Thyroid Nodules – 2. Evaluation and Treatment.

Once the diagnosis of a thyroid nodule has been made, how does one clarify the type of nodule and design an appropriate treatment plan? A thorough analysis of the situation is necessary to distinguish the majority of thyroid nodules that are probably harmless (and can be conservatively monitored) from the occasional nodule that is making too much thyroid hormone and the rare nodule that contains cancer.

One of the first questions to consider is whether or not the nodule is making thyroid hormones (triiodothyronine [T3] and/or thyroxine [T4]), and if so, is hormone production excessive. This is done by measuring the blood Thyroid Stimulating Hormone (TSH) level. The TSH hormone is made by the pituitary gland and levels vary inversely with T3 and T4 levels. Provided the patient does not have pituitary disease, a low TSH level indicates that thyroid hormone levels are too high. The converse is also true; if the TSH level is high (again, assuming the patient does not have pituitary disease) then the thyroid hormone levels are too low. If the TSH level is abnormal, then the thyroid hormone levels should also be measured.

The thyroid sonogram test is also important in the initial evaluation of thyroid nodules. The thyroid sonogram is the best way to evaluate the anatomy of the thyroid and visualize the nodules. This is a relatively inexpensive and harmless test that uses sound waves to generate images of the thyroid gland and any nodules it contains. Much important information is obtained from the thyroid sonogram, including the total number of nodules as well as nodule size, shape, and composition. The physician interpreting the sonogram should provide as much descriptive information as possible about the nodule because this information provides clues about the risk of cancer. Relevant sonographic nodule characteristics include the presence of calcifications (microcalcifications, coarse calcifications, rim calcifications), so-called comet tails (caused by calcification), cystic structure (entirely fluid-filled), solid structure, or mixed solid and cystic structure, tissue sonographic density ("echogenicity," low, medium, or high), presence of increased blood flow (central or peripheral), presence of a "halo," type of margin (well defined vs. poorly defined or ragged), shape (round or oval, and if oval, is the front-back axis longer than the left-right or the top-bottom axis), and size (small, medium, large).

If the TSH level is definitely low and the T3 and/or T4 levels are too high, then the nodule is probably making too much thyroid hormone (hot nodule). This is confirmed with another imaging test, thyroid scintigraphy. This test involves the administration of a nontoxic radioactive tracer that is concentrated by the nodule, followed by measurement of tracer uptake and imaging. In the past, this test was done using technetium-99m as the tracer, but more recently the use of iodine-123 has been favored because it provides more useful information. Hot nodules almost never contain cancer, but they need to be destroyed (ablated) because the excess thyroid hormone production causes health problems. The preferred ablation options are usually radioactive iodine-131 or surgical removal. In certain special situations, anti-thyroid drugs such as methimazole or propylthiouracil can be used. Ethanol injection and laser ablation are two newer methods of treatment – these methods work, but appear to be less effective in curing hyperthyroidism compared to iodine-131 treatment. Occasionally, the TSH level can be borderline low and both the T3 and T4 levels are normal. In this borderline situation, selected stable patients can be safely monitored without treatment.

If the TSH, T3, and T4 levels are normal (i.e. the nodule is not "hot"), then the possibility of thyroid cancer needs to be considered. This situation is where the sonographic features of the nodule are especially helpful. If the sonographic features of the nodule are considered "low risk," then the nodule can be safely observed over time. But if the nodule does not have a low risk appearance, then needle aspiration biopsy of the nodule is usually recommended.

For more on needle aspiration biopsy of thyroid nodules, see my next post.