Topic: PET SCAN FOR THYROID NODULES WITH INCONCLUSIVE FNA CYTOLOGY

Title: $^{18}$F-FDG PET reduces unnecessary hemithyroidectomies for thyroid nodules with inconclusive cytologic results.

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Reference: Journal of Nuclear Medicine 47: 770-775, 2006

SUMMARY

Background: Fine-needle aspiration biopsy (FNAB) is inconclusive in up to 20% of patients with solitary thyroid nodules. In these cases, hemithyroidectomy is necessary, but only 20% of the surgically resected nodules prove to be thyroid carcinoma.

Aim: To explore the potential of $^{18}$F-FDG PET to reduce the number of unnecessary hemithyroidectomies in the preoperative assessment of thyroid nodules with inconclusive FNAB results.

Methods: Forty-four consecutive patients, scheduled for hemithyroidectomy because of inconclusive FNAB results, participated in this prospective study. $^{18}$F-FDG PET of the thyroid region was performed before surgery and standardized uptake values were calculated. The final histopathologic diagnosis served as a standard of reference.

Results: Histo-pathologic examination of the surgical specimen revealed 7 well-differentiated thyroid carcinomas in 6 patients, all accumulating $^{18}$F-FDG (negative predictive value: 100%). $^{18}$F-FDG accumulated in 13 of 38 benign nodules. The pre-PET probability for cancer in this study population was 14% (6/44), and the post-PET probability increased to 32% PET (6/19). The percentage of unnecessary hemithyroidectomies in a hypothetical algorithm using $^{18}$F-FDG was only 30% (13/44), compared with 86% (38/44) without $^{18}$F-FDG PET. $^{18}$F-FDG PET reduced the number of futile hemithyroidectomies by 66% (25/38) (95% C.I.: 49%-80%; Fisher’s exact test: P=0.0038). Semiquantitative analysis using standardized uptake values did not help to further reduce this number.

Conclusions: In addition to data in the literature demonstrating accurate detection of thyroid cancer by $^{18}$F-FDG PET, this study showed that $^{18}$F-FDG PET should play an important role in the management of patients with inconclusive cytologic diagnosis of a thyroid nodule. $^{18}$F-FDG PET reduced the number of futile hemithyroidectomies by 66%. Although PET is a relatively costly procedure, the cost outweighs the costs and risks associated with unnecessary thyroid surgery.

COMMENT

This is strongly opinionated study by Dutch colleagues, showing that in patients with thyroid nodules with inconclusive FNAB diagnosis, the use of $^{18}$F-FDG PET scan may help improve the preoperative diagnosis of cancer and reduce the number of what the authors refer to as unnecessary or ‘futile’ hemithyroidectomies. Clearly, 7 thyroid carcinomas were identified by preoperative $^{18}$F-FDG PET scan in 6 patients (3 papillary and 4 follicular). However, the authors failed to indicate why FNAB was
considered inconclusive and what the characteristics of the nodules were. Moreover, in the entire series of 44 patients, “inconclusive” cytology revealed follicular proliferation in most nodules, and in some of them atypical aspects (such as Hürthle cells, etc.). Without disposing of the complete set of clinical and paraclinical information necessary to make a preoperative diagnosis of “who should be operated” (i.e. clinical history, palpation, ultrasound data, evolution of nodule size over the previous years, etc.), my personal opinion is that I cannot join the enthusiasm of our Dutch colleagues. Thyroid surgery for follicular adenomas (almost one half of the final histologic diagnoses in this series) is not ‘futile’. We could, however, use the present results to include $^{18}$F-FDG PET scanning in specific cases where there is hesitation about the adequate management.

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See algorithm below

![Algorithm Diagram]

**FIGURE 3.** Diagnostic algorithm including $^{18}$F-FDG PET. In existing diagnostic algorithm, nodules with inconclusive cytologic diagnosis must be removed, and hemithyroidectomy is necessary to allow reliable histologic diagnosis. In proposed diagnostic algorithm, $^{18}$F-FDG PET is implemented as shown.