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A COMPARISON OF ULTRASOUND GUIDED CORE NEEDLE BIOPSY VS FNAC FOR THE DIAGNOSIS OF SALIVARY GLAND MASSES

[1]-Dr. Syed jalal ud din, [2]-Dr.Hira Jamil, [3]-Dr.Azka Areej

[1]Xian jiaotong university, Xian Shaanxi China, [2]University Medical and Dental College Faislabad,[3]Quaid e Azam Medical College Bahawalpur

Abstract:

Objective: *To evaluate the efficacy of fine needle aspiration cytology (FNAC) and ultrasound-guided core needle biopsy (US-CNB) in the histopathological diagnosis of salivary gland lesions.*

Study Design: *A prospective cross-sectional study.*

Place and Duration: *In the Pathology, Surgery and Medicine Department of Mayo Hospital Lahore for One year duration from June 2017 to June 2018.**Methodology:*** *A total of 108 patients, ranging from 13 to 72 years, with the inflammation of the salivary glands ranging from 1.5 to 8.5cms having 63(58.3%) males and 45(41.7%) females, with ages between 13-72 years were selected for the study. FNAC and US-CNB were performed in all cases, followed by excisional biopsy. FNAC diagnosis was compared with US-CNB histological findings and excisional biopsy in all cases. The diagnosis was divided into three groups including neoplastic, non-neoplastic, benign and malignant neoplastic lesions. Cystic lesions were excluded from the study.**Results:*** *There were 70 (64.8%) lesions in the parotid gland and 38 (35.2%) in the submandibular gland. Neoplastic lesions were detected in 27 (25%) cases with FNAC and in 29 (26.8%) cases with the US-CNB. Benign neoplastic lesions were detected in 45 cases (41.7%) with FNAC, and 54 cases (50%) by US-CNB. Malignant neoplastic lesions were reported in 36 cases (33.3%) with FNAC, and 25 cases (23.1%) in the US-CNB. Comparison with excisional biopsy revealed 14 false positive and 8 false negative cases by FNAC; On the other hand, the US-CNB is no false + and has shown one false- case. While the sensitivity of US-CNB was 96.2% and its specificity was 100%, the sensitivity of FNAC was 74.2% and the specificity was 81.8%.*

Conclusion: *US-CNB has potential benefits with an accuracy equal to that of biopsy, which is almost no exception to FNAC. It can be done in the outpatient clinic and can help reduce the need and cost of surgical biopsy.*

Key words: *Fine needle aspiration cytology (FNAC), ultrasound guided thick needle biopsy (US-CNB), excisional biopsy, salivary glands.*

Corresponding author:

Dr. Syed jalal ud din,

Xian jiaotong University,Xian Shaanxi ,

China

QR code

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INTRODUCTION:

FNAC is the first step after taking the history and is proposed in the physical examination to assess a mass or expansion of the salivary glands and is an alternative procedure for taking the surgical biopsy, which enables rapid identification of the tissue. . Fine needle aspiration is similar to a venous puncture, a lumbar puncture, or a suprapubic urine aspiration, and early use can lead to more testing, saving time, costs, patient morbidity, and anxiety of residents. The surgeons themselves can perform aspiration in their clinics, smear and fixation, and only the coloring and interpretation should be directed to the pathologist. This guarantees convenience for the patient, prevents delays due to appointments with the cytologist and makes the results faster. The advantages of FNAC include less tissue damage, ease of anesthesia and the ease of repeating the procedure, for example, if it is insufficient. The diagnostic accuracy of FNAC can be further enhanced by ultrasound guidance and a cyto-pathologist on site. Ultrasound is characterized by ease of use, multiplayer scanning capability, non-invasiveness and portability. It is used in the evaluation of salivary glands, especially the masses in the superficial lobe of the parotid gland.

The efficacy of FNAC in the diagnosis of salivary gland lesions is controversial. In the absence of on-site ultrasound guidance or cytopathology, FNAC's accuracy is greatly reduced. In general, FNAC does not alter the scope of the surgical plan or resection. More importantly, if interpreted out of context, an incorrect FNAC sign may prevent the patient and surgeon from following a specified surgical procedure. Improvement in the accuracy of preoperative diagnosis of salivary gland mass is important to prevent unnecessary surgery and biopsy of the frozen section and to choose an appropriate treatment. Biopsy of core ultrasound-guided neoplasm (US-CNB) is a relatively new technique which is well tolerated and has a high diagnostic accuracy in the lesions of salivary glands. It can be safely performed as an outpatient procedure and has potential advantages over FNAC, particularly in the typing and classification of lymphoma and carcinoma and in the differentiation of lymphoma reactive nodal hyperplasia. The use of US-CNB can help reduce the need for a surgical biopsy and facilitate appropriate management. Considering all the above, we performed a comparative study of FNAC and US-CNB for the confirmation of excisional biopsy to assess its efficacy as a diagnostic method for salivary gland lesions.

MATERIALS AND METHODS:

This prospective cross-sectional study was performed on 108 patients with salivary gland masses (size 1.5 to 8.5 cm) in the the Pathology, Surgery and Medicine Department of Mayo Hospital Lahore for One year duration from June 2017 to June 2018. The mean age of the patients ranged from 52.2 to 13 to 72 years, with 63 (58.3%) male and 45 (41.7%) female.

FNAC, US-CNB and excisional biopsy were performed in all cases. FNAC was performed with a 22 gauge needle attached to a 10 ml syringe and without local anesthesia. A minimum of two smears per standard four smears per patient were prepared, the air-dried smear was stained with an area of dye immediately to see the quality of the aspirated material, and another aspiration was performed if the material was found to be inadequate. The remaining smear was stained with hematoxylin and eosin and studied.

US-CNB was performed under local anesthesia with an 18 gauge needle, after cleaning the site, the skin on the bundle was cut with a small disposable scalpel for approximately 2-3 mm to place the tip of the needle. The procedure was performed with ultrasound guidance and one sample was sufficient. The sample was placed in 10% formalin, embedded in paraffin, cut to 4 ildm sections and stained with hematoxylin and eosin and studied. FNAC and US-CNB were compared with excisional biopsy in all cases. The diagnosis was divided into non-neoplastic, benign and malignant neoplastic lesions. Cystic lesions were excluded from the study.

RESULTS:

FNAC, US-CNB and excisional biopsy were performed in 108 patients with salivary glands lesions. As shown in Table 1, there were 70 (64.8%) of the parotid gland and 38 (35.2%) of the submandibular gland.

Table I. Diagnosis of Salivary Gland lesions by FNAC and US-CNB

Diagnosis	Parotid		Submandibular	
	FNAC	USCNB	FNAC	USCNB
NON-NEOPLASTIC				
Reactive lymph node	3 (2.8%)	5 (4.6%)	5 (4.6%)	7 (6.5%)
Chronic sialadenitis	2 (1.8%)	2 (1.8%)	8 (7.4%)	7 (6.5%)
Retention cyst	3 (2.8%)	2 (1.8%)	1 (0.9%)	1 (0.9%)
Tuberculosis	2 (1.9%)	2 (1.8%)	1 (0.9%)	2 (1.8%)
Salivary gland abscess	1 (0.9%)	1 (0.9%)	1 (0.9%)	–
BENIGN NEOPLASTIC				
Pleomorphic Adenoma	22 (20.4%)	24 (22.2%)	9 (8.3%)	11 (10.2%)
Warthin's tumor	9 (8.3%)	12 (11.1%)	–	–
Monomorphic adenoma	1 (0.9%)	3 (2.9%)	1 (0.9%)	2 (1.8%)
Haemangioma	2 (1.8%)	–	2 (1.8%)	–
Oncocytoma	1 (0.9%)	–	–	–
MALIGNANT NEOPLASTIC				
Mucoepidermoid carcinoma	8 (7.4%)	6 (5.6%)	4 (3.7%)	2 (1.8%)
Lymphoma	3 (2.8%)	2 (1.8%)	5 (4.6%)	4 (3.7%)
Adenoid cystic carcinoma	4 (3.7%)	3 (2.9%)	2 (1.8%)	1 (0.9%)
Malignant mixed tumor	4 (3.7%)	3 (2.8%)	1 (0.9%)	1 (0.9%)
Adenocarcinoma	3 (2.8%)	3 (2.9%)	–	–
Acinic cell carcinoma	2 (1.8%)	–	–	–

Neoplastic lesions were diagnosed in 27 (25%) cases with FNAC and in 29 (26.8%) cases in US-CNB (Table I). Excisional biopsy confirmed US-CNB results in all cases. US-CNB not misdiagnosed any case or FNAC was diagnosed with five false cases: two cases of chronic sialadenitis, reactive lymph node and lymphoma, two cases of holding cysts like two pleomorphic adenomas and Warthin's tumor, and acute suppurative sialadenitis such as tuberculosis. (Table II).

Table II. Comparison of FNAC and US-CNB results with Excisional Biopsy

Histological Diagnosis	FNAC			USCNB			Excisional
	No.	False+ve	False-ve	No.	False+ve	False-ve	Biopsy Cases
NON-NEOPLASTIC							
Reactive lymph node	8	–	–	12	–	–	12
Chronic sialadenitis	10	–	2	9	–	–	9
Retention cyst	4	–	2	3	–	–	3
Tuberculosis sialadenitis	3	–	–	3	–	–	4
Salivary gland abscess	2	–	1	1	–	–	1
BENIGN NEOPLASTIC							
Pleomorphic adenoma	31	–	1	35	–	–	35
Warthin's tumor	9	–	1	12	–	1	11
Monomorphic adenoma	2	–	1	5	–	–	5
Haemangioma	2	–	–	2	–	–	2
Oncocytoma	1	1	–	–	–	–	–
MALIGNANT NEOPLASTIC							
Mucoepidermoid carcinoma	12	4	–	8	–	–	9
Lymphoma	8	3	–	6	–	–	6
Adenoid cystic carcinoma	6	2	–	4	–	–	4
Malignant mixed tumor	5	2	–	4	–	–	4
Adenocarcinoma	3	–	–	3	–	–	3
Acinic cell carcinoma	2	2	–	–	–	–	–
Total	108	4	8	108	–	1	108

Benign neoplastic lesions were diagnosed in 45 (41.7%) cases with FNAC and 54 (50%) cases with US-CNB (Table I). Excisional biopsy validates US-CNB results in all cases, except one, with the exception of a Warthin tumor occurring as a mucoepidermoid carcinoma; Therefore, only one misdiagnosed. The diagnosis of FNAC received three false, one false + and diagnosis: a case of a monomorphic adenoma pleomorphic adenoma, a case of oncocytoma pleomorphic adenoma, a case of pleomorphic adenoma malignant mixed tumor, and a pleomorphic adenoma case as mucopidermoid carcinoma (Table II).

Malignant neoplastic lesions Total 36 cases (33.3%) were diagnosed with malignant neoplastic lesions with FNAC and 25 cases (23.1%) with US-CNB (Table I). Excisional biopsy confirmed US-CNB results in all cases, a false case was not diagnosed + or -and 13 false + cases were diagnosed as FNAC: two acinar cell carcinoma and one case of mucepidermoid carcinoma. In one case, mucopidermoid carcinoma was diagnosed as non-specific chronic sialadenitis (Table II).

FNAC and US-CNB procedures were completed in 4-6 minutes, both without serious complications. Immediately after the procedure, all patients were discharged and were able to perform their routine activities on the same day. In only two cases, a small hematoma developed with US-CNB without surgical or medical intervention.

DISCUSSION:

Even in experienced hands, FNAC has well known failures, difficulties in the cytological diagnosis of pleomorphic adenoma, Warthin tumor and lymphoma. It is not possible to have definitive or malignant tumor types or to distinguish them from FNAC and invasive diseases. US-CNB has the advantage that it can be performed in an outpatient setting, can be processed with routine histopathological techniques, In situ can distinguish the disease and invasive without the possibility of false + positive results in benign lesions. The core biopsy has a natural advantage over FNAC in that it provides a tissue sample for immunohistochemical analysis. This enables the typing and classification of carcinomas and lymphomas, and also improves the differentiation of reactive nodal hyperplasia in lymphoma. A central tissue may also be useful for assessing parotid involvement due to systemic diseases. There is no cytopathologist needed during the core biopsy sampling. No complication was observed in our study, but only two cases developed a small hematoma due

to self-settling US-CNB. FNAC observed eight false and 14 false + cases; A common cause of these results is the sampling error, because these lesions have a heterogeneous cell population, a low cellularity, or a combination of benign and malignant properties. When compared with FNAC, false + and no cases were observed, only a false negative case (0.9%) was detected by US-CNB. The sensitivity of the FNAC was 74.2% and the specificity was 81.8%, while the sensitivity of US-CNB was 96.2% and the specificity was 100%.

CONCLUSION:

US-CNB represents a new technique for diagnosing a salivary gland mass with potential benefits on FNAC, defined with almost equal accuracy to excisional biopsy. It can be done in the outpatient clinic and allows the diagnosis of specific tissues that prevent intraoperative frozen biopsy and unnecessary surgeries that help reduce the need for surgical biopsy and facilitate timely and appropriate treatment.

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