Original Article

THE CORRELATION BETWEEN CYTOLOGICAL ASSESSMENT OF HEAD AND NECK SWELLING AND HISTOPATHOLOGY

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Abstract

Head and also the neck swellings can come from lymph nodes, the thyroid, or the salivary glands. The FNAC is used for prognostic as well as the therapeutic purposes, helping surgeons decide on treatment. This study compared sensitivity, diagnostic accuracy and also the specificity of cytological diagnoses of head and the neck swellings with histopathology. This 2-year retrospective study included 500 pathology cases from Fakir Mohan Medical College and Hospital, Balasore, Odissa. The FNAC of head and neck tumors that were palpable corresponded with histopathological results. Descriptive statistics were used to evaluate the specificity, sensitivity and also the diagnostic accuracy of cytology. Lymph nodes (56.23%) had the most aspirates, followed by the thyroid (27.54%) and salivary gland (9.1%). Overall diagnostic accuracy, specificity, sensitivity of FNAC were 73.8%, 99.3%, and 94.5%, respectively. FNAC is considered as a reliable, accurate and also a cost-effective method for diagnosing palpable head and neck lesions, allowing the surgeon to monitor or modify his surgical approach.

Keywords: Neck swelling, FNAC, cytological, histological study.

INTRODUCTION

Patients with neck masses are frequently seen in the otorhinolaryngology outpatient division. Neck mass would be any abnormal enlargement or development between the base of the head and the collarbone. Based on the cause, the neck masses are often divided into inflammatory, neoplastic, and congenital conditions (Park et al., 2018). Due to the composite anatomy of the neck, providing a differential diagnosis for neck masses can be challenging. The differential diagnosis is aided by the patient's age, the length of their symptoms, and the placement of the lump in their neck. The patient's age is the most crucial consideration in the differential diagnosis of a neck mass because the probability of malignancy increases with age (Oroz et al., 2019). FNAC is a simple, quick, and affordable treatment that provides a hint as to the potential cause of edema, including congenital, inflammatory, infectious, and neoplastic conditions. It can be done without hospitalization. It facilitates care and distinguishes benign from malignant illnesses. In the instance of cystic swelling, it can be both therapeutic and diagnostic. There are three types of lesions: inflammatory, benign, and malignant (Oren et al., 2019). In this investigation, the head and neck lesions' cytological and histological data were compared. To assess our findings, descriptive statistics were used.

Materials and Methods

This two-year retrospective analysis of 500 patients from Fakir Mohan Medical College and Hospital, Balasore, Odissa included pre-operative FNAC and histological assessment. The ethics committee approved the study. Before FNAC, a detailed clinical history as well as clinic imaging data have been documented on proforma. The aspiration of Fine needle was performed with a 10 ml disposable plastic syringe with 22-23 G needle. At least four smears were made for each palpable head and neck enlargement and stained with May-Grunwald Giemsa, Papanicolaou and H&E. A limited value of unstained smears has been placed for further stains and/or immunochemistry. 234 patients had surgical samples that were histopathologically equivalent. True positive, false positive, True negative and negative have been the categories used to classify the cytological results. The Galen and Gambino approach determined cytology's specificity and sensitivity in distinguishing malignant and benign lesions.

Results

There have been 500 situations over which FNAC was performed in total. There were 257 women and 243 men among these patients. The mean age of the patients in this series, who ranged in age from 16 to 85, was 34.24 years. From all of the cases, about 234 patients underwent surgery and a subsequent histopathological evaluation, making them eligible for cytohistological correlation. According to the origin of each of the 500 instances, cytologically, the lesions were divided into lymph node, salivary gland and thyroid were the three broad classifications. (Table 1)

Table 1: Clustering of 500 instances of neck and head enlargements diagnosed cytologically.

Site	**Male**	**Female**	**Total**
Lymph node	45	55	100
Thyroid	105	135	240
Salivary glands	95	65	160
Total			**500**

Lymph Node

Deep jugular group lymph nodes were most frequently affected (64.9%), followed by supraclavicular group (10.4%). Malignant and benign lymph node lesions were separated into categories. Out of 85 cases, the final diagnoses for benign lesions included 19 cases of tuberculosis, 17 cases of reactive lymphadenitis, 2 cases of sarcoidosis, and 3 cases of inflammation. For malignant conditions, the final diagnoses included 10 cases each of Hodgkins disease, 12 cases each of non-Hodgkins's lymphoma, metastatic (18 cases), angio-immunoblastic (4 cases). In this group, there was one case of false positive and four cases of false negative (Table 2).

Table 2: Cytopathological Association of the Lymph Node Tumors

Cytological diagnosis	**Number of cases**	**Histopathological diagnosis**			
		Benign (N)		**Malignant (N)**	
Reactive hyperplasia	21	Reactive	17	Angioimmunoblastic HL NHL	4 10 18
TB/granuloma	21	Tuberculosis Sarcoidosis	19 2	HL	1
Inflammatory	3	Inflammatory	3		
HL	17			HL	4
NHL	18	Reactive	1		

Thyroid

There were 90 individuals who had thyroid swelling overall, and the most frequent clinical complaint was an enlarged thyroid gland accompanied by changes in voice and swallowing difficulties. The cyto-histopathological correlation could be performed on 70 of the 90 instances for which FNAC was performed since they had undergone surgical intervention. Colloid goiter (30 cases), 5 cases of cystic nodule, 12 cases of lymphocytic thyroiditis, 2 cases of granulomatous thyroiditis, 8 cases of follicular neoplasm, 4 cases of medullary carcinoma, 6 cases of papillary carcinoma, two cases of hurthle cell neoplas, and non-Hodgkin lymphoma were the thyroid lesions classified on FNAC (1 case). The number of benign instances was 47, and the number of malignant cases was 17, according to histology, the gold standard. This group had 5 false positives (Table 3).

Table 3: Cyto- Histological Correlation of Thyroid lesions.

Cytological diagnosis	**Number of cases**	**Histopathological diagnosis**			
		Benign (N)		**Malignant (N)**	
Colloid goiter	30	Colloid goiter Graves' disease Hashimoto's thyroiditis Hurthle cell Adenoma	12 7 5 1	Papillary Carcinoma	5
Cystic nodule	5	Colloid goiter with cystic degeneration	4	Papillary Carcinoma	1
Lymphocytic thyroiditis	12	Lymphocytic thyroiditis Colloid goiter	7 5		
Granulomatous thyroiditis	1	Colloid goiter with granulomatous thyroiditis	1		
Follicular neoplasm	8	Follicular Adenoma Adenomatous goiter	2 3	Follicular Carcinoma	3
Medullary carcinoma	4			Medullary carcinoma	4
Papillary carcinoma	4			Papillary Carcinoma Follicular variant of Papillary Carcinoma	3 1
NHL	1				
Hurthle cell neoplasm	2	Follicular Adenoma			

Salivary Glands

55 of the 82 cases of salivary gland enlargements that underwent surgery were qualified for cyto-histopathological correlation. The parotid salivary gland was most often affected. Histopathology revealed that 29 of the 55 cases had aggressive and 26 were benign. This group of aggressive salivary gland lesions contained three false-positive cases (Table 4)

Table 4: Cyto-Historical Association for Salivary Gland Tumors.

Cytological diagnosis	**Histopathological Diagnosis**			
	Benign (N)		**Malignant (N)**	
Lipoma	Lipoma	2		
Chronic Sialadenitis	Sialadenosis Chronic sialadenitis	1 4		
Hemorrhagic cyst	Hemangioma	1		
Pleomorphic Adenoma	Pleomorphic adenoma Basal cell adenoma	12 3	Mucoepidermoid Carcinoma Adenoid cystic carcinoma	4 4
Mucoepidermoid Carcinoma			Mucoepidermoid Carcinoma	1
Squamous cell Carcinoma			Squamous cell Carcinoma Adenoid cystic carcinoma	8 3
Oncocytoma			Acinic Cell Carcinoma	2
Warthin's tumor	Warthin's tumor	3		
Oncocytic carcinoma			Salivary duct carcinoma	7

Sensitivity, diagnostic precision and specificity were determined using statistical analysis (Table 5). Individual figures for susceptibility, predictive value, precision, and negative predictability varied from 73.8% to 99.3%, resulting in an overall reliability of diagnosis of 94.55%.

Table 5: Sensitivity, diagnostic accuracy and Specificity of FNAC for the diagnosis of Neck and Head lesions within the study

Organ of origin	Sensitivity	Specificity	Accuracy
Lymph node	86.3%	98.2%	91.3%
Thyroid	59.33%	100%	94.7%
Salivary Glands	60%	100%	91%
Total	**73.8%**	**99.3%**	**94.5%**

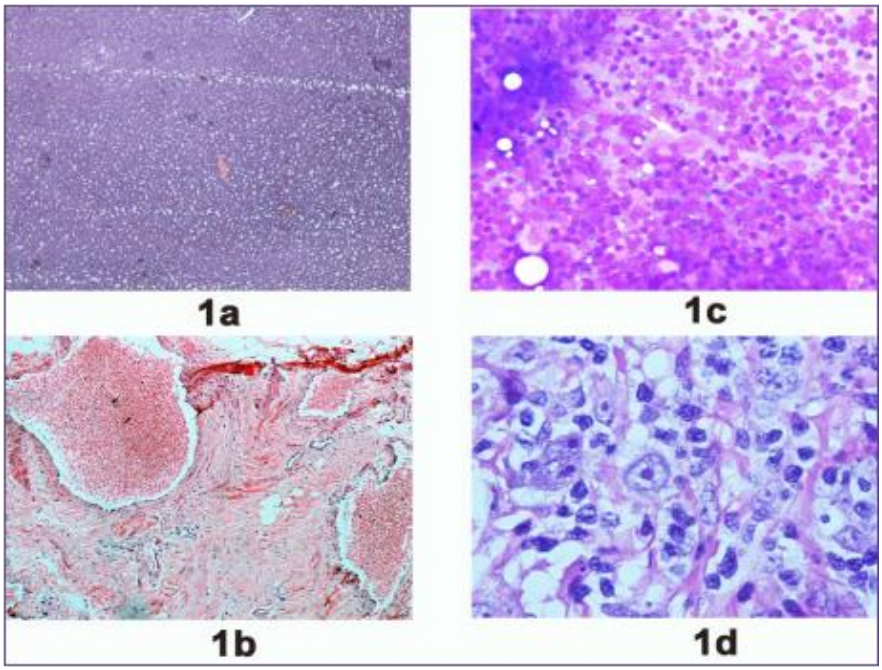

Fig. 1a: The Cytology smears containing exclusively RBC (MGG,100X) are suggestive with a hemorrhagic cyst, and tissue sections reveal cavernous areas filled with RBC and divided by collagenous stroma in 1b (H&E,100X) and 1c. Cytology smears demonstrating RS cells diagnosed as the Hodgkins' lymphoma (MGG, 400X) along with the tissue section demonstrating a mononuclear variation of RS cell in the 1d (H&E, 400X).

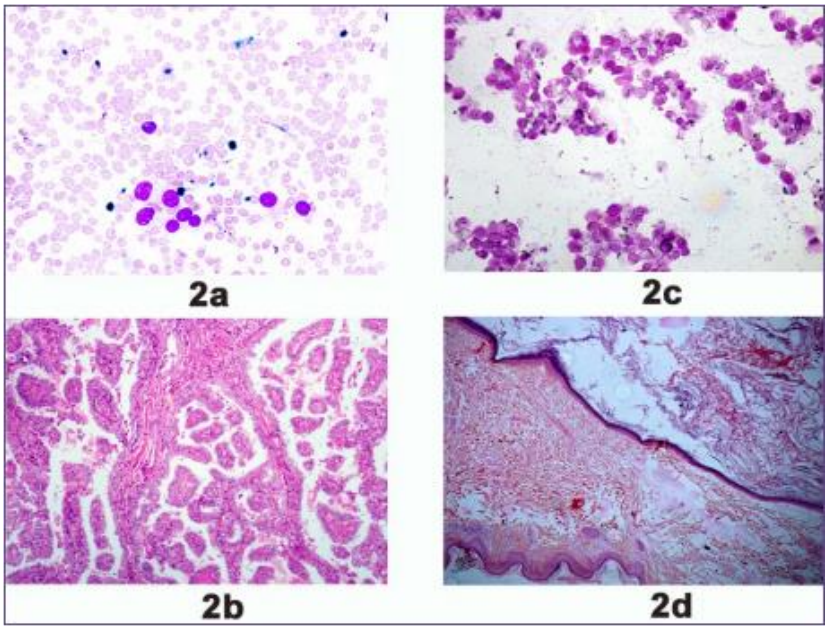

Fig. 2a: The Cytology smears within the thyroid nodule with significant intranuclear inclusion up against a hemorrhagic background and similar tissue section demonstrating papillae and also the cells with Orphan Annie Eye nuclei in the 2b (H&E, 100X). 2c. The Cytology also smears demonstrating multiple anucleate squames identified as sebaceous cyst (MGG, 100X) accompanied with a tissue section demonstrating a well-built cyst packed with plentiful keratin in the 2d (H&E, 100X).

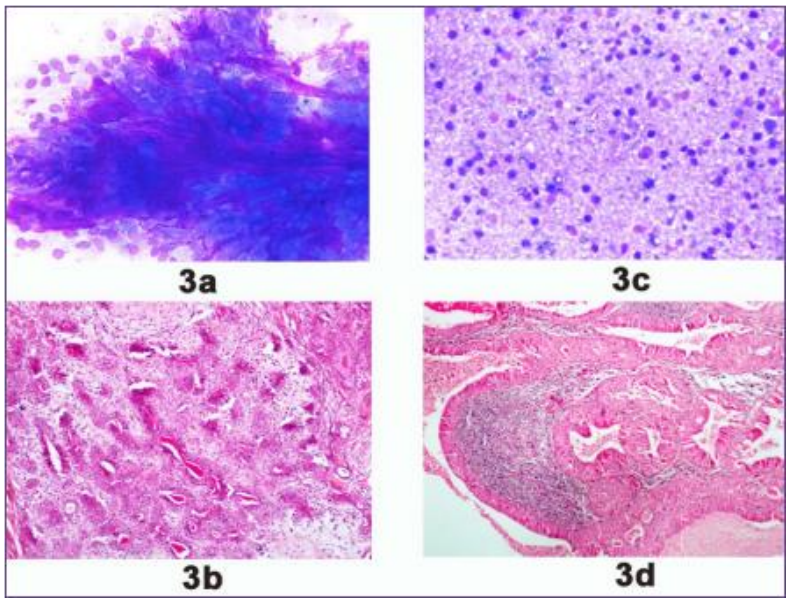

Fig. 3a: The Cytology smears demonstrating epithelial cells coupled with the fibrillar background in Pleomorphic Adenoma and corresponding to the tissue section demonstrating population of the epithelial and also the myoepithelial cells in case of 3b (H&E, 100X), 3c The Cytology smears demonstrating monolayered sheets containing the homogeneous oncocytic cells and lymphocytes on an amorphous background in the Warthin's tumour (MGG, 100X); 3d tissue section depicting the oncocytic epithelium which is resting on the lymphocytes (H&E,100X).

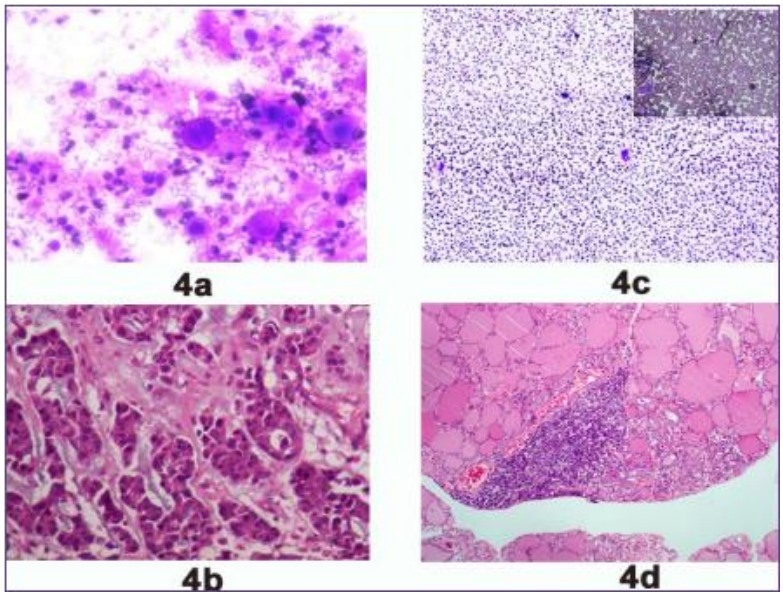

Fig. 4a: The cytology smears upon demonstrating weakly coherent malignant epithelial cells along with the hyperchromatic nuclei against a necrotic background, identified as the Squamous Cell Carcinoma as (MGG, 400X) and similar tissue segment in 4b demonstrating the Adenoid Cystic Carcinoma as (H&E, 400X) 4c. The thin colloid with the follicular epithelial cells which are diagnosed as the colloid goitre (MGG 100X) along with the corresponding 4D tissue section demonstrating elimination of the thyroid follicles using the lymphocytes in the Hashimoto's thyroiditis as (H&E, 100X)

Discussion

The FNAC serves as a crucial first line investigation for head and neck masses, which are prevalent clinical disorders. This information helps the surgeon decide how to proceed with care. With a low prevalence of cancer in young patients and patients receiving palliative care, this minimally invasive examination is a preferable method of research (Goswami et al., 2016) Additionally, within a certain age group, the majority of head and neck masses with definite causes appear in rather predictable areas. This makes it possible to establish a working diagnosis, a differential diagnosis, and the best course of treatment for the patients using a methodical approach (Pathy et al., 2017).

Lymph Node The highest reported sensitivity (86,3%) was found in lymph node disease diagnosis. There's been one false positive as well as four false negatives in 85 cases with histopathological relationship. Tuberculous cervical lymphadenopathy represents the most prevalent extrapulmonary manifestation of tuberculosis. FNAC offers 90-100% diagnostic accuracy in detecting tuberculous nodes. (Fernandes et al., 2009). Comparable to another study, the proportion of the reactive lymphadenitis (24.2%) was second just to the Tubercular lymphadenitis (25.6%). (Swamy et al., 2010)

Our study revealed two instances of reactive lymphadenitis that were histologically determined for being Hodgkin's disease as well as Non-Lymphoma, Hodgkin's, correspondingly. Due to the presence of groupings of epithelioid cells, visible body macrophages, with polymorphous lymphocytes within lymphomas, it might be difficult to identify reactive lymphadenitis as well as tuberculosis with lymphomas. Therefore, the existence of these indications doesn't really rule out lymphoma, which must be classified via tissue biopsy (Khdhayer et al., 2016). The cytology of four cases with Angioimmunoblastic lymphadenopathy (AILD) revealed reactive hyperplasia. Most authors refer to AILD as a kind of peripheral T-cell lymphoma [Botros et al., 2015]. It is difficult to distinguish between an overly benign reactive host inflammation reaction and reactive lymphadenopathy. Typically, the initial diagnosis is verified by a tissue sample. Flow cytometry validates the diagnosis by identifying abnormal T-cell antigen expression (Scott et al., 2018).

Thyroid

Histopathology revealed papillary carcinoma in 12 colloid goiters. Other authors have made similar mistakes (Bagga & Mahajan 2010). Poor cellularity, sampling mistake in tiny neoplasm foci, or the absence of papillary pieces that lack intranuclear aggregates including nuclear grooves might lead to false-negative results (Muratli et al., 2016). Papillary carcinoma was one of four thyroid cysts detected on FNAC based on sparse cellularity, follicular cells, foamy macrophages and colloid. Other authors have noted that thyroid cysts pose diagnostic challenges (Misiakos et al., 2016). Recurrent cysts, insufficient decompressed lesions, and the lesions bigger than 3 to 4 cm where aspiration does not indicate a colloid nodule, as well as lesions in young males must be surgically removed. Differentiating follicular adenoma from follicular carcinoma is another FNAC dilemma. Colloid goiter and adenoma can be difficult to distinguish. Other authors have made similar observations, noting that colloid goiter and follicular adenoma have overlapping cytological appearances (Jadhav et al., 2018). Five of Hashimoto's thyroiditis cases were nodular colloid goiters. They discovered hypocellular smears containing sparse follicular cells and minimal colloid. Other research reveals a diagnostic difficulty. Multiple aspirations are indicated in cases of thyroid enlargement in order to collect representative samples from various locations, as the thyroid may be impacted by multiple disease processes (Malheiros et al., 2018; Zhu et al., 2021).

Salivary Gland

In the current study, 12 cases have been identified as Pleomorphic adenoma by FNAC, but by histological grading it was Adenoid Cystic carcinoma. By examining the smears, clumps of homogeneous cells on a myxoid stromal backdrop without hyaline globules were observed. Two scenarios with acinic cell carcinoma have been incorrectly identified as Warthin's tumour cytology, leading to a false negative (Das et al., 2016; Salehi & Maleki (2018); Köybaşiolu et al., 2020).

Conclusion

False positive as well as false negative results were a limitation of FNAC, especially with small and solid tumors. Regenerative epithelial hyperplasia may cause false-positive tests to be performed. Inadequate procedures and hemorrhagic or necrotic areas devoid of diagnostic cells might lead to false negative results. Inadequate aspiration from the bulk was a significant contributor to erroneous negative outcomes. FNAC is a quick and generally reliable approach for determining the cause of palpable head and neck swellings. It is an extremely productive diagnostic method for the identification and treatment of neck and head masses, and can be applied to both malignant and benign tumours.

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