A PET/CT THAT IS NEGATIVE MAY BE A COST-EFFECTIVE MODALITY TO AVOID UNNECESSARY SURGERY FOR NODULES WITH NONDIAGNOSTIC CYTOLOGY


SUMMARY

BACKGROUND

Many patients with thyroid nodule fine-needle aspiration (FNA) cytology that is classified as nondiagnostic are put through surgery despite having a benign nodule. This article examines the role of ¹⁸F-fluorodeoxyglucose–positron-emission tomography/computed tomography (¹⁸F-FDG–PET/CT) as a tool to determine whether the nodule can be classified as benign despite the nondiagnostic cytology. It should be noted that the nondiagnostic category is not the indeterminate category. Nondiagnostic usually implies insufficient material for diagnosis and is reported in 5% to 20% of FNA biopsies.

METHODS

In this study, 1648 patients with normal thyrotropin (TSH) levels and a single thyroid nodule >10 mm with suspicious ultrasound characteristics (hypoechoic nodule, >10 mm, irregular margins, chaotic intranodular vascular spots, a shape that was round or more tall than wide, microcalcifications) underwent ultrasound-guided FNA between January 2006 and June 2010. Patients had ¹⁸F-FDG–PET/CT after a 6-hour fast. Any visually discernible ¹⁸FDG uptake within the thyroid nodule (above thyroid tissue background) was classified as positive.

RESULTS

A total of 151 of the 1648 patients (9.2%) had nondiagnostic results and FNA was repeated. Of these 151 patients, 88 (58%) had results that were still nondiagnostic and were enrolled in the study (61 women, 27 men; mean ±SD age, 43.5±11.7 years; range, 18 to 79). All 88 patients had ¹⁸F-FDG-PET/CT before they were sent for surgery, and all 88 underwent lobectomy. Histologic analysis of the surgical specimen showed 29 patients (33%) with malignant lesions and 59 (67%) with benign lesions.

Twenty-nine patients with thyroid malignancies had a positive ¹⁸F-FDG–PET/CT scan with focal ¹⁸FDG uptake within the nodule. Among 59 patients with histologically proven benign nodules, 35 displayed no uptake, 16 displayed focal uptake, and 8 (all affected by autoimmune thyroiditis) displayed diffuse or diffuse plus focal uptake.

The sensitivity of ¹⁸F-FDG–PET/CT was 100%, the specificity 69%, the accuracy 79%, the positive predictive value 62%, and the negative predictive value 100%.

CONCLUSIONS

A negative ¹⁸F-FDG–PET/CT scan rules out malignancies among thyroid nodules with nondiagnostic cytology and can serve as a basis to avoid surgical excision. Surgery is still necessary to distinguish benign from malignant disease in nodules that are FDG-positive. Unnecessary surgery could have been reduced from 88 to 41 patients (46%) in this study.

COMMENTARY

¹⁸F-FDG–PET/CT is mainly used in the evaluation of patients with metastatic cancer. The role of ¹⁸F-FDG–PET/CT in the treatment of thyroid cancer is limited, and it is used primarily in the postoperative surveillance of patients with differentiated thyroid cancer with positive thyroglobulin and negative radiiodine scans (1). Other indications are initial staging and follow-up of high-risk patients with poorly differentiated thyroid cancer with negative continued on next page
radioidine scans (2). ¹⁸F-FDG–PET/CT also is useful, though somewhat limited, in the evaluation of thyroid nodules with suspicious features on ultrasound.

The ATA guidelines state that patients with nondiagnostic FNA should get a second FNA that is ultrasound-guided (2). The second FNA should be performed 3 months after the initial test (3). If the nodule is partially cystic with some suspicious characteristics, one may elect to follow the patient closely or recommend surgical excision, whereas a solid nodule should be more strongly considered for surgical evaluation after two nondiagnostic FNAs (2, 3). FNA is nondiagnostic in 5% to 20% of cases (4) and repeat FNA under ultrasound guidance may provide a diagnostic specimen in 75% of solid nodules and 50% of cystic nodules (5). A third ultrasound-guided FNA is less likely to be diagnostic.

Because only 6% to 20% of patients who have thyroid nodules with nondiagnostic FNA results have thyroid cancer (6, 7), the vast majority of the patients are subjected to unnecessary surgery to rule out malignancy. Negative results on ¹⁸F-FDG–PET/CT may be a cost-effective way to avoid unnecessary surgery.

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REFERENCES


