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Fine needle aspiration biopsy as a diagnostic method that guides the clinician and affects the treatment in parotid gland masses

Adem BORA[1a*], Barış ŞAPCI[1b]

[1] *Department of Otolaryngology, Faculty of Medicine, Cumhuriyet University, 58140-Sivas / TURKEY*

**Corresponding author*

Research Article

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ABSTRACT

Background: The aim of our study was to determine the specificity and sensitivity criteria of parotid fine needle aspiration biopsy in the diagnosis of parotid gland masses in our institution and guide the physician by using FNAB before surgery.

Methods: Retrospective analysis was conducted by comparing the fine needle aspiration biopsy results of 80 patients with complete data and postoperative histopathological diagnoses of 90 patients who underwent fine needle biopsy in our clinic between 2015 and 2022 and were subsequently operated. The correlation of preoperative FNAB results to final surgical pathology was performed, and measures of diagnostic accuracy were computed.

Results: Of all patients, 56.3% were male, and 43.7 were female. The mean age was 48 (range 19-87). 56.2% of them were right-sided, and 43.8% were left-sided. When the fine needle aspiration biopsies of the patients were examined, 47 were reported as benign (58.8%), 2 as malignant (2.5%), 21 as suspicious (26.3%), and 10 as insufficient (12.5%). Of 80 patients, 34 were diagnosed as pleomorphic adenoma, 14 as Whartin tumor, and 7 as sialoadenitis.

Conclusion: FNAB is one of the most important diagnostic tools in the diagnosis of parotid gland masses when applied, knowing its advantages and given treatment without ignoring the deficiencies. It should be kept in mind that subtyping with FNAB in cases with a malignant histopathological diagnosis will reduce the secondary surgical needs of the cases.

Keywords: Fine needle aspiration biopsy, parotid gland mass, parotid gland tumor management

Parotis Bez Kitlelerinde Klinisyeni Yönlendiren ve Tedaviyi Etkileyen Bir Tanı Yöntemi Olarak İnce İğne Aspirasyon Biyopsisi.

Süreç

Geliş: 12/04/2023
Kabul: 24/06/ 2023

ÖZ

Amaç: Çalışmamızın amacı, kurumumuzda parotis bezi kitlelerinin tanısında parotis ince iğne aspirasyon biyopsisinin özgüllük ve duyarlılık kriterlerini belirlemek ve cerrahi öncesi FNAB kullanarak hekime yol göstermektir.

Yöntemler: Retrospektif analiz, 2015-2022 yılları arasında kliniğimizde ince iğne aspirasyon biyopsisi yapılan ve daha sonra ameliyat edilen 90 hastanın postoperatif histopatolojik tanıları ile 80 hastanın ince iğne aspirasyon biyopsi sonuçlarının karşılaştırılmasıyla gerçekleştirildi. Preoperatif FNAB sonuçlarının nihai cerrahi patolojiyle ilişkisi incelendi ve tanısal doğruluk ölçüleri hesaplandı.

Bulgular: Tüm hastaların %56.3'ü erkek, %43.7'si kadındı. Ortalama yaş 48 (19-87 aralığındaydı). Hastaların %56.2'si sağ taraflı, %43.8'i sol taraflıydı. Hastaların ince iğne aspirasyon biyopsileri incelendiğinde, 47'si benign (%58.8), 2'si malign (%2.5), 21'i şüpheli (%26.3) ve 10'u yetersiz (%12.5) olarak raporlandı. 80 hastanın 34'ünde pleomorfik adenom, 14'ünde Whartin tümörü ve 7'sinde sialoadenit tanısı konuldu.

Sonuç: FNAB, avantajlarını bilerek uygulandığında parotis bez kitlelerinin tanısında en önemli tanı araçlarından biridir ve eksiklikleri göz ardı etmeden tedavi sağlar. Malign histopatolojik tanı konulan vakalarda FNAB ile alt tiplemeye dikkat edilmesi, vakaların ikincil cerrahi ihtiyaçlarını azaltacaktır.

Anahtar sözcükler: İnce iğne aspirasyon biyopsisi, parotis bez kitleleri, parotis bez tümör yönetimi

[1a] *adembora@yahoo.com* https://orcid.org/ 0000-0002-5036-0595 [1b] *barissapci95@gmail.com* https://orcid.org/ 0000-0002-4404-9768

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Introduction

The role and importance of Fine Needle Aspiration Biopsy(FNAB) in the diagnosis of tumors located in the parotid gland is still a controversial issue [1,2]. The success of FNAB is variable. Nature of the mass, the technique, guidance of the ultrasonography, the experience of the physician and cytopathologist may affect results. While some of the studies in the literature on FNAB suggest that it has no place in patient management; In general clinical practice, the majority of otolaryngologists often prefer it in the diagnosis and management of parotid masses [3,4,10]. The results of meta-analysis on FNAB show that the sensitivity of the method is between 64-90% and the specificity is between 86-100% 5,6.

Purpose of our study was to determine the role of FNAB in the diagnosis of parotid gland masses, its success (in the differential diagnosis of benign and malignant), and hints to be considered in planning treatment. For this purpose, we compared the preoperative and postoperative pathology results of our patients who applied to our clinic with parotid mass and underwent surgery.

MATERIALS AND METHODS

Population

We started after the approval of the Clinical Research Ethics Committee. There were 90 cases who applied to Sivas Cumhuriyet University Hospital Ear Nose Throat clinic between January 2015 and May 2022 due to parotid mass and were operated according to the results of FNAB. All evaluation parameters could not be accessed retrospectively from medical files in 7 cases. Phone records of 3 cases could not be reached. 80 patients were included in the study. Demographic data of the cases, FNAB results, postoperative histopathological results and surgical procedure data were evaluated.

The cases included in the study were divided into four groups according to their FNAB and histopathological diagnoses. Accordingly, the cases; true negative (FNAB and histopathological diagnosis are benign), false positive (FNAB result is malignant, histopathological diagnosis are benign), true positive (FNAB and histopathological diagnosis are malignant), and false negatives (FNAB result is benign, histopathological diagnosis are malignant). The cases with postoperative histopathological diagnosis of reactive lymphadenopathy, cavernous hemangioma, branchial cleft cyst, myoepithelioma, simple duct cyst and traumatic neuroma were classified in the category of other benign masses. The data obtained from the cases were also compared in terms of gender and age groups.

For this retrospective study, all patients who met the study criteria were contacted by the same investigator (BŞ) via telephone, and verbal consent was obtained. In addition, ethics committee approval was obtained from Sivas Cumhuriyet University Clinical Research Ethics Committee (Date: 25.05.2022 and Decision No: 2022 05/14) for the study.

FNAB Method

FNAB was performed in an office in the department of pathology under standard conditions by the assistant doctors of the ENT department with 6 months-2 years seniority who were trained about FNAB before. During the procedure, all of the cases were taken in the sitting position and with the palpation method, by entering the mass from a single point from 4-5 angles with a 21 G injector, in accordance with the FNAB procedure. As soon as the material was received, the assistant doctor of the pathology department underwent a preliminary evaluation under the light microscope, stained with diff-quik kit in accordance with the papanicolau (PAP) technique, fixed with alcohol, air-dried and just then. If enough cells are detected, the process is terminated. In cases where sufficient cells could not be reduced, the procedure was repeated a maximum of three times. All FNAB results in the preoperative period of the cases included in the study were recorded for evaluation.

Surgical Procedure

The surgical procedure applied to all of the cases included in the study was performed in accordance with the standard approach to salivary gland tumors according to the localization of the mass and the prediagnosis obtained from clinical findings and FNAB.

Statistical analysis

SPSS (SPSS Inc., Chicago, IL) 23.0 program was used to evaluate the data obtained in the study. Complementary statistics in the evaluation of data; Arithmetic mean, standard deviation, median, min-max values were used for the values obtained by measurement. Normality assumption was checked according to Kolmogorov-Smirnov or Shapiro-Wilk test. Parametric tests were used for the values that met the normality assumptions, and non-parametric tests were used for the values that did not provide the normality assumptions. The relationship between the two values was evaluated according to Pearson correlation and Spearman rank correlation. Chi-square analyzes were used for qualitative values as categories. Sensitivity, specificity, negative and positive predictive values, and accuracy were calculated by comparing the FNAB reports and postoperative histopathological diagnoses of the cases. and $p < 0.005$ was considered significant.

Results

The mean age of 80 patients included in the study was 51.4±15.76 (min-max: 17-87). The average age by gender is; in men [56.3% (n=45)] 51.62±16.36 (min-max: 17-87) and in women [43.7%; (n=35)] 51.11±15.17 (min-max: 19-76) and the gender distribution was statistically similar (p=0.887).

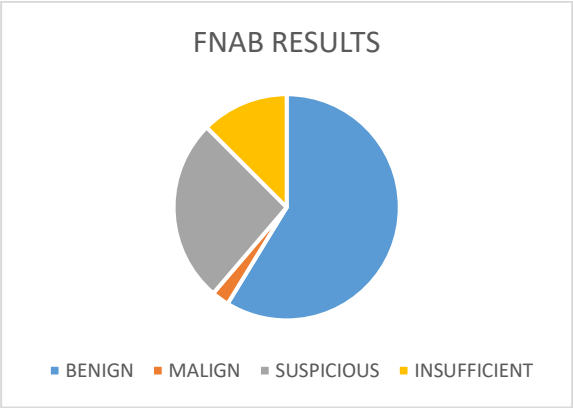

Figure 1 FNAB results of cases

When we evaluated the cases in terms of the localization of the mass in the parotid; 56.3% (n=45) were located on the right side and 43.7% (n=35) on the left side, and there was no difference in side (p<0.005).

The results of FNAB and postoperative histopathological evaluation of the cases in terms of gender are given in Table 1

Superficial partial parotidectomy was performed in 96.25% (n=77) of the 80 cases included in the study, and total parotidectomy was performed in 3.75% (n= 3) with deep lobe localization. In addition, neck dissection was added to the treatment in 3 cases.

It was stated that the FNAB results of the cases were evaluated as 4 categories; 58.8% (n=47) were benign, 2.5% (n=2) were malignant, 2.3% (n= 21) were suspicious and 12.5% (n=10) were insufficient.

Table 2 shows the distribution of preoperative FNAB results and postoperative histopathological results of 80 cases included in the study. As can be seen from the table, 33% of the cases whose FNAB results were evaluated as suspicious were diagnosed as malignant postoperatively.

When the histopathological diagnoses of the postoperative surgical specimens were compared with the FNAB results, excluding the FNAB results evaluated as insufficient and suspicious cytology; The sensitivity of FNAB application is 33%, specificity is 100%, positive predictive value is 100%(2/2), negative predictive value is 91.5%(43/47) and accuracy is (%91,84).

Table 1: FNAB and postoperative histopathology in terms of gender

Evaluation method	**Histopathological diagnosis**	**Gender**	
		Female % (n=)	Male % (n=)
FNAB	Benign	57,4 27	42,6 20
	Malign	100 2	0 0
	Suspicious	38,1 8	61,9 13
	Insufficient	50 5	50 5
Postoperative Histopathology	Pleomorphic adenoma	55,9 19	44,1 15
	Whartin tumor	14,3 2	85,7 12
	Sialoadenitis	28,6 2	71,4 5
	Other benign	27,3 3	72,7 8
	Myoepitelial Carcinoma	100 2	0 0
	Adenoid Cystic Carcinoma	100 1	0 0

Table 2: Classification of postoperative histopathological diagnoses of cases with suspicious, benign, malignant and inadequate FNAB results

Histopathological diagnosis	Suspicious	Benign	Malign	Insufficient
	% (n=)	% (n=)	% (n=)	% (n=)
Pleomorphic adenoma	28,6 6	55,3 26	0 0	20 2
Whartin tumor	19,0 4	19,1 9	0 0	10 1
Sialoadenitis	9,5 2	8,5 4	0 0	10 1
Other benign	9,5 2	8,5 4	0 0	50 5
Myoepitelial Carcinoma	9,5 2	0 0	0 0	0 0
Adenoid Cystic Carcinoma	4,8 1	0 0	0 0	0 0
Acinic Cell Carcinoma	4,8 1	2,1 1	50 1	0 0
Lymphoma	4,8 1	0 0	0 0	10 1
Adenocarcinoma	4,8 1	0 0	0 0	0 0
Ductal Cell Carcinoma	4,8 1	0 0	0 0	0 0
Mucoepidermoid carcinoma	0 0	2,1 1	50 1	0 0
Squamous cell carcinoma	0 0	2,1 1	0 0	0 0
Carcinoma ex plomorphic adenoma	0 0	2,1 1	0 0	0 0
TOTAL	100 21	100 47	100 2	100 10

Table 3: Classification of cases by tumor size

Tumor Size	0-2 cm	2-4 cm	>4 cm
Cases (n=)	22	51	7
Percentage(%)	27.5	63.7	8.8

Table 4: FNAB results and postoperative histopathological diagnoses of 6 patients who received a different treatment other than superficial partial parotidectomy.

	FNAB results	Treatment	Histopathological diagnosis
Case 45	Insufficient	Total parotidectomy	Simple duct cyst
Case 6	Benign	Total parotidectomy	Pleomorphic adenoma
Case 21	Malign	Total parotidectomy and neck dissection	Acinic cell carcinoma
Case 22	Malign	Superficial parotidectomy and neck dissection	Mucoepidermoid carcinoma
Case 41	Benign	Superficial parotidectomy and neck dissection	Squamous cell carcinoma

Table 5: Classification of cases by accuracy

	TRUE NEGATIVE	FALSE POSITIVE	TRUE POSITIVE	FALSE NEGATIVE
Cases	43/47	0	2/2	4/47
Percentage	91.5	0	100	8.5

Table 6: FNAB results and postoperative histopathological diagnoses of 6 patients who received a different treatment other than superficial partial parotidectomy.

	Cases	Sensitivity	Specifity	Accuracy
Suzuki et al.	821	82,3	98,7	95.9
Hanege et al.	286	90	98	97
Altın et al.	217	68,9	89,6	86.5
Marzouki et al.	42	50	100	92.1
Hartimath et al.	41	90,9	96,6	95.1
Our study	80	91,5	100	91.84

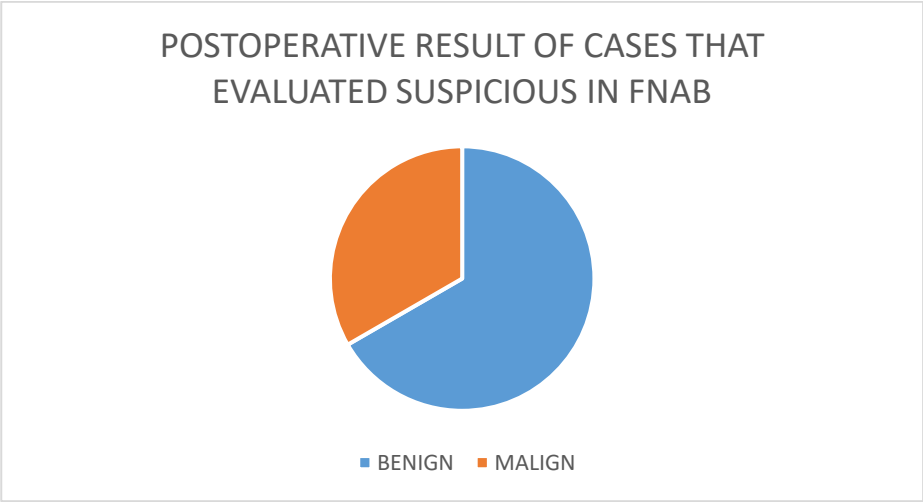

Figure 2 Postoperative results of the patients that evaluated suspicious in FNAB

Discussion

The most important finding of our study is that 33 percent of those with suspicious FNAB results were reported as malignant in the final postoperative histopathological examination. Therefore, the clinician should consider the potential for malignancy when planning surgery in patients whose FNAB results are reported as suspicious.

FNAB is very guiding for the surgeon and patient in the treatment of parotid masses. Boldes et al. suggested that FNAB significantly affects the surgeon and the patient in the treatment plan. If a malignant mass evaluated as benign in FNAB, it delays the patient's surgery, reduces the operation time and hospital stay. It has been mentioned that the result of FNAB does not change the surgery to be performed, and that the most frequently performed operation is superficial partial parotidectomy 7. In addition, according to the study by Sharma et al., it has been suggested that FNAB significantly affects clinical management in one third of the patients [4].

On the other hand, clinical findings are limited in most patients with a parotid mass. Both benign and malignant masses can present as painless swellings. Radiological findings not enough for cilinical management of these cases. In our study, it stands out as one of the most important diagnostic method with physical examination and imaging methods. FNAB results can guide surgeon and helps clinician to understanding possible risks and complications before surgery. It also helps clinician express risks and treatment options to patient before operation.

There were different sensitivity and specificity datas in literature. O'Brian et al. suggested that this difference is a cause of redundancy non-diagnostic FNAB results. [5]. In our study, the sensitivity was 91.5% and the specificity was 100%. These data are similar to the data in the literature. Sensitivity and specificity rates in other studies are given in Table 6.

Another striking point in our study is the predominance of cystic and benign lesions in patients with insufficient FNAB results. Nine out of ten patients (90%) whose FNAB results were reported as insufficient were histopathologically reported as benign. These masses are known to have a better prognosis [10]. Nevertheless, the suspicion of malignancy should not be ignored. For masses whose FNAB results are reported as non-diagnostic cytology, USG-guided FNAB should be considered or core biopsy should be taken. Hard et al. suggested that success of FNAB with USG-guidance was 82 percent, and the success of FNAB taken by palpation was 65 percent. When performed with USG, non-diagnostic results can be decreased from 21.2% to 6.6% 16. However, due to heavy working conditions, USG appointments are given months later and the treatment is quite delayed. USG-guided tru-cut biopsy and open parotid biopsy are not preferred due to disruption of the tumor capsule and tumor

transplantation [3]. Since USG is often used examination, it is more difficult to plan, but it should be preferred especially in non-palpable, cystic, necrotic lesions or lesions close to great vascular structures.

FNAB, as a diagnostic tool, recognizes benign masses better and identifies their subtypes with higher accuracy. The reason for that is Altin et al. suggested that the pathologist has more experience in benign masses because there are more subtypes of malignant masses and because benign masses are more common [3]. The success of FNAB in benign tumors has been found to be associated with differentiation. Pathologists evaluate the grade better in FNAB. Therefore, classifications were made according to grades [11,12]. The cytology material of a low-grade malignancy and a benign mass may show similarity. Since the atypia is less in low-grade tumors, the sensitivity of FNAB decreases, and it becomes difficult to distinguish between benign and malignant ones. 10 According to the study by Boldes et al., 10-year survival is better in malignant tumors that are incorrectly detected as benign, compared to nondiagnostic and malignant tumors [7]. In other words, even if the postoperative histopathological diagnosis of a patient with a benign FNAB result is malignant, it shows a good prognosis since it is low-grade.

FNAB is an important diagnostic tool that must be applied in parotid gland masses when it is known what issues should be considered. One of the factors that increase success is the size of the mass. FNAB was found to be more successful in tumors involving the deep lobe and masses larger than 24 mm [14]. In our study, 72.5% of the masses were larger than 2 cm. Apart from this, the success of FNAB decreases when parotid mass contains mesenchymal matrix, because focal atypia is not seen in cystic masses. While planning FNAB from these masses whose treatment is similar to solid masses and which are almost all benign, cells should be reduced from the cyst wall 15. In addition, non-diagnostic cytology results and false negatives increase in necrotic lesions [3]. Contamination of material with peripheral blood reduces the success of FNAB. Even if a small superficial vein is entered during the procedure, it should be repeated. Another factor affecting the success of FNAB is the experience of the person who does it. Although FNAB procedure is performed by resident doctors in our clinic, the results are similar to those in many large centers. In this, it may be effective that the newly learning assistant doctors first learn by watching in the company of the senior assistant doctor. Viguer JM et al. suggested that multiple aspirations taken from several directions to the mass reduce false negativity. This method is also used in our clinical practice [13].

Conclusion

In masses reported as suspicious cytology, the potential for malignancy should definitely be considered and treatment should be planned accordingly. In our study, the histopathological diagnosis of a substantial number of these masses was reported as malignant. FNAB is one of the most important diagnostic tools in the diagnosis of parotid gland masses when applied knowing its advantages and given the treatment without ignoring the deficiencies.

Our FNAB results are grouped under 4 subtitles according to the pathology reports available. These are benign, malignant, insufficient and suspicious. According to this general classification, the success rates of our pathologists in the comparison of postoperative pathology results were high and consistent with the literature. As a result, FNAB should be performed in patients who apply to the clinic due to a mass in the parotid gland and should be examined by experienced cytopathologists. Thus, the potential need for secondary surgery and treatment will be reduced.

Compliance With Ethical Standards

We certify that no funding has been received fort he conduct of this study and preparation of this manuscript. Stationery expenses were paid by us.

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