

THYROID FNA – A FIRST LINE TEST

Thyroid nodules are a common clinical finding. Palpable thyroid enlargement occurs in 4-7% of the general adult population and 0.2-1.8% of the pediatric population. In addition to the clinically palpable nodules, non-palpable thyroid nodules can be detected by ultrasound. These masses are usually incidental findings and are on the order of ten times more frequent than palpable masses. Some of these non-palpable masses can be quite large in size and are still not palpable due to the deep or substernal location of the mass. Almost any disease of the thyroid can present as a nodule, even diseases that classically have diffuse morphology.

Unfortunately, distinguishing benign from malignant disease can be difficult. Clinical history, physical examination, routine laboratory, and imaging studies offer no definitive diagnostic features one way or the other. Given that the vast majority of thyroid nodules are benign, routine excision of thyroid masses to evaluate for cancer is an untenable proposition, exposing an inordinate number of patients to surgical morbidity. Fine needle aspiration biopsy of thyroid masses, both palpable and non-palpable, has emerged as a rapid, simple means for identifying thyroid cancers, offering a front line diagnostic tool.

Clinical Features

Thyroid cancer accounts for approximately 1% of all visceral cancers per year. Less than one patient in ten who receives a diagnosis of thyroid cancer dies of it.

Family History: Patients with a family history of medullary carcinoma or multiple endocrine neoplasia (MEN) are at an increased risk of developing thyroid carcinoma. There is also a rare familial form of papillary carcinoma.

Gender: Thyroid nodules are more common in women than men (4:1). Although thyroid carcinoma is more common in women, the ratio of carcinoma in women to men is approximately 2:1. Thus, a man with a thyroid mass has a relative risk of 2-3 times greater than a woman for having thyroid cancer.

Age: A thyroid nodule is more likely to be malignant in young and elderly patients. The most aggressive forms of thyroid cancer occur in the older ages groups. Prognosis of thyroid cancer is worse in later life and age is one of the most important prognostic factors in thyroid cancer.

Radiation: A history of radiation exposure to the head and neck increases the risk of thyroid cancer. This includes environmental radiation (nuclear reactors and radioactive fallout), therapeutic radiation for acne, tonsillitis, tumors, and enlarged thymus. The cancer risk is dose dependent. Radioactive iodine therapy has not been proven to cause thyroid carcinoma.

Diet: Dietary goitrogens such as iodine deficiency, calcium and fluoride in the water, and vegetables such as cabbage, cauliflower, brussel sprouts and turnips do not increase the risk of thyroid cancer.

Symptoms: Local symptoms such as pressure, obstruction, dysphasia and pain are not associated with an increased risk of thyroid cancer. However, hoarseness could indicate recurrent laryngeal nerve involvement by tumor or could be secondary to a large goiter causing stretching or compression of the nerve.

Physical Examination: Sudden enlargement of a thyroid mass is of concern, but can be due to hemorrhage into a benign nodule. On the other hand, masses that have been stable in size for years can harbor malignancy.

Physical characteristics that favor a malignancy include a solitary nodule, hardness, irregular outline, and fixation to adjacent structures. Unfortunately many of these characteristics are difficult to ascertain on physical examination. As many as three-quarters of thyroid nodules thought to be solitary clinically, actually represent a dominant nodule of a non-neoplastic multi-nodular goiter. Conversely, the presence of a multinodular gland does not exclude a malignancy.

In summary, the physical characteristics of thyroid nodules are poor indicators of their malignant potential; goitrous

nodules can be huge; malignant nodules can be tiny (occult). Cystic papillary carcinoma may be soft, while benign masses can be rock hard due to benign calcification.

Diagnostic Studies

Ultrasound: Ultrasound can determine if a lesion is solid, cystic, or mixed solid/cystic, a finding that can be helpful, but not diagnostically definitive. Malignancy is most likely in solid masses (21%). Cystic lesions have a 7% risk, and mixed nodules 12%. Recurring cysts have a higher risk of harboring carcinoma. Unfortunately, ultrasound can be misleading: Cystic lesions can appear to be solid due to debris in the fluid and solid appearing lesions may in fact be cystic. Sonography can be useful in following up patients with benign cytologic findings to detect nodule growth or recurrence.

Nuclear Scan: Radionuclide scanning is used to determine which nodules are hyperfunctional (hot), hypofunctional (cold), or relatively normally functioning (warm). The basic assumption is that thyroid carcinoma does not metabolize iodine normally, and therefore produces a cold nodule. In studies by Ashcroft and Gharib, the risk of malignancy in cold nodules was 16%, warm nodules 9%, and hot nodules 4%. Thus, scanning cannot reliably separate benign from malignant disease.

Laboratory Studies: Blood tests are generally not very helpful in determining which patients may have thyroid cancer. Generally, thyroid cancer produces neither hyperthyroidism nor hypothyroidism.

Antithyroid antibodies are useful in confirming a cytologic diagnosis of Hashimoto's thyroiditis. However, elevated levels do not exclude thyroid cancer since the two diseases can coexist. Thyroglobulin may be increased in follicular and papillary carcinomas. However, benign diseases such as Graves' disease, nontoxic goiters, and various forms of thyroiditis can also be associated with an elevated serum thyroglobulin level. FNA biopsy can cause spurious elevation of thyroglobulin; therefore, if thyroglobulin levels are needed, the thyroglobulin measurement should be made prior to an aspiration biopsy. Serum thyroglobulin, however, serves as an excellent marker for recurrence of papillary or follicular carcinoma. Calcitonin is elevated in about three quarters of patients with medullary carcinoma.

Summary

The accuracy of clinical, biochemical and radiological investigations in distinguishing between benign and malignant nodules is rather poor. Thyroid FNA is a minimally invasive procedure, and is an ideal first-line test in the evaluation of a thyroid mass. Multiple reviews have shown FNA to achieve a diagnostic accuracy of over 90% in terms of predictive value, specificity, and efficiency in the diagnosis of a neoplasm.

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COMPANY PROFILE

OUTPATIENT CYTOPATHOLOGY CENTER (OCC) is an independent pathology practice, accredited by the College of American Pathologists, that specializes in performing and interpreting fine needle aspiration biopsy specimens. The practice was established in 1991 in Johnson City, Tennessee. Patients may be referred for aspiration biopsy of most palpable masses as well as for aspiration of non-palpable breast and thyroid masses that can be visualized by ultrasound. OCC is a participating provider with most insurance plans. Our primary referral area includes Tennessee, Virginia, West Virginia, North and South Carolina, and Georgia.

DR. ROLLINS

SUSAN D. ROLLINS, M.D., F.I.A.C. is Board Certified by the American Board of Pathology in Cytopathology, and in Anatomic and Clinical Pathology. Additionally, in 1994 she was inducted as a Fellow in the International Academy of Cytology. She began her training under G. Barry Schumann, M.D. at the University of Utah School of Medicine, subsequently completed a fellowship in Cytopathology under Carlos Bedrossian, M.D. at St. Louis University School of Medicine, and has completed a fellowship in Clinical Cytopathology under Torsten Lowhagen, M.D. at the Karolinska Hospital in Stockholm, Sweden. The author of numerous articles in the field of cytopathology, Dr. Rollins also has served as a faculty member for cytopathology courses taught on a national level.

OFFICE

OUTPATIENT CYTOPATHOLOGY CENTER

2400 Susannah Street Suite A
Johnson City, TN 37601
(423) 283-4734
(423) 610-0963
(423) 283-4736 fax
fna4321@mac.com

Mailing Address:
PO Box 2484
Johnson City, TN 37605-2484

Monday – Friday
8:00 am to 5:00 pm

DR. STASTNY

JANET F. STASTNY, D.O. is Board Certified by the American Board of Pathology in Anatomic Pathology and has specialty boards in Cytopathology. She completed a pathology residency at the University of Cincinnati and subsequently a one-year fellowship in cytopathology and surgical pathology at the Virginia Commonwealth University / Medical College of Virginia. She was on the faculty at the University for 7 years specializing in gynecologic pathology and cytopathology. She has written numerous articles in the field of cytopathology and gynecologic pathology and has taught cytopathology courses at national meetings. She is currently involved on national committees dealing with current issues concerning the practice of cytology.