

*Original Article*

## Diagnostic Efficacy of Fine Needle Aspiration in Parotid Mass

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### **Abstract**

#### **Introduction:**

The preoperative diagnostic evaluation of the parotid lesion is a valuable aid in planning the operation and the approach to intervention. Among different diagnostic tools, Fine Needle Aspiration has a key role. However, the exact efficacy of this technique in our center had not been thoroughly investigated.

#### **Materials and Methods:**

Between January 2000 and June 2007 a subset of 64 patients who had agreed to undergo preoperative FNAB was selected. The FNAB diagnoses were compared with those of the surgical specimens as the gold standard. Then, sensitivity, specificity, predictive value, and pertinent characteristics of the patients were evaluated. Finally, the results were analyzed with SPSS version 14.

#### **Results:**

During the study period, 81 patients underwent parotidectomy, only 64 of whom had the FNA before surgery, so only the data collected from 64 patients were evaluated. The most common clinical presentation 75% (48 patients) was a parotid mass. The second common presentation was facial paralysis at 17.2% (11 patients), followed by pain at 7.8%. The result of FNA sensitivity was 82.5% and specificity was 93.3%. The accuracy of the test was 87.5%. Positive predictive value was 93.3% and negative predictive value was 82.35%.

#### **Conclusion:**

Fine-needle aspiration cytology is a reliable method in the evaluation of parotid tumors with a fairly high specificity and sensitivity rate.

#### **Keywords:**

Cytology, Fine-needle aspiration, Malignancy, Parotid neoplasm,

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### **Introduction:**

Parotid mass with similar clinical presentation may need a different therapeutic approach; therefore, the preoperative diagnostic evaluation of the lesion is a valuable aid in planning the operating time and the approach to intervention, especially in cases in which the need for radical surgery will have substantial implications for esthetic and functional outcomes (1-4). Among different diagnostic tools, Fine-Needle Aspiration plays an important role because most other techniques, like imaging, can give us pathological diagnoses. FNA enables us to differentiate between inflammatory and tumoral pathology, which may have different treatments, and also between malignant and benign pathology, which may have different surgical approaches.

Currently, FNA seems an unrivaled technique, well tolerated, easy to perform, and cost effective (1,2). Although it is generally accepted that FNA has its importance in clinical settings, its accuracy is heavily dependent on the skills of the operator who takes the specimen and the pathologist who evaluates the cells (3,5). As a result, in every academic institute, the accuracy of this technique should be regularly evaluated. The objective of this study is to assess the sensitivity and specificity of FNAC in the diagnosis of malignant and benign neoplasms and to review its weight in clinical decision making.

### **Materials and Methods:**

From a group of 81 subjects who underwent parotidectomy at our institution (Imam Khomeini Hospital) between January 2000 and June 2007, a subset of 64 patients who agreed to undergo preoperative FNAB was selected.

The protocol of research was reviewed and approved in Tehran University IRB, and the data of the patients have been confidential. The patients were registered as outpatients, the FNAB procedure was

explained to them, and informed written consent was obtained at the time of surgery.

The FNAB diagnoses were compared with those of the surgical specimens.

The demographic data and the medical history of all the patients, together with clinical examination findings, computed tomography scans, when needed, were collected.

All FNABs were performed by an expert otorhinolaryngologist with a same method. Initially, from 1 to 3 aspirates were taken using needles that ranged from 25 gauges to 23 gauges. Conventional smears were prepared from each aspirate. The aspirated material was immediately stained with May-Grünwald-Giemsa and examined by the pathologist for sample adequacy. If the sample was found inadequate, the procedure was repeated, and the new sample was stained and examined as mentioned previously. In cystic lesions, the FNAB was repeated after emptying the mass.

An accurate FNAB result was defined as one that correctly identified the mass as malignant or benign and also provided the correct diagnostic subtype. For this calculation, all diagnostic FNAB results from the patients who underwent a subsequent surgical biopsy were compared for diagnostic concordance using the histology results as the "gold standard". In addition, the FNAB results were analyzed for the ability to recognize malignancy by using the statistical parameters of "absolute" sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). "Absolute" sensitivity is defined as the number of unequivocally diagnosed cancers expressed as a proportion of the overall number of cancers aspirated, that is, the ability to identify malignancy correctly using FNAB when cancer is present. Specificity is defined as the number of benign lesions diagnosed correctly expressed as a proportion of the overall

number of benign lesions aspirated, that is, the ability to render a benign diagnosis when malignancy is present. Surgery is included as part of the therapeutic regime only; the FNAB has established the diagnosis preoperatively; other studies would be anticipated for diagnosis, most commonly additional tissue sampling (repeat FNAB, core biopsy, or open surgical biopsy) were absent from this study.

The PPV indicates the degree of confidence with which a clinician can regard as a positive FNAB result, and is calculated as the number of true malignancies divided by all lesions diagnosed as malignant by FNAB. For example, a PPV of 1.0 (100%) means that every time a malignant diagnosis is rendered by FNAB, the patient has a malignant disease. The NPV is defined as the number of true-negative results expressed as a proportion of all negative results, including those that are diagnosed subsequently as malignant. It indicates the degree of confidence with which a clinician can regard a negative FNAB result.

We used SPSS version 14 to perform data analyses and kappa index, T-test and chi-square test to evaluate data correlation.

### **Result:**

During the study, 81 patients underwent parotidectomy, of whom only 64 patients had the FNA before the surgery, so the data of 64 patients were evaluated.

Among those studied, 81.2% (52) and 18.8% (12) were female. The mean age was  $67.77 \pm 13.67$  years with a range of 17-82. The most common clinical presentation was a mass, which approximately 75% (48) of the patients complain from. The second common presentation was facial paralysis at 17.2% (11), followed by pain at 7.8% (5).

The mean size of the mass was  $3.41 \pm 1.74$  cm, and the mode size was 3 cm. In the evaluation of the location of the mass in head and neck, the result was anterior to

tragus 29 (45.3%), mandibular angle 21 (32.8%), submandibular 12 (18.8%), and tail 2 (3.1%).

At the time of the examination, 21 (32.8%) had lymphadenopathy.

The result of FNA is summarized in the Table 1.

**Table 1:** Results of FNA

Result	Frequency
Benign	45% (26)
Malignant	39.1% (25)
Inflammation	3.1% (2)
Cystic	9.4% (6)
Undetermined	1.6% (1)
Atypical epithelial	6.3% (4)

Pathologic distribution of patients is shown in Table 2.

**Table 2:** Pathologic distribution of patients

Pathologic type	Frequency
Pleomorphic adenoma	32.8% (21)
SCC	37.5% (24)
Adenocarcinoma	7.8% (5)
Mucoepidermoid carcinoma	7.8% (5)
Cyst	9.4% (6)
Others	4.7% (3)

The result of FNA sensitivity was 82.5% and that of specificity was 93.3%. The accuracy of the test was 87.5%. The positive predictive value was 93.3% and the negative predictive value was 82.35%.

The allocation of sensitivity and specificity according to age showed that the most sensitive age group was between 70 and 82 years and the most specific age group was 57-69 year-olds. The results of rest of it are summarized in Table 3:

**Table 3:** Distribution of sensitivity, specificity, and accuracy, according to age

Age	Sensitivity	Specificity	accuracy
17 to 43	Cannot be calculated	75%	60%
44 to 56	77.7%	80%	78.57%
57 to 69	80%	100%	88.8%
70 to 82	100%	100%	100%
Sum up	82.3%	93.3%	87.5%

The evaluation of the correlation between age, sensitivity and specificity with kappa =0.751 was shown to be significant and revealed that the higher the age, the higher the sensitivity and specificity of FNA.

The distribution of sensitivity and specificity with clinical presentations demonstrated that FNA was more accurate if the patient's main complain was facial paralysis or pain to mass.

Kappa index equaled 0.751 between pathology and FNA was good to excellent. The result of correlation between sex and sensitivity and specificity with the same kappa index was superiority of men in sensitivity and the superiority of women in specificity of FNA.

In the evaluation of the relation of patients' factors with the ability of FNA in differentiation of benign and malignant growths, it was shown that there was a significant relation between the mass size (P-value=0.03), the existence of lymphadenopathy (P-value =0.000), and the chief complaint (P-value =0.03), but there was no significant relation between age, sex, the site of the mass, and the consistency of the mass. (Chi-square test and T-test)

### **Discussion:**

Fine-needle aspiration cytology is a safe and easy diagnostic procedure that causes little discomfort to the patient (6). The main objective of cytological diagnosis of parotid masses is the differential diagnosis between benign lesions and malignant tumors. Accurate tumor typing is less important and may be deferred to the

definitive histological examination so the efficacy of FNA in the diagnosis of parotid tumor in the Imam Khomeini Hospital was selected.

The accuracy of FNAC depends, on the one hand, on the experience of the clinician in performing the procedure, and on the other, on the experience of the pathologist in evaluating the cytological material. Inadequate smears have been reported in 2% to 10% of cases in the literature (7-10). In our evaluated patients the this rate was 5% and this sample error is comparable to other reports.

In the recent literature, the accuracy has ranged from 84% to 97%, the sensitivity from 54% to 95%, and the specificity from 86% to 100% (1-5,8,10-14). The accuracy, sensitivity, and specificity in our group sensitivity were 82.5% and specificity was 93.3% that shows our pathologist was relatively successful in diagnosis of tumor types.

The most common Histopathological diagnosis was Pleomorphic adenoma (n=7, 24.1%), followed by Mucoepidermoid carcinoma (n=4, 13.8%), and Warthin's tumor (n=3, 10.3%) (15).

Most of our patients were male (81.2%), which is not compatible with other studies, where this difference is less prominent or reverse (2,16,17).

Thirty-nine percent of this series was malignant, which shows result similar to those of other series, (11,16,18,19); The most common pathologic type in the malignant group was SCC, which was different from the results of other studies, where mucoepidermoid carcinoma is the most common type.

Sensitivity of FNA increases with age and their correlation was significant. The explanation can be related to the increasing rate of malignant tumor at older ages and different accuracy of FNA in different pathology. The same explanation can be true of the significant correlation between sex, clinical presentation and

sensitivity, because in our series malignant tumors are more prevalent in males and lymphadenopathy and facial paralysis are definite symptoms of malignancy, the higher sensitivity of FNA in diagnosis of malignant tumor can define it.

***Conclusion:***

Fine-needle aspiration cytology is a reliable method in the evaluation of parotid tumors with a fairly high specificity and sensitivity rate. The ability to diagnose malignant tumors from clinical examination is poor and FNAC allows identification of some malignant tumors, which would have otherwise been missed. Although FNAC may not accurately type the specific Malignancy, preoperative diagnosis of malignancy would be beneficial for both the patient and the surgeon to plan and discuss the surgical strategy. This study can prove that in our country FNA can be a reliable method compared with other studies, but the non-diagnostic and false-negative results are the limitations of FNAC that should be reduced to improve its usefulness in the evaluation of parotid tumors.

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