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Original Research Paper

Pathology

CYTOMORPHOLOGICAL VARIATIONS IN PLEOMORPHIC ADENOMA: FOCUS ON DIFFERENTIAL DIAGNOSIS AND POTENTIAL DIAGNOSTIC CHALLENGES- STUDY FROM A TERTIARY CARE HOSPITAL OF WESTERN INDIA

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ABSTRACT Salivary glands are exocrine glands having function of secreting saliva, which is distributed throughout the mouth and oropharynx. Fine needle aspiration cytology (FNAC) has proven to be an effective diagnostic tool for salivary gland lesions, aiding in informed pre-operative management decisions. Pleomorphic adenoma is the most common salivary gland neoplasm. It displays a broad morphological spectrum, ranging from predominantly epithelial to predominantly stromal patterns, which can present significant diagnostic challenges for cytopathologists. **Methods:** In this study, retrospective analysis of received 50 cases of salivary gland pleomorphic adenoma in cytopathology department during the period of January 2017 to December 2022 was done. Cytopathological examination and HPE reports were correlated whenever available. The cases classified according to cytomorphology. **Results:** Out of 50 cases of PA, Cystic changes were most common cytological variation observed in 10 cases. Total 31 cases had available histological follow-up. Out of 31 cases, 24 cases diagnosed as pleomorphic adenoma in both cytology and histology, while remaining cases were diagnosed other than PA in histology. **Conclusion:** The present study concludes that preoperative FNAC demonstrates high diagnostic accuracy for pleomorphic adenoma. When performed correctly, FNAC provides essential information that aids clinicians in making informed management decisions. However, careful technique and an awareness of cytology's limitations are crucial to prevent misinterpretations.

KEYWORDS : Cytomorphology, Pleomorphic Adenoma, Histology, Salivary gland

INTRODUCTION

Pleomorphic adenoma (PA) is the most prevalent tumor of the salivary glands, accounting for approximately 79% of major and 72% of minor salivary gland tumors[1] This tumor is characterized by morphological diversity, exhibiting various patterns with differing combinations of epithelial and mesenchymal components. FNAC can accurately diagnose most cases of pleomorphic adenoma when established diagnostic criteria are properly followed[2-4] Typically, the diagnosis is confirmed through the presence of bland epithelial cells and characteristic fragments of chondromyxoid stroma with spindle-shaped cells. However, morphological variations can sometimes complicate the diagnosis[5,6] The likelihood of such errors increases due to the limited and selective nature of FNA sampling. As a result, it is crucial for cytopathologists to be aware of the potential morphological variations of PA in FNAC smears.

AIM AND OBJECTIVE

To provide accuracy and minimize dilemma in diagnosis of pleomorphic adenoma on the basis of various cyto morphological patterns for cytopathologist.

MATERIALS AND METHODS

In this study, retrospective analysis of 50 cases of salivary gland pleomorphic adenoma were received in cytopathoogical department during January 2017 to December 2022 was done. Histopathoogical correlation were availabe in 31 cases. Relavant cinical data were retrived from laboratory request forms and the cases were classified according to epithelial component, the type and extent of the mesenchymal matrix, presence of metaplastic cells, spindle cells, oncocytic cells, plasmacytoid cells, hyaline globules, cystic changes, and nuclear atypia. Cytopathogical and histopathological slides were reviewed.

RESULTS

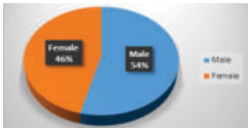

Figure 1 : Gender Distribution – More Common in Males as Compared to Females.

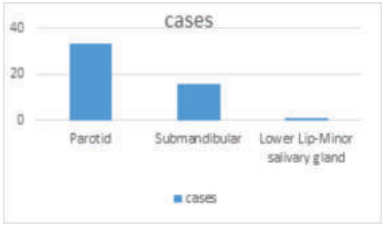

Figure 2: Pleomorphic Adenoma Presented in Gland in Cytopathology

Figure 2 Shows Most Common Gland Involved is Parotid Gland In 33 Cases, Followed by Submandibular Gland in 16 Cases and 1 Case Involving Lower Lip- Minor Salivary Gland.

Table 1: Cyto Morphological Variations on FNAC in Pleomorphic Adenoma Cases

No	Cytological Variations	Cases	Percentage
1	Cystic changes	10	20%
2	Squamous Metaplasia	8	16%
3	Plasmacytoid cells	3	6%
4	Spindle cells	3	6%
5	Oncocytic cells	6	12%
6	Cells with Hyperchromatic bland nuclei	1	2%
7	Mucinous degeneration	5	10%
8	Hyaline globules	1	2%
9	No specific variations	13	26%
Total		50	100

Table 2: Histological Follow-up in Cases Diagnosed as Pleomorphic Adenoma on Cytology

No of Cases	Cytological Diagnosis	Histological Diagnosis
24	PA	PA
19	PA	No Follow up available
2	PA	Mucoepidermoid carcinoma
2	PA	Myoepithelioma
2	PA	Oncocytoma

1	PA	Basal cell adenoma
Total – 50 cases		

DISCUSSION

Salivary gland tumors represent 2% of all neoplasms, with Pleomorphic Adenomas (PA) being the most prevalent, comprising 60-70% of these cases. [7] Fine Needle Aspiration Cytology (FNAC) is a well-established, safe, and efficient method for the pre-operative diagnosis of salivary gland lesions. Pleomorphic Adenoma (PA) is recognized for its diverse architectural and cytomorphological patterns. While these variations typically do not complicate histological diagnosis when the entire tumor is available for examination, FNAC poses a challenge since only a small sample is obtained. As a result, PA can be misdiagnosed as other types of tumors. [8,9]

The cytological diagnosis of Pleomorphic Adenoma (PA) is generally straightforward, characterized by a distinct combination of benign epithelial cells in clusters and metachromatic fragments of fibrillary chondromyxoid stroma with spindle cells. However, PA is also known for its diverse architectural and cytomorphological patterns, which can present diagnostic challenges. Variations in the appearance of both the epithelial cells and stromal components can complicate the diagnosis significantly.

Smears from Pleomorphic Adenoma (PA) containing metaplastic squamous cells, mucoid or mucinous material, and cystic changes with sparsely cellular aspirates may be incorrectly interpreted as mucoepidermoid carcinoma. PA should be suspected when both epithelial and stromal components are identifiable within the mucinous material. Hyaline globules may also be present in PA, basal cell adenoma, and adenoid cystic carcinoma. A predominance of epithelial elements may lead to a misdiagnosis of basal cell adenoma. Therefore, appropriate sampling and thorough cytomorphological evaluation are essential to reduce the risk of mis interpretation.[10]

In this study, total 50 cases of pleomorphic adenoma evaluated on basis of cytomorphological examination. Total 31 cases had histological follow up available. In 50 cases, pleomorphic adenoma was more prevalent in male as compared to females. Most common gland involved is Parotid gland in 33 cases, followed by submandibular gland in 16 cases and 1 case involving lower lip- minor salivary gland. Out of 31 cases, 24 cases diagnosed as pleomorphic adenoma in both cytological and histological examination. Out of 5 cases of pleomorphic adenoma with mucinous degeneration, 2 cases diagnosed as mucoepidermoid carcinoma on histopathology. The reason could be inadequate atypical cellular sampling due to mucinous degeneration and cystic degeneration.

Out of 3 cases of pleomorphic adenoma with spindle cells, 2 cases diagnosed as myoepithelioma on histology. The reason could be sparsely cellular aspirate and predominance of epithelial components in aspiration. Out of 6 cases of pleomorphic adenoma with oncocytic cells, 2 cases diagnosed as oncocytoma on histopathology. The reason could be presence of sparse oncocytic cells in aspiration. One case of pleomorphic adenoma with hyaline globules diagnosed as basal cell adenoma on histopathology. The reason could be inadequate epithelial cells and presence of myxoid stroma.

Therefore, it is essential to either perform an adequate re-aspiration or repeat the FNAC at a later time to enhance diagnostic accuracy of pleomorphic adenoma on cytological examination.

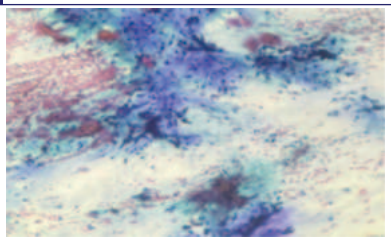

Figure 3: Pleomorphic Adenoma – The Smears are Showing Fibriller Chondromyxoid Stroma Stained as Magenta Colour (10x ,PAP Stain)

CONCLUSION

The present study concludes that preoperative FNAC demonstrates high diagnostic accuracy for pleomorphic adenoma. When performed correctly, FNAC provides essential information that aids clinicians in making informed management decisions. However, careful technique and an awareness of cytology's limitations are crucial in the evaluation of salivary gland lesions. In certain instances, repeat aspiration or performing FNAC at a later time may enhance diagnostic accuracy. A thorough understanding of cytological characteristics and their morphological variations is imperative to prevent misinterpretation. In cases of diagnostic uncertainty, the cytopathologist should refrain from making a definitive diagnosis and instead suggest a range of possible differential diagnoses. Nonetheless, some cases remain challenging due to overlapping cytological features, and in such scenarios, histopathological examination remains the definitive method for accurate diagnosis.

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