Parotidectomy in the Treatment of Aggressive Cutaneous Malignancies

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Background: Aggressive nonmelanoma skin cancer (ANMSC) of the head and neck may require parotidectomy because of neurotropic spread, direct invasion of the parotid gland, or parotid metastasis.

Objective: To review our experience with parotidectomy in the treatment of these tumors to examine the indications for this procedure and to analyze treatment outcomes. We emphasize the importance of early identification of an ANMSC and a systematic approach to treatment.

Design: Review of 23 patients with an ANMSC who required parotidectomy with or without facial (VII) nerve sacrifice between January 5, 1996, and December 27, 1999. Median follow-up for all patients was 24 months.

Setting: Academic tertiary care referral center.

Patients: This study focused on 23 (median age, 71 years) of 54 patients treated for an ANMSC. Most tumors were in the periauricular (n=9) and the frontozygomatic (n=6) areas. Seven patients presented with facial weakness or paralysis. Three patients had clinically evident parotid metastasis, while 14 patients had tumors directly invading the parotid gland. Eighteen patients had recurrent disease that had been treated previously with Mohs micrographic surgery.

Interventions: Following wide local excision of the ANMSC, 12 patients had resection of the lateral parotid lobe with preservation of the nerve, while 11 required radical parotidectomy with sacrifice of 1 or more branches. Nineteen patients received cervical lymphadenectomy. Postoperative radiotherapy was administered in 19 patients.

Main Outcome Measures: Tumor pathologic findings (specifically, perineural invasion of the facial nerve), locoregional control or recurrence, disease-free survival, disease-specific survival, and overall survival.

Results: Neurotropic spread to the facial nerve was present in 6 patients and was more likely to occur in younger patients (51 vs 75 years, \( P = .006 \)). Locoregional failures occurred in 9 patients following treatment. Patients who required parotidectomy in their surgical treatment for an ANMSC were more likely to have recurrent disease (\( P = .0002 \)). Disease-specific and overall survival was 79% and 69%, respectively, at 42 months.

Conclusions: Patients with ANMSC may require parotidectomy in the context of neurotropic spread, regional metastasis, or direct invasion into the parotid gland. Surgery combined with postoperative radiotherapy is necessary in most patients because of adverse clinical and pathologic findings. A systematic approach to the management of the parotid and facial nerve in the presence of these aggressive tumors is required. Despite comprehensive treatment, local recurrence of ANMSC and mortality remain high.


Nonmelanoma skin cancer (NMSC) is the most common neoplasm affecting humans. The 2 principal histologic types of NMSC are squamous cell carcinoma (SCC) and basal cell carcinoma (BCC), with BCC affecting more patients than SCC by a ratio of nearly 4:1. Approximately 800,000 to 1 million new cases are diagnosed annually, and the incidence is increasing by 4% to 8% per year.1,2 Men are affected by these lesions twice as often as women. Although the head and neck comprises only 9% of total body surface area, increased actinic exposure to this region relative to other body surfaces likely accounts for 80% of skin cancers occurring in this region.3 Despite increasing incidence of NMSC, the prognosis for patients is typically excellent. Cure rates are 96% to 99%, with mortality often due to metastatic disease in about 1% of cases.

Although the overall statistics are encouraging, a significant number of patients present with advanced disease.
Features of this aggressive subset of NMSC include recurrent disease, regional metastasis, large lesions (≥2 cm), rapid growth, and involvement of significant cosmetic and functional regions of the face (Table 1). The aggressive nature of these lesions increases the risk for metastasis to regional lymphatics and deep invasion into the parotid gland. Tumors in the periauricular region may directly invade the facial nerve (Figure 1). In addition, lesions with neurotropic capability are likely to spread along the trigeminal and facial nerves. Because the parotid serves as a watershed for lymphatics of the scalp and periauricular regions, the facial nerve may be invaded by metastatic disease to the parotid gland. These aggressive characteristics result in a poorer prognosis for patients with advanced lesions. Invasion of the parotid by metastasis or direct invasion is associated with increased recurrence and mortality. In cases of aggressive NMSC (ANMSC) with perineural invasion, the likelihood of recurrence, local metastasis, and mortality is significantly increased. Furthermore, facial nerve invasion by an ANMSC can lead to devastating physical deformity and dysfunction. The catastrophic potential of ANMSC demands critical attention to the early identification of these lesions and to the comprehensive management of the parotid and facial nerve in the locoregional control of this disease. We reviewed our experience with parotidectomy in the treatment of ANMSC to examine the indications to perform this procedure and to evaluate treatment outcomes.

### Results

**Clinical Presentation**

The median age of the patients was 71 years, and 21 of the 23 patients were men (Table 2). Most patients presented with primary lesions in the periauricular (n=9).
and the frontozygomatic (n=6) areas. Two patients presented with nasal lesions, and 4 patients presented with primary disease of the neck skin. In addition, 1 patient had a lip lesion, and 1 patient presented with posterior scalp disease. Seven patients presented with facial weakness or paralysis, and 10 of the patients had clinical evidence of metastasis to the parotid gland or the neck. Eighteen of the 23 patients presented with recurrent disease, and all of these patients had Mohs micrographic surgery as part of their prior treatment.

**TREATMENT**

In addition to wide local excision of the primary lesion, surgical treatment of an ANMSC included parotidectomy with facial nerve dissection, cervical lymphadenectomy, or facial nerve resection. Twelve patients required superficial parotidectomy, while 11 required radical parotidectomy with sacrifice of 1 or more facial nerve branches. The facial nerve was completely resected in 8 patients and partially resected in 4 others. Nineteen patients received cervical lymphadenectomy. In addition, 2 of 23 patients had bony invasion, requiring lateral temporal bone resection in 1 patient and segmental mandibulectomy in the other. Reconstruction of the facial defect required primary closure in 8 patients, split-thickness skin grafts in 5, locoregional flaps in 9, and free tissue transfer in 4. Facial nerve reconstruction was achieved with a cable graft in 8 patients. In 4 patients who presented with facial weakness or paralysis, no attempt was made to reconstruct the facial nerve. Following surgical treatment, 18 patients received radiotherapy, and 1 patient received combination radiotherapy and chemotherapy (mean dosage, 62.1 Gy; range, 51.0-74.0 Gy).

**TUMOR PATHOLOGIC FINDINGS**

Pathologic findings are listed in **Table 3**. The primary lesion was SCC in 18 patients and BCC in only 5. Twelve of the 18 squamous cell lesions were poorly differentiated. Seventeen of the 23 lesions were 2 cm or larger in diameter, with a mean area of 18.8 cm² (range, 1.0-89.6 cm²). Mean tumor depth was 1.5 cm (range, 0.3-4.0 cm). Margins were negative in 17 of the 23 patients, close in 4, microscopically positive in 1, and grossly positive in 1 patient. In the treatment of regional metastasis by parotidectomy and cervical lymphadenectomy (mean number of nodes removed, 23; range, 1-60), 10 patients had regional metastasis, with positive neck nodes in 6 patients and positive parotid nodes in 9 patients (mean number of positive nodes, 4.8; range, 1-22). Extracapsular spread was present in 6 patients.

In 12 patients, the facial nerve was partially or totally resected because of gross tumor involvement or preoperative facial paralysis. Perineural invasion was histologically identified in 6 cases. In addition, 2 patients had perineural invasion of the ophthalmic division of the trigeminal nerve (V1). Interestingly, younger patients with an ANMSC were more likely to have perineural invasion of the facial nerve (51 vs 75 years, P=.006).

**RECURRENCE AND OUTCOME**

Following our treatment, 12 patients had recurrent disease. In 9 patients, locoregional failures occurred. One patient had local recurrence and distant metastases, while 2 patients with auricular primary lesions had distant metastases alone. The 23 patients who received parotidectomy for locoregional control were a subset of the entire population of 54 patients treated for ANMSC by our department. Despite the inclusion of parotidectomy in their surgical treatment, these patients were more likely to have disease recurrence (P=.0002) than those patients whose disease treatment did not require parotidectomy. Except for cases of facial nerve involvement by an ANMSC that required nerve resection, management of the facial nerve did not result in facial weakness or paralysis in any patients with normal preoperative nerve function. Median follow-up was 24 months (range, 5-43 months). Disease-specific and overall survival was 79% and 69%, respectively, at 42 months (**Figure 2**).
Cosmetic and functional sequelae following surgical resection complicate the management of these patients. Although the first priority of the surgeon should be disease eradication, Wentzell and Robinson \(^a\) have suggested that surgeons frequently underestimate the depth of invasion of an ANMSC and that the potential cosmetic and functional results of surgical resection may lead to less aggressive excision of these tumors. Our experience with ANMSC involved many patients who presented with recurrent disease that had been previously treated with Mohs micrographic surgery. Although Mohs micrographic surgery has proven effective in the control of NMSC, particularly aggressive forms of skin cancer may demand a more radical resection, complex reconstruction, and radiotherapy. Physicians need to remain cognizant of the features of ANMSC during the initial evaluation of an NMSC. When an aggressive lesion is suspected, comprehensive treatment may require consultation with other specialists. This is best achieved through a multidisciplinary approach, with collaboration among the head and neck surgeon, the dermatologic surgeon, and the radiation oncologist.

We reviewed the clinical course of patients with ANMSC who required parotidectomy to identify common disease characteristics and to analyze treatment outcomes. Most patients presented to us with recurrent disease (18/23 [78%]). Twenty-one (91%) of the 23 patients were men, and 18 (78%) of the 23 lesions were SCC, although BCC tends to be more common in patients with NMSC. Younger patients (51 vs 75 years) were more likely to have lesions with perineural invasion \(P = .006\). Variables such as location, size, and depth of invasion did not predict increased potential for perineural invasion or regional metastasis in ANMSC. The small patient population of this study may have affected the ability to demonstrate the statistical significance of these variables. In addition, this population already represented an aggressive subset of NMSC.

Our experience demonstrates that a systematic approach is required to ensure proper understanding of disease extent and definitive management of NMSC with aggressive features. On clinical presentation, these patients may have facial muscle twitching or facial paresis or paralysis. The primary lesions may be fixed to deep structures within the pretragal region (eg, the parotid gland). Unfortunately, approximately 60% of patients with ANMSC involvement of the facial nerve may present asymptomatically. \(^b\)\(^\text{13}^{14}\) In our series, 7 of 23 patients presented with facial weakness or paralysis, although facial nerve dissection was performed in all of the patients, and surgical resection of the facial nerve was required in 12.

When these situations are not clinically obvious, but suspected, radiographic studies should be obtained. Computed tomographic scans and magnetic resonance imaging studies are critical for delineating the size and invasive nature of an ANMSC. In this study, parotid metastasis was clinically appreciated in only 3 of 9 patients, and parotid invasion was recognized in only 3 of 14 patients. The remaining cases of parotid involvement were identified by imaging studies or surgical exploration. Furthermore, findings of facial nerve en-
hancement or thickening provide evidence for perineural invasion. Although they cannot substitute for intraoperative assessment, imaging studies should be routinely included in the preoperative assessment of an ANMSC.

As the parotid serves as a watershed for lymphatics of the anteroparietal scalp, forehead, temple, ear, eyelids, and zygomatic area, management of the parotid is a critical consideration in the locoregional control of an ANMSC. The intimate relationship of the facial nerve with the parotid also demands critical attention to this region to maintain the integrity of the nerve. There are 4 primary indications for parotidectomy in cases of ANMSC: parotid metastasis, invasion of the parotid capsule, facial nerve invasion, and temporal bone invasion. Our approach to management of the parotid is detailed in Table 4. Depending on the depth of the primary lesion, especially in the preauricular region, local control may require superficial parotidectomy and facial nerve dissection. Similarly, facial nerve dissection is requisite in superficial parotidectomy for nodal involvement or deep invasion from preauricular primary lesions. As the facial nerve is identified, areas of gross tumor involvement may necessitate partial or total facial nerve resection. Histologic evaluation for perineural invasion of the nerve branches resected would provide guidance for further nerve excision. Most important, resection must lead to disease control proximally and distally along the course of the facial nerve. As with one of our patients, mastoidectomy may be required for local disease extirpation and facial nerve resection. Finally, reconstruction of the facial nerve is usually performed immediately, with cable grafting of all resected branches.

Given the devastating potential of this disease, our approach to patients with ANMSC includes postoperative radiotherapy. The value of this combined approach has been well documented in cases of parotid invasion by skin cancers. In that study, Taylor et al demonstrated that ultimate control of disease was 62.5% with surgical treatment and 46% with radiation therapy, but improved to 89% when both forms of treatment were used. Indications for postoperative radiotherapy include the following: a large or recurrent primary lesion, close or positive tumor margins, perineural invasion, and poorly differentiated or spindle cell SCC. In addition, radiotherapy may improve regional control in patients with lymph node metastases at multiple neck levels or extracapsular spread of metastatic disease.

Despite the comprehensive treatment that our patients received for ANMSC, the tenacious nature of this disease is obvious. Twelve (52%) of 23 patients had locoregional recurrent disease, and 4 patients (17%) died following distant metastasis of their disease. Compared with the entire population treated for ANMSC by our department, patients whose disease had progressed to the point of requiring a parotidectomy were more likely to have disease recurrence (P = .0002). This may have been because of the advanced state of their disease at the time of presentation for treatment.

Conservative treatment of an NMSC with aggressive features may contribute to a high local recurrence rate. Despite comprehensive surgical treatment and postoperative radiotherapy, the prognosis for recurrent and extensive ANMSC remains grim. Therefore, physicians must remain aware of the features of an ANMSC and attempt to identify these lesions at earlier stages or in their initial presentation. Younger patients and those presenting with SCC are more likely to have tumors with aggressive behavior and to require definitive treatment to prevent complications and future recurrence.

**CONCLUSIONS**

Definitive treatment of ANMSC in the head and neck remains a challenging problem. Identification of these high-risk lesions at initial presentation provides the best opportunity to eradicate disease and to prevent the deleterious effects of facial nerve invasion. Although Mohs micrographic surgery remains valuable for most NMSC, treatment of ANMSC requires a multidisciplinary approach. A review of our experience with these patients demonstrates the importance of parotidectomy in cases of ANMSC with parotid metastasis, invasion of the parotid capsule, and facial nerve invasion. Despite aggressive treatment of this disease, disease recurrence and mortality remain high. Future efforts should be directed toward the earlier detection of lesions with aggressive characteristics and the development of more effective adjuvant therapies.
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