

Comparison of FNAC and Histopathological Finding in Thyroid Swelling

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ABSTRACT

Introduction

Fine Needle Aspiration Cytology (FNAC) is important for pre-operative and pre-treatment diagnosis of benign and malignant thyroid lesions, thus decreasing the incidence of unwanted surgeries. The objective of this research is to compare the FNAC and Histopathological findings of thyroid swelling.

Methods

The present study is a cross sectional study conducted on 30 patients in the Department of Otorhinolaryngology Head and Neck Surgery, College of Medical Sciences, Bharatpur, Nepal from January 2022 to December 2022. Thyroid swelling presented to OPD were examined clinically after thorough history taking and admitted to indoor and subsequently underwent surgery were included in this study. After Histopathology they were compared with preoperative FNAC report. In all cases, informed consent was taken prior to the surgery.

Results

FNAC shows thirteen (28.57%) non neoplastic and twenty-two (71.43%) neoplastic. Among non neoplastic thyroid swelling, colloid goiter was common. Among neoplastic thyroid swelling Papillary carcinoma was the most common. Cyto-histopathological correlation of 35 cases was done. Out of thirty-five cases fifteen (42.87%) were non neoplastic and twenty (57.15%) were neoplastic. Colloid goiter was most common. Sensitivity of our study was 88.24%, Specificity was 55.56 % and accuracy was 71.43%.

Conclusions

FNAC is a quick, safe, and reliable first-line diagnostic test for thyroid nodules. However, histopathology is the gold standard for the diagnosis of thyroid cancer and provides detailed information on the tumor size, location, and histological type.

Keywords: FNAC; histopathology; thyroid swellings.

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INTRODUCTION

Thyroid swelling or goiter is a common condition that affects millions of people worldwide. In order to diagnose thyroid swellings, physicians often use various diagnostic tests, including fine-needle aspiration cytology (FNAC) and histopathology.¹

Fine-needle aspiration cytology (FNAC) is a minimally invasive diagnostic test that involves using a fine needle to collect a small tissue sample from the thyroid gland. The tissue sample is then examined under a microscope to check for any abnormalities, such as the presence of cancerous or non-cancerous cells. On the other hand, histopathology is a more invasive diagnostic test that involves removing a small tissue sample from the thyroid gland using a surgical procedure. The tissue sample is then examined under a microscope to check for any abnormalities, such as the presence of cancerous or non-cancerous cells.² In conclusion, both FNAC and histopathology are effective diagnostic tests for thyroid swellings. However, histopathology provides a more detailed and accurate diagnosis compared to FNAC. FNAC is a minimally invasive and less expensive diagnostic test, making it a useful initial diagnostic tool for thyroid swellings. However, if FNAC results are inconclusive or there is a suspicion of cancer, histopathology should be performed for a more definitive diagnosis.³

METHODS

A descriptive cross sectional study was done in the Department of ENT- Head & Neck Surgery, College of medical sciences, Bharatpur, Nepal, from January 2022 to December 2022. Ethical approval was taken from COMSTH-IRC (Ref. no. 110/1/2) All patients were evaluated by thorough clinical examination followed by routine investigations, thyroid function tests, FNAC and histopathological examination.

Fine needle aspiration cytology of thyroid swelling was done on OPD basis. Thyroidectomy specimens preserved in 10% formalin was sent for histopathological examination to the pathology department in our hospital. The cytology reports were compared with the histological diagnoses.

Those patients presenting with thyroid swelling who underwent FNAC, thyroid surgery and histopathological examination. All the cases of thyroiditis were excluded. Those patients having FNAC done but did not had thyroid surgery were excluded. Those with positive results on histopathology and on FNAC, who actually have the disease is true positive. Those with negative result on FNAC but positive on histopathology, who actually have the disease false negative. This is the portion of the patients having malignant thyroid disease and positive cytological diagnosis on FNAC is Sensitivity of the test.

RESULTS

A total of 35 patients were enrolled for the study. Patient with age group 21-40, 41-60 and 61-80 years were 23%; 49% and 28% respectively. Most of the patients were between the age 41-60 year (Table 1).

| Age (years) | Frequency(%) |
|-------------|--------------|
| 21-40 | 8(23) |
| 41-60 | 18(49) |
| 61-80 | 9(28) |

Female were higher in frequency 25 (71.42%) than men 10 (28.58%) (Table 2).

| Gender | Frequency (%) |
|--------|---------------|
| Male | 10(28.58) |
| Female | 25(71.42) |

In this series of 35 thyroid swelling, on FNAC

shows thirteen (28.57%) non neoplastic and twenty two (71.43%) neoplastic. Among non neoplastic thyroid swelling, colloid goiter was common. Among neoplastic thyroid swelling Papillary carcinoma was the most common, followed by Follicular neoplasm. There was one case of medullary carcinoma of thyroid.

Table 3. FNAC of thyroid swelling (n=35).

| FNAC | Frequency% |
|----------------|------------|
| Non-neoplastic | 10(28.57) |
| Neoplastic | 25(71.43) |

Out of thirty five cases of thyroid swelling after histopathology fifteen (42.87%) were non neoplastic and twenty (57.15%) were neoplastic. colloid goiter was most common followed by multinodular goiter Among neoplastic thyroid swelling Papillary carcinoma was the most common, followed by Follicular carcinoma. There was one case of Anaplastic carcinoma.

Table 4. Histopathological diagnosis of thyroid swelling (n = 35).

| Histopathology | Frequency(%) |
|-----------------|--------------|
| Non- neoplastic | 15(42.87) |
| Neoplastic | 20(57.15) |

Three case was diagnosed as atypia of undetermined significance in FNAC whereas it was diagnosed as multinodular goiter (Adenomatous hyperplasia in histopathological diagnosis. Five case diagnosed as atypia of undetermined significance in FNAC was diagnosed as nodular follicular hyperplasia with fibrosis and calcification. One case diagnosed as medullary carcinoma of thyroid on FNAC was diagnosed as papillary thyroid carcinoma on histopathological examination. Two case diagnosed as atypia of undetermined significance was diagnosed as hurtle cell adenoma on histopathological diagnosis (Table 5).

Table 5. Variation of diagnosis between FNAC and histopathology in thyroid swelling (n=35) FNAC (n=35).

| Histopathology | Benign | Malignant |
|----------------|------------|------------|
| Benign | 10(28.57%) | 5(14.28%) |
| Malignant | 5(14.28%) | 15(42.85%) |

Table 6. Comparison of FNAC finding and Histopathology findings (n=35).

| FNAC test result | Histopathology findings | |
|------------------|-------------------------|------------|
| | Malignant | Benign |
| Positive | 15(42.85%) | 8(22.8%) |
| Negative | 2(5.7%) | 10(28.57%) |

Diagnostic accuracy of FNAC result

Sensitivity = $(TP/TP+FN)*100 = (15/15+2)*100 = 88.24\%$

Specificity = $(TN/TN+FP)*100 = (10/10+8)*100 = 55.56\%$

Positive Predictive Value = $TP/ TP + FP * 100 = 23/23 +10 * 100 = 69.70\%$,

Accuracy = $(TP+TN/Total \text{ Number})*100 = (15+10/35)*100 = 71.43\%$

DISCUSSION

Bloch et al had done a comparison study between FNAC and histopathology and then found that the accuracy and FNAC was 91.6%.¹ Handa et al have a similar study in which FNAC revealed a sensitivity of 97%, specificity 100%, a Positive Predictive Value of 96% and a negative predictive value of 100%.² The advantages of FNAC include its simplicity, low cost, and high accuracy rate, with reported sensitivity and specificity rates ranging from 75% to 98% and 85% to 100%, respectively.³ Moreover, FNAC is a safe and well-tolerated procedure, with a low risk of complications, such as bleeding and infection. Several studies have compared the accuracy of FNAC and histopathology in the diagnosis of thyroid nodules, with varying results. A systematic review and meta-

analysis of 38 studies involving a total of 10,093 patients found that the pooled sensitivity and specificity of FNAC were 83.4% and 96.4%, respectively, while the pooled sensitivity and specificity of histopathology were 92.8% and 99.3%, respectively.⁴ The study also found that FNAC had a higher false-negative rate than histopathology, indicating that some malignant nodules may be missed by FNAC. However, FNAC had a lower false-positive rate than histopathology, which may result in fewer unnecessary surgeries. Fine needle aspiration cytology (FNAC) and histopathology are two commonly used techniques for the diagnosis of thyroid swelling. According to a study by Rosario et al. FNAC is considered the first-line diagnostic test for thyroid nodules because it is quick, safe, and reliable. The accuracy of FNAC in the diagnosis of thyroid nodules ranges from 70% to 97%, with a sensitivity of 72% to 97% and specificity of 65% to 100%.⁵ In our study the sensitivity was 88.24% and specificity was 55.56%. In our study FNAC that yield atypia of undetermined significance were included in malignant category. The sensitivity and specificity of FNAC are influenced by the experience of the pathologist, the quality of the sample, and the size and location of the nodule according to Hegedüs et al.⁶ According to a study by Reddy et al. histopathology is the gold standard for the diagnosis of thyroid cancer because it provides detailed information on the tumor size, location, and histological type. Histopathology can differentiate between benign and malignant thyroid nodules with an accuracy of 95% to 99%.⁷ In our study the accuracy was

71.43%. One of the major advantages of FNAC over histopathology is its non-invasiveness. FNAC can be performed on an outpatient basis and does not require general anesthesia, making it less stressful for patients.⁶ FNAC is also less expensive and quicker to perform than histopathology, with results available within 24 to 48 hours. In contrast, histopathology requires hospitalization, general anesthesia, and a longer recovery period. Histopathology is also more expensive than FNAC.⁷ However, there are some limitations to FNAC. FNAC can produce false negative results, especially in cases of indeterminate or suspicious nodules. In addition, the interpretation of FNAC results can be subjective and may vary depending on the experience of the pathologist. According to a study by Rago et al. the false-negative rate of FNAC ranges from 2% to 7%. Histopathology, on the other hand, provides a definitive diagnosis and is less prone to interpretation errors.⁸ In my study 49 % of patients belongs to age group between 41-60 years of age. Sex distribution of female: male was 2.5:1. Our findings was same as that of study done by Sangali et al.⁹ Our study was compared with the study of Md. Shafiqul Islam which showed 78% nonneoplastic and 22% neoplastic cases whereas our study showed 28.5 % non neoplastic and 71.43% neoplastic.¹⁰

CONCLUSIONS

In conclusion, both FNAC and histopathology have their strengths and limitations. FNAC is a quick, safe, and reliable first-line diagnostic test for thyroid nodules. In my study FNAC is a sensitive test in the diagnosis of thyroid nodule.

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