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DIAGNOSTIC ACCURACY OF FINE NEEDLE ASPIRATION CYTOLOGY IN SALIVARY GLAND LESIONS: A TWO YEAR PROSPECTIVE STUDY

Pathology

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ABSTRACT

Background and objectives: Salivary gland tumors account for 3-10% of all the neoplasms of the head and neck. Fine-needle aspiration cytology is a valuable method for preoperative assessment. The objective of this study was to evaluate the diagnostic accuracy and the sensitivity and specificity of FNAC in correlation with their histopathology, which helps in the appropriate therapeutic management
Methods: A total of 80 FNACs were included and resected specimens were analyzed and correlated.
Results: Out of the total 80 cases, 67 cases were true positive, 1 was false positive, 2 were false negative and 10 were true negative.
Interpretation and conclusion: The overall sensitivity, specificity and the diagnostic accuracy were 97%, 91% and 96% respectively. This study has shown that FNAC has a high sensitivity, specificity and diagnostic accuracy in diagnosing salivary gland lesions.

KEYWORDS

Salivary gland tumours, FNAC, Accuracy

INTRODUCTION:

Salivary gland tumors are uncommon, corresponding to approximately 3-10% of neoplasms of head and neck region [1]. A lump in the salivary gland region often presents as a diagnostic challenge with regards to its site of origin, benign or malignant.

Fine-needle aspiration cytology (FNAC) is a globally accepted method in the preoperative evaluation of head and neck tumors. This method provides excellent distinction between benign and malignant tumors, and has other advantages: it is inexpensive, easy to perform, relatively painless, and well tolerated [2]. However, the value of FNAC for the diagnosis of salivary gland masses has been questioned due to its low sensitivity regarding malignancy, variation in reported results, and the belief that most salivary gland masses require surgery in any case [3]. But a proper pre-operative planning is always better than a revision surgery [4].

Although diagnostic accuracy of FNAC in the assessment of salivary gland swellings has been studied in various studies, it has not been widely assessed in our set up. The aim of the present study is to evaluate the spectrum of salivary gland lesions in our setting and to assess the diagnostic accuracy of FNAC for salivary gland lesions

METHODS

This is a prospective observational study performed in the department of histopathology, Government Mohan Kumaramangalam Medical College Hospital for duration of two (2) years from May 2015 – April 2017. A total of 120 salivary gland surgeries were performed during this period. Of these, only 80 patients were included in this study in which preoperative FNAC was done at our institution exclusively. Rest of the patients, in which we only performed surgery but FNAC was not carried out at our centre, were excluded.

FNAC was performed using a 22 -23 gauge needle attached to a disposable syringe under aseptic conditions. The aspirated content was expressed onto two to six glass slides. The slides were immediately fixed with 95% ethanol. Slides were stained with haemotoxylin and eosin, Papanicolou and giemsa methods.

The excised surgical specimens were fixed in 10% formalin, then routinely processed and stained by Haematoxylin and Eosin (H&E) stain. Special and immunohistochemical stains were performed when necessary.

We compared the histopathological findings with the preoperative cytology of the FNAC specimens and calculated the sensitivity, specificity, positive predictive value (PPV) negative predictive value (NPV), and overall accuracy of FNAC for diagnosing benign and malignant diseases. The possible grey areas in discordant cases was analyzed.

RESULTS:

Eighty patients with salivary gland masses (44 males and 36 females) with a mean age of 56.4 years (range 18-85 years) were included in the study. The female-to-male ratio was approximately 1 to 1.2. Tumors were Located in parotid gland in 56 cases (70%) and 24 cases in (30%) submandibular gland.

FNAC results were “inflammatory/benign lesion” in 68 (85%), “malignant neoplasm” in 12 (15%) (Table1). Final histological evaluation revealed 11 malignant tumors (13.7%) and 69 benign lesions (86.3%). Pleomorphic adenoma was the most common neoplasm (44 cases; 55%), followed by Warthin's tumor (15 cases; 18.8%). Mucoepidermoid carcinoma 7 cases (8.8%) was the most common malignancy. (Table 2)

Table 1: FNAC diagnoses of salivary gland lesions:

	Diagnoses	Total	Percentage
BENIGN	Benign cystic lesion	2	2.5%
	Pleomorphic adenoma	43	53.8%
	Warthin's tumour	13	16.2%
	Myoepithelioma	3	3.7%
	Chronic sialadenitis	5	6.2%
	Keratinous cyst	1	1.3%
	Monomorphic adenoma	1	1.3%
MALIGNANT	Mucoepidermoid carcinoma	7	8.8%
	Lymphoma	2	2.5%
	Acinic cell carcinoma	1	1.3%
	Adenoid cystic carcinoma	1	1.3%
	Carcinoma Ex pleomorphic adenoma	1	1.3%
Total		80	100%

Table 2: Histopathological diagnoses of salivary gland lesions

	Diagnoses	Total	Percentage
BENIGN	Pleomorphic adenoma	44	55%
	Warthin's tumour	15	18.7%
	Myoepithelioma	3	3.7%
	Chronic sialadenitis	6	7.5%
	Keratinous cyst	1	1.3%
MALIGNANT	Mucoepidermoid carcinoma	7	8.6%
	Lymphoma	1	1.3%
	Acinic cell carcinoma	1	1.3%
	Adenoid cystic carcinoma	1	1.3%
	Carcinoma Ex pleomorphic adenoma	1	1.3%
Total		80	100%

In our study the rate of agreement between FNA and histopathogical diagnoses of malignant neoplasms was good (90.9%). While between the benign lesions, 7 of the lesions (10.3%) was misdiagnosed in FNAC, among which two benign lesion (2.5%) was misdiagnosed in FNAC as Lymphoma, mucoepidermoid carcinoma and was histologically proved to be chronic sialadenitis, warthins tumour respectively. While other five cases of benign lesions (7.4%) was misdiagnosed as some other benign lesions in histopathology (Table 3).

Table 3: Table of Discordant Lesions

HISTOPATHOLOGY DIAGNOSIS	MIS DIAGNOSIS ON FNAC
Mucoepidermoid carcinoma (1)	Warthins tumour
Chronic sialadenitis (1)	Lymphoma
Warthins tumour (2)	Benign cystic lesion
Warthins tumour (1)	Mucoepidermoid carcinoma
Pleomorphic adenoma (1)	Monomorphic adenoma
Pleomorphic adenoma (1)	Myoepithelioma
Myoepithelioma (1)	Pleomorphic adenoma

Statistical analysis: We compared the histopathological findings with the preoperative cytology of the FNAC specimens (Table 4). We calculated the sensitivity, specificity, positive predictive value (PPV) negative predictive value (NPV), and overall accuracy of FNAC for diagnosing benign and malignant salivary gland diseases (Table 5)

Table.4 Contingency table between cytological and histological diagnosis

Salivary gland FNAC	Benign histology	Malignant histology	Total
Benign FNAC	67	1	68
Malignant FNAC	2	10	12
Total	69	11	80

TABLE 5: Evaluation of the usefulness of FNAC.

Sensitivity	97.1%
Specificity	90.9%
Positive Predictive Value (PPV)	98.52%
Negative Predictive Value (NPV)	83.3%
Accuracy	96.3%

DISCUSSION:

Swelling of salivary glands, specifically parotid and submandibular gland presents as a common problem and being readily visible creates havoc among patients [5]. FNAC is a simple, inexpensive, and atraumatic method and has now become a diagnostic test of choice to solve this dilemma. In our Department, FnAC is performed in every case of salivary gland lesion, benign or malignant, palpable or not, in order to correctly plan surgery[6]. The most important goal of this examination is to distinguish a benign, from a malignant mass. Fine-needle aspiration of parotid glands may lead to hemorrhage, facial nerve injury, and fibrosis [7].

The importance of FNAC in distinguishing malignant parotid mass lesions from benign ones has been investigated by several authors [2, 8]. Despite the simplicity of the method, the accuracy of FNAC depends upon the diagnostic skill and experience of cytopathologists.
In our study, FNAC was found to have a sensitivity of 97% and a specificity of 91%. The positive predictive value was 99 % and the negative predictive value was 83% with an accuracy of 96% in diagnosing major salivary gland pathologies (Table.5). Literature review revealed a wide variation in the sensitivity and specificity of FNAC for salivary gland swelling in different populations and setups (Table-6)

Table 6: Comparison with Other Studies

Various Authors	No. of cases with histopathological confirmation	Diagnostic accuracy	Sensitivity	Specificity
Shintani	43	93.00%	88.90%	94.10%
Cristallini-EG	63	97.90%	97.60%	98.45%
Sunil kumar	120	96.00%	97.00%	80.00%
Fernandes	32	87.50%	90.30%	80.00%
Our study	80	96.25%	97.10%	90.9%

We found that the overall diagnostic accuracy of FNAC is high. There was one case of false negative diagnosis. The mucoepidermoid carcinoma which were initially diagnosed as warthins tumour on FNAC. The cause of misdiagnosis was error in interpretation. When we reviewed these slides, there were some clusters of atypical squamous cells with nuclear atypia on the necrotic background.

There were 2 cases of false positive diagnosis. In one of that case there were extensive squamous elements without any other component and therefore a diagnosis of neoplastic lesion, suspicious for malignancy was given with a possibility of mucoepidermoid carcinoma. The final histology revealed the diagnosis of warthins tumour. In other case lymphoma was given in FNAC based on the monomorphic lymphoid elements but it was found to chronic sialadenitis with dense chronic inflammation on histology.

We correctly typed pleomorphic adenoma in 43 of 44(95%) cases, better than the reported ranges from 82 to 94% in the literature [3, 9]. Mucoepidermoid carcinoma, according to Cohen et al. [10] is one of the most challenging lesions to diagnose and type cytologically. However, in our series 6 out of 7 were correctly classified.

Because of the varied, complex and overlapping morphological features, the diagnosis of pleomorphic, monomorphic adenoma, and myoepithelioma can be sometimes problematic. We had two cases of pleomorphic adenoma which was reported as monomorphic adenoma and myoepithelioma on FNAC. Similarly a case of myoepithelioma was labelled as pleomorphic adenoma by FNAC(Table3).

The most important questions is whether results gained from FNAC can be useful in the clinical management of patient with salivary gland lesions. Our experience has demonstrated a variety of circumstances in which such data may be valuable. The usual recommendation for the neoplastic lesions regardless of the preoperative cytological diagnosis is excision but recognition of benign lesion, beforehand like in case of Warthin's tumor, in poor risk patients may be of benefit in avoiding inappropriate surgery.

5. Conclusion

Our study shows that preoperative FNAC plays an important role in the accurate diagnosis of salivary gland tumors but its role still remains controversial. It is a safe and effective modality for the treatment of patients with salivary gland lesion. Moreover, in case of cystic lesions, FNA guided by ultrasound will be more representative. Although, limitations are encountered while predicting specific lesions on cytology, especially when dealing with cystic and some malignant lesions, this study has shown that FNAC has a high sensitivity, specificity and diagnostic accuracy in diagnosing salivary gland lesions.

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