

Parotid gland tumors in Northern Greece: a 7-year retrospective study of 207 patients

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ABSTRACT:

Introduction: Parotid gland neoplasms represent a heterogenous group of tumors, either benign or malignant. The diagnosis and management of parotid gland tumors is complicated by their relative infrequency and their diverse biologic behavior.

Aim: The aim of this study is to investigate the epidemiological characteristics, the recurrence rates and the surgical approach employed for parotid gland tumors in Northern Greece.

Material and methods: This is a single-center retrospective study. All patients admitted to the ENT department of “G. Papanikolaou” General Hospital of Thessaloniki from January 2012 to June 2019 with the diagnosis of parotid gland tumor were included in the study. Patients with incomplete charts and patients that underwent revision surgeries were excluded. Chi-squared tests were used to assess the associations between variables.

Results: A total of 207 patients with a mean age of 54.97 (range 16–91) were included in the study. Benign neoplasms accounted for 87.9% of the cases. Warthin's tumor was the most common neoplasm encountered, with an incidence of 46.8%, followed by pleomorphic adenoma (31.9%). There was a higher incidence of parotid gland tumors in males and smokers ($P = 0.025$, $P = 0.001$ respectively). The majority of the patients were treated with an extracapsular resection (60.4%) or with a partial superficial parotidectomy (22.6%). In 12 cases (5.7%), there was a recurrence of the lesion. The most common complications encountered were facial nerve injury, Frey's syndrome and hematoma formation.

Conclusions: Parotid gland tumors are typically benign, non-aggressive tumors, more frequently seen in men than women. There is a positive association between smoking and parotid gland tumor development. Comprehensive information regarding recurrence and complication rates is presented.

KEYWORDS:

cancer, epidemiology, parotid gland, salivary gland, tumor

ABBREVIATIONS

CT – computed tomography

FNA – fine-needle aspiration

MRI – magnetic resonance tomography

SPSS – Statistical Program for Social Sciences

WHO – World Health Organization

INTRODUCTION

Salivary gland neoplasms comprise a diverse group of tumors. Most of these tumors are benign [1–4] and occur mainly in the parotid gland [5, 6]. Previous studies have demonstrated that salivary gland cancer is the sixth most common cancer in the head and neck area and accounts only for 0.3% of all malignancies in the general population [7].

The diagnosis of a parotid gland tumor is established based on the medical history of the patient, clinical findings, including the

presence of a mass in the area, pain or lymphadenopathy, imaging features and fine-needle aspiration (FNA) biopsy results. The choice of a surgical approach is based on the histopathological features and location of the tumor.

The most common techniques for the management of parotid gland tumors are total, partial superficial and superficial parotidectomy. For the past 25 years, extracapsular excision has gained ground, mainly in the treatment of small and benign tumors, as it is a minimally invasive approach with low complication rates [8].

The incidence and distribution of parotid gland tumors varies among different regions. However, there is only one study on their incidence in the Greek population [9] and it involves a specific area in Southern Greece.

This study aims to present the epidemiological characteristics of parotid gland tumors in Northern Greece, with respect to age, gender, laterality and tobacco use, operative technique employed, and recurrence and complication rates after treatment.

Tab. I. Comparison of the demographic characteristics.

	GROUP	EXTRACAPSULAR RESECTION	PARTIAL SUPERFICIAL PAROTIDECTOMY	SUPERFICIAL PAROTIDECTOMY	TOTAL PAROTIDECTOMY	TOTAL	P	
Gender	Male	73	30	15	9	127	0.0025	
	Female	52	16	6	6	80		
Age (y)		54,97 +/- 14,97						
Side	Right	101						
	Left	106						

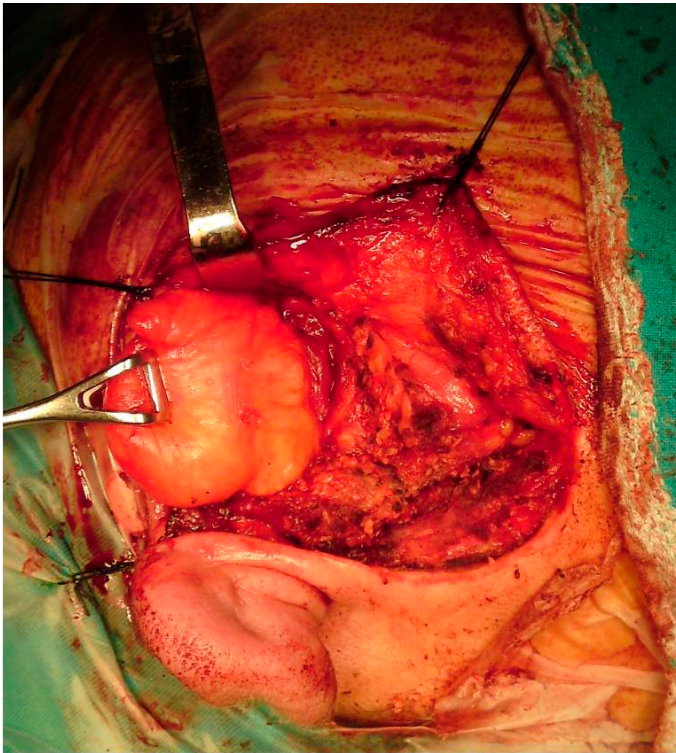


Fig. 1. Lipoma of the deep lobe of the parotid gland.

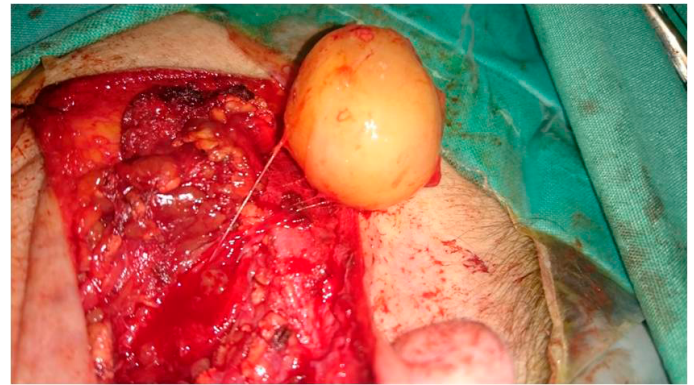


Fig. 2. Facial nerve neurinoma. Postoperative facial nerve paralysis was prevented.

MATERIALS AND METHODS

Data acquisition

All patients with the diagnosis of parotid gland tumor admitted to the ENT department of the "G. Papanikolaou" General Hospital from January 2012 to June 2019 were included in the study. Patients with incomplete charts, patients with a follow-up of less than a year, and patients that underwent revision surgeries were excluded. A data extraction form was developed for recording the following: demographic characteristics, including age, gender, side (left or right) and tobacco use, surgical procedure, histopathological results, tumor recurrence and complications.

The choice of surgical procedure – superficial/partial superficial/total parotidectomy or extracapsular resection – was determined according to the size, location and histopathological features of the tumor. All procedures were performed with facial nerve monitoring by a nerve stimulator.

Statistical analysis

The statistical analyses were conducted using the Statistical Program for Social Sciences (SPSS) 21.0 (IBM Corporation, Armonk, NY). Categorical variables were presented using frequencies and percentages and tested using Pearson's chi-squared test (with continuity correction) or Fisher's exact test, depending on the expected count (>5: Pearson, <5: Fisher) per cell. The significance of statistical differences was attributed to a P-value of < 0.05.

RESULTS

Overall, 207 patients were included in the study. The mean age of the patients was 54.97 years (range 16–91). Regarding the distribution by gender 61% (n = 127) and 39% (n = 80) of all the tumors occurred in males and females, respectively (P = 0.025). Among malignant tumors, 76% (n = 19) occurred in men and 24% (n = 16) in women. As far as laterality is concerned, left and right side were equally affected (49% [n = 106] and 51% [n = 101], respectively). The epidemiological characteristics of the patients are summarized in Tab. I.

Information on tobacco use revealed a statistically significant higher incidence of parotid gland tumor in smokers compared to non-smokers (P = 0.002). In particular, 57% of the patients with parotid gland tumors were smokers (n = 118) and 89% were non-smokers (n = 89). Our results showed a strong correlation between Warthin tumor occurrence and smoking. As many as 68% of the patients with Warthin tumor (n = 66) were smokers. Malignant tumors were also found to be related to smoking, as 68% of the patients (n = 17) were smokers.

Tab. II. Benign parotid tumors.

HISTOPATHOLOGY	TOTAL = 182	MALE = 108	FEMALE = 74
Warthin tumor	97	66	31
Pleomorphic adenoma	66	32	34
Cyst	4	2	2
Lymphoepithelial cyst	3	2	1
Lipoma	3	2	1
Oncocytoma	2	1	1
Branchial cleft cyst	2	2	0
Granulomatous hyperplasia	2	1	1
Facial nerve neurinoma	1	0	1
Toxoplasma lymphadenitis	1	0	1
Necrosis	1	0	1

Tab. III. Malignant parotid tumors.

HISTOPATHOLOGY	TOTAL = 25	MALE = 19	FEMALE = 6
Squamous cell carcinoma	6	4	2
Acinic cell carcinoma	3	2	1
Undifferentiated carcinoma	3	2	1
Mucoepidermoid carcinoma	4	4	0
Adenoid cystic carcinoma	2	2	0
Myoepithelial carcinoma	2	1	1
Lymphoma	4	4	0
Salivary duct carcinoma	1	0	1

All patients had a preoperative CT scan or Magnetic Resonance Imaging (MRI). MRI was preferred in large tumors with possible extension in the deep lobe, suspected cases of malignancy and of investigation of possible facial nerve infiltration.

The histological features of tumors are presented in Tab. II and Tab. III. Benign tumors (Fig. 1.) were more common and accounted for 89.7% of the cases (n = 182). In particular, Warthin tumor was the most common (46%, n = 97), followed by pleomorphic adenoma (31.9%, n = 66). Among the tumors listed as "others", there was one neurinoma of the facial nerve (Fig. 2.).

Preoperative FNA biopsy was performed in 45 of the patients. In 10 (22.22%) patients, although FNA cytology showed features characteristic of a benign tumor, histopathological intraoperative examination proved that the tumors were malignant. The overall diagnostic accuracy of the method was 77.78% for malignant tumors.

Most of the tumors were managed with an extracapsular resection (60.3%, n = 125), followed by a partial superficial parotidectomy (22.2%, n = 46), superficial parotidectomy (10.1%, n = 21) and total parotidectomy (7.2%, n = 15). Extracapsular resection of the tumor was performed in cases of benign, mobile and superficial neoplasms. A superficial parotidectomy (partial or not) was performed in larger tumors or when there was a high suspicion of malignancy. Finally, malignant tumors or tumor with a deeper location were treated with total parotidectomy.

Twelve patients (5.7%) had a recurrence of the lesion. The relapse of the lesion was diagnosed with MRI. Recurrence was noted mainly in malignant tumors (Fig. 3.), associated with a poor prognosis. Tumor recurrence involved 3 patients with undifferentiated carcinoma, 2 patients with adenoid cystic carcinoma, 2 patients with mucoepidermoid carcinoma, 1 patient with salivary duct carcinoma and 4 patients with pleomorphic adenoma. Regarding pleomorphic adenoma, relapse of the lesion was encountered after extracapsular excision in 3 patients and superficial parotidectomy in 1 patient. The mean time of recurrence after operative treatment was 9 months (range 2–12).

Complications were encountered in 33 patients (15.9%). The most common complication was facial nerve palsy (n = 23), followed by Frey syndrome (n = 5) and postoperative hematoma formation (n = 5). Facial nerve palsy was temporary in 21 of the cases (15 of them were treated with extracapsular resection, 6 with superficial parotidectomy) and 2 of them were permanent (both in malignant tumors). Frey syndrome was present in 1 case treated with extracapsular resection (large tumor) and in 4 cases with superficial parotidectomy. Hematoma formation was the case for 4 superficial parotidectomies and 1 extracapsular resection.

DISCUSSION

Previous studies have shown that men are more likely to develop parotid gland tumors than women. Consistently, in our study there



Fig. 3. Tumor malignant transformation.

was a higher incidence of parotid gland neoplasms in men [10]. Male predominance of Warthin tumor has also been demonstrated in previous studies [11]. On the other hand, pleomorphic adenomas occur more frequently in females [12]. Our results show that in the Northern Greek population, Warthin tumor affected more commonly males than females. However, pleomorphic adenomas seemed to have an equal gender distribution.

Tobacco use is associated with many types of cancer. Previous studies have positively associated Warthin tumor occurrence and smoking [12]. In the present study, tobacco use was positively correlated not only with Warthin tumor, but also with malignant tumors.

FNA biopsy under ultrasound guidance is a major non-surgical approach to assess parotid gland tumors. However, the diagnostic sensitivity of the method varies among the studies [13–14]. The results of our study showed a specificity of 77.78% which is lower than the one reported in the literature [13–14].

There are many surgical techniques for the management of parotid gland neoplasms. The choice of the surgical procedure depends on the location, size, and histological features of the tumor [15]. Thus, in small tumors of the superficial lobe, superficial or a partial superficial parotidectomy is usually performed. Small, mobile, superficial tumors are usually treated with extracapsular resection. On the other hand, for deep or malignant tumors,

total parotidectomy is more frequently performed. Regarding extracapsular resection, it should be noted that the technique requires extensive surgical experience. Inappropriate technique may lead to a higher risk of tumor recurrence and facial nerve injury [16]. A recent meta-analysis by Xie et al. [17] showed improved overall rates in transient and permanent facial nerve palsy and Frey syndrome for extracapsular resection compared to superficial parotidectomy.

Parotid gland tumors are characterized by diverse histological appearances. According to World Health Organization (WHO) classification of tumors [18], there are 24 distinct histological types of parotid gland carcinomas. Each histological type presents different biological behavior and metabolic rate [19]. In our sample of 25 malignant tumors, we found 8 different histological types (Tab. III.), which underlies the high histological heterogeneity of the parotid gland tumors. Their diagnosis and management is furtherly complicated by the malignant transformation of benign tumors in up to 25% of the cases [20–21].

Parotid gland tumors may recur as a single mass or as a cluster of more than one, separate tumors [20]. Many benign parotid gland tumors may recur, including pleomorphic adenoma, myoepithelioma, basal cell adenoma, oncocytoma, canalicular adenoma, cyst-adenoma, and ductal papilloma [21]. Recurrence is associated with several factors, including the sex and age of the patient and the location and biological behavior of the tumor. Surgical methods, such as extracapsular resection, may lead to inadequate tumor and recurrence. In our study, 4 patients diagnosed with pleomorphic adenoma had a recurrence of the lesion. Three of them had been treated with extracapsular resection and 1 with superficial parotidectomy. Nevertheless, conclusions regarding the more favorable technique in the treatment of pleomorphic adenomas cannot be drawn in our study due to the relatively small sample.

This is a retrospective study of 207 patients with parotid gland tumors in the Northern Greek population. The current study provides valuable information regarding the epidemiological characteristics, histological type, surgical method utilized and recurrence and complication rates of parotid gland tumors in this population. Additional, multi-center studies are necessary to delineate the parotid gland tumor features and guide the selection of an appropriate surgical method in each case.

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