Managing Incidental Thyroid Nodules Detected on Imaging: White Paper of the ACR Incidental Thyroid Findings Committee

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The incidental thyroid nodule (ITN) is one of the most common incidental findings on imaging studies that include the neck. An ITN is defined as a nodule not previously detected or suspected clinically, but identified by an imaging study. The workup of ITNs has led to increased costs from additional procedures, and in some cases, to increased risk to the patient because physicians are naturally concerned about the risk of malignancy and a delayed cancer diagnosis. However, the majority of ITNs are benign, and small, incidental thyroid malignancies typically have indolent behavior. The ACR formed the Incidental Thyroid Findings Committee to derive a practical approach to managing ITNs on CT, MRI, nuclear medicine, and ultrasound studies. This white paper describes consensus recommendations representing this committee's review of the literature and their practice experience.

Key Words: Incidental findings, thyroid nodule, thyroid cancer, imaging, incidentaloma

J Am Coll Radiol 2014;■:■-■.

FOREWORD

This white paper is not meant to comprehensively review the interpretation and management of thyroid nodules, but to provide general guidance for managing incidentally discovered thyroid nodules (ITNs). Individual care will, of course, vary depending on each patient's specific circumstances, the clinical environment and available resources, and the judgment of the practitioner. In addition, the term "guidelines" has intentionally not been used in this white paper, to avoid the implication that the contents represent a component of the ACR Practice Parameters and Technical Standards, or of the ACR Appropriateness Criteria; they do not. This white paper represents the collective experience of the Incidental Thyroid Findings Committee and does not represent official ACR policy. For these reasons, this white paper should not be used to establish the legal standard of care in any particular situation.

INTRODUCTION

Although the rapid increase in use of imaging examinations in the past 30 years has abated, continued improvements in the quality of images, along with concerns about litigation and other factors, have led to a high number of incidental findings reported by radiologists [1,2]. The ITN is one of the most common incidental findings on imaging studies that include the neck. It is defined as a nodule identified by an imaging study that was not previously detected or suspected clinically. There is currently a paucity of guidance from professional organizations on management of ITNs, and high variability in reporting of ITNs by radiologists [3-5].

Added to the problem of an increased rate of reporting of ITNs, and variability in reporting, is the accessibility of thyroid nodules to biopsy and the low threshold for biopsy. Fine-needle aspiration (FNA) is a very effective and safe test for determining the histology of the ITN. However, unless the cytology result is definitively benign or malignant, patients may embark on a process of further investigations and procedures that may include surveillance, repeat biopsy, and diagnostic surgery. This process results in anxiety and

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1546-1440/14/$36.00 • http://dx.doi.org/10.1016/j.jacr.2014.09.038

potential morbidity for the patient, and is a cumulatively costly problem for the health care system.

PROJECT OBJECTIVES

The objective of this project was to develop medically appropriate approaches to managing ITNs detected on a variety of imaging modalities. Benefits anticipated from this effort include the following:

- Distinguishing between ITNs that do versus do not require dedicated thyroid ultrasound;
- Reducing the downstream risks and costs by reducing the likelihood that an ITN will lead to a dedicated thyroid ultrasound and potential consequences following FNA;
- Achieving greater consistency in recognizing, reporting, and managing ITNs;
- Providing guidance to radiologists who are concerned about not reporting or recommending further workup of ITNs that later prove to be clinically important; and
- Helping focus research efforts to lead to an evidence-based approach to ITNs.

PROJECT HISTORY AND CONSENSUS PROCESS

The Incidental Thyroid Findings Committee (hereafter the Committee) was formed under the auspices of the ACR in 2013. The intent was to develop guidance analogous to the white papers produced by the ACR Incidental Finding Committee on abdominal and pelvic incidental findings on CT and MRI [6,7].

The Committee participants were recruited from members of the ACR and included academic and private practice radiologists with subspecialties in sonography, abdominal imaging, neuroradiology, and chest imaging. Three subcommittees were established to address management of ITNs detected on CT and MRI, nuclear medicine, and ultrasound. Each subcommittee was tasked with developing modality-specific guidance based on review of the literature and practice experience. The recommendations were submitted to other subcommittee members for further comments and discussion. After multiple revisions, the draft was distributed to the entire Committee for additional review to achieve consensus and arrive at a final manuscript.

ELEMENTS, RECOMMENDATIONS, AND FLOWCHARTS

In the flowcharts within this white paper, the algorithms use yellow boxes for steps that involve data that affect management; green boxes to represent action steps; and red boxes to indicate that no further action is required. Radiologists are unlikely to be aware of all relevant clinical factors at the time an ITN is discovered. However, these recommendations do not apply to patients with increased risk for thyroid carcinoma, those who may be symptomatic from thyroid disease, or pediatric patients.

The Committee recognizes that radiologists will have different preferences regarding whether and how to report ITNs. If the ITN does not meet criteria for further evaluation according to the flowcharts, the Committee believes that determination of whether the ITN is mentioned in the body of the radiology report should be left to the discretion of the radiologist. However, the Committee recommends against both mentioning an ITN in the Impression/Conclusion section of the report, and recommending further evaluation or follow-up imaging, if the ITN does not meet criteria for further evaluation.

NATURE AND SCOPE OF THE PROBLEM

Prevalence of ITNs and Risk of Malignancy

Thyroid nodules are very common in the adult population. A large autopsy study published in 1955 found that 50% of patients with no clinical history of thyroid disease had thyroid nodules, and the majority were multiple [8]. Like autopsy, imaging can reveal subclinical thyroid nodules. With increased use of imaging for screening, diagnosis, and treatment response evaluation over the past three decades, ITNs have become a common finding that may be recommended for workup. ITNs are seen in 20%-67% of ultrasound studies [9,10], up to 25% of contrast-enhanced chest CT scans [11], and 16%-18% of CT and MR scans of the neck [12,13]. Two large systematic reviews found that prevalence of ITNs on Fluorodeoxyglucose (^{18}FDG)-PET scans is lower, at 1%-2% [14,15].

The malignancy rate in ITNs depends on the techniques used to diagnose malignancy and the nodule workup rate. Harach et al [16] searched for thyroid cancer at autopsy and found occult papillary cancers in 36% of 101 thyroid glands. Therefore, the fact that a significant portion of patients with ITNs who receive workup will be diagnosed with malignancy is not surprising. Malignancy rates of ITNs detected by imaging vary widely depending on selection biases in the studies. In one ultrasound report, the malignancy rate was 12% in a cohort that included only ITNs that underwent biopsies [17], but in a population-based study that linked patients who had thyroid ultrasound to a cancer registry, the malignancy rate was 1.6% in patients with $\geq$1 thyroid nodules [18]. The malignancy rate of ITNs detected on CT and MRI ranges from 0% to 11% [12,13,19,20], whereas the malignancy rate of ITNs with focal uptake on FDG-PET scans is much higher, at 33%-35% [14,15].

Problems with Initiating Workup

Although FNA of ITNs carries minimal risk to the patient, the inability of cytology to definitively establish a benign diagnosis in a subset of nonmalignant nodules may expose a substantial number of patients to repeat biopsy or lead to diagnostic surgical removal of benign