



## INTER-OBSERVER VARIABILITY IN CYTOLOGICAL DIAGNOSIS OF SALIVARY GLAND NEOPLASMS-FEASIBILITY OF A STANDARDIZED APPROACH.

### Pathology

<b>Lisa Varma*</b>	Resident Department of Pathology, Father Muller Medical College, Kankanady, Mangaluru, Karnataka, India 575002*Corresponding Author
<b>Dr. Sumanth D</b>	Associate Professor Department of Pathology, Father Muller Medical College, Kankanady, Mangaluru, Karnataka, India 575002
<b>Dr. Jayaprakash C.S</b>	Professor Department of Pathology, Father Muller Medical College, Kankanady, Mangaluru, Karnataka, India 575002

### ABSTRACT

**Background :** Salivary gland neoplasms are relatively rare. Fine-needle aspiration (FNA) is a well-established diagnostic approach for salivary gland lesions. However, there is lack of a standard system of terminology for classification of salivary gland. He Wang et al. conducted a study in which they classified the reporting of salivary lesions. Our study aimed at using the classification system proposed by He Wang et al and assessing the inter-observer variations made during the diagnosis of salivary gland neoplasms in FNA smears based on the proposed classification and later comparing the result to histopathological diagnosis wherever possible.

**Materials and methods:** A data set of 29 samples of known salivary gland lesion was analyzed. 2-blinded observers reviewed cytology smears of these cases retrospectively. These lesions were placed in the categories proposed by He Wang et al. by the observers and this was later compared to the histopathological /clinical diagnosis to assess the feasibility of the same.

**Results:** A total of 29 cases of salivary gland lesions, which came to our hospital from January 2014 to April 2016, were taken. 11(37.9%) cases were males and 18(62.1%) were females. The age of the patients ranged from 18 years to 81 years. Most common gland affected was parotid gland(62.1%) followed by submandibular gland(37.9%). There was almost an equal distribution of neoplastic and non-neoplastic cases(ratio=1.07:1).(Table1). A predominance of benign neoplasm was noted amongst the neoplastic group of lesions.(Table 2) Pleomorphic adenoma was the most commonly encountered neoplastic lesion followed by warthins tumor.

**Conclusion:** In our study, we concluded that using the new reporting can decrease ambiguity in clinicians' interpretation of cytology reports, thus benefitting subjects. However, further study on a larger sample size needs to be done to establish the validity of the same.

### KEYWORDS

Salivary gland lesion, fine needle aspiration cytology, 6-tier classification.

#### Introduction:

Neoplasms that arise in the salivary glands are relatively rare, yet they present with a wide variety of both benign and malignant subtypes. Much has been learnt from the study of this diverse group of tumors over the years yet the diagnosis and treatment of salivary gland neoplasms remain complex and challenging problems. 1,2 Fine-needle aspiration (FNA) is a well-established diagnostic approach for salivary gland lesions. However, lack of a standard system of terminology for classification of salivary gland neoplasms collected by FNA and the relatively high frequency of uncertainty of diagnosis are likely partly responsible for current confusion in the interpretation of these FNA samples. 3,4,5 An additional challenge for salivary gland FNA is the significant cytomorphologic diversity and overlap between many benign and malignant salivary gland tumors. 6,7 The Bethesda system for reporting of pap smears and thyroid lesions is already existent which helps in communicating cytology interpretation to the clinician in a clear and relevant fashion. Classification of fine needle aspiration cytology reporting of salivary lesions has also been put forward in the past. Kanahara et al made one such attempt in 2007 followed by He Wang et al. in 2015 in which they classified the reporting of salivary lesions. This study is aimed at understanding the feasibility of the classification system proposed by He Wang et al in standardizing reporting of salivary gland lesions.

#### Materials and methods:

A data set of 29 samples of salivary gland lesions was analyzed. 2-blinded observers reviewed cytology smears of these cases retrospectively. The interpretation was recorded in the form of 6-tier classification proposed by He Wang et al. Collected data was analyzed by frequency and percentage

**Results:** A total of 29 cases of salivary gland lesions, which came to our hospital from January 2014 to April 2016, were taken. 11(37.9%) cases were males and 18(62.1%) were females. The age of the patients ranged from 18 years to 81 years. Most common gland affected was parotid gland(62.1%) followed by submandibular gland(37.9%). There was almost an equal distribution of neoplastic and non-neoplastic cases(ratio=1.07:1).(Table1). A predominance of

benign neoplasm was noted amongst the neoplastic group of lesions.(Table 2) Pleomorphic adenoma was the most commonly encountered neoplastic lesion followed by warthins tumor. (Table 3) 13 out of 15 neoplastic cases were placed in cat IV by observer 1 while observer 2 placed 11 cases in cat IV.(Tables 5 &6)

**Table no.1 Distribution of cases**

Neoplastic lesions	No.of cases
Benign	14(93.3%)
Malignant	1(6.7%)

**Table no. 2 Distribution of neoplastic lesions on HPE**

Type of lesion	No.of cases
Neoplastic lesions	15(51.7%)
Non-neoplastic lesions	14(48.3%)

**Table no. 3 Frequency of different neoplastic lesions on HPE**

Diagnosis	Percentage of cases
Pleomorphic adenoma	73.3%
Warthins tumor	20%
Mucoepidermoid carcinoma	6.7%

**Table no.4 Cytological diagnosis by observer 1**

	Unsatisfactory	Negative for neoplasms	Lesion of unknown significance	Positive for neoplasm	Suggestive of malignancy	Positive for malignancy
Cat I	1					
Cat II		13				
Cat III			2			
Cat IV				13		
Cat V					0	
Cat VI						0

**Table no.5 Cytological diagnosis by observer 2**

	Unsatisfactory	Negative for neoplasm	Lesion of unknown significance	Positive for neoplasm	Suggestive of malignancy	Positive for malignancy
Cat I	1					
Cat II		17				
Cat III			0			
Cat IV				10		
Cat V					0	
Cat VI						1

**Table no. 6 Cytological diagnosis of neoplastic lesions by observer 1**

Cytological diagnosis	No.of cases
Cat II	1(6.6%)
Cat III	1(6.6%)
Cat IV	13(86.8%)

**Table no. 7 Cytological diagnosis of neoplastic lesions by observer 2**

Cytological diagnosis	No.of cases
Cat II	2(13.3%)
Cat III	2(13.3%)
Cat IV	10(66.7%)
Cat VI	1(6.7%)

**Table no. 8 Cytological diagnosis of non-neoplastic lesions by observer 1**

Cytological diagnosis	No.of cases
Cat I	1(7.1%)
Cat II	12(85.8%)
Cat III	1(7.1%)

**Table no. 9 Cytological diagnosis of non-neoplastic lesions by observer 2**

Cytological diagnosis	Histopathological diagnosis
CatII	Pleomorphic adenoma
Cat III	Normal gland

**Table no.10 Discordance in cytology and histopathology diagnosis of observer 1**

Cytological diagnosis	Histopathological diagnosis
Cat II	Warthins
Cat VI	Warthins
Cat II	Pleomorphic adenoma

**Table no. 11 Discordance in cytology and histopathology diagnosis of observer 2**

Cytological diagnosis	No.of cases
Cat I	1(7.1%)
Cat II	13(92.9%)
Cat III	0

**Discussion:** FNAC helps in determining the nature of the salivary gland lesion (inflammatory/neoplastic – benign or malignant). Though the management of almost all neoplastic salivary gland lesions is surgical excision, a pre-operative diagnosis of benign or malignant assists the clinician in planning the extent of surgery.<sup>8</sup> Various studies have been conducted wherein the diagnostic accuracy of FNA smears of salivary gland neoplasms was found to be 86-98% while sensitivity ranged from 62% to 97.6% and specificity from 94.3% to 100%.<sup>9-14</sup> In our study, out of the 29 cases, 18 (67.1%) occurred in parotid gland, and 11 (37.9%) in submandibular gland, which is in concordance with the study done by Jain et al.<sup>4</sup> where they found 67.5% parotid lesions and 30% submandibular lesions. The inadequate sampling rate in the present study was 3.4%, which was lower than 5-10% inadequacy rate reported in literature.<sup>15</sup> Non-neoplastic lesions constituted 48.3% of

all salivary gland aspirates in our study. Similar findings were seen in existing literature (11-66%).<sup>8,16</sup> among the neoplastic lesions,

In the present study 29 salivary gland lesions were analyzed by two blinded observers and grouped under categories proposed by He Wang et al. Similar study was done by Murai et al.<sup>18</sup> with the objective to determine the validity of the salivary gland FNAC reporting proposed in 2004 by the Japanese Society of Clinical Cytology.

Discordance between the cytological diagnoses of the observers in our study was noted in 4 cases (3 neoplastic and 1 non-neoplastic). The reason for this discordance can be attributed to varying cellularity seen on the smears, the presence of inflammatory cells in the background, reactive cells mimicking malignancy and the absence of characteristic findings of a particular lesion. For example- for cytological diagnosis of PA three components are required: extracellular matrix, myoepithelial, and ductal cells in varying proportions and metachromatic chondromyxoid stroma.<sup>17</sup> However, considerable variation of the cellular composition of PA raises diagnostic difficulty. This led to the discordance in one of our cases.

**Conclusion:** FNAC continues to be a reliable diagnostic technique in hands of an experienced cytopathologist. The sensitivity of diagnosis of malignant lesions is high, though the rate of tumor type-specific characterization is lower, due to variable cytomorphology. In our study, we concluded that using the new reporting can decrease ambiguity in clinicians' interpretation of cytology reports, thus benefiting subjects. However, further study on a larger sample size needs to be done to establish the validity of the same.

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