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Comparison of Fine Needle Aspiration Cytology (FNAC) and Histopathology in the Diagnosis of Neck Masses

G. G. Swamy[1*], B. Chandrasekhar[2], J. Parameswari[3], S. Madhuravani[4]

{[1]Associate Professor, [2]Assistant Professor, [3]Professor & HOD} Dept. of Pathology, [4]Medico Social worker, Dept. of Community Medicine, Great Eastern Medical School and Hospital, Ragolu, Srikakulam, Andhra Pradesh, INDIA.

[*]Corresponding Address:

drgangadhar123@gmail.com

Research Article

Abstract: **Objective:** Neck masses are a common clinical finding, affecting all age groups. These lumps may be extremely worrying for both physician and patient, as a wide variety of pathological conditions. Accurate cytological analysis has played a major role in evaluation and planning for surgery. We attempted to evaluate the role of Fine Needle Aspiration Cytology (FNAC) in diagnosing lump lesions of the neck region and to review the diversity of lesions in the patients attending the hospital. **Material and Methods:** The study was conducted prospectively in the Department of pathology at Great Eastern Medical School-Teaching Hospital, Srikakulam, India a tertiary health care centre. The target population comprised patients presenting with palpable masses at neck region during the period of December 2010 to December 2012. The accuracy of FNAC was verified by histological examination in this final study group of (n=136) patients. **Results:** In these (n=136) patients, twenty were males and hundred were females. Thyroid gland (60%) was the commonest site aspirated, followed by lymph node (35%), and soft tissue lesions (5%). In our study the sensitivity was 87.5%, the specificity was 100%, the positive predictive value was 100%, the negative predictive value was 98.50% and false negatives were 12.0%. **Summary and Conclusion:** We concluded that FNAC is a safe, cost-effective, sensitive and specific technique in the initial evaluation of head and neck masses. A correct cytological diagnosis can be achieved in a majority of cases, avoiding the need for surgical interventions.

Key words: FNAC, neck masses, thyroid, lymph node, soft tissue.

Introduction

Neck masses often pose a challenging diagnostic problem to the clinician. Malignancy remains an important differential diagnosis and neck mass is often the first or the only symptom of this disease. Although surgical biopsy is the commonest method of tissue diagnosis, Fine Needle Aspiration (FNAC) is in practice since long time. Fine Needle Aspiration Cytology for evaluation of a neck mass was first used by Kun in 1847, but failed to gain recognition and importance in those times.[1] Later, in 1930, Martin and Ellis rediscovered this technique in the diagnosis of various organ lesions.[2] Over a period of years, FNA biopsy has become established as an accurate, safe, and minimally invasive technique and one of the preferred first-line diagnostic tools. Performed most often for palpable swellings (commonly lymphnode, thyroid and salivary gland) in the region of the head and neck, it encompasses a wide range of differential diagnoses, ranging from inflammatory and infective lesions to neoplastic lesions. Accurate cytological analysis has played a major role in evaluation and planning for surgery of neck lesions. We aimed to evaluate the role of Fine Needle Aspiration in diagnosing lesions of the neck region and to review the diversity of lesions in the patients presenting at tertiary health care hospital. For these lesions, the results of cytology were compared with those of histopathology, wherever possible. This method has become popular as a diagnostic step in the evaluation of a neck mass.[3]

Materials and methods

The study was conducted prospectively in the department of pathology at Great Eastern Medical School- Teaching Hospital, Srikakulam, India, a tertiary health care centre. The target population comprised the patients presenting with palpable masses neck region during the period of December 2010 to December 2012, who underwent Fine Needle Aspiration during the study period. Detailed information regarding the patient, lesion, diagnosis, and any histopathology was recorded from the data. In all cases; Fine needle aspiration was done using a 23-gauge needle fitted to a 10 ml disposable syringe. The aspirated material was smeared on glass slides, immediately fixed in 95% ethanol and stained with Hematoxylin and Eosin, and Papaniculaou stain. In all cases, where there was suspicion of tuberculosis or where purulent material was aspirated, modified Zeihl-Neelsen staining was performed to look for the presence of acid-fast bacilli. Surgically excised specimens routinely processed and stained with Hematoxylin and Eosin. These histopathology slides were reviewed and compared with cytological reports for any discrepancy in diagnosis.

Results

Among the 155 patients, 19 were excluded from the study as the smears were unsatisfactory. The accuracy of FNAC was verified by histological examination in the 136 patients. Thyroid gland (60%) was the commonest site aspirated, followed by lymph node (35%) and soft tissue lesions (5%). The distribution of the 155 cases is given in Table 1. Among the 136 patients, 36 were males and 100 were females (M: F ratio =1: 3). Sex wise distribution among involved organs given in Table 2. A total of 82 patients with thyroid swelling were identified: 12 (14.6%) were male and 70 (85.4%) were females. Age of the patients ranged from 10 to 65 years. Commonest presentation was midline neck swelling in 66 (80.5%) of the patients. Duration of complaints ranged from one week to twenty years and mean duration was 1.5 years. FNAC results revealed 55 (67%) cases as colloid goiter (figure 1), 7(8.5%) as follicular nodular neoplasm (figure.2), 7 (8.5%) as papillary carcinoma (figure 3) , 6 (7.5%) as hurthle cell lesions, 4 (5%) as benign cystic lesions, and 3 (3.5%) cases as suspected of malignancy. Histopathological examination of excised specimens showed 45 (55%) cases as colloid nodular goiter (figure 2) , 12 (14.5%) as follicular adenoma, 12 (14.5%) as papillary carcinoma (Figure 3&4) , 4 (5%) as hurthle cell adenoma, 3 (4%) as hurthle cell changes with capsular invasion and, 6 (7%) as hashimoto's thyroiditis. Comparison of FNAC with histopathological findings was performed. 55 cases were diagnosed as colloid nodular goiter and four were benign cystic lesions by FNAC. Forty five of these cases were found to be non neoplastic lesions, five as papillary carcinoma and nine as follicular adenoma in histopathological examination. Twenty three cases were diagnosed as neoplastic lesions (follicular neoplasm, hurthle cell lesions, papillary carcinoma, and suspected malignancy) by FNAC. Three of these cases were non neoplastic lesions, seven were benign neoplastic lesions, six were carcinomas and nine as hashimoto's thyroiditis on histopathological examination. A total of 15 cases of solitary thyroid nodules were diagnosed as having malignant and the most common malignant lesion detected was papillary carcinoma. Table 3 shows FNAC & Histopathology diagnosis of Thyroid lesions. Statistical analysis of neoplastic lesions showed sensitivity, specificity, accuracy, false positive rate, false negative rate, positive predictive value, and negative predictive value of FNAC to be 80%,86.6%, 84%, 13.3%, 20%, 80%, and 86.6% respectively whereas statistical analysis of carcinomatous lesions showed sensitivity, specificity, accuracy, false positive rate, false negative rate, positive predictive value, and negative predictive value of FNAC to be 80%, 95%, 92%, 5%, 20%, 80%, and 95%. Among forty seven patients with lymph node swelling comprised of seventeen males and thirty females and their ages ranged from 4-60 years. Reactive lymphadenopathy was the commonest cause of lymphadenopathy, followed by tuberculous, granulomatous and metastatic lymphadenopathy. The present study did not make any attempt to categorize the type of Reactive lymphadenopathy. All twelve cases of tuberculous lymphadenopathy showed moderately cellular smears. There were epithelioid granulomas (figure.5&6) in twelve cases and caseation necrosis in seven cases. The special stain for acid fast bacilli was positive in ten cases. Three cases of suppurative lymphadenitis which were confirmed by histological diagnosis. Ten cases of granulomatous lymphadenitis were correctly diagnosed by cytology. The smears showed focal collections of epithelioid cells in association with reactive lymphoid cells. The special stain for AFB showed negative results. Two cases of metastatic carcinoma showed tumor cells in sheets and they were dispersed singly. These cells exhibited pleomorphism and had hyperchromatic nuclei with dense cytoplasm in a necrotic background. These were subsequently confirmed by histopathology. Table 4 shows distribution of Lymphnodal lesions. Patients with soft tissue lesions comprised of six cases of males and one case of female. Their ages ranged from 16-65 years. Five cases of Lipoma, One case each of hamartoma and spindle cell tumour were cytologically diagnosed and confirmed by histopathology. Table 5 shows Distribution of Soft tissue lesions. In the 136 cases, the sensitivity was 87.5%, the specificity was 100%, the positive predictive value was 100%, the negative predictive value was 98.26% and false negatives were 12.5%.

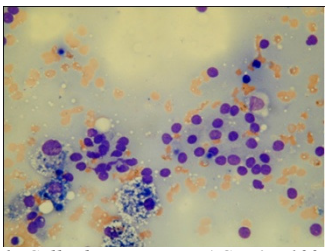

Fig 1: *Colloid goitre on FNAC H&E 100X*

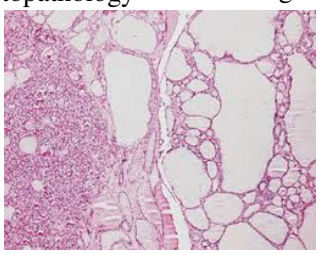

Fig 2: *Colloid goiter on Histopathology H&E 100X*

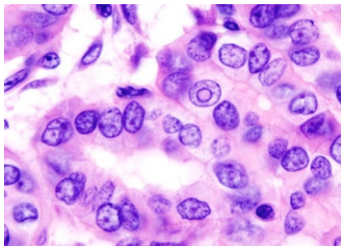

Fig 3: *Papillary carcinoma of Thyroid on FNAC 400X*

Discussion

In present study, thyroid swelling was three times more common in females as compared to males correlating with previous studies.[4,5] Our study showed that solitary thyroid nodules were 10 times more common in females than males. Then false negative rate was 20% 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%.[6,7] The false positive rate was 13.3% for neoplastic lesions but none of these lesions were malignant. Compared the results of present study with various previous studies. The methods used for the calculation of sensitivity, specificity, accuracy, positive predictive value, and negative predictive value were similar to previous studies.[8,9] Sensitivity and accuracy of FNAC for detection of neoplasm were 80% and 84%, respectively, whereas they were 76% and 69%, respectively, in a study by Cusick et al.[9] The sensitivity, specificity, and accuracy of FNAC for thyroid swellings were 80%, 86.6%, and 84%, 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 [5] and 79%, 98.5%, and 87%, respectively, in a study by Kessler et al.[10] In our study 15 cases were found to be malignant on histopathological examination (12 papillary carcinoma and 3 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.[4,10] The incidence of malignancy in this study was 20% which is in accordance with study by Dorairajan and Jayashree.[4] The incidence of malignancy can be as high as 43.6%.[5] The incidence of papillary carcinoma in the present study was 80%. In the literature, incidence of papillary carcinoma varies from 50% to 80% .[4, 5, 12] Brooks et al[11] found that preoperative FNAC had no direct impact on the selection of the surgical procedure. FNAC diagnostic accuracy rate in tuberculous lymphadenitis is as high as 90-100%. FNAC coupled with ZN staining for AFB is a very useful diagnostic tool in the diagnosis of tuberculous. Lymphadenitis. There are problems in arriving at a definitive diagnosis in certain cases of Tuberculous lymphadenitis, when the aspirate shows a polymorphous picture with occasional epithelioid cells, with an absence of Langhan's giant cells or caseous necrosis, making it necessary to resort to excisional biopsy for a definitive diagnosis. This is particularly true in children, in whom a similar picture may be seen in cases of reactive hyperplasia due to viral or toxoplasma infection, since the mere presence of the epithelioid cells is not diagnostic of any specific condition.[13] Eight cases of Reactive lymphadenopathy diagnosed cytologically, confirmed by histopathological studies. The slides were reviewed to look for the typical cytomorphological features. One case diagnosed by cytology as reactive lymphadenopathy but, it was diagnosed by tuberculous lymphadenopathy by histopathological studies. Cases of Lipoma were correctly diagnosed by cytology. One case of Hamartoma diagnosed by cytology proved to be Capillary haemangioma after histological studies. One case of Spindle cell tumour which was suspected to be malignant turned out to be malignant peripheral nerve sheath tumour. Fine Needle Aspiration usually faces no problem in distinguishing high grade soft tissue sarcomas from benign lesions. However, borderline and low grade lesions are susceptible to be missed. Accurate typing and grading of the tumour is not possible in many cases by fine needle aspiration alone. Almost all studies on soft tissue tumours have reported this limitation of fine needle aspiration.[14] On comparing the results of the present series with other workers, it can be said that the results of this study are favorable with those published in literature and are fairly accurate.

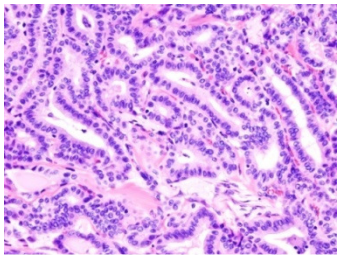

Fig 4: *Papillary carcinoma of Thyroid on histopathology 400X*

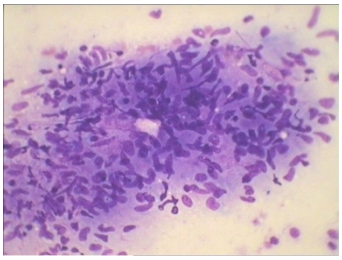

Fig 5: *Epithelod Granuloma on FNAC 400X*

Conclusion

We conclude that FNA biopsy is a simple and rapid procedure which can be carried out as an outpatient procedure with minimal problems. Owing to its accurate diagnostic potential in benign and malignant lesions, we recommend FNA biopsy as the first-line investigation in diagnosing head and neck swellings.

Table 1: Distribution of head and neck cases (Total -136)

Site	Percentage
Thyroid	60%
Lymph node	36%
Salivary gland	16%
Soft tissue	4%

Table 2: Sex wise distribution of Neck lesions (total number of cases in brackets)

Organ	Male	Female
Thyroid (82)	12	70
Lymphnode (47)	17	30
Soft tissue (07)	06	01

Table 3: FNAC & Histopathology diagnosis of Thyroid lesions (Total-82)

Diagnosis	FNAC	Histopathology
Colloid goiter	67 %	55%
Follicular Neoplasm	8.5 %	14.5% (Follicular Adenoma)
Benign cystic Lesions& Suspected malignancy	5% 3%	7% (Hashimoto's Thyroiditis)
Hurthle cell Lesions	7.5%	5%
Papillary Carcinoma	8.5%	14.5%

Table 4: Distribution of Lymphnodal lesions (Total - 47)

Lesion	Number
Reactive Lymphadenopathy	20
Tubercular Lymphadenitis	12
Granulomatous Lymphadenitis	10
Suppurative Lymphadenitis	03
Metastatic Lymphadenopathy	02

Table 5: Distribution of Soft tissue lesions (Total - 7)

Lesion	Number of cases
Lipoma	05
Spindle cell tumour	01
Hematoma	01

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