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Long-Term Oncologic and Functional Outcome in Pleomorphic Adenomas of the Submandibular Gland

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Objectives: The aim of the study was to evaluate the oncologic and functional long-term outcome after surgical therapy of pleomorphic adenomas of the submandibular gland.

Methods: The medical charts of all patients treated for pleomorphic adenomas of the submandibular gland by means of submandibulectomy between 2000 and 2016 were studied retrospectively. Patients who had had revision after external primary surgery, as well as patients with insufficient data were excluded from our study sample.

Results: A total of 75 patients formed our study sample (28 men, 47 women, male:female ratio 0.59:1). Their mean age was 48 years (14–78 years). Mean follow-up was 82 months (12–170 months). No recurrences of a pleomorphic adenoma could be detected in our study cases. Normal facial nerve function (House-Brackmann grade I) in the direct postoperative phase was shown in 54/75 cases (72%). In the remaining 21/75 cases (28%), mild paresis of the marginal mandibular branch of the facial nerve (House-Brackmann II) could be detected in the direct postoperative phase. All cases with facial palsy had recovered with normal facial nerve function (House-Brackmann I) in 3–6 months.

Conclusion: Our study was able to show oncologic and consistently acceptable oncologic and functional outcomes after submandibulectomy for pleomorphic adenomas of the submandibular gland.

Key Words: Pleomorphic adenoma, submandibular gland, submandibulectomy, facial nerve, recurrence.

Level of Evidence: 4.

INTRODUCTION

According to the relevant literature, the submandibular gland is involved in up to 10% of cases of salivary gland tumors and the most common disease form affecting this gland is the pleomorphic adenoma.[1,2] En bloc resection of the tumor with the involved submandibular gland (submandibulectomy) in the same specimen is still considered to be the treatment of choice for this kind of tumor.[2,3] Interestingly, several reports on the potential benefit of partial sialoadenectomy have been published in the last 9 years, giving rise to discussion as to the possibility of minimizing the extent of surgery on the submandibular gland.[4–6]

A thorough review of the relevant literature reveals that numerous studies have been dedicated to pleomorphic adenomas of the parotid gland, but only a few have concerned the same lesions localized in the second most common site, namely the submandibular gland.[7] In our opinion, it would be interesting to assess the clinical outcome after surgical management of this undoubtedly demanding lesion from a histopathological point of view (incomplete capsule with tumor herniation, pseudopodia, and satellite nodules in up to 20–30% of the parotid cases[8]). The aim of our study was to evaluate the oncologic efficacy (in terms of tumor recurrences and postoperative complications) as well as to assess the functional outcome (in terms of postoperative facial nerve function) in a long-term setting after surgical management of pleomorphic adenomas of the submandibular gland by means of submandibulectomy. To our knowledge, this is the largest case series of pleomorphic adenomas involving the submandibular gland in the relevant literature.

MATERIALS AND METHODS

This study was performed 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 medical charts of all patients who underwent primary submandibulectomy for pleomorphic adenomas of the submandibular gland between 2000 and 2016 were studied retrospectively. Patients who had had revision surgery in our department after external primary surgery, as well as patients with insufficient data or cases lost to follow-up were excluded from our study sample.

Preoperatively, all patients were evaluated by means of clinical examination and ultrasonography of the head and neck, with particular attention being paid to the submandibular region, and in some carefully selected cases by means of

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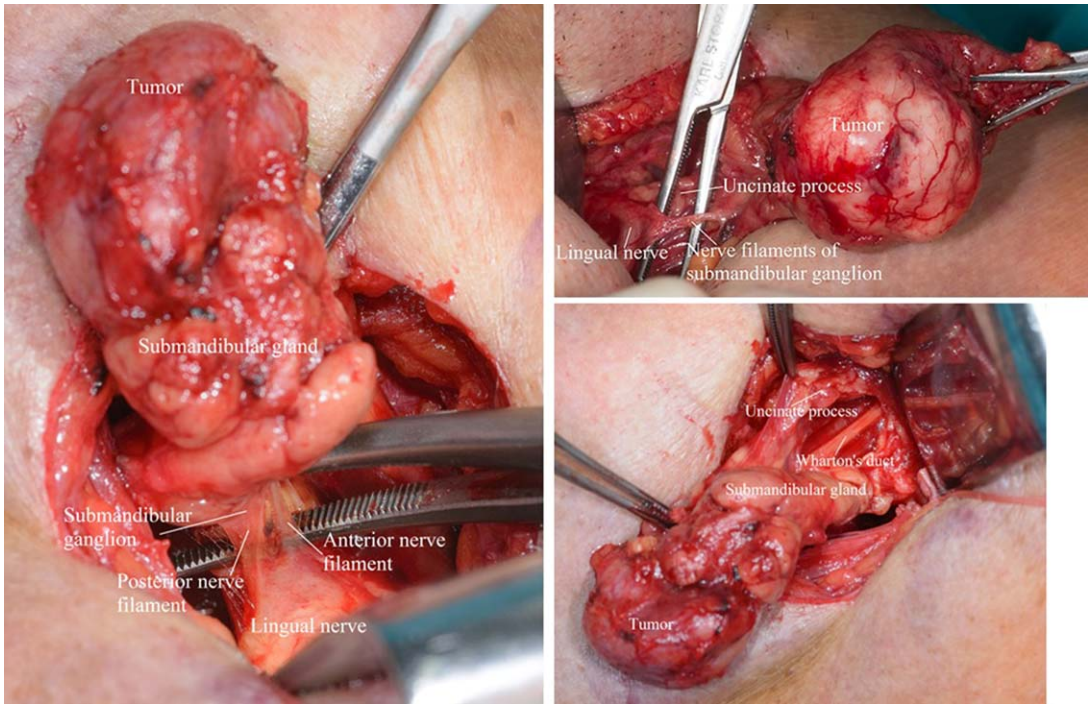

Fig. 1. Surgical anatomy and landmarks by resection of a tumor of the submandibular gland.

computed tomography or magnetic resonance imaging. After surgical therapy carried out by submandibulectomy (Fig. 1) with intraoperative monitoring of the marginal mandibular branch of the facial nerve, follow-up was performed by means of clinical examination and ultrasound at certain time intervals (3 weeks after surgery, every 6 months for the first year and once a year 2 years after surgery).

The oncologic results were measured in terms of local disease control. Local disease control was calculated from the date of surgery to the date when recurrence at the primary tumor site was diagnosed or to the date of the last follow-up. Additional data were obtained concerning postoperative adverse effects (postoperative hemorrhage, hematoma, seroma, wound infection, salivary fistula, Frey syndrome, and excessive scar formation). The functional outcome referred to the postoperative function of the facial nerve and was assessed clinically using the House-Brackmann grading system.[9]

RESULTS

A total of 75 patients formed our study sample (28 men, 47 women, male:female ratio 0.59:1). Their mean age was 48 years (14–78 years). Mean follow-up was 82 months (12–170 months). No tumor recurrences could be detected (local control 100%). No cases of a carcinoma ex pleomorphic adenoma could be found in our study sample. Normal facial nerve function (House-Brackmann grade I) in the direct postoperative phase was shown in 54/75 cases (72%). In the remaining 21/75 cases (28%), mild paresis of the marginal mandibular branch of the facial nerve (House-Brackmann II) could be detected in the direct postoperative phase. All these cases with facial palsy recovered with normal facial nerve function (House-Brackmann I) in 3–6 months. Information on postoperative complications is shown in Table I.

DISCUSSION

A significant number of literature reports referring to pleomorphic adenomas of the parotid gland indicate that these adenomas are characterized, in many cases, by a focal absence of their capsule.[8,10–12] Incompleteness of this natural tumor border allows herniation of tumor cells, pseudopodia, as well as satellite nodules to occur,[8] sustaining one of the most probable hypotheses for the mechanism of recurrence of a pleomorphic adenoma.[11,13] For this reason, several working groups point to the fact

TABLE I.
Information on Postoperative Complications After Submandibulectomy for Pleomorphic Adenoma of the Submandibular Gland.

Complication	Incidence (%)
Temporary palsy of the marginal mandibular branch of the facial nerve	21 (28%)
Permanent palsy of the marginal mandibular branch of the facial nerve	0 (0)
Postoperative hemorrhage	1 (1.3)
Hematoma	6 (8)
Seroma	2 (2.7)
Wound infection	0 (0)
Salivary fistula	0 (0)
Frey syndrome	0 (0)
Excessive scar formation (hypertrophic scar, keloids)	3 (4)

that the acceptable surgical minimum for management of this tumor consists of extracapsular dissection, ie, dissection beyond the capsule of the adenoma with a cuff of macroscopically healthy tissue around the lesion and using facial nerve monitoring.[14,15]

It is reasonable to consider that the aforementioned strategy of trying to leave a cuff of macroscopically healthy glandular tissue around the capsule of the adenoma should also be applied in pleomorphic adenomas found in other localizations, eg, in the submandibular gland. However, common surgical experience and a thorough review of our own surgical specimens show that a significant number of tumors of the submandibular gland invade the glandular parenchyma to a major extent and, in this way, macroscopically reach the margins of the submandibulectomy specimens. Submandibulectomy, consisting of the subcapsular preparation of the gland outside its bed and of the surrounding connective tissue, in many cases leaves (if any) only a sparse margin of macroscopically healthy glandular parenchyma around the tumor and could potentially lead to an extensive exposure of the capsule of a pleomorphic adenoma. If one were to consider applying the principle of extracapsular dissection in these risky "bare areas" with focal exposure of the capsule in order to achieve a broader resection margin around an adenoma, one should resect some fatty tissue of the submandibular region. This surgical procedure would reasonably bear a significant risk for the important surrounding structures (eg, marginal mandibular branch of the facial nerve), especially if we consider that most pleomorphic adenomas are localized in the cranial part of the submandibular gland in the vicinity of or even in contact with the horizontal ramus of the mandible and the caudal branches of the facial nerve.

These observations and thoughts gave rise to the idea of assessing the long-term outcome of a surgical modality that does not guarantee a broad margin around a pleomorphic adenoma and, in any case, consists of less than the currently acceptable minimum of surgery for these lesions. Interestingly, our analysis showed an excellent oncologic outcome, with no recurrences detected in our study sample. This result corresponds to the recurrence rates of 0–1.7% after submandibulectomy for submandibular pleomorphic adenomas[2,4,16] as well as after less invasive surgical procedures for pleomorphic adenomas (extracapsular dissection) of the parotid gland.[12,17–19] It seems that the macroscopic focal exposure of the capsule of the pleomorphic adenoma in the course of submandibulectomy, which in many cases is unavoidable, does not have a negative impact on the oncologic outcome of this surgical procedure.

Concerning the postoperative adverse effects, our data showed a markedly low complication rate, with transient mild facial palsy (House-Brackmann II), corresponding to relevant reports,[20] being the most common complication in our study cohort (21/75, 28%). Remarkably, all 21 cases with facial palsy recovered within 6 months of surgery. This information points to the fact that transient dysfunction of this marginal mandibular branch of the facial nerve in the direct postoperative period should by no means be attributed to its transection, but rather to excessive tension from the surgical hooks, to counter pressure on the marginal mandibular branch against the horizontal branch of the mandible as well as to the surgical manipulations carried out in order to gain sufficient access to a tumor frequently localized in the cranial part of the submandibular gland. Interestingly, several literature reports point to the fact that the marginal mandibular nerve can lie as deep as 2 cm below the lower margin of the horizontal branch of the mandible, thus being at significant risk during surgery of the submandibular triangle.[21,22] Furthermore, other reports indicate the potential existence of several branches of two or more branches with varying courses arising from the marginal mandibular branch of the facial nerve.[23,24] In our opinion, the risk of nerve injury can be minimized using the traditional principle of making the skin incision about 3 cm (2–3 horizontal fingers) below the mandible,[22] the subcapsular dissection of the submandibular gland, minimal hook tension cranially and the intraoperative use of facial nerve monitoring. Surgery for pleomorphic adenomas of the submandibular gland was otherwise characterized by an extremely low rate of postoperative complications and a favorable cosmetic result in the vast majority of cases.

In total, our analysis could detect an excellent long-term oncologic and a thoroughly acceptable long-term functional outcome after submandibulectomy for pleomorphic adenomas. Taking into consideration that every fourth patient in our study group experienced transient palsy of the marginal mandibular nerve and after 17 years of experience with less invasive surgical modalities (extracapsular dissection) in the parotid gland, a question has progressively emerged in our department: Can we lower postoperative morbidity in the case of a benign lesion by minimizing the extent of surgery on the submandibular gland?

A review of the relevant literature revealed several reports on the potential benefit of a partial sialoadenectomy for carefully selected submandibular tumors[4–6]: Ge et al. describe an extracapsular dissection of the tumor in the submandibular gland with a safe tumor-free margin of surrounding parenchyma of more than 5 mm and suggest using this modality in primary benign tumors located in the lateral part of the submandibular gland and distant from Wharton's duct and the lingual nerve.[4] Interestingly, this working group found no significant differences in the recurrence rate or postoperative facial nerve function between complete and partial excision of the gland, but was able to detect an increased residual salivary flow on the affected side as well as a better cosmetic result (symmetrical facial contours without a submandibular defect) in the cases where gland-preserving modalities were used. Our major concern with this kind of limited surgery lies in the significant possibility of misdiagnosis following preoperative imaging, fine needle aspiration or core needle biopsy. A false working hypothesis is particularly relevant in the submandibular gland, where about 50% of the tumors are found to be malignant and comparatively more aggressive on definitive histology.[1,25] Another concern would lie in the theoretically

higher risk of salivary fistulas and in the fact that the functional benefit of this modality compared to total gland excision has not yet been proven by statistical analysis in larger relevant studies. Moreover, extracapsular dissection in the submandibular gland would lead to a more extensive exposure of the potentially incomplete adenoma capsule. In consistency with our concerns, Laskawi et al. propagate for these reasons that a primary operation should extirpate the entire submandibular gland in order to minimize the risk of recurrence.[2]

CONCLUSION

In our view, submandibulectomy still remains the golden mean between achieving an acceptable long-term oncologic outcome in terms of a low recurrence rate in pleomorphic adenomas of the submandibular gland and reducing the risk of permanent palsy of the marginal mandibular branch of the facial nerve. Future comparison studies will have to be performed to prove a functional benefit of partial submandibular excisions without compromising the oncologic outcome.

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