# A Study on Cytomorphological and Histopathological Correlation of Head and Neck Lesions in a Tertiary Care Centre, Bhubaneswar, Odisha

Anima Hota<sup>1</sup>, Pranita Mohanty<sup>2</sup>, Mitu Mohanty<sup>3</sup>

<sup>1, 2</sup> Department of Pathology, IMS and SUM Hospital, Bhubaneswar, Odisha, India. <sup>3</sup>Department of Pathology, E.S.I. Hospital Bhubaneswar, Odisha, India.

### ABSTRACT

### BACKGROUND

The head and neck region is an anatomic site having lymph nodes, nerves, veins, arteries, muscles, mucosal epithelium to salivary glands, thyroid, and a host of developmental tissues. Any of these tissues can become pathological, resulting in a mass. Fine needle aspiration cytology (FNAC) is regarded as a reliable method of investigation in diagnosis of head and neck lesions. However, histopathology is the gold standard of diagnosis. The purpose of this study was to assess the frequency of head and neck tumours according to the sites of their occurrence and to find out the correlation of cytopathological findings by FNAC and histopathological findings by biopsy.

## METHODS

This prospective study undertaken from June 2012 to June 2014 in the Department of Pathology, IMS and SUM Hospital, Bhubaneswar, a tertiary care center. All the patients attending different outdoor of IMS & SUM Hospital, Bhubaneswar with head & neck lesions referred for FNAC were included in the study. The results of FNAC were compared with that of histopathological findings by tissue biopsy. Data collected was entered in MS Excel and analysed using the same software. Descriptive statistical measures like frequency and percentage. Data was presented in tabular form.

#### RESULTS

The commonest site of lesion was in the lymph node followed by thyroid gland. There was preponderance of female sex in thyroid lesions whereas males were commonest in other sites. The accuracy in cyto-histopathology correlation between benign and malignant lesion was 96.36 % and 88.89 % respectively and was most corroborated in the thyroid lesions (50.6 %).

# CONCLUSIONS

Cyto-histo correlation of head and neck lesions provides an important, quick, excellent, and sensitive diagnostic tool to exclude non-neoplastic lesions from neoplastic lesions.

## **KEYWORDS**

Head and Neck Lesions, FNAC, Histopathology

Corresponding Author: Dr. Mitu Mohanty, Plot No. N4-F/38, IRC, Village, Bhubaneswar - 751015, Odisha, India. E-mail: drmmohanty@gmail.com

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# BACKGROUND

Fine needle aspiration cytology is well established as the first line diagnostic tool for evaluation of palpable head and neck swellings. Currently, this technique is practiced worldwide. This is the investigation of choice in head and neck swellings and other palpable swellings of body.<sup>1,2</sup> But aspiration cytology is not a substitute for conventional surgical histopathology, it should be regarded as an essential component of the preoperative/pre-treatment investigation of pathological processes. They leave no scars and it also has a very low risk of seeding of tumours along the needle tract. Patients of all age groups can be subjected to this procedure. The procedure is incredibly cost effective, minimally invasive, free of complications, well tolerated by the patient, can be done on an outpatient basis, repeatable, 3,4,5 bridges the gap between clinical evaluation and final surgical pathological diagnosis in majority of cases and helps to reduce unwarranted surgeries.

Head and neck lesions are common clinical finding and frequently encountered in surgical practice. The head neck region is an anatomic site rich in diverse structures ranging from lymph nodes, nerves, veins, arteries, muscles, salivary glands, thyroid, and a host of developmental tissues. There is high incidence of head and neck cancers in our country, which form 27 % of all cancers. Palpable lesions of head and neck region exclude oropharyngeal, nasal, ocular mucosal lesions and space occupying intracranial lesions.<sup>6</sup> Limitation of fine needle aspiration is related to 1. Skill of the aspirator 2. The expertise of the cytopathologist and 3. The difficulty in distinguishing some benign from malignant counterpart.<sup>7</sup>

#### Objectives

- 1. To study the frequency of head and neck tumours according to the sites of their occurrence.
- To find out the correlation of cytopathological findings by FNAC and histopathological findings by biopsy.

# METHODS

The present study is a prospective study undertaken from June 2012 to June 2014 in the Department of Pathology, IMS and SUM Hospital, Bhubaneswar, a tertiary care center. All the patients attending different outdoor of IMS & SUM Hospital, Bhubaneswar with head & neck lesions were referred for FNAC.

All the cases of head and neck lesions attending various outpatient department (OPDs) of our hospital referred for FNAC were included. Patients not consenting to participate in the study were excluded.

A 22-G hypodermic needle mounted on a 20cc disposable syringe fitted to the Cameco syringe holder was introduced to the swelling, maintaining all aseptic conditions and aspiration was done. Smears were prepared with another clean dry glass slide.

Few of the smears were immediately immersed into the Coplin jar containing 95 % ethyl alcohol and fixed for a few

minutes and stained with haematoxylin and eosin (H & E) staining or Papanicolaou stain. The smears were air dried at room temperature for May-Grunwald-Giemsa staining or Diff Quik.

The resected tumour mass or the biopsy specimens were obtained from the operation theatre in containers using 10 % formal saline as the fixative. The sample or specimen received was examined macroscopically and then kept in the fixative solution for 24 hours. Tissue section of 2 mm thickness was taken from the appropriate representative site of the tumour mass and was processed in automated tissue processor by the following steps - After paraffin impregnation, blocks were prepared and then 4 - 5 mm thick sections were cut by microtome and fixed to the glass slides and subsequently the sections were stained by routine haematoxylin and eosin stain.

The site wise distribution of head and neck tumours were studied based on the history and collection of specimens. The findings of FNAC were correlated with that of histopathological examination by the experienced pathologists. Consistency and inconsistencies across two methods were assessed and tabulated.

## **Statistical Analysis**

Data collected was entered in MS Excel and analysed using the same software. Descriptive statistical measures like frequency and percentage. Data was presented in tabular form.

#### RESULTS

Out of 403 cases of fine needle aspiration cytology performed from head and neck region, surgical biopsy was done in 158 cases. The cytological diagnosis was correlated with the histopathological diagnosis in these cases. Lesions involving the lymph nodes were 179 cases (44.42 %) and were most commonly encountered followed by thyroid 141 cases (34.99 %) and salivary gland 48 cases (11.91 %).

Site	FNAC Cases Having Histopathological Study	%			
Thyroid	80	50.6			
Lymph node	26	16.5			
Salivary	24	15.2			
Skin & adnexa	13	8.2			
Soft tissue	8	5.1			
Orbit	2	1.3			
Miscellaneous	5	3.2			
Total	158	100.0			
Table 1. Site Distribution of Cases with Histopathological Study					

Table 1 shows the cases of lesions in the head and neck having histopathological study and their distribution at various sites. Lesions involving the thyroid (80 cases, 50.6 %) were most commonly encountered followed by lymph nodes, (26 cases, 16.5 %) and salivary gland, (24 cases, 15.2 %) with the orbit having least number of cases.

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	FNAC Diagnosis	No. of Cases*	Cases with Surgical Biopsy	Consistent	In-Consistent	Histopathological Finding	
Benign lesions	Autoimmune thyroiditis	29	5	4	1	Autoimmune thyroiditis - 4; Medullary carcinoma thyroid - 1	
	Colloid goitre	37	27	24	3	Colloid goitre - 24	
	Hyperplastic goitre	22	9	7	2	Hyperplastic goitre - 1	
	Thyroglossal cyst	15	7	6	1	Papillary carcinoma - 1	
	Hurthle cell neoplasm	2	1	1	0	Hyperplastic goitre - 7; Colloid goitre - 2	
	Neurofibroma thyroid	1	1	1	0	Thyroglossal cyst - 1	

Table 2. Distribution of the Cases within Thyroid Lesions

	FNAC Diagnosis	No. of Cases*	Cases with Surgical Biopsy	Consistent	In- Consistent	Histopathological Finding
Malignant lesions	Papillary CA thyroid	27	24	21	3	Papillary CA - 21; Colloid goitre - 2; Adenomatous goitre - 1
	Follicular neoplasm*	5	3	3	0	Follicular Adenoma - 2; Follicular CA - 1
	Medullary CA	2	2	1	1	Medullary CA - 1; Autoimmune thyroiditis - 1
	Lymphoma thyroid (NHL)	1	1	1	0	Lymphoma thyroid - 1 (NHL)
	Total	141	80	69	11	
Table						

	FNAC Diagnosis	No. of Cases*	Cases with Surgical Biopsy	Consistent	In-Consistent	Histopathological Finding		
Benign lesions	Granulomatous lymphadenitis	41	4	4	0	Granulomatous lymphadenitis - 4		
	Reactive hyperplasia	94	9	5	4	Reactive hyperplasia - 5 Granulomatous lymphadenitis - 3 Hodgkin lymphoma - 1		
	Tubercular lymphadenitis	24	4	4	0	Tubercular lymphadenitis - 4		
Malignant lesions	Hodgkin lymphoma	5	2	2	0	Hodgkin lymphoma - 2		
	Metastatic	9	5	5	0	Metastatic - 5		
	Non-Hodgkin lymphoma	6	2	2	0	Non-Hodgkin lymphoma - 2		
	Total	179	26	22	4			
Table 3. Distribution of the Cases within Lymph Nodes								

	FNAC Diagnosis	No. of Cases*	Cases with Surgical Biopsy	Consistent	In-Consistent	Histopathological Finding
Benign lesions	Chronic sialadenitis	12	2	2	0	Chronic sialadenitis - 2
	Lymphoepithelial cyst	2	1	1	0	Lymphoepithelial cyst - 1
	Pleomorphic adenoma	11	9	9	0	Pleomorphic adenoma - 9
	Mucocele	5	3	2	1	Mucocele - 2; Chronic sialadenitis - 1
	Suppurative sialadenitis	7	1	0	1	Granulomatous sialadenitis - 1
	Warthin's tumour	4	2	2	0	Warthin's tumour - 2
Malignant lesions	Adenoid cystic carcinoma	1	1	1	0	Adenoid cystic carcinoma - 1
	Mucoepidermoid carcinoma	5	4	2	2	Mucoepidermoid carcinoma - 2 Retention cyst – 1; squamous cell CA - 1
	Non-Hodgkin Iymphoma	1	1	1	0	Non-Hodgkin lymphoma - 1
	Total	48	24	20	4	
Table 4. Distribution of the Cases within Salivary Gland						



# DISCUSSION

The evaluation of head and neck mass is a clinical dilemma at times which is commonly encountered in clinical practice. Accurate assessment of these lesions in the past depended on histopathological study which required an operative procedure that was expensive and time consuming. Fine needle aspiration cytology is a simple, guick, and costeffective method to sample superficial masses found in the head and neck. FNAC is widely used for lesions such as in the thyroid, lymph nodes, major salivary glands, and other neoplastic conditions.8 The practical value of aspiration cytology and its accuracy rate of 98 % in the diagnosis of head and neck lesions was demonstrated by Frable and Frable in 1972.<sup>9</sup> The study conducted by different authors Jain et al. 1999,<sup>10</sup> Abrari et al. 2002<sup>11</sup> and Advani et al. 2008,<sup>12</sup> reported similar results up to 100 %, 93 %, and 95.3 % respectively.

Our study shows that head and neck masses are the commonest indication among all FNACs done in our department during the study period amounting to 411 out of a total of 1223 (contributing 33.61 %). This supports the findings by Ahmad et al. (2008)<sup>13</sup> that neck swellings are the most likely clinical problems referred for FNACs in surgical outpatients. It was observed that lymph node with its lesions contributed maximum number of cases among head and neck masses which were referred for FNAC. (179 out of 403, 44.42 %). This is similar to the observations of Frable and Frable in 1979,9 who had 56.9 % cases of lymph node in their study and of Jasani et al. (2013)<sup>14</sup> who also found 69 % of lymph node masses in FNAC. A meta-analysis by Tandon et al. (2008)<sup>15</sup> establishes lymph node as major sources of all FNACs. The minimum number of cases were encountered in the orbit (0.74 %).

In our study (Table-2), thyroid lesions contributed 50.6 % of head and neck lesions. Of the 80 cases, 50 were benign and 27 cases were malignant, and the rest 3 cases diagnosed as follicular neoplasm were suspicious. This is similar to the studies of Pepper et al. 1989<sup>16</sup> and Ikram et al. 1999<sup>12</sup> who reported 82 % of benign lesions in thyroid. The clinical spectrum of the cases of thyroid origin in our study include colloid goitre followed by papillary carcinoma thyroid, hyperplastic goitre and other thyroid diseases. Papillary carcinoma (21 cases) was the most frequent malignancy encountered. This is in accordance with study of Gupta et al. (2010)<sup>17</sup> where colloid goitre was most common followed by papillary carcinoma thyroid.

In the cases of thyroid origin, a sensitivity of 92.6 %, specificity of 92.3 % and a diagnostic accuracy of 94.8 % was observed. In our study (FIG-1), most of the cases from thyroid were benign lesions. Colloid goiter (28 cases) was observed in highest numbers followed by papillary carcinoma thyroid (24 cases) and hyperplastic goiter (9 cases). There were 7 cases of thyroglossal cysts, 5 cases of autoimmune thyroiditis and 2 cases of medullary carcinoma thyroid. 9 cases diagnosed by FNAC as hyperplastic goiter, 7 cases correlated well whereas two cases were found to be colloid goiter histopathologically. Out of a total of 7 cases diagnosed as thyroglossal cyst on FNAC, 6 cases correlated well and one case was found to be colloid goiter. In the 5

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cases of autoimmune thyroiditis on FNAC, one was later diagnosed as medullary carcinoma of thyroid on histopathological study. Out of the 27 cases of FNAC done in suspected cases of papillary carcinoma of thyroid, 21 cases correlated well histopathologically. Two of these cases were later found to be colloid goiter and one case diagnosed as adenomatoid goitre. In the two cases of medullary carcinoma of thyroid cytological, one case correlated with the histopathology study and one case was found to be autoimmune thyroiditis histopathologically. The accuracy was concluded as 94.8 %, sensitivity of 92.6 % and specificity of 92.3 %.

Similarly, a study by Kumar et al. (2008);<sup>18</sup> on 89 patients concluded that FNAC is the first line of evaluation in thyroid glands before surgery, where the sensitivity was 77 %, specificity was 100 % and accuracy 97.7 %. A study by Babu SB, et al. (2016)<sup>19</sup> on the role of FNAC in diagnosis of thyroid malignancy and its histopathology correlation inferred that majority of cases were females in the third decade and commonest was colloid goitre (60.71 %), followed by papillary carcinoma (30.36 %) and benign proliferative thyroid disease (5.36 %). The accuracy rate was 82.14 %. A similar study was done by Patil et al. (2013),<sup>20</sup> concluded that cytohistological correlation was 89.44 %.

Of the 179 cases undergoing FNAC of the lymph nodes (Table-3), only 26 went on for histopathological study. From the 26 cases in our study, reactive hyperplasia (Fig-2, Fig-3) was the highest in numbers (9 cases) followed by metastatic carcinomatous deposits in lymph nodes (5 cases), granulomatous lymphadenitis (4 cases) and tubercular lymphadenitis (4 cases). Out of 9 cases of reactive hyperplasia which were subjected for histopathology, 5 cases correlated cytologically and of the remaining 4 cases, 3 cases were later found to be of granulomatous lymphadenitis and one case was diagnosed as Hodgkin lymphoma.

Histopathological study was done in 5 cases of metastatic lymph nodes, 4 cases each in granulomatous and tubercular lymphadenitis, and 2 cases each of non-Hodgkin lymphoma and Hodgkin lymphoma, all of which correlated well with the cytological diagnosis. Similar to our findings, a study by Narang et al. (1990)<sup>21</sup> explored the role of fine needle aspiration cytology in the diagnosis of lymphadenopathy in 60 cases comparing it with the histopathological diagnosis. An accuracy of 85 percent was achieved with FNAC of lymph nodes. Likewise, Pinky Pandey et al. (2013)<sup>22</sup> in her study correlating cytology and histopathology on palpable lymph nodes concluded that most were benign lesions, of which reactive hyperplasia constituted (30.63 %), tubercular (28.60 %) and malignant lesions (22.78 %). In our study there was 90 % sensitivity and 100 % specificity of FNAC in diagnosing malignant lymph node lesions. In a study by Rakhshan and Rakhshan (2009),<sup>23</sup> he showed 75.8 % sensitivity and 96.6 % specificity. Of the 48 cases undergoing FNAC from salivary gland lesions (Table-4), only 24 went on for a histopathological study. Among the benign lesions from these, pleomorphic adenoma (Fig-4) comprised maximum in number (9 cases), followed by mucocele (3 cases), chronic sialadenitis (2 cases), and Warthin's tumour (2 cases).

All the cases of pleomorphic adenoma, diagnosed after FNAC were consistent with histopathological study. A study by Verma and Kapila (2001)<sup>24</sup> studied the role of fine needle aspiration cytology in diagnosis of pleomorphic adenomas. 488 pleomorphic adenomas were diagnosed on FNAC of which histology was available in 232 cases. They proposed FNAC to be useful and accurate in diagnosing pleomorphic adenomas. Aan and Tanwani (2009)<sup>25</sup> who reviewed 61 salivary gland FNAC cases had similar conclusion, as in our study. Of the malignant Lesions, 4 cases of mucoepidermoid carcinoma diagnosed at FNAC, 2 cases correlated well, one case was found to be a retention cyst whereas one case was diagnosed as squamous cell carcinoma histopathologically. Adenoid cystic carcinoma and non-Hodgkin lymphoma of parotid diagnosed cytologically correlated well with histological diagnosis.

Amongst the malignant tumours, mucoepidermoid carcinoma constituted the maximum and this is accordance with the findings of AA Pandit,  $1988^{26}$  and Iqbal et al.  $(2010)^{27}$  who observed that mucoepidermoid carcinoma is by far the commonest primary malignant tumour of the salivary gland. In our study, the accuracy of diagnosing malignant salivary gland tumour by FNAC was 100 % sensitivity and 94.7 % specificity which correlated with the studies of Tan and Khoo<sup>28</sup> and Ersöz et al.<sup>29</sup> having 100 % specificity each and 96 % and 94 % sensitivity respectively.

13 of the 16 cases undergoing FNAC from skin and adnexa went on for a histopathological study. Among the benign lesions from these, the epidermal inclusion cysts comprised maximum number (5 cases) followed by pilomatricoma (2 cases) with one case each of cylindroma, squamous cell papilloma, trichilemmal cyst and fungal lesion on face. From the malignant lesions, one each of basal cell carcinoma and squamous cell carcinoma went in for a histopathological study. Of the 5 cases diagnosed cvtologically as epidermal inclusion cysts, 4 cases correlated histopathologically and one was diagnosed as a case of seborrhoeic keratosis. Out of 2 cases of pilomatricoma subjected for histopathology, one case was diagnosed histopathologically as of squamous cell carcinoma. In our study, 08 cases in soft tissue, of which the lipomas and neurofibromas corelated well both in cytology and histopathology. The cases in orbit were only benign lesions. One case diagnosed cytologically as benign adnexal tumour was found to be eccrine acrospiroma of eyelid histopathologically. One case presented with swelling below left eyebrow was subjected for FNAC, the cytological findings were blood and blood derived elements. On histopathology, it was diagnosed as capillary haemangioma.

Out of the remaining cases of head and neck lesions, 2 cases were diagnosed cytologically as branchial cyst. Cavernous haemangioma of scalp (02 cases) and eosinophilic granuloma (01 case) correlated well with the histopathological findings.

#### CONCLUSIONS

Finally, it can be concluded that the high success rate achieved here encourages us to use cytology as a definitive

diagnostic procedure to provide prompt diagnosis in busy hospitals, however with reservation of histopathological examination in doubtful cases.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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