AUDIT ARTICLE

Clinicopathological analysis of parotid masses: six-year experience of a tertiary center

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Abstract

Objective: To analyse the clinical and histopathological characteristics of parotid gland masses at a tertiary referral centre and to compare the results with those cited in literature.

Methods: The retrospective study was conducted at Adana Numune Training and Research Hospital, Adana, Turkey, and comprised data of patients undergoing parotid surgery between January 2011 and December 2016. They were evaluated in terms of age, gender, surgery method, fine-needle aspiration biopsy results, specimen reports and complications after the surgery for one year. SPSS 20 was used for data analysis.

Results: Of 170 parotidectomies, 97(57.1%) had been performed on males and 73(42.9%) on females. There were 145(85.3%) benign and 25(14.7%) malignant tumours. Pleomorphic adenoma 67(39.4%) and Warthin's tumour 56(32.9%) were the two most common benign tumours. Mucoepidermoid carcinoma 7(4.1%) and adenoid cystic carcinoma 6(3.5%) were the two most prevalent malignant tumours. Superficial parotidectomy 133(78.2%) was the main type of surgical intervention. The sensitivity of fine needle aspiration cytology for identifying malignant tumours was 64.71%, the specificity was 100% and overall accuracy of the procedure was 94.92%.

Conclusion: Repeated aspirations for sampling different parts of the lesion should be performed on suspicion of malignancy, especially if fine needle aspiration cytology reported pleomorphic adenoma.

Keywords: Parotid neoplasm, Pleomorphic adenoma, Biopsy, Fine-needle, Parotid gland surgery. (JPMA 70: 308; 2020)

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Introduction

Salivary gland neoplasms are rare tumours comprising <5% tumours of the head and neck region.[1] The annual incidence rate is 1.1-6.2 cases per 100,000 for benign lesions, 0.2-1.3 cases per 100,000 for malignant tumours and 0.4-13.5 cases per 100,000 for all salivary gland neoplasms.[2-4] Although there are conflicting reports on cell phones increasing the incidence of the malignant parotid tumours, general concept is that there is no direct association.[5]

Besides the institutional and geographical variations, pleomorphic adenoma is the most common tumour of the parotid and the submandibular glands and, generally, the most prevalent benign neoplasm of all salivary glands. The most frequent malignant neoplasm of the parotid gland is the mucoepidermoid carcinoma and adenoid cystic carcinoma and adenocarcinomas are the most prevalent malignant tumours of the submandibular gland and minor salivary glands.[6-8]

The current study was planned to review six-years clinical experience at the study site with parotid neoplasms and parotid surgery, and to assess the frequency of histopathological types, gender difference, age intervals, surgery types and complications, and to correlate our results in consonance with current literature.

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Materials and Methods

The retrospective study was conducted at Adana Numune Training and Research Hospital, Adana, Turkey, and comprised data of patients having undergone parotid surgery between January 2011 and December 2016. After approval from the institutional ethics committee, clinical records of all patients who underwent parotidectomy during the study period were included. Patients were evaluated and tabulated with regards to their age, gender, surgery method, fine-needle aspiration cytology (FNAC) biopsy results, specimen reports and complications after the surgery. All parotid gland neoplasms' histopathological and cytological diagnoses were based on the World Health Organisation (WHO) pathological classification system.[6] SPSS 20 was used for statistical analysis. Chi-square and Fisher's exact test were used as appropriate. $P<0.05$ was considered statistically significant.

Results

There were 170 parotidectomy procedures related to 97 (57.1%) males and 73(42.9%) females. The overall mean age was 47.2±15.02 years (range: 12-86 years). The most common symptom was swelling (97%) followed by pain

Table-1: Histopathological classification of the benign tumours and their distribution according to frequency, mean age, percentage, gender and operation type.

Histopathological Classification of Benign parotid tumours	Frequency	Percentage in total	Percentage in benign parotid lesions	Mean Age	Gender		Operation Type	
					Male	Female	Superficial Parotidectomy	Total Parotidectomy
Pleomorphic adenoma	67	39.4%	46.2%	39.8±15,6 (14-86y)	22 (32.8%)	45 (67.2%)	58 (86.6%)	9 (13.4%)
Warthin's tumour	56	32.9%	38.6%	56.1±7,1 (41-75y)	48 (85.7%)	8 (14.3%)	50 (89.3%)	6 (10.7%)
Chronic non- specific sialadenitis	4	2.4%	2.8%	31.5±12,5 (24-50y)	1 (%25)	3 (%75)	3 (75%)	1 (25%)
Lipoma	4	2.4%	2.8%	45±10,2 (36-59y)	4 (100%)	0	4 (100%)	0
Chronic granulomatous sialadenitis	3	1.8%	2.1%	41±6,6 (34-47y)	1 (33.3%)	2 (66.7%)	3 (100%)	0
Basal cell adenoma	3	1.8%	2.1%	54.3±12,7 (46-69y)	3 (100%)	0	2 (66.7%)	1 (33.3%)
Lymphoepithelial cyst	3	1.8%	2.1%	35±24,1 (12-60y)	2 (66.7%)	1 (33.3%)	3 (100%)	0
Salivary duct cyst	2	1.2%	1.4%	44.5±13,4 (35-54y)	0	2 (100%)	2 (100%)	0
Keratinous cyst	1	0.6%	0.7%	28	0	1 (100%)	1 (100%)	0
Canalicular Adenoma	1	0.6%	0.7%	43	1 (100%)	0	1 (100%)	0
Schwannoma	1	0.6%	0.7%	29	1 (100%)	0	1 (100%)	0
TOTAL	145	85.3%	100%	46.2±14,9 (12-86y)	83(57.2%)	62(42.8%)	128 (88.3%)	17 (11.7%)

Table-2: Histopathological classification of the malignant tumours and their distribution according to frequency, mean age, percent, gender and operation type.

Histopathological Classification of Malignant parotid tumours	Frequency	Percentage in total	Percentage in malignant parotid lesions	Mean Age	Gender		Operation Type	
					Male	Female	Superficial Parotidectomy	Total Parotidectomy
Mucoepidermoid carcinoma	7	4.1%	28%	55.7±22,6 (15-80y)	4 (57.1%)	3 (42.9%)	1 (14.3%)	6 (85.7%)
Adenoid cystic carcinoma (one radical parotidectomy)	6	3.5%	24%	46.5±7,3 (37-56y)	1 (16.7%)	5 (83.3%)	0	6(100%)
Acinic cell carcinoma	3	1.8%	12%	46.3±19,4 (25-63)	1 (33.3%)	2 (66.7%)	2(66.7%)	1(33.3%)
Ductal carcinoma	2	1.2%	8%	56.5±20,5 (42-71y)	2 (100%)	0	0	2 (100%)
Basal cell carcinoma infiltration	2	1.2%	8%	62.5±7,8 (57-68y)	2 (100%)	0	1 (50%)	1(50%)
Myoepithelial carcinoma	1	0.6%	4%	60	1 (100%)	0	0	1 (100%)
Lymphoepithelial Carcinoma	1	0.6%	4%	59	0	1 (100%)	1 (100%)	0
Pleomorphic adenoma ex carcinoma	1	0.6%	4%	53	1 (100%)	0	0	1 (100%)
Malignant melanoma metastasis	1	0.6%	4%	49	1 (100%)	0	0	1 (100%)
Squamous cell carcinoma metastasis	1	0.6%	4%	61	1 (100%)	0	0	1 (100%)
TOTAL	25	14.7%	100%	53.1±15 (15-80y)	14(56%)	11(44%)	5 (20%)	20 (80%)

(15%) and facial paralysis (2%). The average duration of symptoms was 6.4±5.2 months. One (0.58%) patient was operated twice for Warthin's tumour and 1(0.58%) was operated twice for recurrence of pleomorphic adenoma. Half of the patients (50%) had right-sided mass, and the other half had left-sided mass and only 1(0.58%) patient with Warthin's tumour had bilateral parotid mass. Superficial parotidectomy was performed in 133(78.2%) patients, 36(21.2%) had total parotidectomy and 1(0.58%) had radical parotidectomy. Of the 170 patients, benign cases were 85.3%, primary malignant cases were 12.4%, metastatic secondary tumours were 2.4% and the overall benign-malignant ratio was 5.8:1. Benign parotid tumour patients had a male-to-female ratio (MFR) of 1.34:1 and malignant parotid tumour patients had an MFR of 1.27:1. The difference between gender groups and the histopathological type of the tumour (benign/malignant) was not statistically significant (p=0.908).

Histopathological classification of the benign tumours and their distribution according to frequency, mean age, percentage, gender and operation type of the patients were noted (Table-1). Pleomorphic adenoma 67(39.4%) and Warthin's tumour 56(32.9%) were the two most common benign parotid tumours. Pleomorphic adenoma had female dominancy with a MFR of 1:2.04 and the gender difference between the pleomorphic adenoma and non-pleomorphic adenoma group was statistically significant ($p<0.01$). Warthin's tumour had male dominancy, with MFR 6:1, and the gender difference was significant ($p<0.01$). The most common type of operation for benign tumours was superficial parotidectomy 128(88.3%) and total parotidectomy 17(11.7%) was performed for deep-lobe parotid tumours.

Histopathological classification of the malignant tumours and their distribution according to frequency, mean age,

Table-3: The correlation between fine needle aspiration cytology and final histopathological diagnosis.

	FNA malignant	FNA benign	
Histopathological malignant	11 (true positive)	6 (false negative)	Sensitivity (11/17) 64.71%
Histopathological benign	0 (false positive)	101 (true negative)	Specificity (101/101) 100%
	Positive predictive value (11/11) 100%	Negative Predictive Value (101/107) 94.39 %	Malignancy prevalence (14.41%) FNAC accuracy (94.92%) TOTAL = 118

FNAC: Fine needle aspiration cytology.

percent, gender and operation type of the patients were also noted (Table-2). Mucoepidermoid carcinoma 7(4.1%) and adenoid cystic carcinoma 6(3.5%) were the most prevalent malignant parotid tumours. There was no gender difference between the histopathological types of malignant tumours except for adenoid cystic carcinoma. Although we had only 6 parotid mass patients diagnosed as adenoid cystic carcinoma, 5 of them were female with MFR 1:5. Total parotidectomy was the most common operation type, but patients who did not accept re-resection or having specimens with enough resection margins were treated by superficial parotidectomy.

Main complications of parotid surgery were transient facial nerve palsy 30(17.6%), permanent facial paralysis 5(2.9%), salivary fistula tract formation 1(0.6%), skin flap necrosis 2(1.2%), clinical Frey syndrome 1(0.6%), wound infection 9(5.3%) and seroma formation 6(3.5%).

Benign tumours were most frequent parotid lesions encountered between 3rd and 7th decades of life. The ratio between benign and malignant parotid lesions was 5.8:1. Pleomorphic adenoma was the most common parotid tumour showing predilection between 3rd and 6th decades of life followed by Warthin's tumour which was frequent between 5th and 7th decades of life, especially in male patients. Pleomorphic adenoma was prevalent in females with a rather homogenous age distribution where Warthin's tumour was common in males prominently in 6th decade. Mucoepidermoid carcinoma was observed nearly in all decades of life whereas adenoid cystic carcinoma was prevalent between 4th and 6th decades.

Correlation between FNAC and final histopathological diagnosis was noted separately (Table-3). FNAC was performed by a radiologist under ultrasonography guidance. Tru-cut biopsy was performed if the result was inconclusive. FNAC results of 126(74.9%) patients could be obtained while 8(6.3%) of them were indeterminate or inconclusive. The final histopathological examination of the 8 inconclusive cytological reports revealed 5 benign and 3 malignant parotid lesions. The kappa statistics for the degree of agreement between FNAC and histopathological results was 0.758, demonstrating good strength of agreement.

Discussion

This six-year study analysed patients undergoing parotidectomy due to parotid mass. Our patient group was between 2nd and 9th decades of life, with a mean age of 47.2±15.02 years for all parotid tumours, 46.2±14,9 years for benign lesions, 53.1±15 years for malignant tumours and our MFR was 1.33:1 for all parotid lesions, 1.34:1 for benign lesions and 1.27:1 for malignant lesions. This study had slight male dominancy for all kinds of parotid lesions which was in concordance with other studies from Turkey where Kizil et al., reported MFR to be 1.16:1 for parotid lesions and mean age was 46.1 years for benign lesions, 52.9 years for malignant lesions and 47.6 years for all parotid lesions.[9] Other studies from Turkey endorsed the same age and gender trend as our study group.[10,11] Results from researches from different countries were also correlated with this study. In a study in Poland, the mean age was 50.5 years for benign parotid lesions and 57.2 years for malignant parotid lesions, the MFR was 1:1.03 for malignant parotid lesions and 1:1.2 for benign lesions.[12] Studies from Brazil and Greece, demonstrated harmonious results with a mean age of 46.6 years and 48.2 years for benign parotid lesions and a mean age of 56.2 years and 65.4 years for malignant parotid lesions respectively. In addition, MFR was 1:2 and 1:1.18 for benign tumours and 1:1 and 1:0.33 for malignant tumours in these studies respectively.[13,14] We may conclude from these results that although the age groups and MFR of benign and malignant lesions may vary in literature, malignant lesions are always prominent in older ages than benign ones.

The benign-malignant ratio of this study was 5.8:1 and malignancy rate was 14.4% which was in concordance with literature as this study consisted of only parotid tumours.[10,11,13] The most common benign parotid tumour of our study was pleomorphic adenoma which was 39.4% of all parotid tumours. Pleomorphic adenoma had female prominence with a mean age of 39.8±15.6 years and the

mass mainly (86.6%) originated from the superficial lobe of the parotid gland. As it is emphasised in literature, pleomorphic adenoma is not only the most common parotid tumour, but also the most common tumour type among all salivary gland neoplasms.[9] The second most common tumour of our research was Warthin's tumour. Warthin's tumour rate (WTR) among all benign parotid lesions was 32.9%, had male predominence with a mean age of 56.1±7.1 years and primarily (89.3%) originated from the superficial lobe of the parotid gland. Bilaterality and multifocality are characteristics of Warthin's tumours. These tumours are 6.5-12% are bilateral and 6-20.5% multifocal.[15,16] In this study, only one (2%) of our patients had bilateral Warthin's tumour. We observed that the studies from Turkey demonstrated higher Warthin's tumour rate than other parts of the world. In their study, Li et al. reviewed salivary gland tumour cases in western China in the past 50 years and their Warthin's tumour rate was 7.3%.[7] In another study of Sando et al. from Cameroon, WTR was 0.7% and indicated the rareness of Warthin's tumour in African series.[17,18] In their study, Oliveria et. al. from Brazil assessed Warthin's tumour rate 6.4%, Spiro et. al. from the United States (USA) as 6.5%, Jaafari-Ashkavandi et al. from Iran as 10.5% and Sirohi et al. from India as 11%.[8,19-21] Warthin's tumour rate was 22% and relatively higher in the study of Drivas et al. from Greece.[14] In the researches from Turkey, Kizil et. al. designated Warthin's tumour rate as 30.8%, Sürmeli et al. as 30.5% and Derin et. al. as 21.9%.[9-11] Environmental factors such as endemic infections, nutritional factors and genetic factors play an important role in tumourogenesis and can explain Warthin's tumour rate increase in our region.

The most common malignant parotid tumours of this study were mucoepidermoid carcinoma with a prevalence of 4.1% and a mean age of 55.7±22.6 years followed by adenoid cystic carcinoma (ACC), whose prevalence was 3.5% with a mean age of 46.5±7.3 years. Our findings were harmonious with the literature where the prevalence of mucoepidermoid carcinoma ranged from 3% to 13.5% and the prevalence of adenoid cystic carcinoma ranged between 2.3% and 15.9%.[18,22] In this study group, mucoepidermoid carcinoma group showed no gender predilection and a homogenous age distribution, but 5 of the 6 patients of the adenoid cystic carcinoma patients were females between 4th and 6th decades of life. Although there is some controversy, mucoepidermoid carcinoma is generally accepted as the most common salivary gland neoplasm.[7,8] Our findings were consistent with other studies except for the gender predilection of adenoid cystic carcinoma.[23] Various population studies of ACC from Mexico, Brazil and Canada display a female predilection with MFR 1:2 which contradicts with the studies from Nigeria and Turkey exhibiting a male predilection with MFR as high as 33.3:1.[9,19,24-26] However, a slight female predominance regarding ACC is generally accepted in literature and we can affirm that our study was in concordance with the previous studies.[24,25]

As this study mainly compromised benign parotid lesions of the superficial lobe of the parotid gland, the most preferred surgical process was superficial parotidectomy. We had 1(0.6%) male patient with bilateral Warthin's tumour, 2(1.2%) of our female patients who had been operated initially in other clinics were re-operated for recurrent pleomorphic adenoma and 1(0.6%) male patient who was operated for pleomorphic adenoma developed myoepithelial carcinoma after one year. Our most encountered complication of parotid surgery was transient facial nerve palsy with a prevalence of 17.6%. We also had five patients (2.9%) with permanent facial paralysis, all of them were patients with malignant disease requiring total parotidectomy, 1(0.6%) patient was re-operated for salivary fistula tract removal, 2(1.2%) suffered skin flap necrosis and 1(0.6%) had clinical Frey syndrome. Wound infection was detected in 9 patients (5.3%) and treated with antibiotics and seroma formation was seen in 6(3.6%), and our complication rates were comparable with literature.[27]

The correlation between preoperative FNAC and postoperative histopathological diagnosis was analysed by means of sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), FNAC accuracy and malignancy prevalence in this study. In literature, the sensitivity of FNAC for salivary gland tumours ranges between 39.1% and 94% and is often low, but the specificity of FNAC is between 86% and 100% and is frequently higher.[28] The sensitivity, specificity, accuracy, PPV, and NPV for malignancy of our study were 64.71%, 100%. 94.92%, 100% and 94.39% respectively which was in concordance with previous studies.[28,29] The low sensitivity of FNAC for malignant salivary gland tumours is always mentioned and criticised in literature, but the high specificity, accuracy and PPV of this test makes it still reliable and valuable for distinguishing malignant lesions from benign ones. The diagnostic accuracy of our study for detecting malignancy was 94.92%, relatively high among other studies and our malignancy rate was 14.41%, comparable with previous series. The false positive rate was 4.7% which was consonant with other studies where it ranged between 0% and 12.3%.[30] Among 6 false negative results, 5 were reported as pleomorphic adenoma, one of them was reported as chronic granulomatous sialadenitis. The final

postoperative histopathological diagnosis of these 6 false negative cases was reported as adenoid cystic carcinoma (2 cases), mucoepidermoid carcinoma (one case), acinic cell ca (one case), lymphoepithelial carcinoma (one case) and malignant melanoma metastasis (one case previously reported as chronic granulomatous sialadenitis on FNAC). The atypical features of pleomorphic adenoma and its wide spectrum of cytomorphological patterns cause the most frequent diagnostic pitfalls on cytological interpretations. The clinician or the pathologist should not hesitate to repeat aspirations for sampling different parts of the lesion on suspicion of malignancy.

Conclusion

The most common parotid mass was pleomorphic adenoma, followed by Warthin's tumour, which relatively had higher prevalence in our country. The most common malignant parotid tumours were mucoepidermoid carcinoma and adenoid cystic carcinoma. Superficial parotidectomy was the leading surgery of choice and transient facial nerve palsy was the most prevalent complication of parotid surgery.

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