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Comparative study between FNAC & histopathology in thyroid swelling

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Abstract

Thyroid swelling was found in different clinical presentation and demographic characteristics. FNAC of thyroid swellings is a simple, rapid, patient friendly and inexpensive procedure, which can be repeated in cases of inadequate samples. To comparison of FNAC & histopathology in thyroid swelling. The study was conducted at Shaheed Suhrawardy Medical College Hospital, Dhaka, Dhaka during the period of July 2019 to June 2021. The diagnosis of thyroid swelling was based on detailed history, thorough clinical examination and relevant investigations and fine needle aspiration cytology (FNAC). All the patients were undergone surgical management and the outcomes were recorded. A total number of 100 patients were recruited for this study. This study shows age of the patients ranged from 18 years to 64 years. The highest number of cases (34%) belongs to the age group of 31 to 40 years followed by 21% in the age group of 21 to 30 years. Female were higher in frequency (94%) than male (6%). Most of the patients (94%) were from poor socio-economic status. The most common indication was nodular goiter (81%) followed by 13% were papillary carcinoma, 4% follicular adenoma and medullary (2%). In this study most of the findings showed benign (88%). It was observed that sensitivity by FNAC to be 88.3%, the specificity was 58.3%, the PPV was 93.8% and NPV was 41.1%. The present study indicates that FNAC in providing a more accurate diagnosis of thyroid swelling. So, performing FNAC in all possible cases of thyroid lesions would be of immense help.

Keywords: Demographic, characteristics, surgical, outcomes, FNAC, thyroid swelling

Introduction

Thyroid disorders represent a major portion of endocrine diseases across the world because thyroid swellings appear frequently in both primary care facilities and specialized medical centers. Swellings are frequent cause for anxiety in patients as well as clinicians and proper accurate diagnosis is essential for their management ^[1]. Thyroid gland is unique among endocrine organs. It is the largest endocrine gland in the body and the first to develop in fetal life ^[2]. Thyroid swelling is very frequent. It is estimated 4-7% adults have palpable enlargement of thyroid and 10 times more have impalpable nodules. Most of them are benign and fewer than 5% are actually malignant ^[3]. A multitude of diagnostic tests like ultrasound, thyroid nuclear scan, fine needle aspiration cytology (FNAC) and many more are available to evaluate goitre. The thyroid gland enlarges due to multiple factors which include iodine deficiency and autoimmune thyroiditis and multinodular goiter and benign neoplasms and malignancies. Final diagnosis requires morphological examination of lesions for which FNAC and histopathological examination (HPE) becomes mandatory tests ^[4]. The majority of thyroid nodules prove harmless yet the risk of cancer requires precise diagnostic methods to determine proper treatment approaches. Fine Needle Aspiration Cytology (FNAC) serves as the primary diagnostic method because it provides simple procedures at affordable costs with minimal invasiveness. The widespread application of FNAC faces challenges when distinguishing between specific benign and malignant lesions. FNAC as a method was first published by Leyden in 1883 ^[5]. The diagnosis of thyroid lesions using aspiration cytology was first reported by Martin and Ellis in 1930. Practice guidelines set forth by American Thyroid Association and National Comprehensive Cancer Network states that FNAC should be used as initial diagnostic test because of its superior diagnostic reliability and cost effectiveness ^[5]. FNAC is diagnostic test for thyroid swelling. It is a simple, cost effective,

and quick to perform procedure in the outpatient department, with excellent patient compliance. Important factor for satisfactory test includes representative specimen from the goiter and an experienced cytologist to interpret the findings [4]. FNAC, however, is not without limitations related to specimen adequacy, sampling techniques, skill of performing the aspiration, interpretation of the aspirate and overlapping cytological features between benign and malignant follicular neoplasm and also in the detection of some papillary carcinomas because of associated thyroid pathology including multinodular goiter, thyrotoxicosis and marked cystic changes. Here arises the need for histopathological examination, as it is considered the final diagnostic test. Thus even if non-surgical and noninvasive techniques can provide a diagnosis, the ultimate answer rests in the histopathological examination of the excised thyroid tissue. This also raises the question of how much corroborative is FNAC and HPE [5]. This study was carried out with the objective of comparing and correlating the FNAC findings with that of histopathology readings among the patients with thyroid swelling.

Methodology

The study was prospective study conducted at Department of Otolaryngology & Head Neck Surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka during the period of July 2019 to June 2021. This study includes a total of 100 patients of both sexes, all age groups attending the inpatients and outpatient department. The diagnosis of

thyroid swelling was based on detailed history, thorough clinical examination and relevant investigations, thyroid profile, and fine needle aspiration cytology (FNAC). Following the FNAC all the patients were subjected to surgery after getting the fitness from anaesthetist. The thyroid nodule which was excised during the thyroidectomy procedure was processed and sent for histopathological examination. All patients were following up postoperatively. All the data were compiled and tabulated in order obtained a statistical and comprehensive results of the study. Data were analyzed using computer-based programme statistical package for social science (SPSS) for windows version 25.

Results

A complete of 100 patients with thyroid swelling have been blanketed inside the have a look at. The age of the sufferers ranged from 18 to 64 years, with an average age of 36.99 ± 11.85 years. the very high-quality proportion of cases (34%) were within the 31-40 age group, followed through the use of 21% within the 21-30 years age business enterprise, 19% inside the 41-50 years age group, 17% in patients elderly above 50 years, and 9% inside the ones elderly ≤ 20 years. there has been a marked woman predominance, with 92% ladies and handiest 8% men, ensuing in a woman-to-male ratio of approximately 11.5:1. the majority of sufferers (94%) belonged to a poor socio-economic historic past, while satisfactory 6% had been from the center-earnings organization (Table 1).

Table 1: Demographic characteristics of the study subject (N=100)

Characteristics	Number	Percentage (%)
Age in years		
≤ 20	9	9
21-30	21	21
31-40	34	34
41-50	19	19
> 50	17	17
Mean \pm SD	36.99 \pm 11.85	
Range (yrs)	18-64	
Sex		
Male	8	8
Female	92	92
Socio-economic		
Poor	94	94
Middle	6	6

The duration of thyroid swelling at presentation numerous appreciably. maximum sufferers (61%) said a swelling length of ≤ 5 years, while 33% had a length of 6-10 years,

and handiest 6% presented with a swelling persisting for extra than 10 years (Table 2).

Table 2: Duration of thyroid swelling (N=100)

Duration	Number	Percentage (%)
≤ 5 years	61	61
6-10 years	33	33
> 10 years	6	6

Exceptional-needle aspiration cytology (FNAC) findings revealed that 88% of instances have been diagnosed as

benign, at the same time as 12% were categorised as malignant (Table 3).

Table 3: Diagnosis of FNAC in thyroid swellings (N=100)

FNAC	Number	Percentage (%)
Benign	88	88
Malignant	12	12

Histopathological examination of excised specimens supplied a greater specified diagnostic spectrum. The most not unusual histological diagnosis turned into nodular goiter (81%), accompanied by means of papillary carcinoma (13%), follicular adenoma (4%), and medullary carcinoma (2%) (Table 4).

Table 4: Histology of thyroid swelling (N=100)

Diagnosis	Number	Percentage (%)
Nodular goiter	81	81
Follicular adenoma	4	4
Papillary carcinoma	13	13
Medullary	2	2

Whilst FNAC outcomes were in comparison with histopathology (gold standard), 76 instances had been actual positives (malignant on each FNAC and histopathology), and 7 cases have been proper negatives (benign on both modalities). There have been 5 false-high quality instances wherein FNAC recognized malignancy but histopathology found out a benign lesion, and 12 false-poor instances in which FNAC stated benign findings but histopathology showed malignancy (Table 5).

Table 5: The accuracy of diagnostic test of FNAC in thyroid swelling (N=100)

Test (FNAC)	Benign in histopathology	Malignant in histopathology
Positive test	True Positive (n=76)	False Positive (n=5)
Negative test	False Negative (n=12)	True Negative (n=7)

The diagnostic validity parameters of FNAC in detecting thyroid malignancy were calculated as follows: sensitivity 88.3%, specificity 58.3%, wonderful predictive price (PPV) 93.8%, poor predictive cost (NPV) 41.1%, and an overall diagnostic accuracy of 84.6% (Table 6).

Table 6: Validity of study subjects

Sensitivity	88.3%
Specificity	58.3%
PPV	93.8%
NPV	41.1%
Accuracy	84.6%

Discussion

Thyroid surgery performed by surgeons specialized in this type of surgery improves the results and decreases the complication rate [5]. Surgical difficulties are essentially related to identification of the recurrent laryngeal nerve. The use of a magnifying device (binocular magnifying glass or operating microscope) ensures more reliable identification of the nerve [6]. In the present study, all the patients presented with swelling in front of the neck; among them 100 patients. The present study findings were discussed and compared with previously published relevant studies. In this study shows most of the patients were age group of 31-40 years, mean age being 36.99±11.85 years. Similar prevalence has been observed in the prospective studies by Rahman MM *et al.*, Sengupta *et al.*, and Imad *et al.*, where the prevalence was highest in the middle age group 3rd and 4th decades [5,7,8]. Study by Hanumanthappa *et al.*, reported an incidence of 35% in the age group 21-30 years and 30% in the age group 31-40 years [6]. It was observed that in the present study,

female were higher in frequency (92) than male (8%). Bombil *et al* [9] reported that out of 162 cases, 139 cases (85.8%) were females and 23 cases (14.2%) males. In a study by Mushtaq Ahamed *et al.*, of 105 cases, 90 were females and 15 were males [10]. Also, in a prospective study of 854 Danish Patients (10) 726 (85%) were females and 128 (15%) were males. Majority of our patients (61%) presented within ≤5 years duration. Only 6% patients presented at or above 10 years, 33% of patients presented within 6-10 years. All the patients presented with swelling in front of the neck. Most of the studies reviewed also reports that swelling is the most common complaint at the time of presentation followed by complaints of pressure symptoms like dysphagia and breathlessness [5,6,11]. On histopathological analysis of the present study of 100 cases, 96% were nodular goiter and 4% were follicular adenoma. Malignancy was diagnosed in 12% of patients, though the FNAC findings were benign (88%). However, no metastasis was detected. As previously discussed in the methodology, non availability of the ultrasound guided FNAC was one of the limitation of the study. An important limitation of FNAC in MNG is the possibility of a false negative result because the needle may not go into the nodule which needs testing. Rahman *et al.*, reported 3.87% incidence of malignancy among thyroid swelling patients [12]. Mohammed A Altae *et al.*, reported the incidence of thyroid tumours to be 11.8% and those with malignant changes to be of 5.5% [13]. Though the present study is comparable to the above studies, the study conducted by Hanumanthappa MB [6] quoting malignant incidence of 10%. Gandolfi *et al.*, quoting 13.7% incidence of malignancy among MNG, [14] Anwar, Kurshid *et al.*, quoting incidence of malignancy among MNG to be 14.37% is a reason for concern [15]. In the present study we found sensitivity by FNAC to be 88.3%, the specificity was 58.3%, the PPV was 93.8% and NPV was 41.1%. Several international studies have documented the sensitivity of FNAC in thyroid nodules to range from 52-98% [15-18]. Similarly, the international normal range is for specificity is 72 to 100% and for PPV is 50 to 90% [17,18]. The negative predictive value derived from this audit was 73.1%. In a report of 19 studies and 20 series by Lewis *et al.*, [16] the reported and re-calculated mean for negative predictive value was 84% and 93%. So present study is fairly comparable to other studies. In our study the accuracy of FNAC in detection of the thyroid swelling was found to be 84.6%. It is well compared with the study done by Safirullah et. Al [19] in which the accuracy was reported as 94.2%, and another study done by Mundasat et. Al [20] and Rama et. Al [21] the accuracy was 80% and 85% respectively. In FNAC, there were 12% false negative cases and two (5%) false positive case out of 100 cases. One case of follicular neoplasm and 12 case of papillary carcinoma were diagnosed as adenomatoid goitre in cytology i.e. false negative diagnosis. Possible explanation of false negative diagnosis of follicular neoplasm is that follicular pattern of follicular neoplasm was disrupted in smear and cells were in sheets or clusters and there was no acinar structure. Possible explanation of false negative diagnosis of papillary carcinoma was inability in recognizing the minimal cytological atypia present in the smear. The false negative and false positive rates of FNAC in our study were comparable to that in literature. In literature the

same are in the range of 6.6-25.5% and 2-20% respectively^[22,23].

Conclusion

FNAC is a simple, safe and cost-effective diagnostic modality in the investigation of thyroid disease with high specificity and accuracy. We concluded that FNAC diagnosis of malignancy is highly significant. A benign FNAC diagnosis should be viewed with caution as false negative results do occur and these patients should be followed up and any clinical suspicion of malignancy even in the presence of benign FNAC requires surgery. So, final diagnosis and treatment pattern should be based upon histopathology.

Conflict of Interest

Not available

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Not available

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