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RESEARCH ARTICLE

STUDY OF CORRELATION OF FINE NEEDLE ASPIRATION CYTOLOGY WITH HISTOPATHOLOGY IN THE DIAGNOSIS OF SOLITARY THYROID NODULE: OUR EXPERIENCE.

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Abstract

Background: Thyroid nodules are common,thyroid cancer is uncommon and the most common way for it to present is as a solitary thyroid nodule. FNAC has high sensitivity in picking up malignancy in thyroid. The main aim of FNAC is to identify nodules that require surgery and those benign nodules that can be observed clinically and decrease the overall thyroidectomy rate in patients with benign diseases.

Objective: To Correlate The FNAC Findings With Histopathology So That Rate Of Unnecessary Thyoidectomies In Benign Pathologies Should Be Avoided.

Method: This is a prospective analysis of sixty eight consecutive patients of clinically diagnosed solitary thyroid nodule . All patients who were referred to our department were evaluated. Pre-operative FNAC results were compared with final histopathological diagnosis in all 68 patients.

Results: 38 cases were diagnosed as colloid nodular goitre and benign cystic lesions by FNAC. 34 of these cases were nonneoplastic lesions, 2 as papillary carcinoma and 2 as follicular adenoma in histopathological examination . 30 cases were diagnosed as neoplastic lesions (follicular neoplasm, hurthle cell lesions, papillary carcinoma, and suspected malignancy) by FNAC. Statistical analysis of neoplastic lesions showed sensitivity, specificity, false positive rate, false negative rate, positive predictive value, and negative predictive value of FNAC to be 85.7%, 85%, 15%, 14.3%, 85.7%, and 85%, respectively .A total of 12 cases of solitary thyroid nodules were diagnosed as having malignant and the most common malignant lesion detected was papillary carcinoma, 8 out of 12 (66.66%).

Conclusion: We concluded that FNAC diagnosis of malignancy is highly significant and such patients should be subjected to surgery. 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.

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Introduction:-

Thyroid nodules are common,thyroid cancer is uncommon and the most common way for it to present is as a solitary thyroid nodule. Wienke JR[1] has reported the prevalence of thyroid nodules about 4–7% whereas in UK about 8% of population has nodular thyroid disease and significant numbers of them have solitary nodules. The problem in clinical practice is to distinguish 10% of thyroid nodule with cancers reliably from many benign nodules. Moreover, a definitive preoperative tissue diagnosis of malignancy allows appropriate surgery and relevant patient counselling. Fine needle aspiration cytology (FNAC) is the cornerstone of the investigation[2],and it is the diagnostic procedure for the nodule after primary thyroid disease is ruled out with normal thyroid function test[3]. The FNAC was first reported by Martin and Ellis in 1930.[4,5]Now, FNAC has become a critical step in the evaluation of neck masses.[6]Previous, formal open surgical biopsy will yield a definitive histopathological diagnosis but may mandate an extensive approach, which may be inappropriate for best management[7]and will break the barrier and risk of spread in superficial tissues of neck. Then comes the role of FNAC, the ease of which coupled with the rapidity of obtaining a pathological diagnosis allows more intelligent therapeutic approach.[8]This technique is an excellent first line method for investigating the nature of palpable lesions in the head and neck region.[9]FNAC is widely accepted as the most cost-effective diagnostic procedure in the assessment of thyroid nodules and also helps to select patients preoperatively for surgery.[10]FNAC is safe, inexpensive and less invasive diagnostic modality with cost-effective by avoiding the un-necessary operation. FNAC has high sensitivity in picking up malignancy in thyroid.[11]Most studies show accuracy rate exceeding 80%.[12–14]Its limitation includes false negative, false positive, indeterminate or suspicious results.[15]The false negative is defined as the patients in which FNAC shows benign pathology but histopathology reveals malignancy[16], while false positive indicates malignancy in FNAC but histopathology shows benign pathology. False positive result ranges 0–8%.[17]FNAC is, however, not without limitations; accuracy is lower in suspicious cytology and in follicular neoplasms. The main aim of FNAC is to identify nodules that require surgery and those benign nodules that can be observed clinically and decrease the overall thyroidectomy rate in patients with benign diseases. The present study was undertaken to correlate the FNAC findings with histopathology so that rate of unnecessary thyoidectomies in benign pathologies should be avoided.

Material and Methods:-

This is a prospective analysis of sixty eight consecutive patients of clinically diagnosed solitary thyroid nodule who presented to the Department of Pathology, Sher-i-kashmir institute of medical sciences, Soura, Srinagar Kashmir (India) between september 2016 and september 2017. All patients who were referred to our department were evaluated by clinical examination followed by routine investigations including haemogram, lateral neck X-ray.Inclusion criteria included clinically detected solitary thyroid nodule and euthyroid patients with normal thyroid function tests. Patients with abnormal thyroid function tests (hypothyroid/hyperthyroid) and multiple thyroid nodules were excluded from the study. FNAC was performed with 23 gauge needle, smears were fixed with ether-95% alcohol solution, and staining was performed using Giemsa staining or papanicolau's staining. Pre-operative FNAC results were compared with final histopathological diagnosis in all 68 patients. Taking histopathology as gold standard criteria.Correlation of histopathological findings was performed with FNAC. Sensitivity, specificity, accuracy, positive predictive value, and negative predictive value were calculated for neoplastic.

Results:-

A total of 68 patients with solitary thyroid nodule were identified: 8 (11.8%) were male and 60 (88.2%) were females. Age of the patients ranged from 22 to 58 years with mean age of 38.7 years. Characteristics of the patients were shown in Table 1. 51 (75%) patients were from plain areas and 17(25%) were residents of hilly areas. Commonest presentation was neck swelling in 55 (80%) of the patients.

Table 1:- Characteristics of the patients presented with clinically solitary thyroid nodule.

CHARACTERISTIC	TOTAL PATIENTS (68)
Age (in yrs)	
20-29	**8**
30-39	**31**
40-49	**21**
50-59	**8**
SEX	
MALE	**8**
FEMALE	**60**

DEMOGRAPHY	
Plains	**51**
Mountains	**17**
Presenting Complaint	
Neck swelling	**55**
Neck pain	**8**
Neck discomfort	**5**
Mode of detection of swelling	
Self	**55**
Others	**13**
Site of swelling	
Right lobe	**45**
Left lobe	**15**
isthmus	**8**

Table 2:- Nonneoplastic lesions diagnosed by FNAC and their comparison with histopathological diagnosis

FNAC report	**No. of patients (N=38)**	**Histopathological report**	**No. of patients (*n* = 38)**	**Remarks**
Colloid nodular goitre & benign cystic lesions	38	Colloid nodular goitre	34	True negative
		Follicular adenoma	2	False negative
		Papillary carcinoma	2	False negative

Table 3:- Benign or suspicious neoplastic lesions diagnosed by FNAC and their comparison with histopathological diagnosis.

FNAC report	**Number of patients (*n* = 30)**	**Histopathological report**	**Number of patients (*n* = 30)**	**Remarks**
Follicular neoplasm	10	Follicular adenoma	8	True poitive
		Colloid nodular goitre	2	False positive
Hurthle cell tumours	8	Hurthle cell adenoma	6	True poitive
		Hurthle cell carcinoma	2	True poitive
Papillary carcinoma	8	Papillary carcinoma	8	True poitive
Suspected malignancy	4	Hashimoto thyroiditis	4	False positive

Table 4:- Summary of false positive and false negative results of FNAC.

FNAC finding	Histopathology result
False positive	
Follicular neoplasm	Colloid nodular goitre
Suspected malignancy	Hashimoto's thyroiditis
False negative	
Colloid nodular goitre	Follicular adenoma
Colloid nodular goitre	Papillary carcinoma

Table 5:- Statistical analysis for neoplastic lesions.

Test being evaluated (FNAC)	Reference standard test (Histopathology) Positive	Negative
Positive + suspicious	24	6
Negative	4	34

FNAC results revealed 34 (50%) cases as colloid nodular goitre, 10(14.7%) as follicular neoplasm, 8(11.8%) as papillary carcinoma, 8 (11.8%) as hurthle cell lesions, 4(5.8%) as benign cystic lesions, and 4(5.8%) cases as suspected of malignancy.

Histopathological examination of excised specimens showed 36 (52.94%) cases as colloid nodular goitre,10 (14.70%) as follicular adenoma, 10 (14.70%) as papillary carcinoma, 6 (8.8%) as hurthle cell adenoma, 2 (2.9%) as hurthle cell changes with capsular invasion and, 4 (5.88%) as hashimoto's thyroiditis.

Comparison of FNAC with histopathological findings was performed. 38 cases were diagnosed as colloid nodular goitre and benign cystic lesions by FNAC. 34 of these cases were nonneoplastic lesions, 2 as papillary carcinoma and 2 as follicular adenoma in histopathological examination (Table 2).

30 cases were diagnosed as neoplastic lesions (follicular neoplasm, hurthle cell lesions, papillary carcinoma, and suspected malignancy) by FNAC. 2 of these cases were nonneoplastic lesions, 14 were benign neoplastic lesions, 10 were carcinoma, and 4 cases of suspected malignancy were diagnosed as hashimoto's thyroiditis on histopathological examination (Table 3).

False positive and false negative results were shown in(Table 4).Statistical analysis of neoplastic lesions (Table 5) showed sensitivity, specificity, false positive rate, false negative rate, positive predictive value, and negative predictive value of FNAC to be 85.7%, 85%, 15%, 14.3%, 85.7%, and 85%, respectively

A total of 12 cases of solitary thyroid nodules were diagnosed as having malignant and the most common malignant lesion detected was papillary carcinoma, 8 out of 12 (66.66%).

Discussion:-

In present study, the age of patients ranged from 22 to 58 years with mean of 38.72 years. This age range and mean incidence is slightly lower as compared with previous studies[18–20.]We found thatmajority of patients (45.58%) were in their third decade of life. This is in accordance with the study by Dorairajan and Jayashree[21].Solitary thyroid nodules were 4–9 times more common in females as compared to males[21-22.] Our study showed that solitary thyroid nodules were 11 times more common in females than males.The false negative rate was 14.3% in cases of neoplastic lesions. It constitutes a serious limitation of this technique since these malignant lesions would go untreated. The incidence of false negative results is as low as 1%to as high as 30% [23-24.] The false positive rate was 15% for neoplastic lesions but none of these lesions were malignant. The methods used for the calculation of sensitivity, specificity, positive predictive value, and negative predictive value were similar to previous studies [25-26] .Sensitivity and accuracy of FNAC for detection of neoplasm were 85.7% and 85.29%, respectively, whereas they were 76% and 69%, respectively, in a study by Cusick et al.[26]

The sensitivity, specificity, and accuracy of FNAC for solitary thyroid nodules were 85.7%, 85% and 85.29% respectively, in our study. whereas sensitivity, specificity and accuracy of FNAC were 93.5%, 75% and 79.6%, respectively, in a study by Bouvet et al. [22] and 79%, 98.5%, and 87%, respectively, in a study by Kessler et al. [27] In our study 12 cases were found to be malignant on histopathological examination (10 papillary carcinoma and 2 hurthle cell lesions). It is to be stressed that all cases of papillary carcinoma diagnosed by FNAC were papillary carcinoma on histopathological examination also. This is in accordance with previous studies [21,27] .The incidence of malignancy in this study was 17.64% which is in accordance with study by Dorairajan and Jayashree[21].The incidence of malignancy can be as high as 43.6% [22.]The incidence of papillary carcinoma in the present study was 66.66%. In the literature, incidence of papillary carcinoma varies from 50% to 80% [21,22,28.] Brooks et al. found that preoperative FNAC had no direct impact on the selection of the surgical procedure and intraoperative frozen section added very little to surgical management [29].

The diagnostic accuracy of Correlation between FNAC diagnosis and final histological diagnosis, intraoperative frozen section diagnoses without intraoperative cytology and final histological diagnoses, and intraoperative frozen section diagnoses associated with intraoperative cytology and final histological diagnoses were 88.8%, 88.8%, and 95.7%, respectively [30].

Frozen section should be considered unnecessary because it does not affect the intraoperative decision making. The sensitivity, specificity, positive predictive value, negative predictive value, and accuracy were 13.0%, 97.3%, 37.5%, 90.0%, and 88.1% for FNA cytology, and 17.4%, 100%, 100%, 90.8%, and 91.0% for FS, respectively [31]. Analysis of data from seven series showed a false-negative rate of 1% to 11%, a false-positive rate of 1% to 8%, a sensitivity of 65% to 98%, and a specificity of 72% to 100% [32]. The results are consistent with our study.Cytologic and histologic diagnoses were compared in 4069 patients and the sensitivity and specificity of FNAC were found to be 91.8% and 75.5%, respectively [33].

Conclusions:-

We concluded that FNAC diagnosis of malignancy is highly significant and such patients should be subjected to surgery. 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.

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