Diagnostic Accuracy of Fine Needle Aspiration Cytology in Palpable Lesions of Head and Neck in Comparison to Histopathology

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ABSTRACT

Introduction: Head and neck lesions are superficial and easily accessible to fine needle biopsy. A reliable fine needle aspiration if available is an advantage to both the patient and surgeon as the technique is rapid, safe, cost – effective. It provides reliable accurate diagnosis in most of the cases. Fair patient acceptability, repeatability and avoidance of unnecessary surgical procedure have made FNAC as a popular investigation. FNAC being simple, least traumatic and fairly economical has become a popular outpatient procedure in diagnosing the exact nature of various head and neck lesions. Current research aimed to study the accuracy of cytopathological diagnosis of head and neck swellings by FNAC and to compare and analyze FNAC of head and neck swellings with that of histopathological study.

Material and methods: This prospective study was conducted at department of surgery and department of pathology of government medical college and hospital during a period from July 2014 to October 2016. FNAC smears from 100 patients were examined and there correlation was done with histopathological findings. Statistics: Fischer exact test was used for the statistical analysis.

Results: Out of the 100 FNAC of the head and neck lesions performed, lymph nodes (43%) were the most commonly aspirated organ followed by Thyroid (34%), Salivary Glands (15%) and Miscellaneous sites (8%). Among 100 cases, 34 cases were neoplastic and 66 cases were non-neoplastic. Histopathological correlation available in all 100 cases showed sensitivity of 90.47%, specificity of 98.73%, positive predictive value of 95% and negative predictive value of 97.5%. The association between FNAC diagnoses and histopathological diagnoses was considered to be statistically significant.

Conclusion: It can be concluded that FNAC is a relatively atraumatic, well tolerated, safe procedure which can be readily performed in outpatient set up and is an excellent first line method for investigating the patients presenting with head and neck lesions. Since the lesions of the head and neck are easily accessible, FNAC is a diagnostic procedure, which suits well for such a situation. As maximum head and neck lesions are non-neoplastic, FNAC can avoid unnecessary surgeries.

Keywords: FNAC, Lymph, Node, Thyroid, Salivary, Sensitivity, Specificity

INTRODUCTION

Lesions on the exposed part of the body are cosmetically unacceptable to the patient, especially those of head and neck. These lesions often pose a diagnostic dilemma and are to be investigated cytologically and often radiologically on consultant's request to know the nature of the lesion. An early recognition and categorization of the lesion is essential for treatment. Fine needle aspiration cytology (FNAC) is a simple, quick, and cost effective method to sample superficial lesions found in head and neck. FNAC is of particular relevance in the head and neck area because of easy accessibility of the target site, excellent patient compliance, minimally invasive nature of the procedure and helping to avoid surgery in non-neoplastic lesions, inflammatory conditions and also some tumors.[1]

It was in the middle of the nineteenth century when Koss who has worked and devoted his life for FNAC commented- "Thin needle aspiration FNAC is a procedure whose time has come".[2] Martin introduced this technique in the evaluation of head and neck lesions in 1930 and the procedure has since then become increasingly popular and is being frequently used in the evaluation of swellings of this region.[3,4]

A large number of diseases can manifest as visible or palpable swellings in the head and neck region. The commonly presenting head and neck lesions are lymph nodes, thyroid and salivary gland enlargement. Less common pathological conditions which can give rise to swelling in this region are thyroglossal cyst, branchial cyst, epidermal cyst and soft tissue tumours. Fine needle aspiration cytology of head and neck lesions proved useful in separating inflammatory lesions, which do not require surgical excision from cystic and neoplastic lesions with good certainty. It has contributed great deal to transform cytology from a primary screening tool to powerful diagnostic techniques.

MATERIAL AND METHODS

The present study was a prospective study which was conducted at department of general surgery and department of pathology of Government medical college and hospital during a period from July 2014 to October 2016. Appropriate permission was taken from institutional ethics committee. Patients who gave informed consent and with a clinical diagnosis of head and neck lesions that underwent FNAC and histopathological examination were included in this study. Uncooperative patients were excluded. FNAC was carried out using 20ml disposable syringe with 23-25 gauze needle attached. Smears were prepared and routinely stained with Papanicalaou (PAP) / Haemotoxylin and Eosin (H and E) and May Grunewald Gimesa (MGG) stains. Special stains like Ziehl Neelson (ZN) stain and Periodic Acid Schiff (PAS) stains were used wherever required. The surgical specimen

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were fixed in 10% neutral formalin and subjected to gross examination, processing, paraffin embedding, section cutting, staining by H&E and mounting by DPX. The cytomorphological features of various diseases were studied. FNAC and HPE of the same lesion were correlated.

STATISTICAL ANALYSIS

A chi-square test ($\chi2$) test was used for the analysis of categorical variables. Correlation was seen using Fischer exact test. A two tailed p value of less than 0.05 was considered statistically significant.

RESULTS

This prospective study was conducted over a period from July 2014 to October 2016. Results of FNAC obtained from 100 patients with lesions in the head and neck region were analyzed. Histopathological correlation was done in all 100 cases.

Among these 100 patients, 33 (33%) were males and 67 (67%) were females. In the present study females outnumbered the males with a male: female ratio of 1:2.03.

The age of the patients with palpable lesions of head and neck region ranged from 18 months to 86 years, with a median age of 44.5 years. Of the total 100 patients studied, maximum numbers of patients were from the age group of second and third decade, followed by patients from age group of fourth and fifth decade. Out of the 100 FNAC of the head and neck lesions performed, lymph nodes (43%) were the most commonly aspirated organ followed by Thyroid (34%), Salivary Glands (15%) and Miscellaneous sites (8%).

In the present study, FNACs from thyroid gland lesions were common in the age group of 21-40 years where as lymph node lesions were more common in the age group of 11-30 years. The salivary gland lesions were more common in the age group of 31-40 years and miscellaneous lesions in the age group of 21-30 years. Among all the FNAC performed, 31-40 years was the most common age group.

The association between FNAC diagnoses and histopathological diagnoses was considered to be statistically significant.

The distributions of various diseases in head and neck lesions (Table 1) were as that main bulk of TB (17%) followed by colloid goitre (12%). Among the malignant group metastatic lymph node lesions was 7% followed by lymphoproliferative disease (5%). The correlation of FNAC with histopathology in head and neck lesions is shown in Table 2. Table 3 shows the association between FNAC and histopathological diagnosis for head and neck lesions. The diagnostic accuracy of FNAC for palpable head and neck lesions in our study is shown in table 4.

DISCUSSION

Head and neck lesions are easily accessible as a result of relatively superficial locations where they are often palpable. Hence head and neck lesions offer an accessible site for fine needle aspiration cytology. Because of the variety of tissues present in head and neck and the wide range of primary and metastatic neoplasm's that present in this region, both patients and surgeons can be assured of a rapid and accurate diagnosis by FNAC.

The accuracy of FNAC Diagnoses depends on several factors along with sampling method, adequacy of sample, experience of aspirator and expertise of cytopathologist. The false positive

and false negative diagnosis points towards limitation and pitfalls in FNAC and our study fully coordinates with the above statements. The present study was conducted from July 2014 to October 2016 with the aim to study the diagnostic accuracy of FNAC in palpable head and neck lesions in comparison to histopathology in about 100 cases.

In our study which comprised of 100 patients; 33 were males and 67 were females, giving male to female ratio of 1:2.03. Our finding are in concordance with the study by Tilak et al[5] with male to female ratio of 1 : 2.4, Fernandes H et al[6] where the male to female ratio was 1:4.37 and Solanki PK et al[7] with ratio of 1 : 1.32. Our study is in contrast to the study by Schwarz R et al[8] who had a male to female ratio of 1.43:1. In the study by Schwarz R et al[8], thyroid aspirates were excluded from the study however they were included in our study. Hence, the incidence of head and neck lesions was higher amongst females in our study as thyroid swellings are more common amongst females.

In the present study, the age of the patients with palpable lesions of head and neck region ranged from 18 month to 86 years, with a median age of 44.5 years. Of the total 100 patients studied, maximum number of patients were from the age group of second and third decade, followed by patients from age group of fourth and fifth decade. This was in concordance with the study of Rahman et al[9] where age of the patients ranged from 10 months to 85 years and most of the patients presented in third decade followed by second and fourth decades of life. In

Sr. No	Disease	No. of cases	Percentage
1	Tuberculous lymphadenitis	17	17%
2	Colloid goitre	12	12%
3	Colloid goitre with cystic change	11	11%
4	Reactive lymphadenitis	9	9%
5	Pleomorphic adenoma	9	9%
6	Metastatic lymphadenopathy	7	7%
7	Lymphoproliferative disorders	5	5%
8	Benign epidermal cyst	4	4%
9	Papillary carcinoma thyroid	3	3%
10	Acute suppurative lymphadenitis	3	3%
11	Granulomatous lymphadenitis	2	2%
12	Follicular neoplasm	2	2%
13	Lymphocytic thyroiditis	2	2%
14	Lymphocytic thyroiditis with Hurtle cell changes	1	1%
15	Hashimoto's thyroiditis	1	1%
16	Colloid goitre with Hurtle cell change	1	1%
17	Medullary carcinoma thyroid	1	1%
18	Chronic sialadenitis	1	1%
19	Mucoepidermoid carcinoma	1	1%
20	Lymphoepithelial cyst	1	1%
21	Lipoma of parotid	1	1%
22	Adenoid cystic carcinoma	1	1%
23	Squamous cell carcinoma	1	1%
24	Benign papilloma	1	1%
25	Lipoma	1	1%
26	Benign nerve sheath tumour	1	1%
27	Giant cell lesion	1	1%
	Total	100	100%

Table-1: Distribution of Head and Neck lesions on FNAC (n=100)

Sr. No.	Disease	True Positive	True Negative	False Positive	False Negative	Total
1	Tuberculous lymphadenitis	0	17	0	0	17
2	Colloid goitre	0	12	0	0	12
3	Colloid goitre with cystic degeneration	0	11	0	0	11
4	Reactive lymphadenitis	0	9	0	0	9
5	Pleomorphic adenoma	0	9	0	0	9
6	Metastasis of Squamous cell carcinoma	6	0	0	0	6
7	Non Hodgkin's lymphoma	4	0	0	0	4
8	Benign epidermal cyst	0	4	0	0	4
9	Papillary carcinoma thyroid	2	0	1	0	3
10	Acute suppurative lymphadenitis	0	3	0	0	3
11	Granulomatous lymphadenitis	0	2	0	0	2
12	Follicular neoplasm	0	2	0	0	2
13	Lymphocytic thyroiditis	0	1	0	1	2
14	Lymphocytic thyroiditis with Hurtle cell changes	1	0	0	0	1
15	Hashimoto's thyroiditis	0	0	0	1	1
16	Colloid goitre with Hurtle cell change	0	1	0	0	1
17	Medullary carcinoma thyroid	1	0	0	0	1
18	Metastasis of adenocarcinoma	1	0	0	0	1
19	Hodgkin's lymphoma	1	0	0	0	1
20	Chronic sialadenitis	0	1	0	0	1
21	Mucoepidermoid carcinoma	2	0	0	0	2
22	Lymphoepithelial cyst	0	1	0	0	1
23	Lipoma of parotid	0	1	0	0	1
24	Adenoid cystic carcinoma	1	0	0	0	1
25	Benign papilloma	0	1	0	0	1
26	Lipoma	0	1	0	0	1
27	Benign nerve sheath tumour	0	1	0	0	1
28	Giant cell lesion	0	1	0	0	1
	Total	19	78	1	2	100

Table-2: Correlation of FNAC with histopathology in Head and Neck swellings (n=100)

Test result (FNAC)	No. of cases	Gold standard test (Histopathology)		
		Malignant (positive)	Non- malignant (negative)	Total
Malignant (Positive)	20	19	1	20
Non- malignant (Negative)	80	2	78	80
Total	100	21	79	100
Fischer exact test – p value < 0.05				

Table-3: Association between FNAC and histopathological diagnoses for head and neck lesions

Statistics	Estimate	Lower 95% CI	Upper 95% CI
Sensitivity	90.476%	68.17%	98.33%
Specificity	98.73%	92.18%	99.93%
Predictive value of positive test	95%	73.03%	99.73%
Predictive value of negative test	97.5%	90.42%	99.56%

Table-4: Diagnostic accuracy of FNAC in comparison to histopathology for head and neck lesions

a study done by Narang RK et al[15], highest age incidence of head and neck lesions was in third decade of life. Head and neck lesions can occur in any age group, though its incidence tends to be common in younger age group because of relatively high occurrence of infective conditions like tuberculosis and reactive lymphadenitis in our country.[15]

In our study, out of the 100 FNACs of the head and neck lesions performed, lymph nodes were the most commonly aspirated organ comprising of total 43 cases (43%) followed by thyroid with 34 cases (34%). These findings were consistent with the study done by Frable and Frable[11], Rahman et al[9], Jasani et al[10] and Jindal et al.[12]

In the present study, of the 100 FNACs performed, 43 cases were from lymph node lesions. The most common diagnosis found was Tuberculous lymphadenitis comprising of 17 cases (17%). This observation is in accordance with the observation of other studies done by Mui S et al[13], Mobley DL et al[14] had lymph node masses as the commonest cause for neck lesions. In present study 7 cases (7%) were of metastatic lymph node which is similar to the result from Farzana Shahid et al[16] (4.5%). This is in accordance with the studies by Narang RK[15], Tarantino DR et al[17] who got a diagnostic accuracy of 100% in their studies. In our study, out of these 7 cases, 6 were metastasis of squamous cell carcinoma and 1 was metastasis of adenocarcinoma.

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Fine needle aspiration cytology has an important role in the identification of metastatic disease.

Thyroid gland enlargement is a common occurrence in many regions of the world. India has the biggest goitre belt. The incidence of goitre among thyroid nodules is high as shown in our study. In this study a total of 34 aspirates were obtained from thyroid gland lesions. Among this colloid goitre were the most common diagnoses in 24 lesions (70.59%). This is in accordance with the studies conducted by Abrari AS et al[1], Tilak et al[5], Fernandes H et al[6] and Rahman et al.[9]

For thyroid lesions, sensitivity and specificity were 66.66% and 96.42% respectively. Predictive value of positive test and predictive value of negative test were 80.00% and 93.10% respectively in our study. These were comparable to studies done by Handa et al[18], Arup sengupta et al[19], Richa sharma et al.[20]

In the present study, out of the 100 FNAC performed, 15 were from salivary gland lesions. The most common benign tumour was pleomorphic adenoma (60.00%) and mucoepidermoid carcinoma formed 6.66% of all salivary gland lesions. These findings were consistent with study done by Fernandes et al[6] Rahman et al[9], and Gunvanti et al.[21] The overall diagnostic accuracy was 100%.

In the present study, 8 cases were reported in the category of miscellaneous group. The most common diagnoses offered in this group were epidermal cyst with 4 cases (50%). This was similar to study done by Gunvanti et al[21] where incidence of epidermal cyst was highest among soft tissue and miscellaneous lesions. Subsequent histopathological examination confirmed the cytological findings in all cases with diagnostic accuracy of 100%. This is in accordance with the study by Akerman M et al[22] who got a diagnostic accuracy of 94.2% for the diagnoses of miscellaneous lesions using fine needle aspiration FNAC.

The sensitivity of fine needle aspiration cytology for the detection of malignancy in our study is 90.47%, and the specificity (accuracy for absence of malignancy) is 98.73%. Positive predictive value is 95% and negative predictive value is 97.5%. This is in accordance with the studies by Wilson JA et al[23], Tilak et al[5], Fernandes H et al[6], Sismanis A et al[24] and Schwarz R et al.[8]

CONCLUSION

FNAC is an excellent first line method for investigating the patients presenting with head and neck lesions. Since the masses of the head, neck and face are easily accessible, FNAC is a diagnostic procedure which suits well for such a situation. Apart from the high accuracy rate of FNAC, this technique is rapid, safe and painless, an out-patient procedure done without prior preparation or anesthesia. Both FNAC procedure and interpretation are quick and is a cost-contained procedure. It is eminently suitable for all age groups. In the neck, it obviates the need for an excision biopsy in non-malignant conditions, thereby reducing the chances of an ugly scar in the exposed area. The chances of complications, such as infection, hemorrhage are almost nil. However, FNAC should be correlated with histopathology wherever possible for arriving at the accurate conclusion. Thus, these two techniques should complement each other, along with the other newer diagnostic techniques for the diagnosis to be infallible and accurate for further management.

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