Sarcomatoid Carcinoma in the Parotid Gland: A Review of 30 Years of Experience

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Objective: The goal of this study was to analyze the results of clinical treatment of sarcomatoid carcinoma in the parotid gland by reviewing 30 years of experience.

Methods: Thirty-five patients were enrolled in this study. The Kaplan-Meier methods were used to calculate the recurrence-free survival (RFS) and disease-specific survival (DSS) rates. The Cox model was used to determine the independent risk factor.

Results: Mean age at presentation was 57.8 years, and most of the patients were staged as tumor (T)3 or T4. Perineural invasion was noted in 15 (42.9%) patients. Fifteen (42.9%) patients received neck dissection due to clinically suspicious nodes. Of those, three patients had pathologically positive nodes. Recurrence was noted in 14 patients; the most common pattern of treatment failure was local recurrence, and only 40% of the patients could receive salvaged surgical treatment. Disease-specific death was noted in 10 patients. The 5-year RFS and DSS rates were 67.3% and 65.7%, respectively. In a multivariate analysis, only the factor of perineural invasion was independently correlated with death.

Conclusion: Parotid sarcomatoid carcinoma carries a poor prognosis, and perineural invasion was the most important predictive factor.

Key Words: Sarcomatoid carcinoma, head and neck cancer, parotid gland, parotid cancer.

Level of Evidence: 2b

INTRODUCTION

Sarcomatoid carcinoma (SaCa), a rare variant of the squamous cell carcinoma, was first reported by Virchow1 in 1864. SaCa has now been proven to be biphasic2; it usually contains both a sarcomatous spindle cell component and a conventional epithelial squamous cell component. The sarcomatoid as well as conventional squamous carcinoma components have now been proven to arise monoclonally from a single stem cell.3–7 The disease is characterized by invasive growth, local recurrence, and poor prognosis. The tumor shows morphologic epithelial changes, where areas of squamous and spindle cell differentiation are demonstrated.2–8

SaCa of the head and neck usually occurs in the larynx, followed by the oral cavity and hypopharynx.1,3 Cases of parotid SaCa are only described by a few authors,9,10 and all these studies are case reports. Detailed information of prognosis and risk factors for parotid SaCa remains scarce. Therefore, we aimed to analyze the clinical treatment results of SaCa in the parotid gland by reviewing 30 years of experience.

MATERIALS AND METHODS

The Zhengzhou University (Zhengzhou, PR China) institutional research committee approved our study; all participants signed an informed consent agreement; and all experiments were performed in accordance with relevant guidelines and regulations.

Medical records of parotid cancer patients for the period from January 1985 to December 2016 were reviewed, and patients diagnosed with carcinosarcoma, pseudosarcoma, sarcomatoid carcinoma, and spindle cell carcinoma were extracted. Information regarding age, sex, operation record, treatment, and follow-up was collected and analyzed. All the pathologic sections were re-evaluated, and patients were re-staged by the 7th edition American Joint Committee on Cancer classification.11

Independent risk factors were analyzed by multivariable logistic regression. The Kaplan-Meier methods were used to calculate the recurrence-free survival (RFS) and disease-specific survival (DSS) rates. All statistical analyses were performed using SPSS 19.0 (IBM Corp., Armonk, NY). A P value < 0.05 was considered significant.

RESULTS

Among the 3,751 patients, 1,302 (34.7%) patients were diagnosed with mucoepidermoid carcinoma; 911 (24.3%) patients were diagnosed with adenoid cystic carcinoma; 327 (8.7%) patients were diagnosed with acinar cell carcinoma; 97 (2.6%) patients were diagnosed with parotid duct carcinoma; 100 (2.7%) patients were diagnosed with polymorphous low-grade adenocarcinoma; 228 (6.1%) patients were diagnosed with adenocarcinoma (not otherwise specified); 177 (4.7%) patients were diagnosed with papillary cystadenocarcinoma; 404 (10.8%)
patients were diagnosed with basal cell carcinoma; 97 (2.6%) patients were diagnosed with myoepithelial carcinoma; and for 73 (1.9%) patients, an exact primary diagnosis was unknown (Table I). Thirty-five patients (30 male and 5 female) diagnosed with SaCa (Figure 1) were finally enrolled with an incidence of 0.93%. The frequency of smokers and drinkers was 25 (71.4%) and 17 (48.6%), respectively. Mean age at presentation was 57.8 (range: 30–73) years. The most common symptom at first diagnosis was a painless mass (100%), followed by facial paralysis (10 of 35, 28.6%) and local pain (4 of 35, 11.4%). The disease was mostly located (34 of 35, 97.1%) in the superficial lobe of the parotid. At presentation, stage of tumor (T) 1 was recorded in seven (14.3%) patients, T2 in 10 (28.6%) cases, T3 in one (2.9%) case, and T4 in 15 (42.9%) cases. The stage of two (5.7%) patients was unknown. Perineural invasion was noted in 15 (42.9%) patients, and lymphovascular invasion was noted in eight (22.9%) patients.

All the patients received an operation of total parotidectomy; 15 (42.9%) patients also received neck dissection (levels I–III) due to clinically suspicious nodes. In those 15 patients, the diameter size of the lymph node was measured by ultrasound and found to be larger than 3 cm in 10 patients, and the ratio of long to short diameter was less than two in five patients; however, in postoperative specimen analysis, only three patients had pathologically positive nodes. Radiotherapy was performed in 10 (28.6%) patients.

During our follow-up (mean: 71 months; range: 5–167 months), nine patients were lost. In the remaining patients, recurrence was noted in 14 patients: 10 cases locally, one case regionally, and three cases distantly. In the patients with local recurrence, only four patients received salvaged surgical treatment. Disease-specific death was noted in 10 patients. The 5-year RFS (Figure 2) and DSS (Figure 3) rates were 67.3% and 65.7%, respectively.

Prognostic factors are presented in Table II. In a univariate analysis, tumor stage and perineural invasion were significantly associated with the recurrence, and perineural invasion was significantly associated with death. In a multivariate analysis, only the factor of perineural invasion was independently correlated with death.

### Table I: Distribution of Parotid Cancers.

<table>
<thead>
<tr>
<th>Pathologic Type</th>
<th>Number (n = 3,751)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>1,302 (34.7%)</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td>911 (24.3%)</td>
</tr>
<tr>
<td>Basal cell carcinoma</td>
<td>404 (10.8%)</td>
</tr>
<tr>
<td>Acinar cell carcinoma</td>
<td>327 (8.7%)</td>
</tr>
<tr>
<td>Adenocarcinoma (not otherwise specified)</td>
<td>228 (6.1%)</td>
</tr>
<tr>
<td>Papillary cystadenocarcinoma</td>
<td>177 (4.7%)</td>
</tr>
<tr>
<td>Polymorphous low-grade adenocarcinoma</td>
<td>100 (2.7%)</td>
</tr>
<tr>
<td>Parotid duct carcinoma</td>
<td>97 (2.6%)</td>
</tr>
<tr>
<td>Myoepithelial carcinoma</td>
<td>97 (2.6%)</td>
</tr>
<tr>
<td>Primary diagnosis was unknown</td>
<td>73 (1.9%)</td>
</tr>
<tr>
<td>Sarcomatoid carcinoma</td>
<td>35 (0.93%)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Since first reported, SaCa has been reported in the upper aerodigestive tract, bladder, breast, prostate, small intestine, gall bladder, lung, ovary, skin, and colon using alternative names consisting of spindle cell carcinoma, pseudosarcoma, and carcinosarcoma. However, very little has been described in the literature of SaCa of the parotid gland. Few cases were presented; therefore, this is the first study to prospectively evaluate the prognosis of the parotid SaCa using the largest sample size to date.

Epidemiology findings in current studies were consistent with previous reports. SaCa was rare, only accounting for 0.93% of all parotid cancers, and it was the least common pathologic type. The disease had maximum
occurrence between the fifth and seventh decades of life and showed an apparent male predominance. It had been noted that alcohol consumption and tobacco use were strong causative agents for the development of squamous carcinoma in general, as well as for SaCa.\(^3,4,6\) All these factors were also seen in our study.

Prognosis of SaCa was dismal. Gamez et al.\(^4\) described the clinical outcome of 38 patients with SaCa of the larynx in The Mayo Clinic. Multimodality therapy was performed, and as many as 15 patients (39%) had tumor recurrence. The 5-year progression-free survival was just 46%. Chang et al.\(^8\) reported that, in 64 patients diagnosed with head and neck SaCa undergoing surgical excision, 66% of the cases developed recurrence. Of the remaining cases without recurrence, the survival rate was still poor at 32%. Similar findings were also noted in this current study: 53.8% of the patients had disease recurrence and 38.5% died of the disease. The 5-year RFS and DSS rates were just 67.3% and 65.7%, respectively. The finding might be attributed to the following aspects: first, review of the literature suggested that radical surgery, postoperative cytotoxic chemotherapy, or radiation therapy were not beneficial to survival,\(^21,22\) and secondly, local recurrence was the most common form of treatment failure, but the salvage rate was low.\(^8\)

Neck management remained controversial in parotid malignant tumors. In an article published by the Memorial Sloan Kettering Cancer Center (New York, NY),\(^23\) the authors reported that in patients with clinically node negative (cN0) disease, observation of the neck was safe in those who were under 60 years of age, with clinical T1 or T2 tumors and those who had low-grade histology. Effective neck dissection should be carried out in patients with cT3T4 disease or high-grade histology and should involve levels II to IV at a minimum. Patients with cN + disease commonly had all neck levels involved and should therefore be managed with comprehensive neck dissection. Lau et al.\(^24\) had evaluated the pattern of occult cervical lymph node metastasis among patients with clinically N0 salivary gland carcinoma, and 25 patients (21%) had pathological cervical disease. The incidence rate was highest among patients with high-grade malignancy. Further multivariate analysis also reported that the histological subtype was independently predictive of occult pathological lymph node metastasis. All these findings suggested that elective neck dissection might be required in patients with high-grade parotid cancers, such as parotid SaCa. However, although clinically suspicious nodes were noted in 15 patients, the true incidence rate of neck node metastasis was only 20%. Possible explanations were the limited reliability of lymph neck node size in predicting cancer metastasis and the exact low node metastasis rate in SaCa.\(^4\) During our follow-up, only one patient had regional recurrence. Therefore, further analysis is required to determine whether neck dissection was routinely needed in patients with parotid SaCa.

Risk factors for the recurrence and death in parotid cancers were widely analyzed. Shi et al.\(^25\) reported that node metastasis and the preoperative House-Brackmann grade were independent predictors of both RFS and DSS in parotid duct carcinoma. A recent article described that recurrences were mainly influenced by the presence of perineural invasion and nerve paralysis, whereas female gender and age < 50 years were predictors for good prognosis in patients with adenoid cystic carcinoma.\(^26\) Due to the rarity of parotid SaCa, no related literature was available for studying prognostic factors. It was noted that perineural invasion was independently correlated with death, and a similar finding could also be seen in other parotid high-grade malignancy.\(^25,26\) However, the common risk factors, such as tumor stage, node status, and radiotherapy, had little effect on the prognosis. It might be mostly attributed by our small sample size. Future multicenter analysis will be needed to clarify these questions.

**CONCLUSION**

In summary, parotid sarcomatoid carcinoma carries a poor prognosis, and perineural invasion is the most important predictive factor. Local recurrence is the most
common treatment failure pattern with a low salvage rate. Therefore, the authors conclude that neck management requires more extensive research.

**BIBLIOGRAPHY**

9. Niu: Sarcomatoid Carcinoma in the Parotid Gland