ORIGINAL ARTICLE

ULTRASOUND-GUIDED CORE NEEDLE BIOPSY FOR SALIVARY GLAND LESIONS

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ABSTRACT

Background: A salivary gland swelling may result from various causes and create a diagnostic challenge. This study was conducted to evaluate the usefulness of ultrasound-guided core needle biopsy as a diagnostic modality.

Material & Methods: It was a cross-sectional study conducted in Nawabshah Medical College, Pakistan, from January 2004 to December 2007. One hundred & eight patients were included, ages 13-72 years (Mean 52.2). Ultrasound-guided core needle biopsy was performed. These patients also underwent excision biopsy. Histological diagnosis of ultrasound-guided core needle biopsy was compared with that of excisional biopsy.

Results: Out of 108 patients, 70(64.8%) lesion were in parotid and 38(35.2%) in sub-mandibular gland. Histological findings of ultrasound-guided core needle biopsy showed non-neoplastic lesions in 29(26.8%) cases; 12 reactive lymph nodes, 9 chronic non-specific sialadenitis, 4 tuberculosis, 3 retention cysts and one salivary gland abscess. Benign neoplastic lesions were found in 54(50%); 35 pleomorphic adenomas, 12 Warthin tumors, 5 monomorphic adenomas, and 2 hemangiomas. Malignant lesions were found in 25(23.1%); 8 mucoepidermoid carcinoma, 6 lymphoma, 4 adenoid cystic carcinoma, 4 malignant mixed tumor and 3 adenocarcinoma. Excisional biopsy confirmed the diagnosis of ultrasound-guided core needle biopsy, except in one case of Warthin tumor which was mucoepidermoid carcinoma on excisional biopsy.

Conclusion: Ultrasound-guided core needle biopsy is a safe, simple and accurate procedure for the diagnosis of salivary gland lesions and can be performed as an outpatient procedure.

Key words: Salivary gland, Biopsy, Ultrasound-guided Biopsy.

INTRODUCTION

An accurate diagnosis of a salivary gland swelling is essential for its adequate management.[1] It may result from various non-neoplastic lesions and benign or malignant neoplasms and may create a diagnostic and therapeutic challenge.[2]

Fine needle aspiration cytology (FNAC) of salivary gland is commonly practiced technique in the diagnosis of both neoplastic and non-neoplastic lesions of salivary gland.[3] The efficacy of FNAC in the diagnosis of salivary gland lesions remains a controversial subject. Studies utilizing experienced cytopathologists have shown FNAC to have high sensitivity and specificity for these lesions.[4] In the absence of ultrasound-guidance, or on-site cytopathologist, the accuracy of FNAC often falls off dramatically.[5] Apart from the normal morphology, salivary glands give rise to no fewer than 30 histologically distinct benign and malignant tumors.[6] The errors in the cytodiagnosis are due to the morphological variability of the salivary gland lesions which make sampling and interpretation difficult.[7] FNAC generally does not alter the surgical plan or extent of resection. More importantly, if interpreted out of context, a false-negative FNAC finding may dissuade the patient and surgeon from pursuing an indicated surgical procedure.[8]

Improvement in the accuracy of the pre-operative diagnosis of salivary gland mass is essential to avoid unnecessary surgery and to select adequate management.[9-11] Ultrasound guided core needle biopsy (US-CNB) is relatively recently described technique in the salivary gland which has been well tolerated and has demonstrated a high degree of diagnostic accuracy in several studies.[12] US-CNB has potential advantages over FNAC, particularly in the typing and grading of lymphoma and carcinoma and in improved differentiation of reactive nodal hyperplasia from lymphoma. The use of US-CNB may help to reduce the need for

surgical biopsy and facilitate prompt appropriate management.[13]

We conducted this study to evaluate the usefulness of ultrasound-guided core needle biopsy as a pre-operative diagnostic modality for salivary gland lesions.

MATERIAL AND METHODS

The study was conducted on 108 patients, in Departments of Pathology, Surgery and Medicine, Nawabshah Medical College, Nawabshah, Pakistan, from January 2005 to December 2007. The age range was 13 to 72 years, with a mean age 52.2, including 63 (58.3%) males and 45 (41.7%) females. All of the patients were having salivary gland swelling ranging in size between 1.5 to 8.5 cm of variable duration. In 70 (64.8%) cases lesion was present in the parotid gland and in 38 (35.2%) cases in the sub-mandibular gland. (Table-1)

Table-1: Demographic Data.

Age: Mean, (range) years	52.2(13-72)
Sex:	
Male	63(58.3%)
Female	45(41.7%)
Site of lesion:	
Parotid	70(64.8%)
Sub-mandibular	38(35.2%)
Size of lesion: Mean (range) cm	2.2(1.5-8.5)

The ultrasound-guided core needle biopsy was performed in these 108 patients. The indication of ultrasound-guided core needle biopsy was solid and/or intermediate lesion visualized by ultrasound. The cases having whole cystic lesions were not included in the study. The procedure was performed under local anesthesia using 18 gauge needle, after cleaning the site. The skin over the lump was incised with a small disposable scalpel for about 2-3 mm to accommodate the tip of the needle. The procedure was performed under ultrasound guidance, one specimen obtained by a single procedure of ultrasound-guided core needle biopsy was sufficient for histological examination in all cases. The samples were placed in 10% formalin, embedded in paraffin, cut into 4μm sections and stained with hematoxylin and eosin stain, observed under microscope and histological diagnosis made. The results were tabulated. All of these patients underwent excisional biopsy of the gland involved and specimens were sent for histopathological examination. The results of ultrasound-guided core needle biopsy were compared with the histological findings of excisional biopsy in all the cases.

RESULTS

The ultrasound-guided core needle biopsy was performed on 108 selected patients having solid and/or intermediate salivary gland lesions revealed on ultrasound examination, all of these cases underwent operation, and every surgically resected specimen was observed histologically and the histological diagnosis of ultrasound-guided core needle biopsy was confirmed. Seventy (64.8%) lesion were diagnosed in the parotid gland and 38 (35.2%) in the sub-mandibular gland. (Table-2)

Histological findings of US-CNB show that out of 108 patients, non-neoplastic lesions were diagnosed in 29(26.8%) cases, among these 29 patients, 12 cases were proved as reactive lymph node, 9 cases were having chronic non-specific sialadenitis, 4 cases showed epithelioid granulomas with Langhan's type of giant cells and foci of caseation necrosis resembling tuberculosis, 3 cases were diagnosed as retention cyst, and one case as salivary gland abscess. Excisional biopsy was performed in all of these 29 cases and the histology of the excisional biopsy examination confirms the histological results of US-CNB in all cases, no any false positive or false negative case was diagnosed in non-neoplastic lesions on US-CNB examination.

54(50%) cases were diagnosed as benign neoplastic lesions, among these 54 cases, majority i.e. 35 cases revealed pleomorphic adenoma, Warthin tumor was diagnosed in 12 cases, monomorphic adenoma in 05 cases, and hemangioma in 02 cases. Excisional biopsy was also performed in all of these 54 cases and the histology of the excisional biopsy specimens were the same as that of the histological results of US-CNB, except one case of Warthin tumor was found to be mucoepidermoid carcinoma on excisional biopsy examination. Only one false negative case was diagnosed in benign neoplastic lesions on US-CNB examination.

Twenty-five (23.1%) cases which were diagnosed as malignant neoplastic lesions, among these, 8 cases were confirmed as mucoepidermoid carcinoma, 6 cases as lymphoma, 4 cases each as adenoid cystic carcinoma and malignant mixed tumor, and 3 cases were diagnosed as adenocarcinoma The histological diagnosis of excisional biopsy was identical to the histological results of US-CNB in all cases, no any false positive or false

Table-2: Histological diagnosis of salivary gland lesions.

Diagnosis	Parotid	Sub-mandibular	Total
Non-neoplastic			
Reactive lymph node	05 (4.6%)	07 (6.5%)	12
Chronic sialadenitis	02 (1.8%)	07 (6.4%)	09
Retention cyst	02 (1.8%)	01 (0.9%)	03
Tuberculosis	02 (1.8%)	02 (1.8%)	04
Salivary Gland Abscess	01 (0.9%)	00	01
Benign Neoplastic			
Pleomorphic adenoma	24 (22.2%)	11 (10.2%)	35
Warthin tumor	12 (11.1%)	00	12
Monomorphic adenoma	03 (2.9%)	02 (1.8%)	05
Hemangioma	02 (1.8%)	00	02
Malignant Neoplastic			
Mucoepidermoid carcinoma	06 (5.6%)	02 (1.8%)	08
Lymphoma	02 (1.8%)	04 (3.7%)	06
Adenoid cystic carcinoma	03 (2.9%)	01 (0.9%)	04
Malignant mixed tumor	03 (2.8%)	01 (0.9%)	04
Adenocarcinoma	03 (2.9%)	00	03

Table-3: Comparison of histological results of US-CNB with Excisional Biopsy.

US-CNB Histological Diagnosis	No.	Falae+ve	Falae-ve	Excisional Biopsy No. of Cases
Non-neoplastic				
Reactive lymph node	12	00	00	12
Chronic sialadenitis	09	00	00	09
Retention cyst	03	00	00	03
Tuberculous sialadenitis	04	00	00	04
Salivary gland abscess	01	00	00	01
Benign Neoplastic				
Pleomorphic adenoma	35	00	00	35
Warthin tumor	12	00	01	11
Monomorphic adenoma	05	00	00	05
Hemangioma	02	00	00	02
Malignant Neoplastic				
Mucoepidermoid carcinoma	08	00	00	09
Lymphoma	06	00	00	06
Adenoid cystic carcinoma	04	00	00	04
Malignant mixed tumor	04	00	00	04
Adenocarcinoma	03	00	00	03
Total	**108**	**00**	**01 (0.9%)**	**108**

negative case was diagnosed in malignant neoplastic lesions on US-CNB examination. (Table-3)

The procedure of ultrasound-guided core needle biopsy was performed within 4-6 minutes without any serious complication. Only 2 cases developed a small hematoma which subsided spontaneously with no surgical or medical intervention. All the patients were discharged after the procedure and allowed to perform their routine activities on the day of procedure.

DISCUSSION

US-CNB in salivary gland lesions is well tolerated and has demonstrated a high degree of diagnostic accuracy. It also represents a practical approach for further treatment planning and results in the identification of non-malignant lesions where management is less clear.[14,15] Many studies have shown that in benign lesions surgical procedure can be avoided,[16,17] allows better treatment planning and a higher likelihood of negative margins for those with cancer[18-20] and results in lower costs for both patients with and without cancer.[21-22] Although a core biopsy is of significant value in accurately identifying and diagnosing the lesion, it reflects a sampling of a generally larger lesion.[23] The advantages of US-CNB include its simplicity, low cost, low morbidity and the rapidity of obtaining an accurate diagnosis.[24-25] It has the advantage that it can be done as an out door procedure, can be processed with routine histopathological techniques, can differentiate between in situ and invasive disease and can exclude the possibility of false positive results in benign lesions.[26] It is also helpfull in tumor grading, and various immuno-histochemical analysis before surgery.[26-28] While US-CNB is not helpfull in cystic lesions.[29]

US-CNB is little more invasive than FNAC as it requires local anaesthesia and a skin incision, US-CNB also does not lend itself to the “one-stop” clinic setting due to larger requirements for histological reporting than a cytological aspirate[12]. The main objections to core biopsy of salivary gland are the risk of facial nerve injury when the procedure is performed in a parotid gland mass and tumor seeding along the needle tract.[30] These complications may be avoided by using small bore needle and by careful and experienced handling.

In our study no false positive case was noted, only one (0.9%) false negative case was detected on US-CNB. The diagnostic accuracy in non-neoplastic and malignant neoplastic lesions was 100%. The overall sensitivity was 96.2% and specificity 100%, which is in agreement with other studies[1,30,31] in different parts of the world.

CONCLUSION

Ultrasound-guided core needle biopsy is a safe, simple and accurate procedure for histological diagnosis of salivary gland lesions and can be performed as an outpatient procedure.

In non-neoplstic lesions surgical procedure can be avoided by early specific treatment and in neoplastic lesions the surgeons will be cautious in planning procedure to reduce the risk of recurrence.

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