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RESEARCH PAPER

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Surgical outcomes for cutaneous squamous cell carcinoma of the auricle

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Abstract

Background: Cutaneous squamous cell carcinoma (CSCC) on the auricle is believed to carry a higher risk of metastatic spread. The rates of lymphatic metastasis reported in the literature have varied widely. There are no established prognostic criteria to determine which of these tumors are higher risk and warrant prophylactic treatment of the associated lymphatic basins.

Objective: To retrospectively evaluate outcomes after surgical treatment of auricular CSCC in our department, examining excision completeness, tumor recurrence, and lymphatic metastasis. Secondarily, to identify factors associated with lymphatic metastasis.

Methods: One hundred and thirty-eight consecutive cases of auricular SCC were excised from 126 patients in our department over a 7-year period (January 2012–December 2018). Data were retrospectively collected on patient characteristics, tumor histology, surgical procedures, and follow-up.

Results: Incomplete initial excision occurred in 17 cases (12.32%). Six patients (4.76%) had a local recurrence. Lymphatic metastasis occurred in eight patients (6.35%), on average within 10.25 months after primary excision. Six patients with metastasis died during follow-up, with a mean survival of 10.2 months. Older age was associated with lymphatic metastasis ($P = 0.0267$). Other factors, including tumor recurrence, size, grade, cartilage invasion, and positive margins, were evaluated and not significantly associated with metastasis.

Conclusion: In this study, the metastatic rate of auricular SCC was 6.35%, which is within the previously reported ranges. No histological prognostic factors were identified in this study, which may be due to our limited sample size. In the absence of established prognostic criteria, decisions regarding prophylactic treatment should be made on an individual basis with multidisciplinary support.

KEYWORDS
cutaneous malignancy, external ear, metastasis, squamous cell carcinoma

Key points

- Significant findings of the study.

- Auricular SCC metastatic rate was found to be 6.35% in our patient group.
- Older age was associated with lymphatic metastasis ($P = 0.0267$).
- What this study adds.
- Useful data and observations on tumor characteristics, outcomes after surgical excision, and surgical technique considerations.

INTRODUCTION

Cutaneous squamous cell carcinoma (CSCC) is the second most common cutaneous malignancy worldwide, with an estimated European incidence of around 30 per 100,000 people per year.[1] The main risk factor is ultraviolet radiation exposure, and 70%–80% of these lesions arise on the sun-exposed areas of the head and neck. The worldwide incidence of cutaneous SCC is currently increasing.[1]

Although basal cell carcinoma (BCC) remains the most common skin cancer on the head and neck, malignant lesions on the pinna/auricle exhibit a higher proportion of SCC compared to other subsites.[2,3] While the metastatic rate for CSCC, in general, is around four percent,[4] it is believed that SCC located on the pinna has a higher risk[5–8] and may be a leading cause of death among nonmelanoma skin cancers.[9] Various studies have reported metastatic rates between 3% and 16% for auricular SCC.[5–8,10,11] Determining which of these tumors carry a high risk of metastasis, and when prophylactic treatment of lymphatic basins should be considered, remains a subject of ongoing debate.[12–14]

The primary aim of this study is to retrospectively evaluate our departmental outcomes after surgical treatment of auricular SCC over a 7-year period, with outcomes of interest including completeness of excision, tumor recurrence, and lymphatic metastasis.

The secondary aim is to determine if potential factors related to patient characteristics, method of surgical excision, and tumor histology are significantly associated with development of lymphatic metastasis.

MATERIALS AND METHODS

A retrospective study of all patients who underwent surgical excision of auricular SCC was performed by the Department of Otolaryngology/Head and Neck Surgery in University Hospital Waterford over a 7-year period (January 2012–December 2018). This study was approved by the local research ethics committee (HSE South East) and was conducted in compliance with the Declaration of Helsinki.

All suitable cases of auricular SCC were identified from the University Hospital Waterford histopathology database. Cases were excluded if the SCC involved the external auditory canal or underlying bone, as this involved more extensive surgery not performed within our center. We also excluded cases where lymphatic or distant metastasis was present at the time of initial presentation, as the primary treatment for these patients is radically different. Therefore, all patients in our study had disease staged between T1 and T3, N0, M0 as per the AJCC TNM staging.[15] In total, 138 cases of auricular SCC excised from 126 patients were included in the study.

Our standard practice involves an initial 3-mm punch biopsy of any auricular cutaneous lesion clinically suspicious for malignancy. Histologically confirmed cases of SCC are formally excised with a radial surgical margin of at least 6 mm, as recommended by the NCCN guidelines.[16] Several surgical techniques for excising auricular lesions have been described and we choose the most appropriate method for achieving complete resection while optimizing cosmetic outcome. "Wedge excision" involves full-thickness resection of a triangular portion of the auricle with the triangle's base along the helical rim, allowing approximation and primary closure of the defect, preserving the contour of the ear. For lesions not amenable to wedge excision (e.g., located closer to the concha), the auricular skin containing the tumor is excised with adequate margins, also resecting underlying cartilage if the tumor infiltrates deeply, but leaving the skin on the opposite side of the cartilage intact to allow reconstruction with full-thickness skin graft. For larger bulky tumors, it may be needed to perform a pinnectomy or excision of the entire auricle to obtain oncological clearance. Incomplete surgical excision is defined as microscopic tumor extension involving the specimen radial margin or deep margin on histopathological evaluation. As this implies a possibility of residual SCC at the surgical site, we routinely perform a subsequent procedure for revision of margins, where an area of tissue is excised around the previous surgical scar. If the margins of the revision specimen are microscopically tumor-free, the lesion is now deemed to be completely excised.

Radiological imaging with CT (computed tomography) scan of the neck and thorax for staging is performed preoperatively if cervical lymphatic metastasis is suspected on clinical examination. After histopathological examination of the excised specimens, every case is discussed in a multidisciplinary setting (including radiology, histopathology, and oncology) to decide if further treatment is required, such as revision surgical excision or adjuvant radiotherapy.

All data was gathered retrospectively from histopathology reports, clinical notes, and electronic patient records. Data was collected on patient characteristics (age, gender, history of previous head and neck skin cancer, and immunosuppression), tumor factors (size, thickness, histological grade, perineural invasion, cartilage invasion, and microscopic margins as determined on histological analysis), and surgical excision procedure. While tumor size and grade

were routinely documented on histopathology reports, a number of reports did not clearly specify tumor depth or presence/absence of perineural invasion, which unfortunately prevented us from analyzing our cases using the AJCC TNM staging[15] (as these features may distinguish a T3 from a T2 lesion). No data was collected on patient skin type/ethnicity or subsite of the tumor within the auricle. Follow-up data was collected up to August 2020, which is 20 months after the last case in the series was excised, by reviewing patient records for details of further treatment and reviewing the histology database for any histologically confirmed recurrence or metastasis. Data were statistically analyzed using STATA ver. 16.0 (StataCorp LLC). The Mann–Whitney *U* test or Fisher's exact test was used to evaluate for association between risk factors and metastasis, with $P < 0.05$ regarded as statistically significant.

RESULTS

Patient characteristics

One hundred and thirty-eight cases of auricular SCC were included in the study, excised from a total of 126 patients. The mean age at the time of excision was 77.90 years (range 36–99 years, SD 9.02 years). One hundred and twenty-one patients (96.03%) were male. Sixty-five patients (51.6%) had a previous history of cutaneous malignancy on the head and neck. Twelve patients (9.5%) were immunosuppressed, on a background of organ transplantation or hematological disorders.

Outcomes

In total, 14 patients (11.1%) who underwent auricular CSCC excision during the study had subsequent disease recurrence after surgery.

Six patients (4.76%) had local recurrence, defined as cutaneous recurrence of SCC on the auricle over the previous excision site. One of these patients had microscopically positive margins after the initial surgery, undergoing a further revision procedure whereupon histology confirmed complete excision. Two patients were immunosuppressed, due to renal transplantation and a lymphoproliferative disorder, respectively. All local recurrences underwent urgent surgical excision once they were clinically apparent. In two patients, the lesion recurred for a second time. None of the patients with local recurrences developed lymphatic metastasis.

Eight patients (6.35%) developed lymphatic metastasis after surgery, all of which was locoregional (Table 1). Six cases (75.00%) occurred in the parotid region, one case occurred in the postauricular region, and one case occurred in the upper cervical region. The mean time from primary tumor excision to development of lymphatic metastasis was 10.25 months (range, 6–18 months). None of these patients were immunosuppressed. It was found that older patient age was associated with development of metastasis ($P = 0.0267$). After diagnosis of metastasis, five patients were treated with curative intent and had a parotidectomy, neck dissection, and adjuvant radiotherapy, while the other three received palliative treatment. Despite this, 6 patients with metastatic disease (75.00%) died during follow-up, with an average survival of 10.2 months after diagnosis (range, 1–24 months). Four of these deaths were secondary to disease progression, while two deaths were related to cardiorespiratory decompensation.

Tumor characteristics: (Table 2)

Twenty-two (15.94%) of the excised lesions were local recurrences of previously excised auricular CSCCs. Of these recurrent tumors, three cases (13.64%) developed lymphatic metastasis, but there was no statistically significant association ($P = 0.116$).

Data on tumor size was available in 96.38% of cases. In the other 3.62% of cases, tumor size was impossible to determine due to fragmentation of the specimen. The median tumor size on histology was 12 mm (range 3–50 mm; mean 15.56 mm; SD 9.76 mm). The majority of tumors (78.2%) measured 20 mm or less in size, corresponding to T1. Tumor size in millimeters was not significantly associated with metastasis ($P = 0.388$). Tumor size, when classified according to the staging categories described in the AJCC classification (8th edition),[16] was not significantly associated with metastasis ($P = 0.395$).

Regarding histological grading, the majority of tumors ($n = 97$) were moderately differentiated (70.29%). Moderate-to-poor differentiation was present in eight cases (5.80%) and poor differentiation was present in six cases (4.35%). Of the eight tumors that developed metastasis, six were moderately differentiated and two were moderate/poorly differentiated, but overall, tumor grade was not found to be associated with development of metastasis ($P = 0.325$).

Tumor invasion of the auricular cartilage was present in 21 cases (15.22%). Of these, three cases (14.29%) developed metastasis but there was no statistically significant association ($P = 0.116$).

Data on tumor depth and perineural invasion was not available for a number of cases, which precluded statistical analysis of these factors. Therefore, available data is included for descriptive purposes only. The presence or absence of perineural invasion was only reported in 72.46% of cases ($n = 100$). Of these tumors, 20.00% ($n = 20$) were confirmed to have perineural invasion. Data on tumor thickness (maximum vertical dimension) was only available for 73.18% of cases ($n = 101$). For these cases, median thickness was 4 mm (range, 0.3–15.0 mm).

Treatment

The commonest surgical procedure was wedge excision, which was performed in 68 cases (49.28%). Excision of auricular skin alone was performed in 54 cases (39.13%), and this also included underlying cartilage in five cases (3.62%). More radical excision in the form of pinnectomy was done in 11 cases (7.97%). (Table 3).

TABLE 1 Age, histological features, and outcomes for patients with metastasis.

Case	Age (years)	Recurrent lesion	Tumor size (mm)	Cartilage invasion	Margin status	Time to metastasis (months)	Treatment	Alive	Survival post metastasis (months)	Cause of death
Case 1	82	Yes	8	Yes	Negative	12	Parotidectomy + neck dissection + radiotherapy	No	18	Respiratory infection
Case 2	84	No	22	No	Negative	6	Parotidectomy + neck dissection	No	24	Respiratory infection
Case 3	81	Yes	27	Yes	Negative	7	Parotidectomy + neck dissection + radiotherapy	No	11	Disease progression
Case 4	82	No	12	No	Negative	11	None	No	5	Disease progression
Case 5	79	No	29	No	Negative	11	Parotidectomy + neck dissection + radiotherapy	Yes	-	-
Case 6	90	Yes	12	No	Negative	7	None	No	1	Disease progression
Case 7	84	No	12	Yes	Negative	18	Parotidectomy + neck dissection + radiotherapy	Yes	-	-
Case 8	84	No	12	No	Negative	10	None	No	2	Disease progression

TABLE 2 Tumor characteristics and association with metastasis.

Characteristics	Total (n = 138)	Metastasis (% of total) (n = 8)	P value
Tumor size (mm)			0.395
<20	104	5 (4.81)	
20–40	24	3 (12.50)	
>40	5	0	
Not available	5	0	
Differentiation			0.325
Well	11	0	
Well/moderate	10	0	
Moderate	97	6 (6.19)	
Moderate/poor	8	2 (25.00)	
Poor	6	0	
Not available	5	0	
Cartilage invasion			0.103
Yes	21	3 (14.29)	
No	117	5 (4.27)	
Recurrent lesion			0.116
Yes	22	3 (13.64)	
No	116	5 (4.31)	

TABLE 3 Method of surgical excision and resulting outcomes.

Procedure	Total (n = 138)	Incomplete excision (% of total) n = 17	Local recurrence (% of total) n = 6	Metastasis (% of total) n = 8
Auricular skin excision	54	12 (22.22)	3 (5.56)	2 (3.70)
Auricular skin + cartilage	5	3 (60.00)	0	0
Wedge excision	68	0	3 (4.41)	5 (7.35)
Pinnectomy	11	2 (18.18)	0	1 (9.09)

Incomplete initial surgical excision, defined as microscopic extension of tumor to the specimen margin, occurred in 17 cases (12.32%). Incomplete initial excision was more likely to occur when only skin was excised (with or without cartilage) when compared to wedge excision or pinnectomy (P < 0.001). However, the type of surgical procedure was not associated with development of metastasis (P = 0.466).

The patients with incomplete initial excision underwent subsequent re-excision surgery, and six of the re-excision specimens (35.29%) were histologically positive for SCC. In three of these six cases, the revision margins were histologically clear and complete excision was now confirmed. Of the three cases with positive margins after revision, one had further surgery and adjuvant radiotherapy, while two had adjuvant radiotherapy alone. None of the patients with incomplete initial excision developed lymphatic metastasis.

Eight other cases (5.80%) were "narrowly excised," with margins microscopically clear by less than 1 mm, and further treatment with revision surgery or adjuvant radiotherapy was given based on other histological factors and taking the patient's preference into account. In total, revision of margins was carried out in 28 cases (20.29%), and seven of these 28 specimens (25.00%) showed histological evidence of residual SCC.

Regarding adjuvant therapy, eight patients (6.35%) were treated with radiotherapy following primary surgery for SCC, after multidisciplinary team consensus. As this was carried out in another facility, no further details were available for inclusion in this study.

DISCUSSION

In this study, 96.03% of the patients treated for auricular cutaneous SCC were male, with a mean age of 77.86 years. This is consistent with other epidemiological studies.[7,8] Possible explanations for this gender disparity include outdoor occupations with increased sun exposure being historically more prevalent in males, and the protective effect of longer hair covering the ears in women.

Excising cutaneous SCCs from the external ear can be particularly challenging as it is a cosmetically important structure. Incomplete excision of cutaneous head and neck lesions is most likely to occur from the external ear, where it has been reported in 20.5% of cases.[17] In our study, we found that 12.32% of auricular SCCs were incompletely excised. All of these underwent repeat excision, and 35.29% of these specimens contained evidence of residual malignancy. This is similar to a previous study by Bovill et al., where residual SCC was found in 28.6% of re-excision specimens.[18] Out of the cases with incomplete initial excision in our study, only one out of 17 had a subsequent local recurrence and none progressed to metastasis. Regarding surgical technique, incomplete excision was more likely to occur with local excision of the tumor from the surface of the pinna, as opposed to more radical procedures such as wedge or pinnectomy. This illustrates the challenge faced by surgeons when dealing with these lesions, having to balance the cosmetic outcome with the risk of potentially needing a revision procedure.

Although it is acknowledged that the external ear is a unique, higher-risk subsite for cutaneous SCC, the rates of metastasis reported in different studies have varied considerably. In a systematic review by Clark et al., 11 studies between 1956 and 1996 comprising a total of 1182 patients with auricular SCC were included.[11] The overall metastatic rate was found to be around 11%, but individual studies reported rates which ranged from 2.8% to 16.4%. Metastatic rate may vary even between different regions of the same country, as shown in UK studies from Southampton[19] and Glasgow,[8] which found metastatic rates of 2% and 10.5%, respectively. This may be due to geographic or socioeconomic differences influencing healthcare presentation or elderly patients dying or becoming lost to follow-up before metastatic disease could develop. In our study

cohort, the rate of metastasis was 6.35%, which is within this reported range. Most of our metastatic cases (75%) presented clinically in the parotid region, which is consistent with previous studies.[10,20,21] Metastasis typically develops within 1 year after primary tumor excision.[8,20] This was also observed in our study, where metastasis developed within an average of 10 months after primary excision, with the latest presentation occurring after 18 months. This emphasizes the need for careful clinical follow-up. The prognosis for metastatic auricular SCC is known to be very poor.[8,20,22] Of the eight patients with metastatic disease in our study, six died during follow-up, with a mean survival of 10 months after diagnosis of metastasis. This further highlights the aggressive nature of this disease.

There has been considerable discussion on the topic of which auricular SCCs have a high risk of metastasis and should be offered prophylactic treatment of lymphatic basins.[12–14] In this setting, prophylactic surgery involves parotidectomy with or without selective neck dissection. It has been suggested that the risk of metastasis should be at least 20% to justify prophylactic treatment.[12] Numerous histological risk factors have been studied such as tumor diameter, thickness, depth of invasion, histological grade, and perineural invasion,[4,8,11] but no prognostic criteria have been widely accepted or established for this purpose. In particular, questions have been raised over the prognostic value of tumor size or diameter, which is the mainstay of staging systems such as the AJCC.[16] A large study found that there was no correlation between tumor size and development of metastasis in auricular SCC.[7] In another large Australian series of 266 patients with metastatic cutaneous SCC of the head and neck, the mean tumor diameter was only 15 mm, which corresponds to AJCC Tumor Stage I.[23] These findings are also reflected in our study, as the patients who developed metastasis had a mean tumor diameter of 16.75 mm and there was no significant association between tumor size and metastasis.

Other studies have attempted to predict metastatic risk by combining individual histological risk factors. Clark et al.[8] studied 229 cases of auricular SCC and concluded that depth of invasion between 2 and 8 mm in addition to cartilage destruction or lymphovascular invasion conferred a 24.2% risk of lymphatic metastasis. Wermker et al.[22] proposed a risk prediction model for lymphatic metastasis in auricular SCC based on the four parameters of recurrence number, invasion of cartilage, histological grading, and tumor depth.[23] In our study, we observed that 37.5% of patients who developed metastasis had histological evidence of cartilage invasion and 37.5% had recurrent lesions. Although this association was not statistically significant, our study contains a small number of metastatic cases, and a larger sample size may be required to further investigate this.

We acknowledge that our present study contains several limitations. All data was collected retrospectively, and there was incomplete reporting of histological risk factors such as tumor thickness and perineural invasion, which did not allow us to evaluate their prognostic significance. As our study population was relatively elderly, patients may have died of other causes before disease would have recurred or progressed, or they may have been unable to attend follow-up visits. Due to the limited size of our cohort, a relatively small number of metastatic cases were observed, making it more difficult to draw statistically significant conclusions.

CONCLUSION

Lymphatic metastasis in auricular SCC carries a poor prognosis for the patient. In our cohort, the rate of lymphatic metastasis for auricular SCC was 6.35%, which is consistent with existing literature, exceeding the 4% rate reported for cutaneous SCC overall. No histological prognostic factors were identified in this study, which may be due to our limited sample size. In the absence of established prognostic criteria, multidisciplinary consensus involving the surgeon, histopathologist, and oncologist is essential in deciding when further prophylactic therapy is warranted. Furthermore, as our study illustrates, these patients are often very elderly, implying associated frailty and comorbidities, which may limit tolerance of prophylactic interventions. Treatment plans must therefore be considered according to individual patients.

AUTHOR CONTRIBUTIONS

All authors have made substantial contributions to the conception or design of the work, drafting and critical revision of the work, and final approval of the version to be published and agree to be accountable for all aspects of the work.

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The authors have nothing to report.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

ETHICS STATEMENT

This study was approved by the local research ethics committee (HSE South East) and was conducted in compliance with the Declaration of Helsinki.

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REFERENCES

1. Lomas A, Leonardi-Bee J, Bath-Hextall F. A systematic review of worldwide incidence of nonmelanoma skin cancer. *Br J Dermatol*. 2012;166:1069-1080.
2. Ahmad I, Gupta ARD. Epidemiology of basal cell carcinoma and squamous cell carcinoma of the pinna. *J Laryngol Otol*. 2001;115:85-86.
3. Bumsted RM, Ceilley RI, Panje WR, Crumley RL. Auricular malignant neoplasms. When is chemotherapy (Mohs' technique) necessary. *Arch Otolaryngol Head Neck Surg*. 1981;107:721-724.

4. Brantsch KD, Meisner C, Schönfisch B, et al. Analysis of risk factors determining prognosis of cutaneous squamous-cell carcinoma: a prospective study. *Lancet Oncol*. 2008;9:713-720.
5. Afzelius LE, Gunnarsson M, Nordgren H. Guidelines for prophylactic radical lymph node dissection in cases of carcinoma of the external ear. *Head Neck Surg*. 1980;2:361-365.
6. Freedlander E, Chung FF. Squamous cell carcinoma of the pinna. *Br J Plast Surg*. 1983;36:171-175.
7. Byers R, Kesler K, Redmon B, Medina J, Schwarz B. Squamous carcinoma of the external ear. *Am J Surg*. 1983;146:447-450.
8. Clark RR, Soutar DS, Hunter KD. A retrospective analysis of histological prognostic factors for the development of lymph node metastases from auricular squamous cell carcinoma. *Histopathology*. 2010;57:138-146.
9. Lewis KG, Weinstock MA. Nonmelanoma skin cancer mortality (1988-2000): the Rhode Island follow-back study. *Arch Dermatol*. 2004;140:837-842.
10. Lee D, Nash M, Har-El G. Regional spread of auricular and periauricular cutaneous malignancies. *Laryngoscope*. 1996;106:998-1001.
11. Clark RR, Soutar DS. Lymph node metastases from auricular squamous cell carcinoma. A systematic review and meta-analysis. *J Plast Reconstr Aesthet Surg*. 2008;61:1140-1147.
12. Wong WK, Morton RP. Elective management of cervical and parotid lymph nodes in stage N0 cutaneous squamous cell carcinoma of the head and neck: a decision analysis. *Eur Arch Otrhinolaryngol*. 2014;271:3011-3019.
13. Osborne RF, Shaw T, Zandifar H, Kraus D. Elective parotidectomy in the management of advanced auricular malignancies. *Laryngoscope*. 2008;118:2139-2145.
14. Kadakia S, Saman M, Gordin E, Marra D, Ducic Y. The role of parotidectomy in the treatment of auricular squamous cell carcinoma. *Otolaryngol Head Neck Surg*. 2015;152:1048-1052.
15. Amin MB, Edge S, Greene F, et al. (Eds.). *AJCC Cancer Staging Manual*. 8th ed. Springer International Publishing: American Joint Commission on Cancer; 2017.
16. Bichakjian CK, Olencki T, Aasi SZ, et al. *NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines) Squamous Cell Skin Cancer 1.2017*. National Comprehensive Cancer Network, Inc.; 2016.
17. Tan PY, Ek E, Su S, Giorlando F, Dieu T. Incomplete excision of squamous cell carcinoma of the skin: a prospective observational study. *Plast Reconstr Surg*. 2007;120:910-916.
18. Bovill ES, Cullen KW, Barrett W, Banwell PE. Clinical and histological findings in re-excision of incompletely excised cutaneous squamous cell carcinoma. *J Plast Reconstr Aesthet Surg*. 2009;62:457-461.
19. Mayo E, Sharma S, Horne J, Yuen HM, Lee A, Gulati A. Squamous cell carcinoma of the pinna: which histological features could be used to predict prognosis. *Br J Oral Maxillofac Surg*. 2017;55:524-529.
20. Turner SJ, Morgan GJ, Palme CE, Veness MJ. Metastatic cutaneous squamous cell carcinoma of the external ear: a high-risk cutaneous subsite. *J Laryngol Otol*. 2010;124:26-31.
21. Peiffer N, Kutz Jr. JW, Myers LL, et al. Patterns of regional metastasis in advanced stage cutaneous squamous cell carcinoma of the auricle. *Otolaryngol Head Neck Surg*. 2011;144:36-42.
22. Wermker K, Kluwig J, Schipmann S, Klein M, Schulze HJ, Hallermann C. Prediction score for lymph node metastasis from cutaneous squamous cell carcinoma of the external ear. *Eur J Surg Oncol*. 2015;41:128-135.
23. Veness MJ, Palme CE, Morgan GJ. High-risk cutaneous squamous cell carcinoma of the head and neck: results from 266 treated patients with metastatic lymph node disease. *Cancer*. 2006;106:2389-2396.

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