

# Study of Preoperative Predictive Signs in Management of Facial Nerve in Parotid Tumors

Magdalena CHIRILA<sup>a</sup>; Mihaela MURESAN<sup>b</sup>; Sorana D. BOLBOACA<sup>c</sup>

<sup>a</sup>Department of ENT, Emergency County Hospital, Section of ENT, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania

<sup>b</sup>Department of Pathology, Emergency County Hospital, Cluj-Napoca, Romania

<sup>c</sup>Department of Medical Informatics and Biostatistic, "Iuliu Hatieganu" University of Medicine and Pharmacy Cluj-Napoca, Romania

## ABSTRACT

**Objectives:** To find preoperative predictive signs for better surgical planning of the facial nerve in parotid tumors.

**Methods:** Prospective study in patients with primary parotid malignancies. Patients with primary parotid malignant tumor were investigated for preoperative clinical signs in correlation with histological findings and surgical management of the facial nerve.

**Outcomes:** The study included 47 patients. Several clinical findings as facial pain, paresthesia, and rapid growth of tumor might suggest the risk of malignancy. Paresis/palsy of the facial nerve was correlates with direct neural involvement.

**Conclusion:** There are several predictive clinical signs that might suggest malignancy of a parotid tumor.

**Keywords:** pain, paresthesia, growth, palsy, facial, parotid malignancy

## INTRODUCTION

In light of the dramatic consequences of facial nerve resection in terms of function and quality of life, preoperative knowledge of facial nerve involvement can help for better planning including microsurgical team and patient preparation (1). Moreover, early detection of malignancy allows improving surgical planning and information given to patients. Histological pre-diagnosis

can then be obtained by cytological analysis of fine needle aspiration (FNAC) (2) and frozen sections during the parotidectomies (3). Preoperative facial nerve palsy is a definite indication for its involvement by the tumor, but when the facial nerve function is intact there are no accurate preoperative known criteria for prediction of its involvement (1).

In this prospective study the authors aimed to find preoperative predictive factors for better surgical planning of the facial nerve in cor-

*Address for correspondence:*

Magdalena Chirila, Department of ENT, "Iuliu Hatieganu" University of Medicine and Pharmacy, 8 Victor Babes Street, Cluj-Napoca, Romania.

E-mail: chirila\_magda@yahoo.com.

Article received on the 28<sup>th</sup> of July 2013. Article accepted on the 4<sup>th</sup> of March 2014.

relation with FNAC and/or frozen sections, and finally, with definitive histopathological exam.

□

### MATERIAL AND METHODS

The institutional review board of "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania, approved the present study. The study was conducted between January 2007 and January 2012 at the Department of ENT of the Emergency County Hospital, Cluj-Napoca, Romania. The surgeon performed superficial or total parotidectomies with or without facial nerve sacrifice by following the same protocol. A senior pathologist from the Department of Pathology from the Emergency County Hospital, Cluj-Napoca, Romania, performed the histologic examination.

The patients involved in the study first signed an informed consent for participation. The patients were included in the study by observing the following inclusion criteria: (1) primary parotid tumor and (2) primary surgical resection.

However, we excluded patients with any prior parotid surgery or non-primary parotid tumor, prior radiotherapy/chemotherapy, patients who had synchronous or metachronous head or neck malignancies, and patients who were subject to follow-ups for less than four years from the present study. The patients who refused surgery were not included in the study.

The following data were observed during the study: patient age and gender, facial pain at presentation (daily intake of pain medication);

paresthesia; rapid growth of tumor (double size of the tumor in the last month); paresis or facial nerve palsy; fine needle aspiration cytology (FNAC) preoperatively; frozen section; type of surgical procedure; findings of facial nerve involvement at surgery; histological findings; lymph node involvement; postoperative radiation therapy; postoperative facial palsy; and recurrence of tumor. During this period, FNAC and frozen sections were performed by the same pathologist well trained to these techniques. FNAC was performed in patients who have given their consent for this labor, some of them refusing FNAC for various reasons: they were frightened, lived far from the hospital, didn't understand its goal, and refused to know the diagnosis before the operation. To all patients included in the study were performed frozen sections. After comparison of the FNAC and frozen sections findings with the final histological results, we evaluated both the precision of the tumor histological diagnosis and the capacity to detect malignancy related to symptoms and clinical signs.

All parotidectomies were performed by the head and neck surgeon and the facial nerve was identified by standard landmarks (tragal pointer, posterior belly of the digastric muscle and the tympanomastoid suture line), without facial nerve monitoring. The facial nerve trunk or branches that were encased within the tumor were included in the resection. For facial reanimation a cable graft was harvested from the sural nerves, and microscopic epineural repair was done with 9.0 nylon sutures (Figure 1).

The statistical analysis was performed using Statistica 8.0 software (StatSoft, Inc., Tulsa, OK 74104) with a significant level less than 0.05. Pearson Chi-square test was used to compare variables between groups, and odds ratio, risk ratio, Fisher exact test, and Mann-Whitney U tests were used for continuous variables. □

### OUTCOMES

Forty-seven patients were included in the study, all of them signing an informed consent for participation. The study included nineteen women with a mean age 54.68 years (95% CI: 49.50-59.87) and twenty eight men with a mean age of 59.36 years (95% CI: 55.60-63.12), with no difference between the age of appearance of parotid gland pathology (T-tests,  $p=0.127703$ ).

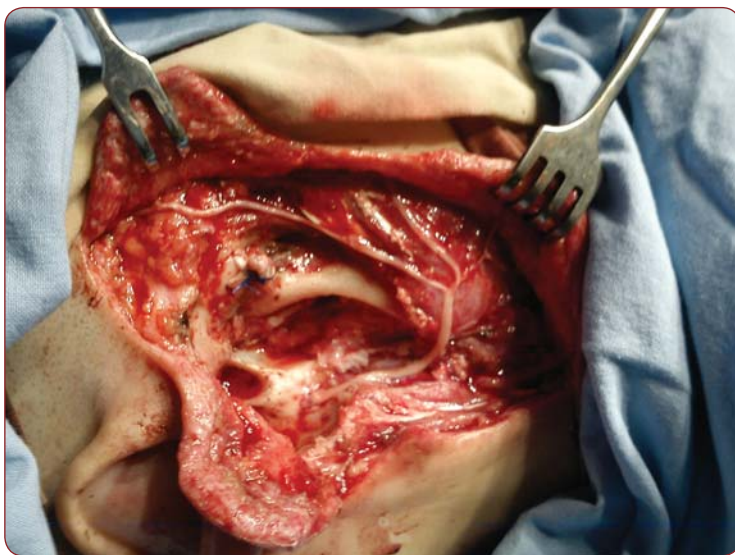


FIGURE 1. Shows the facial rehabilitation with sural cable graft.

In Table 1 we can see the parotid gland pathology included in this study, after final histological data. FNAC was performed at twenty three patients; in nineteen cases we had true positive results in comparison with final histological diagnosis. The frozen sections offered about 100% of true positive results compared with final histology, with high statistical significance (Pearson Chi-Square test: kappa = 0.913, p<0.0001).

Twenty patients (42.6%) underwent superficial parotidectomy with facial nerve dissection, all for benign lesions, while twenty seven (57.4%) underwent total parotidectomy, in seven cases with facial nerve sacrifice and facial reanimation. Fifteen patients experienced post-operative nerve dysfunction (paresis or paralysis). In fourteen cases were performed selective neck dissections (29.8%), and eleven patients underwent comprehensive neck dissections (23.4%) respective twenty two patients had no neck dissection (46.8%); the decision to perform neck dissection was taken depending on the outcome of the frozen sections (selective or comprehensive neck dissection for medium or high grade of malignancy). All patients with total parotidectomy and neck dissection performed postoperative radiotherapy in agreement with the decision of the head and neck oncology multidisciplinary committee.

The average age of those patients with benign pathology was statistically significant lower than the average age of the patients with low grade malignant disease (T-tests: p = 0.023581). Instead, the average age of patients with benign pathology does not differ significantly from the average age of persons with high grade malignant disease (T-tests: p = 0.729205). The average age of those with low grade malignant disease is significantly higher compared with the average age of patients with high grade malignancy (T-tests: p = 0.007568).

In this study we followed a series of clinical symptoms and signs listed in Table 2, in order to study their predictive value for malignancy. Because not for all patients included in the study was performed FNAC, clinical correlation with symptoms and signs were made with the frozen sections.

Regarding the predictive value of sacrificing the facial nerve in relation to appearance of recurrence, statistical tests showed no statistically significant difference in recurrence rate in patients with or without facial nerve sacrifice (OR

= 4.000; RR = 1.7500; Fisher exact test: p = 0.1392).

There was no statistically significant difference between the 4 years survival of the patients with or without facial nerve sacrifice (Mann-Whitney U test: p = 0.219) or between the 4 years survival of the patients with or without macroscopically invasion of the facial nerve (Mann-Whitney U test: p = 0.325). □

**DISCUSSION**

The malignant lesions of the parotid gland are histologically and biologically variable, mucoepidermoid, adenoid cystic, and acinic cell carcinomas are the most prevalent (1). The gold standard treatment for the parotid gland tumor has been the parotidectomy, traditionally radical but more conservative since there is the recent advances in understanding of tumor biology and the benefits of radiotherapy (1, 4, 5). Today there is an agreement of the most head and neck surgeons that the facial nerve can be spared providing the nerve is not in-

Type	Frequency	%
Pleomorphic adenoma	11	23.4
Whartin tumor	5	10.6
Oncocytoma	2	4.3
Inverted ductal papilloma	2	4.3
Mucoepidermoid carcinoma	6	12.8
Acinic cell carcinoma	4	8.5
Adenoid cystic carcinoma	2	4.3
Polymorphic adenocarcinoma	2	4.3
Squamous cell carcinoma ex-pleomorphic adenoma	8	17.0
Salivary duct carcinoma	1	2.1
Papillary cystadenocarcinoma	3	6.4
Sialadenosis	1	2.1
Total=	47	100.0

TABLE 1. Histological types of parotid tumor.

	present	absent	present (%) vs absent (%) (p value)
Facial pain	3	44	0.00 vs 0.14 (0.1735)
Paresthesia	14	33	0.62 vs 0.64 (0.9152)
Rapid growth of the tumor (double size in the last month)	16	31	0.38 vs 0.71 (0.0973)
Paresis/palsy of the facial nerve	4	43	0.08 vs 0.21 (0.3502)

TABLE 2. Clinical symptoms and signs.

	Odds Ratio (OR)	Risk Ratio (RR)	Fisher exact test (p value)
Facial pain	0.9740	0.4502	0.4988
Paresthesia	1.8750	1.3500	0.5000
Rapid growth	1.5556	1.3333	0.56643
Facial paresis/palsy	9.3333	2.0417	0.01836

TABLE 3. Predictive value of clinical symptoms and signs.

volved; the nerve should be sacrificed if the tumor is adherent to or surrounds the nerve (1).

In the present study, all patients with malignant tumor at the frozen sections underwent total parotidectomy, seven of them with facial nerve sacrifice. The facial nerve sacrificing decision was taken considering the following reasons: adenoid cystic carcinoma (2 cases) recognized for perineural extension, 3 cases of high-grade mucoepidermoid carcinoma and 2 cases of squamous cell carcinoma ex-pleomorphic adenoma, in all those 5 cases the nerve being embedded in the tumor without any possibility of dissection.

In 2010, Preis and colab. (2) did not find any difference in age, gender, pain at presentation and presence of positive lymph nodes between patients with or without facial nerve involvement, studying a lot of 267 parotidectomies with predominance of acinic cell, ex-pleomorphic, and salivary duct carcinomas. They concluded that early prediction of a high risk of facial nerve involvement by malignant parotid tumors is important for treatment planning and patient counseling. Only facial palsy at presentation is the only predictor of invasion of the facial nerve by tumor cells.

There are a number of studies in English literature that identified some factors with predictive value for facial nerve management: advanced age, deep lobe involvement, large size of the tumor, a low response to preoperative electroneuronography, a high negative predictive value for cross-sectional imaging with computed tomography and magnetic resonance imaging (6-11). Most studies in recent years focused on the predictive value of FNAC and frozen sections in surgical management of the facial nerve, considering that only preoperative predictive clinical signs at presentation is facial paralysis (3,12-15).

Our study was focused on the primary parotid malignancies, because for non-primary parotid malignancies the clinical presentation, surgical management and outcomes are differ-

ent, with better prognosis of facial nerve function (16). In addition, we focused our study on the clinical symptoms and signs at presentation, which can guide diagnosis and therapy planning in front of a parotid gland mass. The invasion of the deep parotid lobe or tumors which extend into the parapharyngeal space, recurrent tumors, skin involvement or extension into the bone, locally extensive lesions, and the presence of the pathologic neck nodes are gross clinical or imagistic signs associated with malignancy. The sacrifice of the facial nerve erodes the quality of life, so preoperative patient counseling and rehabilitation of facial nerve become mandatory for head and neck surgeons.

The results of our study show that high-grade parotid malignancies occur at a mean age of 54.28 years, older age being the attribute of the benign or low-grade malignancies. The facial pain and paresthesia, rapid growth of tumor, and facial paresis/palsy are clinical symptoms and signs that have not a high frequency but may suggest malignancy, especially paresis or paralysis of the facial nerve which means direct neural involvement. Also, our study confirms that the facial nerve sacrifice doesn't bring benefits in the survival of the parotid tumors' patients. □

## CONCLUSIONS

Middle-age, facial pain and paresthesia, and rapid growth of the parotid tumor might suggest the malignancy with consequences in patient's counseling and facial nerve surgical management.

The paresis or paralysis of the facial nerve at presentation means direct neural involvement.

The sacrificing of the facial nerve doesn't improve local control and survival of patients with parotid malignancies.

*Conflict of interests: none declared.*

*Financial support: none declared.*

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