Thyroid Nodule Assessment

Thyroid nodules can be identified on physical exam or incidentally on imaging for another indication. There are various etiologies for thyroid nodules, some benign and some malignant, so it is important to investigate further when they are discovered. Initial work-up includes a serum thyroid stimulating hormone (TSH) and an ultrasound of the thyroid gland. Depending on the findings, further testing may include fine needle aspiration (FNA), radioactive iodine uptake (RAIU), and serum triiodothyronine (T3) and thyroxine (T4). Routine monitoring of a thyroid nodule is recommended with ultrasound 6-18 months after diagnosis.



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Initial Tests

Thyroid-Stimulating Hormone (TSH)
TSH-tissue
Made by the anterior pituitary, thyroid stimulating hormone (TSH) stimulates the thyroid gland to produce the thyroid hormones T4 and T3. TSH levels are measured to assess function of the thyroid gland and the other glands that interact with it; if normal then the patient is euthyroid, while too low or too high values suggest a pathologic process.

Ultrasound
Ultrasound-machine
Assessing initial size, position, and characteristics of a nodule with ultrasound is important to establish a baseline to monitor for future changes. It is currently not standard of care as it cannot distinguish between benign or malignant nodules, but considering its ease of use and lack of harm to the patient, its utility is increasing.

Normal / Elevated TSH

Fine Needle Aspiration
Fine Needle and Aspiration-ass
If the initial TSH value is normal or increased, a biopsy via fine-needle aspiration (FNA) is recommended. The procedure involves inserting a thin needle into the thyroid nodule, allowing for collection of a tissue sample. Ultrasound is often used to guide the needle placement. This biopsy is examined by a pathologist and determined to be either benign, suspicious, malignant, or indeterminate, and need for further testing or treatment is then evaluated.

Most Accurate Test
Accuracy Chart
FNA is considered the most accurate test because it allows for direct microscopic visualization of the thyroid nodule cells to determine if there is any pathology present. The biggest variable is the experience of the pathologist evaluating the biopsy.

Decreased TSH

Radioactive Iodine Uptake (RAIU)
Radioactive-guy with Iodine Uptake-tube
If TSH is decreased, the next assessment step is radioactive iodine uptake (RAIU) study, also known as thyroid scintigraphy or radionuclide thyroid scan. This test involves the use of radioisotopes of iodine that are administered to a patient, taken up by normal thyroid follicular cells, and concentrated to produce what is known as a hot nodule when viewed on imaging.

Hot Nodules Rarely Malignant
Hot Knob with Rare-steak and Malignant-man
Hot nodules usually indicate normally functioning cells. However, cancer cells like those in follicular thyroid carcinomas are nonfunctional and exhibit poor uptake of the radioisotopes, and thus appear as a cold nodule on thyroid scintigraphy. If a cold nodule is identified, FNA biopsy is indicated.

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Free T3 and T4

Tea (3) Tree and Tea (4) Fork

Levels of these hormones are checked if it is found that the nodule is hot (functioning). If TSH is decreased but thyroid hormones are elevated, it implies that there could be a toxic adenoma present or another various cause of hyperthyroidism.

Considerations

Repeat Ultrasound 6 -18 Months

Ultrasound-machine with (6) Sax, (18) ID and Month-moon

If a thyroid nodule is determined to be benign, routine monitoring for changes with ultrasound is recommended within 6 to 18 months, and if no changes are present, monitoring intervals can be spaced years apart.

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