Oral Oncology 94 (2019) 111–114

Contents lists available at ScienceDirect

Oral Oncology

journal homepage: www.elsevier.com/locate/oraloncology

Does increasing the incidence of extracapsular dissection for benign tumors of the parotid correlate with an increased need for revision surgery?

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ARTICLE INFO

Keywords:
Extracapsular dissection
Partial parotidectomy
Superficial parotidectomy
Complete parotidectomy
Revision surgery
Recurrence
Facial nerve
Pleomorphic adenoma
Cystadenolymphoma

ABSTRACT

Objectives: The aim of this study was to investigate the hypothesis of whether extracapsular dissection (ED) of the parotid gland increases the need for revision surgery for benign tumours in comparison to traditional surgical modalities. A further aim of this study was to evaluate and compare the functional outcome of revision procedures after primary ED with other modalities involving the parotid gland in our department.
Materials and methods: All patients who underwent revision parotid surgery after a primary surgical procedure at a tertiary care hospital (University of Erlangen-Nürnberg) between 2000 and 2016 were included in our study. Data concerning the indication for revision surgery as well as the functional postsurgical outcome were obtained.
Results: 2465 cases formed our study sample. In total, revision surgery was necessary in 30/2465 cases (1.2%). 1532 patients underwent primary ED, with 17 cases requiring revision (1.1%), whereas 933 cases were managed by means of other facial nerve dissecting surgical modalities, with the indication for revision surgery in 13 cases (1.4%). Our analysis did not reveal a statistically significantly higher need for revision surgery or a higher rate of facial nerve palsies after revision surgery in the group of patients after primary ED.
Conclusion: The argument in favour of a greater need for revision surgery after primary parenchyma-sparing modalities was not sustained from our data. Due to the low revision rate and the acceptable functional results after revision surgery, we believe that extracapsular dissection is justified in cases where a benign lesion is suspected preoperatively.

Introduction

The majority of tumours of the parotid is located in the superficial part of the gland [1], with the majority (75–80%) being benign. Traditionally, these tumours have been treated by resection of the superficial portion of the parotid, with obligatory dissection of the facial nerve [2]. For malignant lesions, complete parotidectomy, with or without elective ipsilateral neck dissection [3,4], has long been considered the gold standard.

Since the early 1990s, extracapsular dissection (ED) has been performed as an alternative way of treating parotid tumours. ED is defined as the gradual dissection of the tumour, leaving a sheath of healthy tissue around the capsule and using facial nerve monitoring [1]. As a minimal invasive technique with a reduced rate of perioperative morbidity and facial nerve injury [5], ED may be indicated in cases with a single and mobile lesion [1,2] or multiple lesions [3] with preoperative clinical and imaging signs of a benign tumour, located within the lateral lobe of the parotid gland. Additionally, ED can be performed via an extended submandibular incision in rare cases of tumours arising from the pharyngeal extension of the parotid gland and located in the deep parapharyngeal space, after sectioning of the posterior belly of the digastric muscle in most cases [4].

The main point of criticism against ED lies in the claim that the less invasive surgery there is, the more recurrences of benign tumours are to be expected [5]. The primary aim of this study was to undertake a comparison between ED and other facial-nerve dissecting modalities in terms of need for revision surgery. Furthermore, we aimed at investigating facial nerve function after revision surgery, taking the statement of the working group around McGurk into consideration that primary extracapsular dissection offers better conditions for the facial nerve in revision cases, because the nerve is not exposed during the primary operation and thus not bound up in scar tissue [6].

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https://doi.org/10.1016/j.oraloncology.2019.05.022
Received 12 April 2019; Received in revised form 22 May 2019; Accepted 25 May 2019
Available online 29 May 2019
1368-8375/

Materials and methods

This study was conducted at an academic tertiary referral centre 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 benign parotid tumours between 2000 and 2016 were studied retrospectively. The indication for revision surgery was given in cases with suspected recurrence of pleomorphic adenoma as well as in cases with suspected ipsilateral metachronous occurrence of cystadenolymphomas. Patients with primary parotid surgery in their history in another department were excluded from our study sample. In order to assess the rate of revision exclusively due to benign tumour recurrence, all cases with revision surgery in the form of completion parotidectomy and neck dissection after unexpected detection of malignancy were excluded from our study cohort. Equally, cases with revision surgery due to a complication in the direct postoperative phase (e.g. surgical exploration and haemostasis due to bleeding, completion parotidectomy as ultima ratio for persistent salivary fistula) were also excluded from our study sample.

ED was defined as removal of a tumour with a cuff of parotid tissue, without intending to expose the main trunk or the branches of the facial nerve [8]. If the main trunk was deliberately exposed before tumour dissection and only parts of the superficial lobe were removed, the procedure was designated partial superficial parotidectomy. Removal of the entire superficial lobe was defined as superficial (or lateral) parotidectomy, whereas extirpation of the whole glandular parenchyma was referred to as complete parotidectomy [1,7]. In the revision setting (see below), "node picking" was defined as the marginal excision of the suspicious lesion. For study reasons, the patients were divided in two groups: The first group contained patients who received primary ED, whereas the second group consisted of the remaining patients receiving facial nerve-defined, traditional surgical modalities (partial superficial parotidectomy, superficial parotidectomy, complete parotidectomy).

All patients were evaluated preoperatively by means of a clinical examination and ultrasonography of the head and neck region and, in some carefully selected cases, by magnetic resonance imaging. The aim of our study was to investigate and compare the need for revision surgery between both study groups, as well as the post-revision functional outcome (in terms of facial nerve function) in the revision cases of both groups of our study sample. The function of the facial nerve was assessed clinically using the House-Brackmann grading system at the patient́s last follow-up visit [9]. Reporting of facial nerve function was performed at least 12 months after salvage surgery. The study was performed in accordance with the Declaration of Helsinki.

Results

2507 cases were primarily evaluated. In 42 cases, the indication for revision surgery was set after unexpected histologic verification of a malignant lesion in a less invasive procedure (ED, partial superficial parotidectomy or superficial parotidectomy) and was performed as completion parotidectomy with elective neck dissection. For the purposes of our analysis and in order to secure comparability of our groups, these cases were excluded from our analysis. Consequently, 2465 cases formed our study sample (1280 men, 1185 women; male-female ratio: 1.08:1). Their mean age was 56 years (range, 1–91 years). Mean follow-up time was 84 months (range: 12–190 months). Analysis and comparison of the epidemiologic data between the two groups is shown in Table 1. In total, revision surgery for suspected recurrence of a benign tumour was necessary in 30/2465 cases (1.2%). 1532 patients underwent primary ED, with 17 cases having to be revised (1.1%): In 13 cases, the need for revision surgery (completion parotidectomy) was suspected ipsilateral metachronous cystadenolymphoma, in 3 cases suspected recurrence of a pleomorphic adenoma (2 cases with completion parotidectomy, one case with "node picking") and basal cell adenoma in one case (revision "node picking"). 933 cases were managed by means of the other surgical modalities (partial superficial parotidectomy, superficial parotidectomy, complete parotidectomy) and the indication for revision surgery for suspected recurrence of a benign tumour was given in 13 cases (1.4%) in this group of patients: in 4 cases, the reason for revision was suspected metachronous cystadenolymphoma (completion parotidectomy), in 6 cases it was recurrence of a pleomorphic adenoma ("node picking"), and basal cell adenoma, lymphangioma and neurofibroma in one case each ("node picking"). Our analysis did not reveal a statistically significantly greater need for revision surgery in the group of patients after primary ED ($x^2 = 0.388$, $p = 0.533$, odds ratio: 1.259, 95%CI: 0.609–2.605). Particularly for pleomorphic adenomas, ED did not seem to correlate with a higher recurrence rate (3/698 after ED, 6/504 after facial nerve dissection surgery, $p = 0.131$). When examining cystadenolymphomas, a slightly (but not significantly) lower occurrence of metachronous tumours in favour of more radical surgery was shown (13/595 after ED, 4/401 after facial nerve dissection surgery, $p = 0.156$). The incidence of permanent facial palsy was 17.6% (3/17, all House-Brackmann II) in the revision cases after primary ED and 3/13 (23.1%, two cases with House-Brackmann II, one case with House-Brackmann IV) in the second patient group, without significant differences between the two groups ($x^2 = 0.136$, $p = 0.713$, odds ratio: 1.4, 95%CI: 0.233–8.421). The increased performance of ED did not seem to increase the need for recurrence-related revision surgery over the years in our department (Fig. 1).

Table 1
Analysis and comparison of the epidemiologic data between the two groups of our study.

	Extracapsular dissection	Dissection of the facial nerve	P value
Mean age in y (range)	54 (1–91)	57 (7–88)	0.801
Gender (♂/♀)	795/737	485/448	0.967
Mean Follow-up (months)	51	111	0.081

Discussion

The main points of criticism against ED of the parotid gland could be summarized in the statement that its increased performance is expected to lead to a higher rate of tumour recurrence and thus a higher need for revision surgery in the future [5]. With regard to pleomorphic adenomas, numerous reports describe the possibility of a focal absence of a well-defined capsule [8] as well as the presence of pseudopodia, satellite tumours, and tumour herniation through infiltration of an incomplete capsule [9,10]. For these reasons, obligatory dissection of the facial nerve with broad-margined resection of these tumours in all cases has long been propagated as the "gold standard" solution [11]. Concerning ED, several working groups have expressed a strong criticism against this technique: Piekarski et al. detected a high rate of capsular exposure (13.3%), often rupture of the capsule (7.1%) and an unacceptably high rate of recurrences (8.2%) in their series of 98 patients [12]. In their multicentre retrospective study with 281 patients, Zheng et al. detected a slightly, but not significantly higher rate of capsular rupture in the group of ED [13]. On the other hand, several authors have detected capsular exposure in 47–60% of their cases, irrespective of the surgical modality used [14–16]. Witt et al. found focal capsular exposure in 60% of the cases managed by partial superficial parotidectomy and 70% of pleomorphic adenomas treated by means of complete parotidectomy [14]. These data should not surprise the reader, as, in the areas with contact to the facial nerve, all available surgical modalities would lead to a marginal excision with focal capsule exposure of a pleomorphic adenoma. These observations, as well as our results, sustain the conclusion that properly indicated and orderly

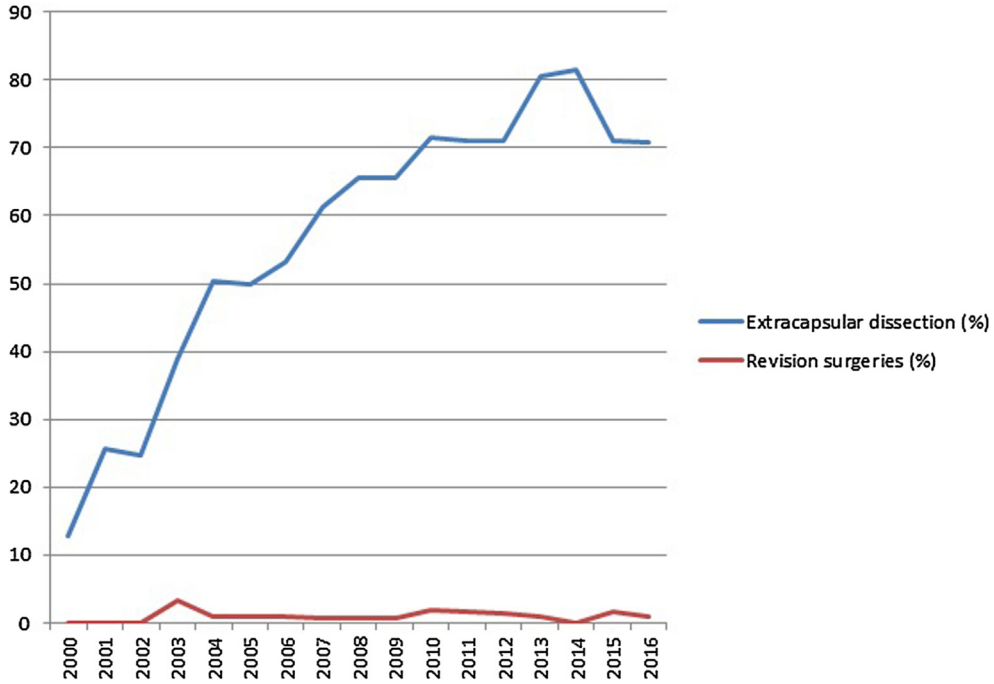

Fig. 1. Progression of extracapsular dissections and revision surgeries over the years.

performed ED by experienced surgeons, based upon the presence of certain tumour characteristics (superficial localisation, good palpability, absence of fixation to the surrounding tissues), is not related with a higher need for revision in comparison with conventional surgical modalities. In the end, it seems that certain histologic characteristics (fragile myxoid subtype with often thinner capsule, numerous satellite nodules) as well as surgeon-related factors (positive resection margins and inadvertent tumour spillage), rather than the surgical modality itself, decide which pleomorphic adenoma will recur.

As regards cystadenolymphomas, several literature reports indicate that the majority of these lesions are located in the caudal parotid pole, as the majority of intraparotideal lymph nodes which give rise to these tumours are found in this anatomic region [6]. The need for elimination of potential microscopic synchronous lesions and the reduction of the risk of metachronous tumours has led many authors to propose resection of the entire outer lobe (superficial parotidectomy) [17], or at least the caudal pole of the parotid gland ("laterocaudal parotidectomy") [18], as the surgically acceptable minimum for these lesions. However, the results of our analysis and several literature reports point to the fact that extracapsular, or even capsular, dissection of all macroscopic lesions seems to provide sufficient safety from potential metachronous tumors [2,3,19]. Even in the unfavourable scenario of metachronous lesions, an increasing number of literature reports points to the reliability of a "wait-and-see" approach with quite acceptable results [20–22]. It seems that only an impressively small number of multilocular microscopic cystadenolymphomas present in more than half of cases [23] manage to develop into macroscopic lesions needing treatment.

Analysis of our data showed an increase in the rate of ED from 12.8% in 2000 to a stable over 70% after 2010 (Fig. 1). This almost sixfold rise is indicative of the impressive change in the philosophy concerning the therapeutic approach to benign parotid tumours in our department. Comparison of the need for revision surgery failed to show a difference reaching statistical significance between the two patient groups. Considering the fact that pleomorphic adenomas recur a long time (at least 2–15 years) after primary surgery [24,25], we noted that the need for revision surgery in the period e.g. after 2010 remained unaffected by the rapid increase of EDs from one quarter (2001) to more than one half of cases (2004) in the early years of our observation. Because of the extremely small number of events (recurrences of pleomorphic adenomas or metachronous tumours after resection of cystadenolymphomas), no analysis for the detection of potential risk factors for revision surgery could be performed.

According to McGurk and Combes, avoidance of dissection of the nerve (during primary ED) secures ideal circumstances for it in the revision setting, as this critical structure is not bound up in scar tissue [1,6]. Interestingly, no significant differences in post-revision facial nerve function between the two groups were reported. In an attempt to explain this finding, we discovered that in a total of 17 revision cases after primary ED, 15 were complete parotidectomies (88.2%), whereas in the second group only 4 complete parotidectomies out of 13 cases were performed (30.8%, Fig. 2). It seems that primary ED perhaps gave rise to more enthusiasm and allowed more surgical invasiveness on revision, and the functional result was much more determined by the extent of revision surgery than the initial tissue situation in the vicinity of the facial nerve. This conclusion points to the fact that an acceptable functional result in a case of recurrence presupposes less dissection around the nerve, both at primary surgery as well as in the revision setting.

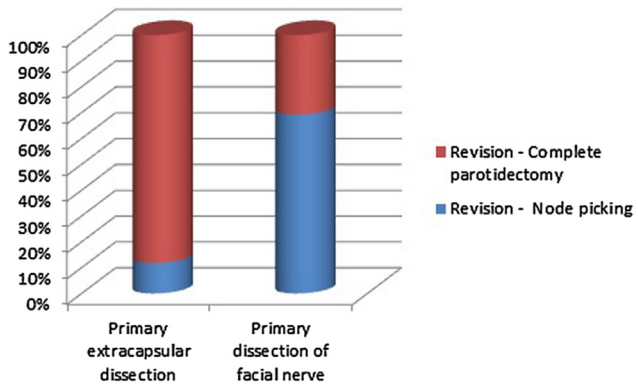

Fig. 2. Type of revision surgery after primary extracapsular dissection and other facial nerve-dissecting surgical modalities.

In our department, the type of revision treatment is determined by tumour-related (histologic benign or malignant nature of the recurrent tumour, extent of facial nerve dissection on primary surgery) and patient-related factors (age, comorbidities, and patient's wishes). For recurrent pleomorphic adenomas after primary ED, completion parotidectomy with elimination of all macroscopic foci is attempted in the revision setting after thorough patient counselling about the generally low possibility of definitive cure. Recurrence of this tumour after extended dissection of the facial nerve during the primary procedure encourages thinking towards more conservative forms of revision surgery (e.g. "node picking" for exclusion of a carcinoma ex pleomorphic adenoma), because of the significantly higher risk of injury to the facial nerve. As regards metachronous cystadenolymphomas, other factors should be also considered: the not rare significant comorbidities as well as advanced age in this patient group could justify primarily a "watchful-waiting" approach. Otherwise (e.g. cosmetically unfavourable lesion and patient's wish), every surgical effort should be made to secure the best possible postoperative facial nerve function, considering the outstandingly benign behaviour of a "tumour-like" lesion, not even qualified to be designated a tumour. Again, the extent of facial nerve dissection during primary surgery determines the possibility for increased invasiveness (if required) in the revision setting.

The benign nature of more than 80% of all parotid lesions seems to justify every thought in the direction of less invasive surgery. However, several limitations have to be considered in the interpretation of the results of this retrospective study: First of all, the personal factor (different surgeons with varying experience, expertise and preferences as well as different patients' wishes) should not be underestimated as a source of selection bias. Secondly, the limited follow-up of the cases in the last years of our analysis (with more than 70% of all parotid surgery procedures performed extracapsularly) should also be considered as a potential drawback of this study. It seems that a study with a longer follow-up of the cases managed by means of less invasive surgery (e.g. ED) could shed more light on the main question of this project.

In any case, it seems that primary less invasive surgery, whenever it is possible, is not associated with a higher need for revision surgery. In such a scenario, individualization of treatment under consideration of several parameters, such as the mostly unavoidable, multilocular re-recurrence of a pleomorphic adenoma as well as the possibility of active surveillance of metachronous cystadenolymphomas, seems to represent a reasonable approach. The surgeon should keep in mind that a proper indication is paramount for minimal invasive surgery, not forgetting that safe dissection of the facial nerve is possible only once and taking care to secure ideal surgical circumstances in its vicinity in the worst case of recurrence.

Declaration of Competing Interest

None declared.

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