

ORIGINAL ARTICLE

Completion surgery after extracapsular dissection of low-grade parotid gland malignant tumors

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Abstract

Background: The aim of the study was to compare the oncological and functional outcome between extracapsular dissection and completion surgery on the one hand and sole extracapsular dissection on the other hand in small low-grade malignant parotid tumors.

Methods: The records of all patients treated for T1-T2 low-grade malignant tumors of the parotid gland primarily by means of extracapsular dissection between 2006 and 2015 were studied retrospectively.

Results: Forty patients with T1-T2 low-grade parotid malignancies were detected. Our study showed outstanding oncological outcomes in both patient groups, the facial nerve function being significantly better after sole extracapsular dissection in the direct postoperative phase, with no differences between the groups in the long term.

Conclusions: Our study showed very encouraging preliminary results following primary extracapsular dissection as the sole surgical therapy for carefully selected low-stage, low-grade, inferiorly located lesions in patients with high compliance.

KEYWORDS

extracapsular dissection, facial nerve, low-grade, malignant tumor, parotid gland

1 | INTRODUCTION

The treatment of primary malignant tumors of the parotid gland remains challenging, but also controversial, because of their extremely low incidence (1-3 cases/100 000 annually), the 20 different histologic types (World Health Organization [WHO] classification 2017¹), and their accordingly varied metastatic behavior.² Especially the management of the regional intraparotideal and cervical lymphatic network in cases of low-grade less aggressive malignancies with cN0 neck status still remains a matter of debate.³⁻⁷

The absence of a suspicion of malignancy preoperatively in combination with some favorable tumor characteristics (unilocularity, superficial location, inferior pole, good tumor mobility after raising the skin, subcutaneous tissue, and

superficial musculoaponeurotic system (SMAS) flap) allows more conservative surgery with less perioperative morbidity. According to our experience, malignant tumors of the parotid gland only rarely raise a suspicion of malignancy at the time of presentation. Especially small (T1-T2) low-grade malignancies present as nonsuspicious lesions in the vast majority of cases. Interestingly, assuming a “false” working hypothesis and performing less invasive surgery because malignancy is not expected appear to account for about 3%-5% of cases and is thus not particularly rare.²⁻⁴

The main question of our study was to investigate the need for completion surgery (in terms of completion parotidectomy and selective neck dissection) after primary R0 extracapsular dissection of carefully selected small (T1-T2) cN0 low-grade malignant tumors of the parotid

gland. For this purpose, patients who received primary extracapsular dissection with R0 tumor resection and completion surgery as a secondary procedure were compared with the cases who received only R0 extracapsular dissection without any revision surgery or adjuvant form of treatment in terms of the oncological outcome as well as functional results (post-therapeutic facial nerve function).

2 | PATIENTS AND METHODS

This study was conducted at an academic tertiary referral center specializing in salivary gland diseases (Department of Otorhinolaryngology, Head and Neck Surgery, University of Erlangen-Nuremberg, Erlangen, Germany). The records of all patients treated for T1-T2 low-grade primary malignant tumors of the parotid gland primarily by means of extracapsular dissection and an R0 status following definitive histology of the extracapsular specimen between 2006 and 2015 were studied retrospectively. Extracapsular dissection was defined as the removal of a tumor with a cuff of parotid tissue without intending to expose the main trunk of the facial nerve.^{8,9} Preoperatively, all patients were evaluated by means of a clinical examination and ultrasonography of the head and neck, with particular attention being paid to the parotid region, and in some selected cases by computed tomography or magnetic resonance imaging. Preoperatively, the function of the facial nerve was assessed clinically using the House-Brackmann grading system¹⁰ and by electromyography of the facial nerve. Follow-up was performed by means of clinical examination, ultrasound, or MRI at regular time intervals (6 weeks after surgery, every 3 months thereafter for the first 2 years, every 6 months for the next 3 years, and once a year 5 years after surgery).

The aim of our study was to investigate the need for completion surgery (completion parotidectomy with selective neck dissection) after primary R0 extracapsular dissection of pT1-T2 cN0 low-grade malignant tumors of the parotid gland. For this purpose, the group of patients who received primary R0 extracapsular dissection and completion surgery as a secondary procedure were compared with the cases who received only R0 extracapsular dissection without any revision surgery or adjuvant form of treatment in terms of the oncological outcome (5-year disease-specific survival, local disease control) and functional result (facial nerve function at the end of therapy). The 5-year disease-specific survival rate was defined as the percentage of patients who did not die of the respective tumor within 5 years divided by the total number of patients. Local disease control was reflected by tumor recurrence at the primary site and was calculated from the date of surgery to the date when local recurrence was diagnosed or to the date of the last follow-up. Local recurrence was defined as malignancy that developed at the

anatomic site of the primary tumor after completion of initial treatment. Approval was obtained from the institutional review board of our hospital.

3 | RESULTS

A total of 40 cases formed our study sample (22 men and 18 women). Their mean age was 52.3 years (14-87 years). Mean follow-up was 4.5 years (2.1-8 years). The first 26 cases subsequently underwent completion parotidectomy and ipsilateral neck dissection as a secondary procedure. The last 14 cases were treated solely by means of extracapsular dissection after thorough counseling of the patient. In 21 cases, the tumor was an acinic cell carcinoma, in 16 cases a mucoepidermoid carcinoma, in 2 cases a noninvasive carcinoma ex pleomorphic adenoma, and in one case a basal cell adenocarcinoma (Table 1). In the group with sole extracapsular dissection, 5-year disease-specific survival was 100% and local disease control was 100% (mean follow-up was 3.1 years); in the group of patients with completion surgery, 5-year disease-specific survival was 100% and local disease control was 94.7% (mean follow-up was 5.3 years). Figure 1 shows the Kaplan-Meier analysis of the locoregional control according to surgical strategy. The extremely low number of local recurrences as well as the absence of disease-related deaths did not allow a statistical analysis of the oncological outcome between the groups. Information on the functional outcome (facial nerve function) in the direct postoperative phase after completion of surgical therapy is shown in Table 1. Statistical analysis of our data detected a significantly worse temporary functional outcome in the cases with completion surgery ($P = .006$). Information on the facial nerve function in the long term (at least 6 months after completion of surgical therapy) is shown in Table 1. Statistical analysis of our data could not detect any significant differences in the functional outcome between the two groups of patients in the long term ($P = .65$).

4 | DISCUSSION

Primary cancer of the parotid gland presents an inhomogeneous group of 20 different entities with significant variation in cytopathologic morphology and biological behavior.¹ The group is large enough to contain less aggressive lesions, such as the “low-grade” (but still by no means innocent²) acinic cell carcinoma with a 20-year disease-specific survival of 93.5% at stage I on the one hand^{2,3} and highly aggressive histologic subtypes, such as the salivary duct carcinoma (“the big villain”), with a 5-year overall survival of 43% and most of the patients dying within 3 years from the time of diagnosis on the other hand.^{4,5} Retrospective studies on salivary gland malignancies are being further confused

TABLE 1 Epidemiological and histologic characteristics as well as functional results of the patients of the study group. ACC, acinic cell carcinoma; CEPA, carcinoma ex pleomorphic adenoma; BCC, basal cell adenocarcinoma; ED, extracapsular dissection; ED + REV, extracapsular dissection and completion parotidectomy with selective neck dissection; MEPCA, mucoepidermoid carcinoma

	Sex	Age	Histologic type	Pathologic TNM stage	Surgical therapy	Direct postop. facial nerve function	Long-term facial nerve function
1.	Female	51	CEPA	T1N0M0G1R0	ED	I	I
2.	Male	47	MEPCA	T1N0M0G1R0	ED	I	I
3.	Male	41	MEPCA	T1N0M0G1R0	ED	I	I
4.	Female	68	MEPCA	T1N0M0G1R0	ED	I	I
5.	Female	65	MEPCA	T1N0M0G1R0	ED	I	I
6.	Male	58	ACC	T1N0M0G1R0	ED	I	I
7.	Female	22	ACC	T1N0M0G1R0	ED	I	I
8.	Female	27	ACC	T2N0M0G1R0	ED	II	II
9.	Male	87	ACC	T1N0M0G1R0	ED	I	I
10.	Male	68	BCC	T1N0M0G1R0	ED	I	I
11.	Male	56	CEPA	T1N0M0G1R0	ED	I	I
12.	Female	56	MEPCA	T1N0M0G1R0	ED	I	I
13.	Female	46	MEPCA	T1N0M0G1R0	ED	I	I
14.	Male	40	MEPCA	T1N0M0G1R0	ED	I	I
15.	Female	78	ACC	T2N0M0G1R0	ED + Rev	II	I
16.	Female	50	ACC	T1N0M0G1R0	ED + Rev	II	I
17.	Female	77	ACC	T1N0M0G1R0	ED + Rev	I	I
18.	Female	30	ACC	T1N0M0G1R0	ED + Rev	II	I
19.	Female	73	ACC	T1N0M0G1R0	ED + Rev	II	I
20.	Female	45	ACC	T1N0M0G1R0	ED + Rev	I	I
21.	Female	61	ACC	T1N0M0G1R0	ED + Rev	II	I
22.	Female	67	ACC	T1N0M0G1R0	ED + Rev	I	I
23.	Male	35	ACC	T1N0M0G1R0	ED + Rev	III	I
24.	Male	75	ACC	T1N0M0G1R0	ED + Rev	I	I
25.	Male	19	ACC	T2N0M0G1R0	ED + Rev	I	I
26.	Male	30	ACC	T1N0M0G1R0	ED + Rev	I	I
27.	Male	31	ACC	T1N0M0G1R0	ED + Rev	III	I
28.	Male	73	ACC	T1N0M0G1R0	ED + Rev	III	I
29.	Male	68	ACC	T1N0M0G1R0	ED + Rev	I	I
30.	Male	59	ACC	T1N0M0G1R0	ED + Rev	I	I
31.	Male	62	ACC	T1N0M0G1R0	ED + Rev	II	I
32.	Female	33	MEPCA	T1N0M0G1R0	ED + Rev	II	I
33.	Female	39	MEPCA	T1N0M0G1R0	ED + Rev	II	I
34.	Female	66	MEPCA	T1N0M0G1R0	ED + Rev	II	I
35.	Male	66	MEPCA	T1N0M0G1R0	ED + Rev	II	I
36.	Male	75	MEPCA	T1N0M0G1R0	ED + Rev	V	II
37.	Male	21	MEPCA	T1N0M0G1R0	ED + Rev	II	I
38.	Male	67	MEPCA	T1N0M0G1R0	ED + Rev	III	I
39.	Male	46	MEPCA	T1N0M0G1R0	ED + Rev	III	I
40.	Male	14	MEPCA	T1N0M0G1R0	ED + Rev	I	I

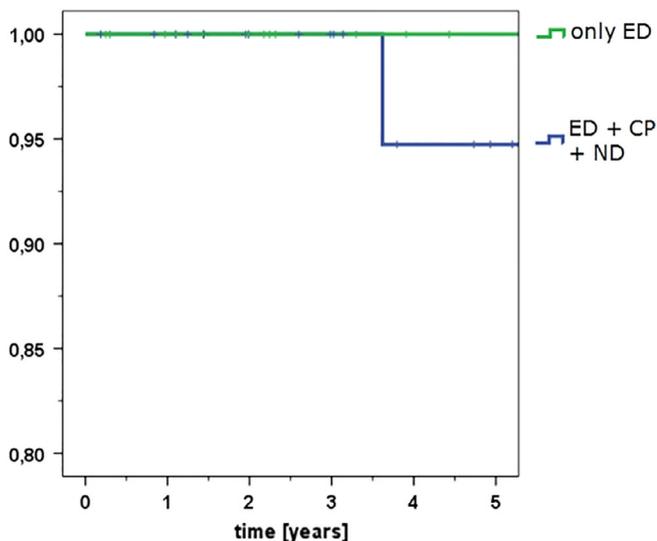


FIGURE 1 Kaplan-Meier analysis of the oncological outcome (locoregional control) according to surgical strategy. CP, completion parotidectomy; ED, extracapsular dissection; ND, neck dissection [Color figure can be viewed at wileyonlinelibrary.com]

by the significant changes from one WHO classification to another (“an evolving art”⁶), with the number of subtypes having been notably reduced in 2017 for the first time since 1972 (in comparison to the last classification system of 2005).^{1,7} The possibility of retrospectively changing the diagnosis by using molecular genetic methods (eg, fluorescence in situ hybridization) should not be overlooked: the retrospective change in diagnosis, after molecular identification of the ETV6-NTRK-3, from an acinic cell carcinoma to a mammary analogue secretory carcinoma with a less favorable prognosis is one prominent example.^{11,12} These issues point to the fact that an experienced head and neck pathologist, who is well informed about the continuously updated and reappraised knowledge on salivary gland malignancies, should be regarded as one of the most important members of the surgical team dealing with these demanding entities.

In our department and in accordance with current practice,^{8,13} surgical treatment of a preoperatively known primary parotid gland malignancy with a cN0 neck status generally consists of a complete parotidectomy with elective ipsilateral neck dissection. This surgical concept allows complete removal of the primary lesion and all possible locoregional metastatic foci to intraparotid and cervical lymph nodes.¹⁴ The same treatment modality is chosen in cases in which primary parotid gland malignancy is detected solely on frozen sections. In cases with preoperatively unknown malignancy and primary partial R0 parotidectomy, completion parotidectomy with an ipsilateral elective neck dissection is generally recommended at a second stage. Interestingly, in a department with a total of 270 parotidectomies and more than 220 partial parotidectomies (including

180 extracapsular dissections) per year, almost four to five surgical procedures are performed annually on the basis of a false working hypothesis, with a malignant tumor being unexpectedly detected following definitive histology.⁸

This scenario of a false working hypothesis does not appear to be particularly rare.^{8,15} To be specific, it is well known that suspicious clinical symptoms (facial pain, facial nerve palsy, skin infiltration, and enlarged cervical lymph nodes) or imaging signs (blurred margins and diffuse perfusion) tend to appear overwhelmingly rarely and only in locally advanced stages in patients with parotid gland malignancies.^{16,17} The accuracy of preoperative cytological diagnostics seems to be limited by a moderate sensitivity, particularly because of the significant cytological overlapping between low-grade lesions and benign tumors.^{18,19} Frozen section offers acceptable accuracy (mean sensitivity by 90%, means specificity almost 99%) with quite reliable true positive results for malignancy,^{18,19} but has not gained a stable position in parotid oncology, mainly because of the need for a highly experienced pathologist with specialization in salivary gland malignancies and the increased additional costs. In the present study, frozen section was not performed because of the false working hypothesis and the lack of preoperative (good mobile lesion on palpation, intact facial nerve function, and well-margined lesion on imaging) as well as intraoperative suspicion of malignancy (good dissection circumstances, lack of aggressive tumor behavior, and lack of infiltration of the facial nerve). On the other hand, many aspects, such as the technical feasibility of resection of a small, low-grade, nonaggressive, nonfixated malignant lesion by means of less invasive surgery (eg, extracapsular dissection), the rarity of regional (intraparotid or cervical) metastases at the time of diagnosis,^{20,21} the principally favorable prognosis in these tumors,^{2,3} as well as the significant emotional, psychosocial, and often financial distress to patients with a non-negligible risk of iatrogenic facial palsy on revision surgery,⁸ lead to the idea that completion surgery might perhaps ultimately be tantamount to overtreatment, potentially without any direct oncological benefit in these cases.

For this reason, we started to perform sole extracapsular dissection (removal of the lesion with a cuff of healthy tissue around it²²) in small (T1-T2) low-grade primary malignancies of the parotid gland in our department. The question that arises is whether avoidance of completion surgery has a negative impact on the oncological outcome in these cases. Investigating the benefit of a reduction in surgical invasiveness concerning the functional outcome (in terms of functional integrity of the facial nerve) is a second issue. As we examined only small low-grade cases, our analysis showed that facial nerve function was significantly better after sole extracapsular dissection in the direct postoperative phase. However, no differences could be detected between the two patient groups in the long term. From an oncological point of view, avoidance of revision surgery (completion parotidectomy and elective neck dissection)

did not seem to have an adverse impact on the oncological outcome of the disease.

Reasonably, reducing surgical invasiveness was considered only in specific, nonaggressive (“low-grade”), carefully selected cases. However, several limitations have to be considered in the interpretation of our results. The low incidence of primary parotid cancer, the increase in preoperative and intraoperative indication for complete parotidectomy because of aroused suspicion as a result of our increasing expertise and experience (leading to an increased performance of frozen section), as well as the relatively new (and challenging) concept of minimal invasive surgery in malignant tumors were responsible for the limited size of our study sample ($n = 40$). The concept of sole extracapsular dissection in selected cases, which we adopted later, led to a non-negligible difference in the follow-up time between our study groups. Furthermore, one should keep in mind that the majority of low-grade cases suffered from an acinic cell carcinoma. Evidence suggests a generally favorable prognosis, albeit with a protracted clinical course and recurrences occurring even decades after initial diagnosis.^{2,23} For this reason, our preliminary results should be considered with caution and verified, in the future, by studies with a significantly longer follow-up.

Proper selection of the cases presupposes accurate preoperative imaging, a thorough inspection of the surgical site, exact examination of the tumor specimen by a pathologist experienced in recognizing possible adverse histologic features, and consideration of patient-related factors. First of all, intraoperative inspection of the surrounding parenchyma of a tumor allows detecting suspicious lymph nodes which have to be resected with the extracapsular specimen. Detection of an intraparotid metastasis (pN+), either by means of a frozen section or following definitive histology, points to the need for a more aggressive surgical approach. Histopathologic examination of the specimen allows the detection of features of prognostic significance (positive resection margins, extracapsular extension, vascular/perineural invasion, necrosis, nuclear pleomorphism, high mitotic rate, and atypical mitoses).²⁴ The exact examination of the extracapsular dissection specimen seems to allow a reliable prognosis of the tumor's biological behavior (by identifying potential dedifferentiated forms) and thus a potential individualization and optimization of the therapeutic strategy. Taking the aforementioned limitations into consideration, our preliminary results encouragingly show that extracapsular dissection *might* ultimately be sufficient from an oncological point of view for carefully selected low-grade carcinomas in patients with high compliance and assured follow-up.

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