasound examination 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's scope of practice requirements. (ACR Resolution 35, adopted in 2006)

V. SPECIFICATIONS OF THE EXAMINATIONS

A. The Thyroid Examination

The examination should be performed with the neck in hyperextension. The right and left lobes of the thyroid gland should be imaged in the longitudinal and transverse planes. Recorded images of the thyroid should include transverse images of the superior, mid, and inferior portions of the right and left thyroid lobes; longitudinal images of the medial, mid, and lateral portions of both lobes; and a transverse image of the isthmus. The size of each thyroid lobe should be recorded in three dimensions, anteroposterior (AP), transverse, and longitudinal. The thickness (AP measurement) of the isthmus on the transverse view should be recorded. Color or power Doppler examination can be used to supplement the grayscale evaluation of either diffuse or focal abnormalities of the thyroid. It is often necessary to extend imaging to include the soft tissue above the isthmus – for example, to evaluate a possible pyramidal lobe of the thyroid – or congenital abnormalities such as a thyroglossal duct cyst, or if any superior palpable abnormality is noted. The examination should also include a brief evaluation of the lateral neck compartments.

Thyroid abnormalities should be imaged in a way that allows for reporting and documentation of the following:

1. The location, size, number, and character of significant abnormalities, including measurements of nodules and focal abnormalities in three dimensions.
2. The localized or diffuse nature of any thyroid abnormality, including assessment of overall gland vascularity [5,6].

3. The sonographic features of any thyroid abnormality with respect to echogenicity, composition (degree of cystic change), margins (smooth or irregular), presence and type of calcification (if present), and other relevant sonographic patterns [7-19].
4. The presence and size of any abnormal lymph node in the lateral compartment of the neck (see section B below).

In patients who have undergone complete or partial thyroidectomy, the thyroid bed should be imaged in transverse and longitudinal planes. Any masses or cysts in the region of the bed should be measured and reported. Additionally, the lateral neck should be evaluated as described in section B.

Whenever possible, comparison should be made with other appropriate imaging studies.

Sonographic guidance may be used for aspiration or biopsy of thyroid abnormalities or other masses of the neck, or for other interventional procedures [20-22].

B. Cervical Lymph Node Evaluation

High resolution ultrasound examination of the neck is used for the staging of patients with thyroid cancer and other head and neck cancers, and in the surveillance of patients after treatment of such cancers [23-29]. In these patients, the size and location of abnormal lymph nodes should be documented. Suspicious features such as calcification, cystic areas, absence of central hilum, round shape and abnormal blood flow should be documented. The location of abnormal lymph node should be described according to the image based nodal classification system developed by Som et al which corresponds to the clinical nodal classification system developed by the American Joint Committee on Cancer and the American Academy of Otolaryngology – Head and Neck Surgery, or in a fashion that allows the referring clinician to convert the location of abnormal nodes to that system [30].

C. The Parathyroid Examination

Examination for suspected parathyroid enlargement should include images in the region of the anticipated parathyroid gland location. One of the important uses of parathyroid ultrasound is to try to localize parathyroid adenomas in patients with primary hyperparathyroidism to help with surgical planning [3,4].

The examination should be performed with the neck hyperextended and should include longitudinal and transverse images from the carotid arteries to the midline bilaterally, and extending from the carotid artery bifurcation superiorly to the thoracic inlet inferiorly. As parathyroid glands may be hidden below the clavicles in the lower neck and upper mediastinum, it may also be helpful to have the patient swallow during the examination with constant real-time observation. Color and/or power or spectral Doppler ultrasound may be helpful. The upper mediastinum may be imaged with an appropriate probe by angling under the sternum from the sternal notch. Rarely, parathyroid adenomas may also be intrathyroidal. Although the normal parathyroid glands are usually not visualized using available sonographic technology, enlarged parathyroid glands may be visualized. When visualized, their location, size, and number should be documented and measurements should be made in three dimensions. The relationship of any visualized parathyroid gland(s) to the thyroid gland should be documented, if applicable [2,31,32].

Whenever possible, comparison should be made with other appropriate imaging studies.

Sonographic guidance may be used for aspiration or biopsy of parathyroid abnormalities or other masses of the neck, or for other interventional procedures.

VI. DOCUMENTATION

Each organization addresses this requirement individually. ACR language is as follows:

Adequate documentation is essential for high-quality patient care. There should be a permanent record of the ultrasound examination and its interpretation. Comparison with prior relevant imaging studies may prove helpful. Images of all appropriate areas, both normal and abnormal, should be recorded. Variations from normal size should generally be accompanied by measurements. Images should be labeled with the patient identification, facility identification, examination date, and image orientation. An official interpretation (final report) of the ultrasound examination should be included in the patient's medical record. Retention of the ultrasound examination images should be consistent both with clinical need and with relevant legal and local health care facility requirements.

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

VII. EQUIPMENT SPECIFICATIONS

Thyroid and parathyroid studies should be conducted with a linear transducer. The equipment should be adjusted to operate at the highest clinically appropriate frequency, realizing that there is a trade-off between resolution and beam penetration. For most patients, mean frequencies of 10 to 14 MHz or greater are preferred, though some patients may require a lower frequency transducer for depth penetration. If the gland is deep or extremely enlarged, a curved linear transducer may be necessary. Resolution should be of sufficient quality to evaluate the internal morphology of visible lesions. Doppler frequencies should be set to optimize flow detection. Diagnostic information should be optimized, while keeping total sonographic exposure as low as reasonably achievable.

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

Each organization addresses this requirement individually. ACR language is as follows:

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 *Position Statement on QC & Improvement, Safety, Infection Control, and Patient Education* on the ACR website (<http://www.acr.org/guidelines>).

Equipment performance monitoring should be in accordance with the [ACR Technical Standard for Diagnostic Medical Physics Performance Monitoring of Real Time Ultrasound Equipment](#).

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