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Original Research Article

Fine-needle aspiration cytology (pre-operative) and histopathological (post-operative) correlation in thyroid swellings

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ABSTRACT

Background: Fine-needle aspiration cytology (FNAC) is one of the most important pre-operative procedures used in the primary diagnosis of thyroid swelling. Even if non-surgical and non-invasive techniques can provide a diagnosis, the ultimate answer rests in the histopathological examination of the surgically excised thyroid tissue. A correlation of both FNAC and HPE though can help predict outcomes and may be helpful to avoid unnecessary surgical procedures for benign conditions. The purpose of this study was to establish a cyto-histological correlation and to evaluate accuracy of FNAC in diagnosing thyroid lesions.
Methods: The study was carried out over a period of three years between September 2017 to September 2020 prospective study in which 38 cases were taken who eventually underwent thyroid surgery. A cyto-histological correlation was made between the pre-operative FNAC and the post-operative HPE report. These reports were correlated and conclusions drawn after statistical analysis.
Results: Cyto-histological correlation was done and overall accuracy was 94.7%. Majority of cases were non-neoplastic, peak age of incidence was in third and fourth decade and there was female predominance.
Conclusions: It was observed that FNAC is a very reliable test having high sensitivity, specificity and accuracy in diagnosing thyroid swellings which is also a simple, safe and cost effective modality in investigation.

Keywords: FNAC, Histopathology, Thyroid swellings

INTRODUCTION

In day to day clinical practice we encounter various types of neck swellings. Thyroid gland is a superficially located endocrine organ and is a frequent site of various diseases. The prevalence of thyroid swellings ranges from 4% to 10% in general adult population.[1] Surgically excising all the thyroid lesions is impracticable and may be associated with various risk factors.

FNAC as a method was first published by Leyden in 1883.[3] The diagnosis of thyroid lesions using aspiration cytology was first reported by Martin and Ellis in 1930.[4]

FNAC being a simple (less invasive and can be performed on out-patient level), safe, reliable, cost effective and with high sensitivity and specificity has become the main diagnostic tool.[2] The accuracy of the outcome of FNAC is ensured by performing it under USG guidance. A pre-operative FNAC can help guide a surgeon regarding the outcome of the pathology if has strong correlation, which is the basis of our study here.

Inspite of it being an excellent diagnostic tool, FNAC has its own limitations. Results of the FNAC depend upon the experience of the person aspirating, skill of the pathologist performing the cytological interpretation and

clinical history in the context of the patient. Scanty sample, high vascularity, faulty sampling technique, overlapping cytological features, few neoplasms (follicular) are certain pitfalls in FNAC, thus histopathological examination of the thyroid gland is still considered superior diagnostically compared to FNAC.[5,6]

This study was carried out with the objective of comparing the findings of the two tests namely FNAC and HPE and suggestions for the future.

METHODS

The present study was a prospective study and was conducted on 38 patients in the department of otorhinolaryngology (ENT) and head and neck surgery at our Surat municipal institute of medical education and research (SMIMER), Surat, over a period of three years between September 2017 to September 2020. This study was approved by the institutional review board.

The patients were selected consecutively as and when they presented during the study period considering inclusion and exclusion criterias by simple random sampling. After thorough history taking, the selected patients were subjected to clinical examination, thyroid function tests, USG guided FNAC, routine hematologic investigations, ultrasound scans and CT scans (where indicated), pre-operatively and histopathologic examination of the thyroidectomy specimen post-operatively.

Post-operative HPE reports were then compared with pre-operative FNAC reports of the patients. Patient with other neck swellings were excluded from this study. In all 38 cases informed consent was taken prior to surgery.

Inclusion criteria

Patients with thyroid swellings with normal thyroid hormone profile undergoing thyroidectomy at our tertiary hospital were included in the study.

Exclusion criteria

Cases of thyroiditis, patients with co-morbidities and unfit for surgery, patients who refused surgery, patients with inoperable thyroid malignancy were excluded from the study.

Classification of the thyroid swellings were cyto-histopathologically depending upon the cellularity and then were also categorized in accordance with the Bethesda system.

Figure 1: Bethesda system for cyto-histopathologically classifying thyroid swellings.[7]

Diagnostic category	Risk of malignancy (%)	Usual management
Nondiagnostic or unsatisfactory	1-4	Repeat FNA with ultrasound guidance
Benign	0-3	Clinical follow-up
AUS or FLUS	5-15	Repeat FNA
Follicular neoplasm or suspicious for a follicular neoplasm	15-30	Surgical lobectomy
Suspicious for malignancy	60-75	Near-total thyroidectomy or surgical lobectomy
Malignant	97-99	Neat-total thyroidectomy

Statistical method used and calculation

Positive predictable value for thyroid swellings=$\frac{TP}{(TP+FP)} \times 100$

=$\frac{36}{(36+0)} \times 100$

=94.7%,

where,

TP is true positive,

FP is false positive.

RESULTS

Out of 38 patients, 36 were females. Peak incidence was seen in the third and fourth decades of life (Table 2). 34 were non-neoplastic and remaining 4 were neoplastic. Among non-neoplastic lesions (28) were of colloid goitre, followed by lymphocytic thyroiditis (2), lymphocytic thyroiditis with colloid goitre (2) and least common being colloid goitre with Hashimoto's thyroiditis (1) and chronic thyroiditis (1). Most common neoplastic lesion on FNAC was papillary neoplasm (2), followed by follicular (1) and medullary (1) (Table 3).

Cyto-histopathological correlation was done for all 38 cases post-operatively. Overall accuracy was found to be 94.7%. One case of follicular neoplasm and one case of

papillary neoplasm detected in the pre-operative FNAC differed when was compared post-operatively to the final HPE report. All colloid goitre cases picked up in FNAC were concluded to the same diagnosis even on HPE.

Table 2: Age wise distribution of cases.

Age group (in years)	Number of cases	Percentage (%)
0-10	0	0
10-20	5	13.2
20-30	10	26.3
30-40	11	29
40-50	8	21
50-60	3	7.9
60-70	1	2.6
Total	38	100

Table 3: Distribution of FNAC of all 38 cases.

Distribution of FNAC		
Non-neoplasm	Colloid goitre	28
	Lymphocytic thyroiditis	2
	Lymphocytic thyroiditis with colloid goitre	2
	Colloid goitre with Hashimoto's thyroiditis	1
	Chronic thyroiditis	1
Neoplasm	Papillary neoplasm	2
	Follicular neoplasm	1
	Medullary neoplasm	1
Total	38	

Table 4: Positive correlation of result of FNAC with result of histopathology of different thyroid swelling.

Study	Diagnostic accuracy (%)
Rout et al[10]	96.05
Altavilla et al[19]	92.86
Frable et al[20]	94
Bloch et al[21]	91.6
Handa et al[22]	97
Mundasad et al[23]	79.1
Our study	94.7

DISCUSSION

In the present study, cytological features of thyroid lesions were studied and correlated with histopathology. Thyroid lesions are more prevalent in females as compared to males with a male to female ratio of 18:1. The female predominance was seen in various similar studies performed by Sangalli et al, Mandal et al, Rout et al, Ramteke et al, Chaudhari et al, Parikh UR et al and Sharma.[8-14]

In the present study out of 38 FNAC cases, 34 were non-neoplastic and 4 were neoplastic. Colloid goitre was the most common non-neoplastic lesion, similar observations were made by Abdulkader et al, Jeelani et al, Rout et al and Ramteke et al.[11.10,15,16] In our study, papillary neoplasm was the most common neoplasm followed by follicular and then medullary, which was compared to observations in a similar study made by Gulia et al where it was found that follicular neoplasm was most common followed by papillary neoplasm in their study.[17]

In our study, peak age of incidence was in third and fourth decades of life (Table 3). In similar studies performed by Bhansali et al it was the fifth decade of life and for Rout et al it was second and third decades of life.[10,18]

All our cases underwent surgery and then subsequent histopathological study, 36 cases showed positive correlation between FNAC and histopathology result. However it differed in two cases when diagnosis by FNAC proved otherwise. The diagnostic accuracy of FNAC for thyroid swellings in our study was 94.7%. This

is comparable with that of Rout et al (96.05%), Altavilla et al (92.86%), Frable et al (94%), Bloch et al (91.6%), Handa et al (97%) and Mundasad et al (79.1%) (Table 4).[10,19-23]

Even though it is an excellent diagnostic tool, FNAC has its own limitations. Results of the FNAC depend upon the experience of the person aspirating, skill of the pathologist performing the cytological interpretation and clinical history in the context of the patient. Scanty sample, high vascularity, faulty sampling technique, overlapping cytological features, few neoplasms (follicular) are certain pitfalls in FNAC, thus histopathological examination of the thyroid gland is still considered superior diagnostically compared to FNAC.[5,6]

CONCLUSION

It was observed that FNAC is a very reliable test having high sensitivity and specificity in thyroid swellings, which is also a simple, safe and cost effective modality in investigation. Its accuracy can hence be relied upon while predicting the prognosis of the thyroid swelling pre-operatively. Therefore, it can be concluded as a must diagnostic tool which should be performed pre-operatively.

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