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Histopathology vs fine needle aspiration cytology in determining thyroid swellings

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Abstract

Thyroid nodule which is usually considered for FNAC should be of firm, palpable and solitary Fine needle aspiration cytology (FNAC) is now being accepted as the most cost-effective, minimal invasive technique still the histopathological examination of the thyroid gland was considered superior to FNAC in diagnosing the thyroid pathologies

Keywords: FNAC, Thyroid Swellings, Goitre, Solitary Nodules

Introduction

Enlargement of Thyroid gland is a common manifestation in countries like India which is endemic for iodine deficiency disorders. The prevalence of goitre in India is as high as 40%^[1]. Around 10% of the goiter swellings are reported as malignant^[2]. Even though, thyroid malignancies are relatively rare but accounts for more than 90% of all the endocrine cancers. Among the various types of cancers in thyroid gland, papillary carcinoma is the most common which is followed by follicular, medullary, anaplastic and lymphoma.

Fine needle aspiration cytology (FNAC) is now being accepted as the most cost-effective, minimal invasive technique with very low incidence of complications in the diagnosis of most of the thyroid lesions with an added advantage of segregating the patients of solitary thyroid nodule (STN) into operative and non-operative groups^[3-5].

A thyroid nodule which is usually considered for FNAC should be of firm, palpable and solitary. FNAC can also be performed on nodules with suspicious ultrasonographic features; dominant or atypical nodules in multinodular goiter; complex or recurrent cystic nodules; or any nodule associated with palpable or ultrasonographically abnormal cervical lymph nodes^[6].

FNAC is considered to be the “gold standard” in the selection of patients for surgery^[7]. It is usually performed without local anaesthesia and any previous preparations on the patients. Studies have quoted that medical professionals with longstanding experience, the diagnostic (adequate) biopsies obtained from solid nodules had ranged between 90–97%^[8, 9]. During the procedure, ultrasound guidance instead of palpation had enhanced the value of the FNAC diagnostic accuracy^[10, 11].

Still the histopathological examination of the thyroid gland was considered superior to FNAC in diagnosing the thyroid pathologies due to certain pitfalls in FNAC such as scanty sample, vascularity of thyroid swelling, variation in sampling technique and skill of the performing expert and as well as the experience of pathologist interpreting the aspirate^[12].

Comparatively, few studies had been done in India in the aspect of comparison of FNAC and Histopathology in the diagnosis of thyroid swellings. In view of that, the current study was undertaken.

Methods

A prospective longitudinal study was undertaken over a period of 1 year 6 months from January 2017 to July 2018 at the Great Eastern Medical School and hospital. Patients with visible thyroid swelling with a solitary nodule, in euthyroid state and with no other serious medical disorders were included in our study. With those meeting the above criteria totally 186 patients were our study subjects. The study was carried out after getting the clearance from our institutional ethical committee and the informed consent was obtained from all

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the patients who were included in our study. All the patients were evaluated by thorough clinical examination including the status of the vocal cords followed by routine serological investigations like haemogram, renal function tests, liver function tests and thyroid function test. The imaging test like chest X-ray, X-ray of soft tissue of neck lateral view and USG of neck were also carried out. FNAC was performed with 23gauge needle, smears were fixed with ether, 95% alcohol solution, and staining was performed using papanicolau's staining. Following the FNAC all the patients were subjected to surgery after getting the fitness from anesthetist. The thyroid specimen which was excised during the thyroidectomy procedure was processed in automated tissue processing units and sent for histopathological examination. The report of FNAC was then compared with HPE and the validity of FNAC was assessed in terms of sensitivity, specificity and the predictive values.

Results

The age and sex wise distribution was shown in Table 1. It is seen from the table that the majority of the study subjects were females and among those females most of them were in the age group between 30–45 years. Out of 186 only 7 were males in our study population.

Table 1: Age and sex wise distribution of the study population.

Age group	Gender		Total
	Male	Female	
25 - 30	0	4 (2.2%)	4 (2.1%)
31 - 35	0	36 (20.1%)	36 (19.4%)
36 - 40	2 (28.5%)	35 (19.5%)	37 (19.9%)
41 - 45	3 (42.8%)	54 (30.2%)	57 (30.6%)
46 - 50	1 (14.3%)	44 (24.6%)	45 (24.2%)
>50	1 (14.3%)	6 (3.3%)	7 (3.8%)
Total	7 (100%)	179 (100%)	186 (100%)
Mean	44.14	40.71	

The diagnosis of the various thyroid gland swelling made on the basis of the FNAC report had shown that among 186 patients, 144 of them had benign lesions and 32 of them had malignant lesions.

Among the benign diseases, colloid solitary goitre was the most common followed by thyroiditis whereas among the malignant lesions, it was the papillary carcinoma which was more common followed by follicular carcinoma. 10 of the FNAC report showed that the sample is inadequate as given in Table 2.

The post-surgical sample of the thyroid gland which was sent for histopathological examination had revealed the report which was almost similar to that of FNAC.

The only difference was the 10 samples which were not diagnosed by FNAC due to the inadequacy of the sample were reported by HPE. In the 10 samples 5 was found to be of benign lesions and the remaining 5 was found to be of malignant lesion as shown in Table 3.

The validity of FNAC in terms of sensitivity and specificity was assessed by comparing it with the histopathological examination and showed in Table 4.

Table 2: FNAC diagnosis of thyroid swelling among the study subjects.

FNAC diagnosis		Frequency	Percentage
Benign (n=144)	Solitary/colloid goitre	104	72.2%
	Thyroiditis	26	18%
	Adenomatous goitre	9	6.25%
	Follicular adenoma	5	3.5%
Malignant (n=32)	Papillary carcinoma	18	56.2%
	Follicular carcinoma	12	37.5%
	Anaplastic carcinoma	1	3.1%
	Medullary carcinoma	1	3.1%
Inadequate cytology (n=186)		10	5.4%

Table 3: HPE diagnosis of thyroid swelling among the study subjects.

HPE diagnosis		Frequency	Percentage p
Benign (n=149)	Solitary/colloid goitre	105	70.5%
	Thyroiditis	27	18.1%
	Adenomatous goitre	10	6.7%
	Follicular adenoma	7	4.7%
Malignant (n=37)	Papillary carcinoma	22	59.5%
	Follicular carcinoma	12	32.4%
	Anaplastic carcinoma	2	5.4%
	Medullary carcinoma	1	2.7%

Table 4: Validity of FNAC in comparison with HPE.

Diagnosis	Sensitivity	Specificity
Solitary/colloid goitre	99%	100%
Thyroiditis	96%	100%
Adenomatous goitre	90%	100%
Follicular adenoma	71%	100%
Papillary carcinoma	81.9%	100%
Follicular carcinoma	100%	100%
Anaplastic carcinoma	50%	100%
Medullary carcinoma	100%	100%

Discussion

Any form of thyroid enlargement usually leads to a battery of investigations, mainly to rule out the possibility of a neoplasm. The routinely done investigations for an enlarged thyroid are ultrasound examination, thyroid function tests, thyroid scan, and antibody levels and subsequently FNAC was done to segregate the patients requiring surgery and those who can be managed conservatively [13-15].

The mean of the study population in the present study was 40.71 among the females. The similar type of results was also observed by the study done by Gardner HA *et al.* and Miller JM *et al.* [16, 17]

Thyroid swelling is more prevalent among the females and many of the studies had proven it and our study was also in par with it and majority of the females were in the age group

between 30-45 years.

The solitary colloid goitre is the most common benign condition and the papillary carcinoma was the most common malignant lesion identified by FNAC in our study and the results was almost similar to the study done by Handa *et al.* [18] In our study the FNAC showing inadequacy in getting the sample was only 5.4% and a similar type of study done by Mahar *et al.* had shown that 9% of the FNAC sample was found to be inadequate and so our study was almost in par with it [19].

In the present study the HPE report, which was considered to be the gold standard had identified all the 10 samples which were reported as insufficient sample by FNAC. Among the 10 samples 5 were found to be benign and 5 were malignant, the remaining 176 samples which were reported by HPE were almost similar to that of FNAC. Similar to our results the studies done by Gupta M *et al.*, Babu SBK *et al.* had shown the samples which were reported as insufficient in FNAC had been diagnosed in HPE. This had proven HPE to be considered as the gold standard test [20, 21].

The Sensitivity and Specificity of the samples in our study Correlates with the similar study done by the Babu Sbk *et al.* which was an Indian Study [21].

Several international studies have documented the sensitivity of FNAC in thyroid nodules to range from 52-98%. Similarly, the international normal range is for specificity is 72-100% whereas in our study the sensitivity of FNAC in detecting all the benign and malignant type of thyroid lesions was found to be in the range of 50-100%, whereas the specificity and the positive predictive value was almost 100% for all the lesions detected by FNAC [22-25]. There was not even a single false positive case reported in our study.

Conclusion

FNAC is therefore considered as a novel diagnostic tool with high sensitivity and specificity in determining thyroid lesions. But it should be noted False Negatives are possible. So, follow up should be done in case of any clinical suspicion of malignancy and surgery should be planned even though FNAC indicates benign nature.

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Ethical approval: The study was approved by the institutional ethics committee

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