Diagnostic Value of Fine Needle Aspiration Cytology in Parotid Tumors

Muhammad Sohail Awan (Departments of Surgery The Aga Khan University, Karachi)
Zafar Ahmad (ENT*, Fauji Foundation Hospital*, Rawalpindi.)

Introduction

Parotid gland lesions are a histologically diverse group. Tumours of this region comprise 3% of all head and neck tumours and 0.6% of all tumours of human body.1

The role of fine needle aspiration cytology (FNAC) for the diagnosis of salivary gland masses is well documented.The traditional open biopsy is no longer justified because of risk of tumour spillage and damage to the facial nerve.2 FNAC on the other hand is safe, easy to perform, causes little discomfort to the patient and no risk of implantation of tumour cells.3 Although the procedure has gained popularity, the fear of hemorrhage, facial nerve injury, as well as lack of confidence in diagnostic accuracy have led clinicians to question the validity of FNAC in the management of parotid lesions.4

We studied 50 patients who underwent parotid surgery for various parotid lesions to evaluate the usefulness and accuracy of FNAC in the diagnosis of parotid gland tumours.

Material and Methods

We reviewed files of all those patients undergoing parotidectomy for various parotid pathologies between January 1991 - December 2001 at Aga Khan University Hospital. A total of 68 parotid resections were performed during this time period. Of these, 50 patients were included in the study in which preoperative FNAC and final histology slides were available for review.

FNAC was done by our pathology department using a 22 gauge needle attached to a 10-ml syringe holder. A minimum of two needle passes were made in each case. The specimens were expelled onto two or three slides, and thin smears were prepared between two slides and immediately fixed. The slides were generally stained with Papanicolaou and occasionally with May-Grunwald Giemsa (MGG) methods.

FNAC results were classified into the following categories: true-negative (absence of malignancy correctly diagnosed); true-positive (presence of malignancy correctly diagnosed); false-negative (the cytological specimen failed to diagnose a malignancy); and false-positive (the cytological specimen was incorrectly considered or suspect of malignancy).

Study design included a comparison between results of preoperative FNAC with final histopathological diagnoses. Data analysis was based on Galen and Gambino method which calculates sensitivity and specificity of FNAC in differentiating between benign and malignant lesions (Table 1).

Table 1. Galan and Gambino method.

Sensitivity	a / a + c x 100
Specificity	d / b + d x 100
Positive predictive value	a / a + b x 100
Negative predictive value	d / c + d x 100
Accuracy	a + d / a+b+c+d x 100

a = True +ve
b = False +ve
c = False -ve
d = True -ve

Results

Among 50 patients reviewed in this study 32 were males and 18 female. Youngest patient in the series was 10 years of age and while the oldest one was 70 with a mean age of 42 years. The results of FNAC showed that 42 cases were diagnosed as benign and 8 were diagnosed as malignant. Among 42 benign reported on FNAC, 39 proved to be benign on final histology, so there were 3 false negative results reported on FNAC. FNAC reported 8 malignant lesions but on final histopathology report 7 had a correct diagnosis and there was one false positive (Table 2).

When Galen and Gambino method is applied this gives 70% sensitivity of FNAC for reporting malignancy and 97% specificity to rule out malignancy. The overall accuracy in detecting malignant tumours was 92% with positive predictive and negative predictive values 87% and 92% respectively.

The FNAC was also evaluated for any complication associated with the procedure. Two patients with

Warthins.

Table 2. False positive and false negative cases.

FNAC diagnosis	Histological diagnosis
Mucoepidermoid CA	Pleomorphic Adenoma
Pleomorphic Adenoma	Malignant Mixed Cell
Pleomorphic Adenoma	Mucoepidermoid CA
Oncocytoma	Metastatic Hepaticellular C

tumour showed increase in swelling and pain after FNAC. Hematoma, infection, facial nerve damage, implantation of tumour cells, or other complications were not observed.

Discussion

The role of FNAC in the diagnosis of parotid tumors has been well established as this is a safe and easy diagnostic procedure that causes little discomfort to the patient. The main objective of FNAC in parotid lesions is to differentiate between benign lesions and malignant tumors. This study reviews our experience with FNAC of parotid gland tumors over a period of 10 years. Overall diagnostic accuracy was 92%, which compares well with other reports.5-7 Specificity of FNAC have been high, with false positive being reported infrequently in the literature. In our series, only one false positive has been reported and specificity comes out to be 97%. The most common cause of a false positive report is atypia in a benign mixed tumor.8 Sensitivity in our series is 70% which has varied in the literature from 64% to 99%.9 This results from percentages of false-negatives which have been high in some studies.5,6 Such false-negatives may result from difficulty in distinguishing mucoepidermoid carcinoma from both Warthins tumor and benign mixed tumor on a cytological smear.10 Errors can also be caused by confusion between benign mixed tumor and adenoid cystic carcinoma.11

We have found FNAC specimens particularly useful in the diagnosis of those tumors which are clinically unsuspected or clinically questionable parotid lesions. It is often difficult even for the most experienced clinician to differentiate between tumors of the lower pole of the parotid and high cervical swellings, such as enlarged upper jugular chain lymph nodes or branchiogenic cysts. Reliability of FNAC specimens in differentiating inflammatory conditions from tumors of parotid has previously been demonstrated.12 Ability to gain a correct diagnosis by FNAC in such instances enables the surgeon to decide swiftly on appropriate management, which otherwise would necessitate either a wait-and-see policy or open biopsy for diagnosis.

Complications of FNAC appear to be rare13, although hematoma is occasionally reported.14 No morbidity was encountered in the 50 parotid needle aspirations reported here except for one instance of increase in size of swelling after FNAC in a patient with Warthins tumor. An unusual complication of necrosis of a Warthins tumor after FNAC was reported by Kern.15 Several authors have commented specifically on the absence of any reported cases of tumor implantation at the site of FNAC.13,14,16,17 The danger of seeding of tumor cells in the needle tract or in the puncture site in the skin remains a matter of concern to those who are critical of this method of obtaining tissue for diagnosis. Engzell et al18, found no recurrence involving the skin or the site of the needle aspiration in 157 cases of benign mixed tumors treated surgically and followed for 10 years. In another study, histological analysis of the excised tumor area, including serial sections of the needle tract after needle aspiration biopsy, also failed to reveal tumor seeding in seven benign mixed tumors.8 Frable119 failed to observe any recurrence in cases of pleomorphic adenoma. If there is concern that the tumor cells may be implanted along the needle tract, the puncture site can be tattooed and excised at the time of surgery. This was done in a study by Qizilbash et al.20 The histological examination of the excised needle tract and puncture site in their study showed no evidence of local implantation of tumor cells. However, the clinical significance of this is difficult to evaluate since the tumors were excised along with the needle tract site of puncture soon after the aspiration. No report of local tumor extension caused by FNAC of the parotid is seen in our series. The use of larger bore needles has led to this complication in other sites, as well covered by Zajicek21 in his monograph. Dissemination of tumor cells by vascular channels is a potential danger of this technique. However, experiments in rabbits suggest that needling the lesion does not result in release of cancer cells into lymphatics and blood.18 The most important question to be answered by this study is whether information gained by FNAC can be useful in management of patients. Our experience has demonstrated a variety of circumstances in which such information may be valuable. The usual recommendation for neoplastic lesions of the parotid regardless of the preoperative cytological diagnosis is excision but recognition of benign lesions, particularly Warthins tumor, in poor risk patients may be of benefit in avoiding inappropriate surgery. Similarly, preoperative recognition of lymphoma may permit a simple operation to obtain tissue for typing than parotidectomy with facial nerve dissection.4 FNAC may be most advantageous in differentiating tumor from inflammation, for surgery may not be the treatment of choice. On the other hand, preoperative recognition of malignancy may help both surgeon and patient in terms of psychological, medicolegal and surgical preparation.

FNAC is a safe and effective modality in diagnosis and treatment planning of patients with parotid tumors. This

office procedure is reliable, easy to perform and cost effective and finally FNAC provides the surgeon with useful information that otherwise could be obtained only by surgical exploration.

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Abstract

Objective: To evaluate the usefulness and accuracy of fine needle aspiration cytology in the diagnosis of parotid gland tumors.

Methods: We reviewed files of all patients who underwent parotidectomy for various parotid pathologies at Aga Khan University Hospital. Study design included a comparison between results of preoperative FNAC with final histopathological diagnosis. Galen & Ganbino method was used to calculate sensitivity and specificity of FNAC.

Results: Among 50 patients reviewed, there was one false positive and 3 false negative results reported on FNAC. This gives a sensitivity of FNAC for reporting malignancy to be 74% and specificity to rule out malignancy 97%. No significant complications were reported while performing the procedure.

Conclusion: FNAC is a safe and effective modality in diagnosis and treatment planning of patients with parotid tumors (JPMA 54:617;2004).