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Original Research Article

Study of Fine-Needle Aspiration Cytology of Thyroid Lesions in Rural Area of Bastar District, Chhattisgarh

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ABSTRACT

Aims and objectives: The present study was carried out to study the spectrum of thyroid lesions on cytology and to evaluate the diagnostic accuracy of FNAC in palpable thyroid lesions by comparing with histopathology wherever available.
Materials and methods: The present study is a two year analysis of patients referred to a tertiary care hospital for FNAC of thyroid lesions from 1 January 2014 to 31 December 2015. FNAC was performed on 120 patients with diffuse or nodular thyroid enlargement and compared with histopathology wherever possible.
Results: The non-neoplastic lesions were 78 (65%) amongst them colloid goiter was the most common and constituted 58 cases (48.33%). The neoplastic lesions were found in 34 cases (28.33%). The malignant lesions were 10 and papillary carcinoma was the most common malignant tumor constituted 5 cases (5.83%).
Conclusion: Patients can be followed in cases of benign diagnosis and subjected to surgery in cases of malignant diagnosis thereby decreasing the rate of unnecessary surgery.

Keywords: Thyroid, FNAC, Histopathology.

INTRODUCTION

Fine-needle aspiration cytology (FNAC) plays a vital role in the evaluating patients with thyroid nodules. Thyroid nodules are a common clinical finding with reports of a prevalence ranging from 4-7% of population available in the literature. [1,2] The vast majority of thyroid nodules are non-neoplastic lesions and only < 5% are malignant. Clinical features alone cannot distinguish between benign and malignant nodules. Thyroid cytology not only provides a definite diagnosis of malignancy but also the tumor type, thus enabling appropriate therapeutic surgery. Benign lesions can be managed conventionally. Nodules decreasing in size have negligible risk of cancer and no treatment is required. However, enlarging solid nodules have a definite risk for thyroid cancer. [3,4] Thyroid nodules are common in women. Fine needle aspiration cytology (FNAC) of the thyroid gland is now a well established, first line diagnostic test for the evaluation of diffuse thyroid lesions as well as of thyroid nodules with the main purpose of confirming benign lesions and thereby, reducing unnecessary surgery. [5] The diagnosis of thyroid lesions using aspiration cytology was first reported by Martin and Ellis in 1930. [6] Clinicians have a variety of tests giving anatomical and functional information about the thyroid gland. Fine needle aspiration cytology (FNAC), by

giving direct morphological information has supplanted most other tests for preoperative evaluation of thyroid nodules. [7] The routine use of FNAC in the assessment of thyroid nodules has reduced the number of patients subjected to thyroidectomy for benign diseases of the thyroid. [8] Hence, FNAC is considered to be the gold standard in the selection of patients for surgery. [9] As a result, the incidence of malignancy at thyroidectomy has increased from 5-10% to 30-50% in the recent years. [10] FNAC has become the dominant method in the evaluation of thyroid nodules as it is a fast, reliable, safe, minimally invasive and cost effective procedure with a high sensitivity and specificity. The present study was carried out to study the spectrum of thyroid lesions on cytology and to evaluate the diagnostic accuracy of FNAC in palpable thyroid lesions by comparing with histopathology wherever available.

MATERIALS AND METHODS

The present study is a two year analysis of patients referred to a tertiary care hospital for FNAC of thyroid lesions from 1 January 2014 to 31 December 2015. After obtaining ethical committee clearance from our institution and informed consent from the patients, FNAC was performed on 120 patients with diffuse or nodular thyroid enlargement and compared with histopathology wherever possible to determine the diagnostic accuracy. All the patients were clinically examined in detail and a careful palpation of the thyroid was done to guide precisely the location for doing aspiration. Details of the procedure were explained to the patients. Aspiration was done with the patient lying comfortably in a supine position and the neck was extended with a pillow under the shoulder so as to make the thyroid swelling appear prominent. Under aseptic precautions, 23gauge needle was inserted into the lesion without attachment to the syringe and to and fro motion performed quickly. The material gets collected in the base by capillary suction. The needle hub was attached to the air filled syringe and the plunger was pushed down to expel the material onto a clean labeled glass slide. In case of cystic nodules, the contents were aspirated with the syringe, centrifuged and slides made from the sediment for cytological analysis. Some of the smears were fixed in 95% ethyl alcohol and stained by Haematoxylin and Eosin (H&E) and Papanicolaou stain, others were air dried and stained with May Grunwald Giemsa stain. Ultrasound (USG) guided aspiration was done wherever necessary. Hamburger et al suggested that, in the assessment of a dominant nodule six clusters of benign cells in at least two slides prepared from separate aspirates constitute reasonable minimum material for diagnosing benign lesions. Other authors rely on similar criteria (5–6 groups of cells with more than 10 cells per group). Out of 120 patients, 35 were treated by surgeries like total, subtotal and hemithyroidectomies. Histopathological examination was done. These were fixed in 10% formalin, routinely processed and stained with H&E. Cytological diagnosis was correlated with histopathology wherever available.

RESULTS

Table 1: Age and sex distribution of patients

Age	Male	Female	Total
0-10	0	1	1
11-20	0	6	6
21-30	2	24	26
31-40	4	32	36
41-50	3	18	21
51-60	2	14	16
61-70	1	9	10
71-80	0	4	4
Total	**12**	**108**	**120**

Thyroid enlargement, whether diffuse or nodular, leads to a battery of investigations like ultrasound (USG), thyroid function tests (TFTs), thyroid scan and FNAC, of which FNAC is the most useful first line of investigation for early diagnosis and treatment of thyroid lesions. A total of 120 patients with thyroid lesions were subjected to FNAC during the two year study period. Of these, 35 patients underwent surgery and histopathological examination was done. Ages of the patients

ranged from 10- 80 years with the peak age incidence being 20-40 years (54%). Females outnumbered the males with a male to female (M: F) ratio of 1: 10. The results were categorized as per the recent 2007 Bethesda classification into-I-Non-diagnostic or unsatis-factory; II-Benign; III-of undetermined significance (AUS) or follicular lesion of undetermined significance; IV-Follicular neoplasm or suspicious for a follicular neoplasm; V-Suspicious for malignancy and, V-Malignant categories. Aspirates yielding insufficient or low cellularity or those that were of poor quality were considered "unsatisfactory". For thyroid FNAC specimens to be labelled as satisfactory for evaluation at least 6 groups of benign follicular cells are required and each group should be composed of at least 10 cells. Table 1 show the age and sex distribution of the patients. All the patients presented with swelling in the thyroid region. Commonest symptom was dyspnoea and dysphagia. Thyroid profile was available in 39 patients of whom 11 were hypothyroid, 3 were hyperthyroid and the rest 25 were euthyroid. FNAC results were interpreted as inadequate in 8 (6.67%), benign in 78 (65%), Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance in 11 (9.17%), Follicular neoplasm in 9 (7.5%), Suspicious for malignancy in 4 (3.34%) and malignant in 10 (8.33 %) cases. Table 2 shows the detailed FNAC diagnosis in 120 cases. Histopathology was available in 35 cases (29.16%). Table 3 shows the correlation between FNAC and histopathology. Among 78 non-neoplastic lesions diagnosed by cytology, histopathological studies were possible in 14 cases. Out of 14 cases 11 cases were of colloid goiter and 3 cases were of Hashimoto thyroiditis. The histopathological diagnosis remained the same in 9 cases of colloid goiter and differed in 2 cases which were turned out to papillary carcinoma. Out of 34 neoplastic lesions, histopathology was available in 18 cases and the diagnosis remained the same in 17 cases. It differed in 1 case of cytologically diagnosed suspicious of malignancy which turned out to be Hashimoto thyroiditis. 8 aspirates were inadequate for evaluation even on repeated aspiration. Histopathological correlation was available in three cases of which two were colloid goiter and one was Hashimoto thyroiditis. Four cases were diagnosed as suspicious for malignancy. Three cases are available for histopathology, one was a case of Hashimoto thyroiditis, one was follicular adenoma and one was follicular carcinoma. For statistical analysis, the 8 inadequate cases were excluded. All Atypia of undetermined significance (AUS) or follicular lesions of undetermined significance were considered as suspicious as no definite information (either benign or malignant) could be communicated to the clinician based on cytological findings. So the total numbers of suspicious cases were 15 out of 120 (including 4 suspicious cases showing some form of cytologic atypia and 11 Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance). 7 of these cases are available for histopathology out of which 2 turned out to be follicular carcinoma.

Table 2: Distribution of lesions on FNAC

Thyroid lesion	Number of cases	Percentage of cases
Unsatisfactory	8	6.67
Non-neoplastic lesions	78	65
Colloid goiter (Figure 1)	58	48.33
Hashimoto thyroiditis(Figure 2)	20	16.67
Neoplastic lesions	34	28.33
Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance	11	9.17
Follicular neoplasm (Figure 3)	9	7.5
Suspicious for malignancy	4	3.34
Malignant	10	8.33
Papillary carcinoma(Figure 4)	7	5.83
Anaplastic carcinoma(Figure 5)	3	2.5

Table 3: Correlation of FNAC and Histopathology diagnosis

FNAC Diagnosis	Histopathology Diagnosis						
	Colloid goiter	Hashimoto thyroiditis	Follicular adenoma	Follicular carcinoma	Papillary carcinoma	Anaplastic carcinoma	Total
Unsatisfactory	2	1	0	0	0	0	3
Colloid goiter	9	1	0	0	2	0	11
Hashimoto thyroiditis	1	2	0	0	0	0	3
Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance	0	0	3	1	0	0	4
Follicular neoplasm	0	0	3	2	0	0	5
Suspicious for malignancy		1	1	1	0	0	3
Papillary carcinoma	0	0	0	0	4	0	4
Anaplastic carcinoma	0	0	0	0	0	2	2
Total	**13**	**5**	**7**	**4**	**6**	**2**	**35**

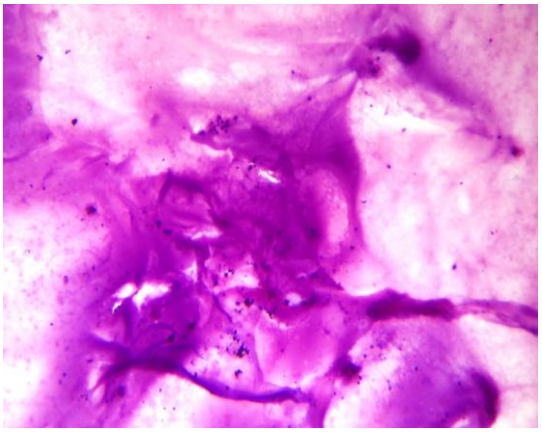

Figure 1: Colloid goiter, H & E, 10X

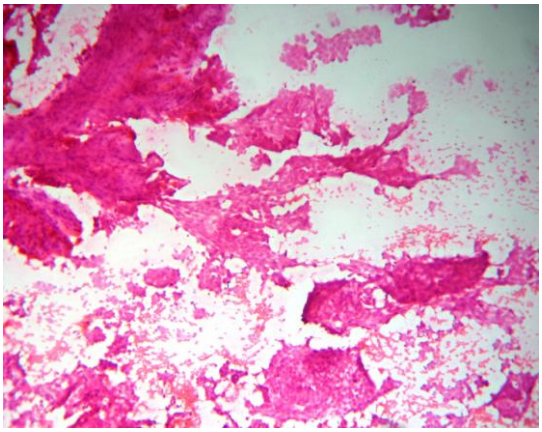

Figure 4: Papillary carcinoma, H & E, 4X.

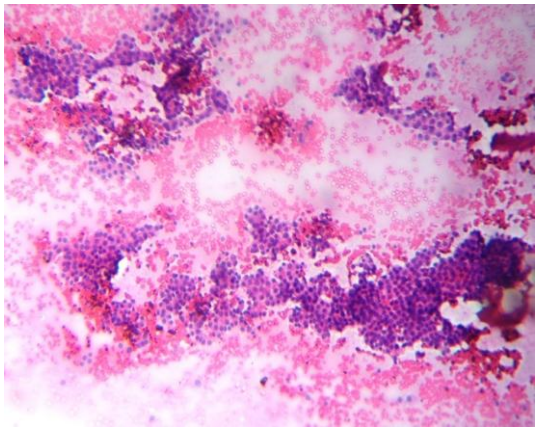

Figure 2: Hashimoto thyroiditis, H & E, 4X.

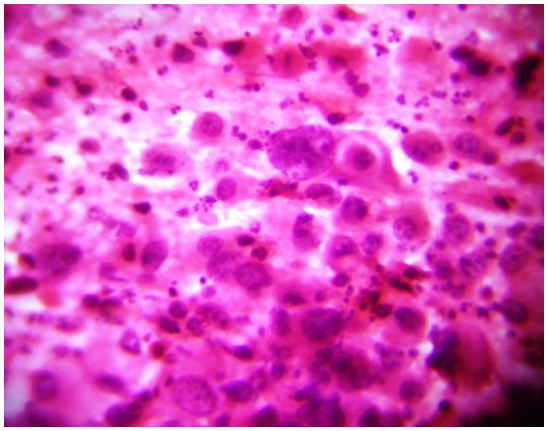

Figure 5: Anaplastic carcinoma, H & E, 40X.

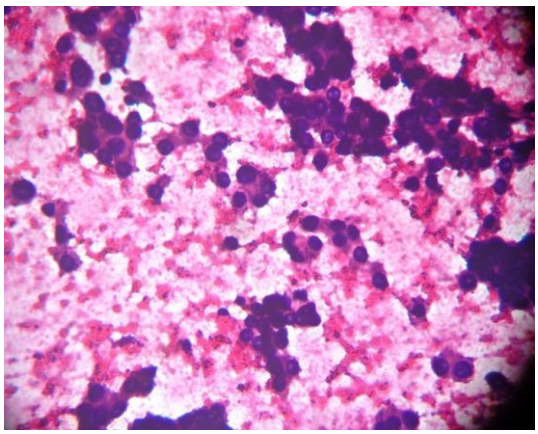

Figure 3: Follicular neoplasm, H & E, 10X.

DISCUSSION

FNAC of the thyroid gland has radically changed the management of patients with thyroid disease. FNAC is widely accepted as the most accurate, sensitive, specific and cost effective diagnostic procedure in the preoperative assessment of thyroid nodules. [7] In the present study, 120 cases of thyroid FNAC were performed over a period of 2 years from 1 January 2014 to 31 December 2015. 78 (65%) patients were found to have non-

neoplastic thyroid lesions and of these, colloid goiter (CG) was found more commonly (48.33%). A similar observation was made by Bagga PK, et al where 228 out of 252 patients had benign thyroid lesions and 78.07% cases showed CG and CG with hyperplastic foci. [7] Of the 58 cases of CG, histopathology was available in 11 cases. The cytodiagnosis was confirmed in 9 cases. It differed in 2 cases, which were papillary carcinoma (PC) on histopathology. One case of PC, whose diagnosis was missed on FNAC, was associated with cystic change. Das et al have suggested that cystic papillary carcinoma is a common cause for false negative reports in cytology. [11] In the study by Afroze et al, PC was missed in two cases which were diagnosed as thyroid cysts. [12] It is accepted that upto 5-10% of cancers, excluding the occult types, cannot be diagnosed by FNA. This could be due to sampling error or cytodiagnostic error. [12] In other case of PC which was misdiagnosed as CG, there was a tiny focus of PC in a multinodular goiter. Amrikachi et al have reported that such sampling errors leading to false negative results were due to not using USG guidance. [13] Mandrekar et al attributed their false negative results to geographical misses and cytodiagnostic error. They reported that such geographical misses can be avoided by thyroid imaging prior to FNAC so that cold nodules can be localized. [14] This indicates that every case of CG should be sampled from multiple sites to avoid missing of associated neoplastic lesion. USG guidance improves the efficacy. [15] In the present study, 20 cases of Hashimoto's thyroiditis (HT) were diagnosed. Oxyphil cells, abundant polymorphous population of lymphocytes, scant or no colloid were found on aspirates. In 3 cases, small multinucleated giant cells and epithelioid cells were seen. Gharib et al have reported in their study that multinucleated giant cells were not infrequent in HT. [16] Histopathological examination was done in 3 cases and was consistent with the cytology report in 2 cases. One case turned out to be CG. In burnt out case of HT, only oxyphil cells are seen and distinction from CG may then be impossible. Multiple sampling offers the best chance of finding evidence of lymphoid infiltration. [17] In this study, 8 cases (6.67%) were reported as inadequate. Of these patients, 3 underwent surgery, 2 were diagnosed as CG and one as HT. The frequency of inadequate cases was 2.35% in a study by Afroze et al which is comparable with our study. [12] An inadequate sample is encountered when there are large areas of cystic degeneration or necrosis or due to aspiration of sclerotic or calcified nodules. The application of USG guided FNA improved specimen acquisition and reduced the rate of inadequate specimens, especially in patients with small thyroid nodules. [18] Malignant lesions constituted 10 (8.33%) of the total number of cases. The incidence is comparable with Raveto et al (3.3%). [19] PC was the most common malignant lesion seen in 7 cases (5.83%). Anaplastic carcinoma accounted for 3 (2.5%) cases .Handa et al diagnosed PC in 2.53% cases and anaplastic carcinoma in 0.002%. [8] Paterson et al have reported that at least 2/3rd of thyroid carcinomas are papillary in origin. [20] This is comparable with our study where PC was seen in 7 out of 10 cases (70%). In the present study, all the 4 PCs which underwent surgery were true positive. Ko HM et al have reported a predictive value of a cytologic diagnosis as 100% for PC. [21] One case of PC showed lymph node metastasis. Tseng et al have reported the occurrence of PC in the thyroid gland in 67.2%, in the thyroid and cervical nodes in 13% and cervical lymph nodes only in 19.7%. [22] 3 cases of anaplastic carcinoma were diagnosed on FNAC. Highly pleomorphic cells, which were spindle like along with giant cells, were seen against a necrotic background. Gharib et al in their study have stressed for a careful search for malignancy when necrosis and purulent inflammation are seen in the smears. [16] The value of thyroid FNAC is however limited by its inability to distinguish follicular lesions reliably. This is probably due to

overlapping cytologic criteria between hyperplastic nodule in a nodular goiter, Follicular adenoma (FA) and Follicular carcinoma (FC). [7] Nine Follicular neoplasms were reported in the present study. Histopathological examination was possible in 5 cases, of these 3 cases showed FA and 2 cases showed FC. It is difficult to differentiate between follicular adenoma from carcinoma on cytological assessment, because cytology cannot evaluate the criteria for vascular or capsular invasion. [12] Eleven cases of Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance were reported on FNAC out of that 4 cases were available for histopathology. Of that 3 cases were FA and 1 case was FC. 4 cases were reported as suspicious of malignancy on FNAC out of that 3 cases were available for histopathology. Of that 1 case was HT, second was FA and third was FC.

CONCLUSION

FNAC is an invaluable tool in the management of thyroid lesions with a high degree of accuracy. It is safe, simple, cost-effective procedure with absence of major complications and can be performed on out-patients with wide patient compliance. FNAC provides a more rapid and accurate diagnosis of thyroid lesions than any other combination of clinical laboratory tests. Fine needle aspiration cytology is a cost effective procedure that provides specific diagnosis rapidly with minimum complications. Based on the cytology findings, patients can be followed in cases of benign diagnosis and subjected to surgery in cases of malignant diagnosis thereby decreasing the rate of unnecessary surgery. It plays a crucial role in the selection of patients in surgical management thus minimizing the surgical burden.

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