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DIAGNOSTIC ACCURACY OF FNAC IN DETECTION OF THYROID CARCINOMA

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Abstract;

Background; Thyroid nodules are quite common and different imaging techniques are now used for diagnosis of thyroid nodules like radionucleotide scanning, high-resolution ultrasonography, etc. However, FNAC is still regarded as the single most accurate and cost-effective procedure, particularly if ultrasound is used as a guide for better sample collection, especially for cystic lesions. The current study was done to ascertain diagnostic accuracy of FNAC using histopathology as gold standard. **Objective:** To determine the diagnostic accuracy of FNAC in detection of thyroid carcinoma in patients with thyroid nodules using histopathology as gold standard.

Material and Methods; A total of 120 patients were taken in this study. Both genders with thyroid nodules › 2 months aged more than 18 years were enrolled in our study. Patients receiving chemotherapy or radiotherapy, confirmed cases of thyroid carcinoma and previous history of any type of thyroid surgery were excluded from our study. Sample size was 120 specimens fulfilling the inclusion criteria received at the department of histopathology, Nishtar Hospital Multan. **Results;** Of these 120 study cases, 28 (23.3%) were male patients while 92 (76.7%) were female patients. Mean age of our study cases was 42.31 ± 8.40 years. Of these 120 study cases 104 (86.7%) were married while 16 (13.3%) were un-married. Mean disease duration was 8.34 ± 3.91 months while 76 (63.3%) had disease duration more than 6 months and 66 (55%) had more than 10 cm size of nodule. Only 8 (6.7%) of these patients were using Iodine in their diet while remaining 93.3 % were not using Iodine supplemented diet. FNAC results revealed that thyroid carcinoma was present in 39 (32.5%) while histopathology documented thyroid carcinoma was present in 31 (25.8%) of our study cases. Sensitivity of FNAC was 87 %, specificity was 86.51 %, diagnostic accuracy was 86.66 %, positive predictive value was 69.23 % and negative predictive value was noted to be 95.06 %. **Conclusion;** Fine needle aspiration cytology (FNAC) is a sensitive, specific, and accurate initial diagnostic test for the evaluation of patients with thyroid swellings. It is highly reliable, easy to perform, cost-effective and accurate tool to differentiate a malignant lesion from a benign one with high accuracy.

Keywords; Thyroid nodules, thyroid carcinoma, FNAC.

Introduction:

The thyroid gland usually located below and anterior to the larynx, consists of two bulky lateral lobes connected by a relatively thin isthmus.[1] Thyroid nodular lesions are a common clinical problem in our country. These are more common in women and in areas of iodine deficiency. Exposure to ionizing radiation in childhood and adolescence increases the risk of solitary thyroid nodule and thyroid carcinoma.[2]

A solitary thyroid nodule is defined as a benign encapsulated mass of follicles, usually showing a uniform pattern throughout the confined nodule.[3] The prevalence of thyroid nodules depends on how carefully one looks

for them. Palpable nodules are found in 4% to 7% of adults, but the prevalence is much higher (20% to 70% adults) when non-palpable nodules are included.[4]

A variety of tests are available to evaluate thyroid nodules. These include radiological imaging, fine needle aspiration cytology and histopathology. FNAC is the first-line diagnostic test for evaluating thyroid nodules. It is a simple, rapid and cost effective test that can effectively distinguish between neoplastic and non-neoplastic lesions of the thyroid.[5] But the results are sometimes misleading.[6]

In one study by Manoj Gupta and Bushan Gupta, FNAC results revealed 39 (52%) cases as colloid nodular goiter, 12 (16%) as follicular neoplasm, 9 (12%) as papillary carcinoma, 6 (8%) as hurtle cell lesions, 6 (8%) as benign cystic lesions, and 3 (4%) cases as suspected of malignancy. Comparison of FNAC with histopathological findings was performed. A total of 45 cases were diagnosed as colloid nodular goiter and benign cystic lesions by FNAC. Out of these 39 cases were non-neoplastic lesions, 3 were papillary carcinoma and 3 were diagnosed as follicular adenoma in histopathological examination.[7] Sensitivity of FNAC has been reported to be 80% and specificity as 86.6%. [7]

In another study by Bagga PK, Mahajan NC, 252 patients underwent FNAC of thyroid swellings. FNAC results were compared with the corresponding histological diagnoses. The FNAC results were interpreted as inadequate in four (1.6%), benign in 228 (90.5%), suspicious in 17 (6.7%), and malignant in three (1.2%). The histopathological findings of 32 cases that underwent surgery were benign in 25 and malignant in 6. The malignant cases comprised of papillary carcinoma (50%), follicular carcinoma (33.3%), and medullary carcinoma (16.7%).[8]

Although data is available on this subject, but data shows wide variability. Sensitivity of FNAC thyroid varies from 72 % to 90 % and specificity varies from 80 % to 90 %, keeping this in view, the purpose of this study was to address this issue by determining the diagnostic accuracy of FNAC in detection of thyroid carcinoma in patients with thyroid nodules using histopathology as gold standard.

Materials & methods:

A total of 120 patients were taken in this study. Both genders with thyroid nodules › 2 months aged more than 18 years were enrolled in our study. Patients receiving chemotherapy or radiotherapy, confirmed cases of thyroid carcinoma and previous history of any type of thyroid surgery were excluded from our study. Sample size was 120 specimens fulfilling the inclusion criteria received at the department of histopathology, Nishtar Hospital, Multan by using non-probability, consecutive sample technique. The data was collected on a pre-designed proforma. Informed consent was taken from each patient. FNAC was performed with 10 gauge needle by a histopathologist having an experience of three years, smears was fixed with 95% alcohol solution, and staining was performed using haematoxylin and eosin staining. After FNAC, all the patients were subjected to surgery after pre-op preparation and anesthesia checkup. Thyroidectomy specimen was evaluated by histopathological examination. Specimens were processed in automated tissue processing units and staining was performed with routine haematoxylin and eosin stain. Comparison of FNAC with histopathological finding was performed. All cases were examined by consultant histopathologist having an experience of five years. On Histopathology, following features were considered diagnostic for thyroid carcinoma;

1) For papillary carcinoma (most common type) papillae formation, ground glass nuclei, nuclear pseudoinclusions and nuclear grooves.
2) For follicular carcinoma, capsular invasion is the most important histopathological finding.

Data was analyzed using SPSS version 18. The quantitative variables like age, size of nodule, duration of the disease was presented by calculating mean and standard deviation. The qualitative variables like gender, age groups, marital status, use of Iodine supplement in diet and thyroid carcinoma on FNAC and histopathology was presented by calculating frequency and percentages and diagnostic accuracy was also calculated. Two by two table was constructed for calculating sensitivity, specificity, PPV, NPV and diagnostic accuracy of FNAC by taking histopathology as gold standard.

Results;

Our study included a total of 120 patients meeting inclusion criteria of our study. of these 120 study cases, 28 (23.3%) were male patients while 92 (76.7%) were female patients. Mean age of our study cases was 42.31 ± 8.40 years (with minimum age was 30 years while maximum age was 60 years). Mean age of the male patients was 41.71 ±5.46 years while that of female patients was 42.49 ± 9.12 years (p = 0.671). Our study results have indicated that 83 (69.2%) were aged 30 to 45 years of age. Of these 120 study cases 104 (86.7%) were married while 16 (13.3%) were un-married. Mean disease duration was 8.34 ± 3.91 months while 76 (63.3%) had disease duration more than 6 months and 66 (55%) had more than 10 cm size of nodule with mean size of the nodules was 14.49 ± 4.04 cm. Only 8 (6.7%) of these patients were using Iodine in their diet while remaining 93.3 % were not using Iodine supplemented diet. FNAC results revealed that thyroid carcinoma was present in 39 (32.5%) while histopathology documented thyroid carcinoma was present in 31 (25.8%) of our study cases. Sensitivity of FNAC was 87 %, specificity was 86.51 %, diagnostic accuracy was 86.66 %, positive predictive value was 69.23 % and negative predictive value was noted to be 95.06 %.

Discussion;

Thyroid nodules are very common, and although the majority are benign, approximately 5% may harbor malignancy [9, 10]. Thyroid nodules are common clinical findings and have a reported prevalence of 4–7% of adult population [11-14]. Our study included a total of 120 patients meeting inclusion criteria of our study. Of these 120 study cases, 28 (23.3%) were male patients while 92 (76.7%) were female patients. Ciftci et al [15] also reported female gender predominance with 79.2% female patients undergoing thyroidectomy having multinodular benign goiter. Aurangzeb et al [16] from Peshawar reported female to male ratio being 5:1 which is similar to that of our study results. Iqbal et al from Peshawar and Moosa et al [17] from Karachi also reported female gender predominating over male gender which are in compliance with that of our study results. Nadeem et al [18] from Raheem Yar Khan also reported female gender predominance with 70 % female patients which is similar to that of our study results. Naqvi et al [19] Sukkur reported 87 % female patients which is in compliance with that of our study results.

Mean age of our study cases was 42.31 ± 8.40 years (with minimum age was 30 years while maximum age was 60 years). Mean age of the male patients was 41.71 ±5.46 years while that of female patients was 42.49 ± 9.12 years (p = 0.671). Our study results have indicated that 83 (69.2%) were aged 30 to 45 years of age. Ciftci et al [15] reported 41.5 ± 12.7 years mean age of the patients with benign multinodular goiter undergoing thyroidectomy. These results are close to our study results. Moosa et al [17] from Karachi reported 33.42 ± 12.4 years which is quite less than our findings. The reason for this difference is due to their inclusion criteria for age (17-45 years) while we included till 60 years of age. Nadeem et al [18] from Raheem Yar Khan also reported same results as that of our study results. Naqvi et al [19] also reported majority of patients belonging to 4th decade of life which is similar to our findings. Ahmad et al [20] from Peshawar reported 38 years mean age which is close to our findings.

FNAC results revealed that thyroid carcinoma was present in 39 (32.5%) while histopathology documented thyroid carcinoma was present in 31 (25.8%) of our study cases. Sensitivity of FNAC was 87 %, specificity was 86.51 %, diagnostic accuracy was 86.66 %, positive predictive value was 69.23 % and negative predictive value was noted to be 95.06 %. In an Indian study [7], sensitivity of FNAC has been reported to be 80% and specificity as 86.6% [7] these findings are close to our study results. Sharma et al [14] from India also reported 89.5 % sensitivity, 98 % specificity, positive predictive value was 84.6 % and negative predictive value was 98.6% while 97 % diagnostic accuracy. These results are similar to that of our study results. Sinna et al [21] from Egypt also reported sensitivity in 92.8% while specificity in 94.8% and diagnostic accuracy was 93.6% which is in compliance with our study results.

Conclusion;

Fine needle aspiration cytology (FNAC) is a sensitive, specific, and accurate initial diagnostic test for the evaluation of patients with thyroid swellings. It is highly reliable, easy to perform, cost-effective and accurate tool to differentiate a malignant lesion from a benign one with high accuracy.

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