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# The Clinical Management of the Parotid Masses: A Five Year Study

## *Parotis Kitlelerine Klinik Yaklaşım: 5 Yıllık Deneyim*

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***SUMMARY***

***Objectives:*** *Our objective was to analyze the diagnostic measures and management methods for benign and malignant lesions localized in the parotid gland and to assess the role of radiological imaging, fine-needle aspiration biopsy (FNAB), the type and extent of surgery in respect to histopathology of the lesion and subsequent functional results.*

***Methods:*** *The data related to 79 parotidectomies performed in our clinic between October 2005 and December 2010 were retrospectively reviewed. Age, gender, clinical findings, FNAB cytology, radiological evaluation, surgical methods, histopathological evaluation, and complications were recorded.*

***Results:*** *The distribution of the lesions found on the 79 patients was as follows: 59 benign (75%), 19 malignant (24%), and one inflammatory (1%). The most common benign tumor was pleomorphic adenoma (69%) and the most common malignant tumor was acinic cell carcinoma (15.8%). The mean age of patients with malignant tumor was significantly higher than the mean age of patients with benign tumors. The accuracy rate of FNAB was 90.63% for malignant tumors and 76.56% for benign tumors. The 37 pleomorphic adenomas localized in the superficial lobe and the 13 Warthin's tumors were managed with superficial parotidectomy, whereas the 12 malignant and 5 benign tumors localized in the deep lobe were removed with total parotidectomy. The most common complication in our series was facial paralysis (5%).*

***Conclusion:*** *Despite the significant contribution of FNAB cytology, particularly in malignant-benign differentiation, the diagnosis of parotid gland lesions should include either clinical or radiological data as complementary to FNAB cytology data. Ultrasonography, owing to the low cost and absence of radiation exposure, may be used routinely for locating superficial lobe masses. CT and MRI may be reserved for malignant and selected benign cases. Our surgical preference was superficial parotidectomy in superficial benign parotid masses and total parotidectomy in deep-lobe benign tumors and advanced-stage malignant tumors.*

***Key words:*** *Fine-needle aspiration biopsy; parotidectomy; parotid tumor.*

**ÖZET**

**Amaç:** Bu çalışmada, parotis bezinde yerleşmiş benign ve malign lezyonların tanı yöntemleri ve tedavi metodları, radyolojik görüntüleme ve ince iğne aspirasyon biopsisinin (İİAB) lezyonun histopatolojik tanısını desteklemede ve yapılacak cerrahinin şeklini belirlemedeki rolü ve fonksiyonel sonuçlar değerlendirildi.

**Gereç ve Yöntem:** Ekim 2005 ile Aralık 2010 tarihleri arasında kliniğimizde yapılan 79 parotidektomi retrospektif olarak tarandı. Yaş, cinsiyet, klinik bulgular, İİAB sitolojisi, radyolojik değerlendirme, cerrahi metodlar, histopatolojik değerlendirme ve komplikasyonlar kaydedildi.

**Bulgular:** Yetmiş dokuz hastanın lezyon dağılımı; 59 benign (%75), 19 malign (%24) ve 1 enflamatuvardı (%1). En yaygın benign tümör pleomorfik adenom (%69), en yaygın malign tümör asinik hücreli karsinomdu (%15.8). Malign tümörlü hastaların ortalama yaşı benign tümörlü hastaların yaşına göre anlamlı olarak yüksekti. İİAB'nin doğruluk oranı malign tümörler için %90.63, benign tümörler için %76.56 idi. Yüzeyel lobta yerleşik 37 pleomorfik adenom ve 13 Warthin tümörüne superfisiyal parotidektomi yapılırken, derin lobta yerleşmiş 12 malign ve 5 benign tümör total parotidektomi ile çıkarılmıştır. Serimizde en yaygın komplikasyon fasiyal paraliziydi (%5).

**Sonuç:** İİAB sitolojisinin malign benign ayırımındaki belirgin ayırıcılığına rağmen, parotis bezi lezyonlarının tanısı radyolojik ve klinik verilerin İİAB verilerini tamamlaması ile konur. Ultrasonografi ucuz maliyeti ve radyasyon riskinin olmaması ile yüzeyel lob lezyonlarında rutin olarak kullanılır. Bilgisayarlı tomografi ve manyetik rezonans görüntüleme malign ve bazı seçici benign lezyonlarda tercih edilir. Cerrahi tercihimiz süperfisiyal lob benign tümörlerde superfisiyal parotidektomi iken derin lob benign tümörlerde ve ileri evre malign tümörlerde total parotidektomidir.

**Anahtar sözcükler:** İnce iğne aspirasyon biopsisi; parotidektomi; parotis tümörü.

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## INTRODUCTION

The management of parotid masses including diagnostic and therapuetic aspects warrants systematical approach.

In diagnostic work-up apart form the history, the radiological imaging techniques including ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI) are frequently encountered.[1] Fine-needle aspiration biopsy (FNAB) is of value in benign and malignant differentiation. The accuracy rate of FNAB in benign and malignant lesion differentiation was reported as 81-98%.[2,3] In another study, the validity of FNAB was found nearly 80%.[3,4] The major complications associated with fine-needle aspiration biopsy were not reported previously. FNAB is an easy, safe, and minimally invasive procedure.[4-6]

In parotid masses, the combined data derived from clinical, radiological and pathological assessment provides the final diagnosis.[7]

Seventy to eighty percent of all salivary gland tumors are localized in parotid gland. Parotid masses are predominantly benign tumors (80%). The most commonly encountered benign tumors are pleomorphic adenomas, followed by Warthin's tumor. The most common malignant tumor of the parotid gland is mucoepidermoid carcinoma.[8]

Benign lesions localized in the superficial lobe are managed with superficial parotidectomy, whereas benign lesions localized in the deep lobe necessitate total parotidectomy.[9,10] In the early stages, superficial malignant lesions also only require superficial parotidectomy; however, total parotidectomy is performed for deep lobe lesions. In advanced stages and for high grade lesions, neck dissection and/or radiotherapy are combined with total parotidectomy.[8]

In this study, 79 patients diagnosed with parotid tumors were retrospectively analyzed. The clinical findings, fine-needle aspiration biopsy results, type of the surgery, postoperative histopathology, and any resulting complications. The diagnostic measures were reviewed to assess the role of radiological imaging and FNAB. The management including the type and extent of surgical treatment was discussed in respect to histopathology of the lesion and subsequent functional results.

**Table 1.** Classification of cytology

| | |
|---|---|
| Positive value | Exclusively benign lesion |
| Negative value | Malignant, inflammatory, or suspicious |
| Positive value | Exclusively malignant lesion |
| Negative value | Malignant, inflammatory, or suspicious |

## MATERIALS AND METHODS

This study retrospectively analyzed 79 patients who received operations for parotid masses and metastatic lesions at the Istanbul Training and Research Hospital between 2005 and 2010. The demographic, clinical, surgical, histopathological and postoperative follow-up data. Postoperative complications, malignant tumor stages for malignant lesions and data were collected from their records. The demographic data included age, gender. Clinical data consisted of symptoms, signs, staging for malignant lesions, signs revealed through clinical examination and radiologi-

**Table 2.** Histopathology of the parotid tumors (October 2005-December 2010)

| Histology | n | % |
|---|---|---|
| **Benign tumors** | 59 | 75 |
| Pleomorphic adenoma | 41 | 69 |
| Warthin's tumor | 14 | 24 |
| Myoepithelioma | 2 | |
| Oncocytoma | 1 | |
| Lymphoepitalial cyst | 1 | |
| **Malignant tumors** | 19 | 24 |
| Acinic cell carcinoma | 3 | |
| Mucoepidermoid carcinoma | 2 | |
| Adenoid cystic carcinoma | 2 | |
| Epidermoid carcinoma | 2 | |
| Malignant fibrous histiocytoma | 1 | |
| Spindle cell carcinoma | 1 | |
| Myoepitelial carcinoma | 1 | |
| Auricula basal cell carcinoma | 1 | |
| Retromolar trigone epidermoid carcinoma | 1 | |
| Salivary duct carcinoma | 1 | |
| Folliculer lymphoma | 1 | |
| Buccal region epidermoid carcinoma | 1 | |
| Undiferantiated pleomorphic sarcoma | 1 | |
| Inflammatory parotid disease | 1 | 1 |

**Table 3.** Comparison of benign and malignant parotid tumors

| | Benign | Malignant |
|---|---|---|
| No. of patients | 60 | 18 |
| Male / Female | 35/25 | 12/6 |
| Age (year) | 47.9 (18-82) | 64.6 (28-86) |
| Right/Left/Bilateral | 32/27/1 | 10/8 |
| Superficial/Deep/Safe | 55/5 | 6/9/3 |

cal imaging. Surgical data included type of surgery, perioperative findings, histopathological data consisted of FNAB cytology and final specimen pathology reports. FNAB cytology was categorized (Table 1) to calculate specificity, sensitivity, and accuracy values were also calculated.

The statistical analysis was performed using SAS package (9.2 version, cary, NC, USA). A student t-test was used to compare categorical data on benign and malignant lesions. The predictive value of fine-needle aspiration biopsy in the diagnosis of benign and malignant tumors was calculated using a chi-square test.

## RESULTS

Seventy-nine patients had a parotidectomy at the Istanbul Training and Research Hospital Second Otolaryngology Clinic between 2005 and 2010. Postoperative histological diagnoses are summarized in Table 2.

The male and female distribution was 48 (61%) and 31 (39%), respectively. The distribution of patients with benign lesions is summarized in Table 3. The average age for patients with benign and malignant lesions was 47.9 and 64 years old, respectively. The difference between the two groups was statistically significant (p=0.0002) (Table 4).

**Table 5.** Radiological imaging (BT and MRI)

| Patient groups | BT | MRI | BT+MRI |
|---|---|---|---|
| **Malignant** | | | |
| Malignant fibrous histiocytoma | | | + |
| Retromolar trigone epidermoid carcinoma | | | + |
| Spindle cell carcinoma | | | + |
| İndiferantiated anaplastic carcinoma | | + | |
| Pleomorphic undiferantiated sarcoma | | + | |
| Myoepitelial carcinoma | | + | |
| Renal clear cell carcinoma metastasis | | + | |
| **Benign** | | | |
| Giant pleomorphic adenoma | + | | |
| Pleomorphic adenoma recurrence | + | | |

Pleomorphic adenoma (69%) was the most commonly encountered benign lesion, with the second most common lesion being Warthin's tumor (23%). The Warthin's tumor was bilateral in one patient out of 14. In our series, the most common malignant tumors were acinic cell carcinoma (15.8%), mucoepidermoid carcinoma (10.5%), adenoid cystic carcinoma (10.5%), and epidermoid carcinoma (10.5%), respectively.

Sixty-one superficial and 15 deep- lobe localized tumors were encountered. The distribution is summarized in Table 3.

### Radiological Evaluation

During the diagnostic work-up, every patient had an ultrasonographical examination. The distribution of selected patients with CT and MRI exams during the preoperative diagnostic work-up is summarized in Table 5.

**Table 4.** Comparison of age and gender in the benign and malignant parotid tumors (p<0.05)

| | | n | Avarage | Standard deviation | p |
|---|---|---|---|---|---|
| Age | All groups | 78 | 51.818 | 16.602 | |
| | Benign | 60 | 47.898 | 14.874 | 0.00022 |
| | Malignant | 18 | 64.667 | 15.789 | |
| Gender (Male/Female) | All groups | 47/31 | 0.597/0.403 | – | |
| | Benign | 35/25 | 0.576/0.424 | – | 0.4858 |
| | Malignant | 12/6 | 0.667/0.333 | – | |

**Table 6.** The patient distribution according to FNAB results

| Cytology | Histology | | | | Total |
|---|---|---|---|---|---|
| | Benign | Malignant | Inflammation | Not available | |
| Benign | 42 | 5 | 0 | 0 | 47 |
| Malignant | 1 | 7 | 0 | 0 | 8 |
| Inflammation | 4 | 0 | 1 | 0 | 5 |
| Suspicious | 4 | 0 | 0 | 0 | 4 |
| Not available | 8 | 6 | 0 | 1 | 15 |
| **Total** | **59** | **18** | **1** | **1** | **79** |

Fine-Needle Aspiration Biopsy (FNAB) Cytology:

FNAB was performed in 64 of 79 patients. Five of the remaining 15 patient had neighboring metastatic lesions with incisional biopsy results. Ten patient had their biopsy performed in other centres and had no records at our institution. FNAB was consistent with the final diagnosis in 33 of 41 patients diagnosed with pleomorphic adenoma. The records of five patients were missing. The remaining patients were reported as having chronic inflammation (1 case), intraparotid neoplasia (1 case), and spindle cell neoplasia (1 case). The FNAB was consistent with the final diagnosis of Warthin's tumors in seven of 14 patients. In the remaining five patients, FNAB was revealed acute inflammation (1 case), suspicious cytology (1 case), oncocytic epithelial cells (1 case) and cyst consistent findings (1 case). In three cases with a final diagnosis of acinic cell carcinoma, FNAB revealed a benign oncocytic tumor, suspicious cytology, and was inconclusive in discrimination between mucoepidermoid carcinoma and benign epithelial tumors.

In this study, the specificity, sensitivity, and accuracy of FNAB for malignant tumors was calculated as 0.98, 0.58 and 0.91, respectively. FNAB specificity, sensitivity and accuracy for benign tumors were calculated as 0.58, 0.81, and 0.77, respectively (Tables 6,7,8).

## Surgical Procedure and Evaluation of Results

Thirthy-seven pleomorphic adenoma (59.6%) and 13 Warthin's tumors (20%) were diagnosed in 62 patients undergoing superficial parotidectomy. Our surgical approach was a classical superficial parotidectomy, involving a preauriculocervical incision (Blair), and the detection of the main trunk of the facial nerve with through an anterograde approach. Facial nerve monitorization was not routine, except revision surgeries. One of the 62 patients with the basal cell carcinoma of the auricula had a superficial parotidectomy together with a skin excision, and another patient with the final diagnosis of Warthin's tumor had a superficial parotidectomy together with a skin excision and functional neck dissection. A total parotidectomy was performed in one recurrent case, FNAB reported pleomorphic adenoma with a final histopathological diagnosis of epidermoid carcinoma. Three patients with maxillar skin epidermoid

**Table 7.** Specificity, sensitivity and accuracy of the FNAB for malignant parotid tumors

| Cytology | Histology | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Positive | 42 | 5 | 47 |
| Negative | 10 | 7 | 17 |
| **Total** | **52** | **12** | **64** |

Specificity= 51/52= 0.9808; Sensitivity= 7/12= 0.5833; Accuracy= 58/64= 0.9063.

**Table 8.** Specificity, sensitivity and accuracy of the FNAB for benign parotid tumors

| Cytology | Histology | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Positive | 7 | 1 | 8 |
| Negative | 5 | 51 | 56 |
| **Total** | **12** | **52** | **64** |

Specificity= 7/12= 0.5833; Sensitivity= 42/52= 0.8077; Accuracy= 49 /64= 0.7656

**Table 9.** The cases without recurrence following radiotherapy

| Malignant tumor cases | n |
|---|---|
| Asinic cell carcinoma | 3 |
| Mucoepidermoid carcinoma | 2 |
| Adenoid cystic carcinoma | 2 |
| Salivary duct carcinoma | 1 |
| Spindle cell sarcoma | 1 |
| Myoepitelial carcinoma | 1 |

**Table 10.** Complications following parotidectomy

| | Benign | Malignant |
|---|---|---|
| Facial nerve paralysis | 2 | 2 |
| Transient facial nerve paralysis | 1 | 0 |
| Frey's syndrome | 2 | 1 |
| Seroma | 1 | 0 |
| Wound hematoma | 1 | 1 |
| Salivary fistula | 1 | 0 |

carcinoma, basal cell auricular carcinoma, and retromolar trigone carcinoma had a superficial parotidectomy combined with an excision of the original lesion, but a histopathological parotid gland infiltration was not detected.

Seventeen patients with 12 malignant and five benign lesions had a total parotidectomy. Seven patient had a neck dissection (two radical, one modified radical, and four functional) combined with a total parotidectomy. Deep -lobe localized pleomorphic adenomas (4 cases) and Warthin's tumor (1 case) were managed with a total parotidectomy.

Two patients with a histopathological diagnosis of follicular lymphoma and malign fibrous histiocytoma had chemotherapy. One patient with malignant fibrous histiocytoma had a recurrence, and one patient with a tumor in retromolar trigone had a recurrence despite postoperative radiotheraphy and chemotherapy.

The patients with parotid gland metastasis of renal clear cell carcinoma (1 case), epidermoid carcinoma (1 case), pleomorphic undifferentiated sarcoma (1 case) died. Malignant cases without recurrence in follow-ups after parotidectomy and radiotherapy were summarized in Table 9.

### Evaluation of Complications

Transient peripheral facial paralysis arising in a patient following a superficial parotidectomy recovered after three months. Patients with facial paralysis were evaluated using the Hause-Brackman grading system. Facial paralysis was encountered following two superficial parotidectomies for benign tumors and two total parotidectomies for malignant tumors (5%). The evaluation of postoperative complications revealed Frey's syndrome (3 cases), hematoma (2 cases), salivary fistula (1 case), and seroma (1 case) (Table 10).

## DISCUSSION

In our series, the routinely ordered radiological imaging was US in patients suspected of benign tumor. Recently various imaging techniques have been proposed for the preoperative evaluation of parotid lesions including ultrasonography, CT and MRI (2 cases). In deep- lobe tumors with a tendency for infiltration, tumor recurrences, and facial paralysis, CT and MRI are important tools for making diagnoses in conjunction with US (3 cases). Owing to its high sensitivity and better differentiation of soft tissues, MRI is a better choice than CT.[11] Advanced stage malignant tumors are differentiated from benign tumors with irreguler features, infiltration, and a lack of differentiation from subdermal tissues (4 cases).[12] MRI was performed on adjacent tumors with the possibility of infiltrating parotis tissue, and on metastatic tumors. US was primarily ordered radiological evaluation, whereas CT and MRI were reserved for selected cases.

The significance of fine-needle aspiration biopsy in preoperative evaluations of parotid tumors is controversial. In a previous study, the accuracy of malignant and benign parotid tumors was found to be between 81 and 98%.[2] In another study, the accuracy was reported as 80-90%.[13] Karaman et al.[14] observed the overall diagnostic accuracy of FNAB in parotid gland lesions was 90.625%. The diagnostic sensitivity and specificity were 90.625% and 100%, respectively. In our study, the accuracy of FNAB was found 90.63% and 76.56% in benign and malig-

nant tumors, respectively, and was concordant with the previous data. The sensitivity and specificity of FNAB was detected as 58% and 98% in malignant lesion and 81% and 58% in benign lesions. The detected ratios seem to be supportive for the diagnostic value of FNAB.[13,15]

The routine or selective use of FNA for parotid masses is still under discussion and the standards for performing FNA in parotid masses are not clearly established.[15] In our series, FNAB was performed on all patients with a detected mass in the parotid gland mainly to identify the parotid lesions indicating surgical intervention. Concordant with previous literature, we did not encounter any major FNAB-related complications.[16,17]

Pleomorphic adenoma is most commonly encountered benign parotid tumor. In the present series, the pleomorphic adenoma was the most common benign tumor (52%), followed by Warthin's tumor (17.7%). In a previous study from Singapore, the most common benign parotid tumor was reported as Warthin's (40%). The same series reported 36% pleomorphic adenoma.[18] Geographical and genetic differences may play role in the etiology. In many previous studies, a significantly high incidence of Warthin's tumor was reported in men, compared to women.[19] In the present series, all patients diagnosed with Warthin's tumor are male, and this prevalance can be explained by the higher smoking rate in males, provoking metaplasia.[19-23]

Mucoepidermoid carcinoma was reported as the most common malignant tumor of parotid glands in previous studies.[24-27] Al-Khateeb et al have reported a similar incidence of mucoepidermoid carcinoma and adenoid cystic carcinoma.[28] Another study of 478 cases reported the most common malignant tumor to be acinic cell carcinoma.[29] In the present series, the distribution of 14 patient with primary malignant tumors revealed acinic cell carcinoma (3 cases) and mucoepidermoid carcinoma (2 cases) as the most commonly encountered malignant tumors.

The most common surgical procedure was a superficial parotidectomy. Benign tumors localized in the superficial lobe of the parotid gland and early stage malignant tumors of the superficial lobe were managed with a superfical parotidectomy. The previous studies reported high recurrence ratios (4-40%) with tumor enucleation and conservative parotidectomy.[9,10] However there are recent reports emphasizing the role of partial superficial parotidectomy in providing more cosmetic and the functional results.[30]

The presence of malignant tumors necessitates the use of combination therapy. Superficial parotidectomy is adequate for the management of early-stage and low-grade tumors. In the present series, eight patient with superficial lobe-localized malignant tumors had a superficial parotidectomy. A total parotidectomy was performed on deep-lobe tumors. Radiotherapy and/or chemotheraphy were included according to the histopathological evalution of tumors. In advanced -stage parotid lesions, a total parotidectomy was combined with neck dissection and radiotherapy. In the present series, seven patients with advanced-stage malignant tumors had a neck dissection and radiotherapy, and one had chemotherapy.

The tail is the most common localization of parotid tumors. The marginal mandibular nerve is the most commonly injured branch, due to its long course and to facial nerve.[31,32] Revison surgery and a history of infection statistically increase the incidence of facial paralysis, which was reported as 5% in our series and 4.9% in a previous study.[33] Frey's syndrome was reported in a wide range, from 5-66%, in the literature.[34,35] In the present series, we encountered three cases (3.7%) of Frey's syndrome.

## CONCLUSION

Despite the significant contribution of FNAB cytology particularly in malignant-benign differentiation, the diagnosis of parotid gland lesions should include either clinical and radiological data as complementary to FNAB cytology data. US may be used routinely for locating benign lesions. CT and MRI may be reserved for malignant and selected benign cases. Our surgical preference was superficial parotidectomy in superficial benign parotid masses whereas total parotidectomy in deep-lobe benign tumors

and advanced-stage malignant tumors.

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