THOSE PESKY THYROID NODULES

Michael D. Kwong, MD

Thyroid nodules are very common and often are incidental findings on chest CT, cervical spine MRI, or carotid ultrasounds. These are usually asymptomatic, not palpable on exam, and the chronicity or stability is unknown. These can be cystic or solid and often multiple nodules are present scattered throughout the gland. Most thyroid nodules are benign, however, approximately 10% of nodules are cancerous. This means an estimated 37,000 cases of thyroid cancer are diagnosed each year. In fact, the rate seems to be increasing. This may be due to the improved imaging which allows for earlier detection at a smaller size, increased awareness and vigilance of care providers, and possibly from increased exposure to ionizing radiation including CT scans.

Known risk factors for thyroid cancer include exposure to radiation, personal or family history of thyroid goiter or cancer, and certain inherited genetic syndromes such as multiple endocrine neoplasia, familial adenomatous polyposis, and familial medullary thyroid cancer. They occur more frequently in patients with nodules who are younger than 20 or older than 60 as compared to those between 20-60. When symptoms develop, it can include a new or enlarging palpable mass, dysphagia, odynophagia, hoarseness or changes to voice, or adjacent adenopathy.

Managing thyroid nodules

The imaging evaluation of thyroid nodules following physical exam and laboratory studies should start with a thyroid ultrasound. This high resolution evaluation will allow characterization of the nodule size, morphology, echogenicity, internal vascularity and whether there is a “halo” sign, assess for microcalcifications, and characterize the borders. Sometimes the ultrasound can show characteristically benign findings such as a comet tail artifact arising from echogenic foci which is indicative of the colloid crystals of benign nodules. A cystic lesion and multiplicity of nodules are more favorable signs, but thyroid cancers can occur in all nodules. When a nodule is confirmed to be solid and has indeterminant characteristics, a nuclear medicine thyroid scan can be performed to assess whether the nodule is “hot”, “warm”, or “cold”. A cold nodule would be more concerning for cancer whereas a hot nodule is more likely a hyperfunctioning benign lesion. The ultrasound and nuclear medicine thyroid scan are complimentary tests, one assesses the physical nature and the other assesses the physiological nature of a lesion.

The Society of Radiologists in Ultrasound convened a special panel of medical experts to address this topic and published a consensus conference statement in 2005 with these recommendations:

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<tr>
<th>U/S FEATURE</th>
<th>RECOMMENDATION</th>
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<tbody>
<tr>
<td>Solitary nodule - Microcalcifications</td>
<td>Strongly consider US guided FNA if &gt; 1 cm</td>
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<tr>
<td>Solid (or almost entirely solid) or coarse calcifications</td>
<td>Strongly consider US guided FNA if 1.5 cm</td>
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<tr>
<td>Mixed solid and cystic or almost entirely cystic with solid mural component</td>
<td>Consider US-guided FNA if &gt; 2 cm</td>
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<tr>
<td>None of the above, but substantial growth since prior US examination</td>
<td>Consider US-guided FNA</td>
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<tr>
<td>Almost entirely cystic and none of the above and no substantial growth (or no prior US)</td>
<td>US-guided FNA probably unnecessary</td>
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<tr>
<td>Multiple nodules</td>
<td>Consider US-guided FNA of one or more nodules, with selection prioritized on basis of criteria (in order listed) for solitary nodule*</td>
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When more than one nodule meets the criteria for biopsy, typically the most concerning nodule is chosen for biopsy. Often in a multinodular gland, one from each side is biopsied. At the Cary IR Center, all of our fellowship trained interventional radiologists carefully review each case prior to the procedure and obtains additional targeted history from the patient to guide our management. In addition, all biopsy results are reviewed and correlated back to the imaging findings to ensure that the pathologic results are concordant with the imaging. These results are then forwarded to the referring physician by fax and the referring physician is sometimes called to discuss unusual cases. By having radiology-pathology correlation on each case, our IR physicians have gain invaluable experience and insight into assessing thyroid nodules over the years. Take the following case for example: This patient of Dr. Burns from Chapel Hill presented with multiple thyroid nodules for biopsy. Typically, the largest nodule is biopsied or the largest from each side. However, following an interview with the patient and reviewing all her imaging in the CIR Center on the day of the procedure, a third lesion caught the attention of the IR physician. This was not the largest nor the most suspicious on either side based on written criteria, however, a gut feeling (the presence of irregular macro-calcifications) noted from reviewing the ultrasound led to a biopsy of this third lesion in addition to the dominant nodules. This was pathologically proven to be a small papillary carcinoma whereas the two other more dominant lesions proved to be benign.

Image 3 demonstrates a dominant complex nodule on the left side of the same patient with internal micro-calcifications. Micro-calcifications are typically more suspicious than macro-calcifications. However, this was proven to be a benign colloid nodule on the biopsy.

Images 1 and 2 demonstrate a solid complex nodule with shadowing macro-calcifications. Although this lesion is smaller than the dominant nodule, the irregular appearance of the macro-calcifications raised our concern. This was proven to be a papillary carcinoma on the biopsy.
Radiology Education Program for Physicians and Staff in November

On November 7, 2009, Wake Radiology will offer a one-day CME program – Radiology Today: How to Effectively Utilize State-of-the-Art Imaging in the Treatment of Your Patients. The sessions, designed for physicians, physician assistants and nurse practitioners, will be taught by radiology staff from Wake Radiology and Duke University Medical Center. Participants will learn how to select the best imaging studies – MRI, CT, PET·CT and ultrasound — for the most common patient symptoms, such as headaches, acute abdominal pain, flank pain, leg pain, acute chest pain and shortness of breath. Course objectives are:

- Discuss the use of ultrasound versus MRI for conditions associated with the female pelvis.
- Describe indications for use of Breast MRI.
- Outline which neurologic conditions are best evaluated with CT and which by MRI.
- Choose the most accurate and effective modality among ultrasound, CT, MRI and PET-CT in the diagnosis of abdominal pathology.
- List approved indications for ordering PET-CT.
- Given the uniqueness of children, discuss the correct preparation and use of imaging in diagnosing the cause of rectal bleeding, such as intussusceptions, Meckel’s diverticulum, etc.
- Discuss the most appropriate imaging modality for children with a UTI.

Radiology Today:
How to effectively utilize state-of-the-art imaging in the treatment of your patients

Saturday, November 7, 2009
Registration: 8:00am Course: 8:30am to 5:00pm
AMA PRA Category 1 credits: 7 contact hours
Wake AHEC CEU: 7 (7 contact hours)

Target Audience
Internal Medicine, Family Practice and Emergency Physicians, Physician Assistants, Nurse Practitioners, and Registered Nurses

Register Online Today
wakeahec.org
Brochures are available from your RSM!

Wake Radiology is a Year-Round Sponsor of Komen
Wake Radiology has forged a year-long partnership with Komen NC Triangle. Our practice not only actively participates in the annual Race for the Cure, held each June, we also support educational events throughout the year that bring more awareness in the community about breast cancer.

On August 7, Wake Radiology hosted a grantee luncheon for the Comfort Suites in Cary for the 2009 Komen NC Triangle grant recipients of which 36 representatives attended. Kerry Chandler, MD, director of Wake Radiology Breast Services, presented “An Overview of Breast Cancer Diagnostic Imaging” that was well received by the audience. Dr. Chandler’s talk detailed the sequence of breast imaging and explained some of the newer technologies – Breast Specific Gamma Imaging (BSGI) and Breast MRI, which provide a more definitive diagnosis for some women. The information will be helpful for the grantees to use in educating women who are uninsured or underinsured concerning all imaging options available for the diagnosis of breast cancer.

Pam Blondin, executive director, Nadine J. Barrett, director of community programs, and Julie Steel, manager of grants & education, from Komen Triangle NC, were in attendance.

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Types of Thyroid Cancer

The type of thyroid cancer determines treatment and prognosis:

- **Papillary thyroid cancer** – The papillary type of thyroid cancer is the most common, making up about 80 percent of all thyroid cancer diagnoses. Papillary thyroid cancer can occur at any age, but is most commonly diagnosed in people ages 30 to 50.

- **Follicular thyroid cancer** – Follicular thyroid cancer also includes Hurthle cell cancer. Follicular thyroid cancer typically occurs in people older than 50.

- **Medullary thyroid cancer** – Medullary thyroid cancer may be associated with inherited genetic syndromes that include tumors in other glands. Most medullary thyroid cancers are sporadic, meaning they aren’t associated with inherited genetic syndromes.

- **Anaplastic thyroid cancer** – The anaplastic type of thyroid cancer is very rare, aggressive and very difficult to treat. Anaplastic thyroid cancer typically occurs in people age 60 or older.

- **Thyroid lymphoma** – Thyroid lymphoma begins in the immune system cells in the thyroid. Thyroid lymphoma is very rare. It occurs most often in adults age 70 or older.

The treatment and management of the individual types of thyroid cancer is beyond the scope of this article.

Our interventional staff is available to schedule a patient for a thyroid biopsy or to answer any questions you may have about this procedure, please call us at 919-854-2180.

About Michael D. Kwong, MD
Dr. Kwong joined Wake Radiology in 2003 as a vascular and interventional radiologist. He is certified in diagnostic radiology by The American Board of Radiology.