

Is it possible to eliminate the number of inappropriate thyroid surgeries combining scintigraphy and cytology?

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Abstract

Objective: Although fine needle aspiration cytology (FNAC) is the most reliable, safe and accurate method for the clinical management of abnormal thyroid nodules, 5%-15% of cases lead to indeterminate diagnoses and surgery is the recommended practice for them as they may be malignant. Nevertheless, the majority of cases with indeterminate cytology are benign, so the risk of unnecessary surgery is significant. In our study we combined FNAC and scintigraphy in order to reduce the number of inappropriate surgeries.

Subjects and Methods: From 219 patients with thyroid fine needle aspiration cytology 33(9 males and 24 females) aged 18-73 years, had indeterminate FNAC diagnoses and were referred for scintigraphy. Surgery was performed in all cases. The results of FNAC, scintigraphy and histology were collected and compared.

Results: From 33 cases with indeterminate cytology 32 had a benign histological diagnosis and only one was malignant (follicular Ca). That case had a positive scan. All cases with negative thyroid scans (29/33) were benign. False positive scans were 3, whereas one scan was true positive with final diagnosis follicular carcinoma.

Conclusion: This study showed that combining the FNAC with the thyroid scintigraphy in cases of thyroid nodules with indeterminate cytology it is possible to reduce the number of inappropriate surgeries from 32 to 3.

Keywords: thyroid gland, fine needle aspiration, scintigraphy, thyroid surgery

Introduction

Although thyroid nodules are not a rare problem and it is well known that most of them are a result of a benign disease process, it is clinically important to exclude malignancy.

Thyroid nodules are usually asymptomatic and found on physical examination or incidentally with the use of sensitive imaging techniques. Nodules of various sizes are being detected in up to 65% of the general population (more frequent in women) but only about 4%-6, 5% of all thyroid nodules are found to be malignant [1].

The techniques used to detect malignant cases include ultrasonography, thyroid scintigraphy, serum markers, fine needle aspiration cytology as well as molecular biomarkers that can be powerful adjunct to cytology.

Thyroid fine needle aspiration cytology (FNAC) is the most reliable, safe and accurate method particularly under ultrasound guidance (US FNAC) in order to decrease the rate of false negative or non-diagnostic cases [1, 2]. However the cytological findings from approximately 20%-30% of

cases lead to indeterminate diagnoses and performing ultrasound guidance there is a 5%-15% risk of non diagnostic cytology [3-9].

Cases of follicular lesions cannot be accurately evaluated since it is not possible to exclude capsular or vascular invasion [10, 11]. The vast majority of cases with indeterminate cytology are benign, so the risk of unnecessary surgery is significant [12-14]. Thyroid scintigraphy remains critical for the evaluation of autonomously functioning thyroid tissue [15].

In this study we combined FNAC and scintigraphy in order to have the right preoperative selection of patients and reduce the number of inappropriate surgeries.

Subjects and Methods

Thirty three patients that fell into an indeterminate category after FNAC, were selected for the current study. All were patients with single nodules more than 1cm in size. The age of the patients ranged from 18 to 73 years with mean age 39 years. Twenty four patients were females and 9 were

males (male to female ratio 3/8). The selected cases had recommendations for FNAC based on experts opinion, mainly suspicious sonographic and/or clinical features.

Before injection patient stayed at a quiet environment. The thyroid scans were obtained after intravenous administration of 100MBq of technetium-99m pertechnetate ($^{99m}\text{TcO}_4^-$) and they were imaged on a dual-head Siemens gamma camera (E- Cam, Siemens Electronics, Erlangen, Germany) 20 and 60 minutes later. All scans were obtained in the anterior position.

Final histological diagnoses were evaluated by three experienced pathologists after surgery in all 33 patients.

The results of FNAC, scintigraphy and histology were compared.

Results

From 32 cases with histologically benign diagnosis (Table 1), 29 cases had negative thyroid scans (Figure 1).

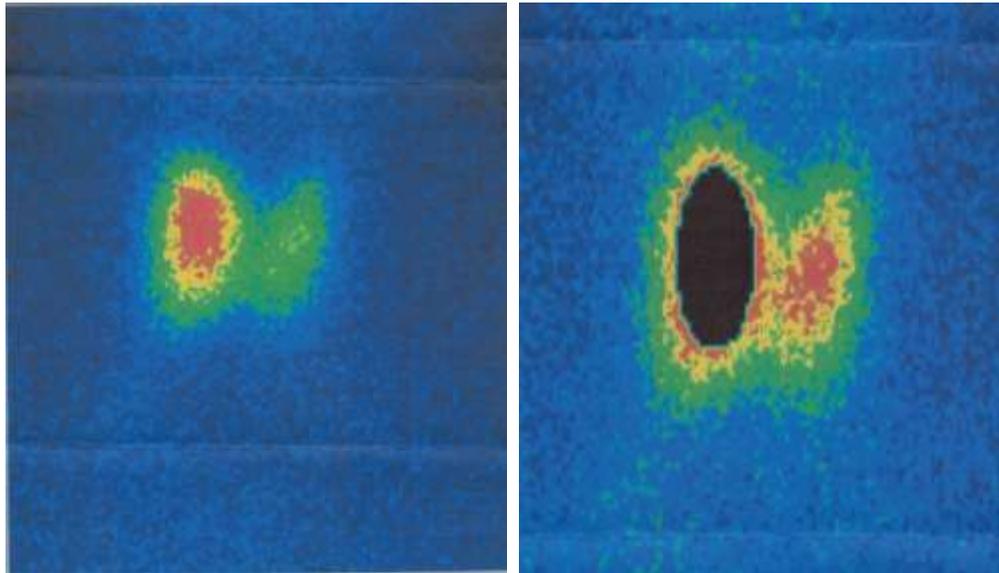


Figure 1. Thyroid scan.

Histologic diagnosis	Benign	Malignant
Papillary carcinoma	-	-
Follicular carcinoma	-	1
Follicular adenoma	4	-
Hyperplastic goiter	11	-
Colloid goiter	17	-

Table 1. Histologic results in cases with non-diagnostic cytology.

Three patients with follicular adenoma had false positive scans (false positive results by scintigraphy).

However all cases with negative thyroid scans (29/33) proved to be benign histologically (11 cases with hyperplastic goiter, 17 with colloid goiter and 1 with follicular adenoma).

The only one patient with follicular carcinoma (Figure 2) but non-diagnostic cytology had a positive scan.

Thirty two out of 33 cases that were not diagnostic cytologically had benign final histologic diagnoses, so the risk of missing carcinomas by FNAC proved to be very low 1/33. Scintigraphy gave positive results in 4 cases 4/33 (1 true positive and 3 false positive.)

In conclusion, fine needle aspiration of the thyroid proved to be a reliable, inexpensive, sensitive and specific procedure for discriminating between surgical and non-surgical nodules [16-22]. It offers the best preoperative assessment of solitary thyroid nodules [23]. However diagnostic difficulties appear in many cases leading to 5%-20% non diagnostic cases. Follicular lesions including follicular-the most common-variant of papillary carcinoma, must be accurately diagnosed (gray zone).

For indeterminate cases surgery is still the current recommended practice, as they may harbor neoplastic potential [24, 25].

Immunocytochemistry and molecular testing are a powerful adjunct to cytology, incorporated in the algorithms of the American Thyroid Association guidelines [8] that are used to manage patients with indeterminate thyroid nodules.

In our study one out of thirty three cases with non diagnostic cytology revealed malignancy, whereas the remaining large majority of cases had benign final histological results, concerning mainly colloid goiter and hyperplastic goiter.

It is well known that the probability of thyroid malignancy is higher in hypofunctioning nodules and thyroid scintigraphy is the only test able to show the presence of autonomously functioning thyroid tissue.

The specificity of thyroid scan was found to be 20%-21, 1% [26-28]. However the specificity is 88% in other studies [4]. Many researchers agree that thyroid scans are not sufficient to rule out surgery and cannot be used as a routine technique.

In our study all patients with negative thyroid scans had benign histological diagnoses, on the contrary in the positive scans there were three false positive cases.

Combining the fine needle aspiration cytology with the thyroid scintigraphy in cases of thyroid nodules with indeterminate cytology, we have the opportunity to reduce the number of inappropriate surgeries [29].

Our results show that unnecessary surgery could have been reduced from 32 to 3 cases combining cytology and scintigraphy.

Since the majority of the patients with indeterminate cytology do not have cancer and scintigraphy can detect the benign cases, it seems advisable to perform thyroid scans in order to eliminate the number of inappropriate thyroid surgeries.

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