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Cartilage-sparing surgery for melanoma of the external ear



Conrad Harrison*, Cian Wade, Matthew Potter, Oliver Cassell

Blenheim Head and Neck Unit, Churchill Hospital, Old Road, Headington, Oxford, OX3 7LE, UK

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KEYWORDS

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Summary Background: The excision of melanoma of the external ear poses a challenge to surgeons, who must achieve adequate oncological control while minimising impact on form and function. Cartilage-preserving surgery is an attractive option, as it leaves behind a scaffold for immediate reconstruction with a variety of techniques including full-thickness skin grafts (FTSGs) and local flaps. This manuscript will review the literature comparing cartilage-sparing surgery with composite excision of the skin and the cartilage for the treatment of auricular melanoma. We report the results of a 17 year experience of using both techniques, together with sentinel node biopsy at our centre.

Methods: A structured review of MEDLINE and EMBASE was conducted to evaluate all studies reporting local recurrence or survival rates for melanoma of the external ear treated with cartilage-preserving surgery. A retrospective review of all patients undergoing wide local excision (WLE) and sentinel lymph node biopsy (SLNB) for auricular melanoma at our centre between 2000 and 2017 was performed.

Results: Of 40 patients identified, 29 underwent cartilage-preserving surgery with no local recurrences or evidence of perichondral involvement. There was one local recurrence out of 11 patients who had their cartilage excised. There were no significant differences in recurrence rates or melanoma-specific survival rates when comparing cartilage-preserving and cartilage-sparing surgery. Our results are supported by the literature review, which suggests that cartilage-sparing surgery is gaining acceptance as a safe practice.

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Introduction

Melanoma of the external ear is a relatively rare and infrequently reported disease, with little consensus on its prognosis or management.^{1,2} The auricle is a cosmetically

sensitive area and plays an important functional role in hearing by funnelling sound into the external acoustic meatus.³ The shape of the pinna bears additional importance for those who depend on eyeglasses, earpieces and hearing aids. With regard to excision, auricular melanoma poses a challenge to surgeons, who must achieve adequate oncological control while minimising impact on form and function.

Earlier studies have described melanoma of the external ear as bearing a particularly grave prognosis⁴ and further

* Corresponding author.

E-mail address: Conrad.harrison@medsci.ox.ac.uk (C. Harrison).

Table 1. Search strategy employed in literature review.

Database	Search term	Results
1 MEDLINE	(ear OR ears OR earlobe*).ti,ab	95,148
2 MEDLINE	(melanoma* OR "skin cancer*").ti,ab	113,677
3 MEDLINE	(excision* OR excise* OR excising OR resection* OR surgical OR reconstruct* OR graft* OR ap* OR "cartilage sparing" OR perichondrium OR wedge OR splint).ti,ab	1,551,378
4 MEDLINE	(1 AND 2 AND 3)	168
5 EMBASE	(ear OR ears OR earlobe*).ti,ab	113,187
6 EMBASE	(melanoma* OR "skin cancer*").ti,ab	153,842
7 EMBASE	(excision* OR excise* OR excising OR resection* OR surgical OR reconstruct* OR graft* OR ap* OR "cartilage sparing" OR perichondrium OR wedge OR splint).ti,ab	2,000,315
8 EMBASE	(5 AND 6 AND 7)	297

advised 'wide margins despite the cosmetic consequences'⁵ and even 'amputation of the ear with total parotidectomy and radical neck dissection... in every case of melanoma of the ear with or without regional metastasis.'⁶

Recent studies have demonstrated a fairer prognosis⁷ and advocated more moderate treatment strategies including Mohs surgery, composite 'wedge' excision of skin and cartilage or cartilage-preserving surgery.⁸⁻¹² Cartilage-preserving surgery is an attractive option, as it leaves behind a scaffold for immediate reconstruction with a variety of techniques including full-thickness skin grafts (FTSGs) and local flaps. There is a paucity of evidence comparing one technique with another; similarly, evidence comparing wide and conservative excision margins in melanoma of the external ear is lacking.

This manuscript reviews the literature by comparing cartilage-sparing surgery with composite excision of the skin and the cartilage for the treatment of auricular melanoma and reports the results of a 17 year experience of using both techniques at our centre.

Method

Literature review

Two of the authors (CH and CW) independently searched MEDLINE and EMBASE using the search strategy given in Table 1 on 21 March 2018. Papers were included when a full peer-reviewed manuscript was available, written in English, reporting local recurrence or survival rates for melanoma of the external ear treated with cartilage-preserving surgery. Papers reporting heterogeneous treatment methods for auricular melanoma were excluded when local recurrence rates or survival rates were not stratified by treatment modality. Studies of Mohs micrographic surgery were also excluded. Data were extracted and tabulated under the following headings: reference, patient demographics, tumour characteristics, number of patients receiving cartilage-sparing surgery, number of patients receiving cartilage-preserving surgery and summary of results. Owing to the scarcity and low quality of available studies, a meta-analysis was not conducted.

Single-centre study

A 17 year (2000-2017) analysis of patients undergoing wide local excision (WLE) and sentinel lymph node biopsy (SLNB) for melanoma at our department was conducted using prospectively collected data. Notes were reviewed by two members of the team (CH and CW), and original pathology data were obtained from our hospital and referring units. Excision margins were estimated from the pathology reports to the nearest centimetre. Melanoma-specific survival data were obtained from local and national records. Melanoma-specific survival rates were defined as the percentage of patients followed up across a given time period who had not died due to melanoma.

Results

Literature review

The search strategy (Table 1) yielded 465 results including duplicates. Nine papers met inclusion criteria. Three papers were excluded for failing to stratify outcomes by treatment modality,¹³⁻¹⁵ and one paper was excluded, as it focussed only on Mohs surgery cases.¹⁶ The remaining five papers^{12, 17-20} are presented in Table 2.

Single-centre study

We identified 40 patients (aged 31-83 years) who had undergone SLNB for melanoma of the external ear at our centre between the years 2000 and 2017. Of these patients, 29 were male (73%) and 21 had left-sided tumours (53%). The mean follow-up of these patients was 5.1 years. Four patients (10%) had positive SLNBs.

Eleven patients underwent composite 'wedge' excision of the skin and the cartilage, and 29 patients underwent cartilage-preserving surgery. Comparisons were made with the chi-square test and unpaired two-tailed *t*-tests. Statistical significance was defined as $p < 0.05$. There were no statistically significant differences between patient demographics or tumour characteristics between those who underwent either form of surgery. In addition, there were no

Table 2. Results of literature review. SLNB: Sentinel lymph node biopsy.

Reference	Patient demographics and tumour characteristics	Number of patients in whom cartilage was excised	Number of patients in whom cartilage was preserved	Summary of results
McCarty et al. ¹¹ , <i>European Archives of Oto-Rhino-Laryngology</i> ¹⁷	18 patients aged 42-83 years (16 males) Breslow thickness 0.4-6.0 mm	0	18	100% local control rate; mean follow-up: 30.5 months Melanoma-specific survival rate was 89% during a 30.5 month mean follow-up 8% SLNB positivity
Cole et al. ⁸ , <i>Journal of Surgical Oncology</i> ¹⁸	31 patients Breslow thickness 0.3-7.0 mm	28	3	0/3 patients treated with cartilage-preserving surgery had local recurrences compared with 7% of those in whom the cartilage was excised during a mean follow-up of 7 years
Pockaj et al. ⁹ , <i>Annals of Surgical Oncology</i> ¹⁹	78 patients aged 23-87 years (68 males) Breslow thickness 0.2-7.0 mm	71	7	None of the seven patients treated with cartilage-preserving surgery had local recurrences compared with 13% of those in whom the cartilage was excised during a mean follow-up of 7 years Overall 5-year survival rate was 65% 0/10 positive SLNBs; 7/19 positive elective lymph node dissections; 2/2 positive therapeutic lymph node dissections
Sartore et al. ¹⁰ , <i>European Archives of Oto-Rhino-Laryngology</i> ²⁰	9 patients, 8 males aged 42-75 years and a 37 year old female patient	7	2	6.3 year median follow-up Neither of cartilage-preserving patients had local recurrence One distant recurrence in a patient who had cartilage excision No histological evidence of perichondrial invasion
Thuile et al. ¹² <i>Journal of the German Society of Dermatology</i> ¹²	32 patients had cartilage-preserving surgery for various skin tumours and reconstruction with STSG	0	Three melanoma patients; other patients had non-melanoma skin cancer	No recurrence across 39 months, 12 months (melanoma in situ) and 44 months (melanoma in situ).

significant differences between recurrence rates (local, in-transit, nodal or distant), mean excision margins, 5 year melanoma-specific survival and 10 year melanoma-specific survival rates among those who underwent composite excisions or cartilage-preserving surgery (Table 3).

We observed one local recurrence, which occurred in a patient with a 2.00mm thick, ulcerated, nodular melanoma. The patient underwent composite excision of the skin and the cartilage with narrower (approximately 1 cm) margins. The tumour recurred in the scar 26 months later, thus requiring further surgery.

Residual melanoma was detected in a total of five wide excision specimens. Three of these specimens were described pathologically as containing microsatellites or in-transit disease, and the other two were described as in-

complete excisions. There was no evidence of perichondrial involvement in any of our cases.

Of the patients undergoing cartilage-sparing surgery, 17 (59%) had reconstruction with FTSG and eight had reconstruction with a local flap (28%). We had no cases of flap or graft failure.

Discussion

Our cohort of patients with external ear melanoma demonstrates a male preponderance with a low SLNB-positivity rate and a favourable prognosis compared with melanoma at other body sites.²¹⁻²³

By using our search strategy (Table 1), we found only three studies directly comparing cartilage-preserving

Table 3. Comparison of composite excision and cartilage-sparing excision. No differences reached statistical significance. SSMM: superficial spreading malignant melanoma; SLNB: sentinel lymph node biopsy.

	Composite excision (n = 11)	Cartilage-sparing excision (n = 29)
Mean age (years)	58.4	59.0
Male Patients	7 (64%)	22 (76%)
SSMM classification	6 (60%; 1 tumour not classified)	12 (46%; 3 tumours not classified)
Nodular classification	4 (40%; 1 tumour not classified)	10 (38%; 3 tumours not classified)
Mean Breslow thickness (mm)	2.24	2.08
Ulceration present	4 (36%)	11 (38%)
Mitotic rate $\geq 1/\text{mm}^2$	5 (100%; 6 mitotic rates not recorded)	25 (100%; 4 mitotic rates not recorded)
Mean excision margins (cm)	1.3	1.4
Positive SLNB	2 (18%)	2 (7%)
Local recurrences	1 (9%)	0 (0%)
In-transit cutaneous recurrences	0 (0%)	3 (10%)
Regional lymph node recurrences	0 (0%)	0 (0%)
Distant recurrences	0 (0%)	2 (7%)
5-year melanoma-specific survival rate	8/8 (100%)	7/8 (88%)
10-year melanoma-specific survival rate	1/1 (100%)	5/6 (83%)

surgery with composite excisions of external ear melanoma scars.⁸⁻¹⁰ All these studies favour cartilage-preserving surgery compared to composite excision, and there is no suggestion in the literature that sparing cartilage increases the risk of local recurrence.

In 2012, Craig et al. published a study of 51 histology specimens following WLE of external ear melanoma scars. They found no evidence of perichondral involvement in their specimens and concluded that the perichondrium forms a barrier to prevent the local spread of auricular melanoma.¹⁷ Our study (the largest series of cartilage-conserving excisions of auricular melanoma scars to date) supports these findings. Local recurrence occurred in only one patient who had undergone composite excision of the skin and the cartilage. All residual melanoma was found in the dermis with no perichondrial involvement.

Excision margins are a source of contention amongst melanoma surgeons, with randomised controlled trials both supporting¹⁸ and refuting¹⁹ the safety of narrow margins. A multinational phase III clinical trial is underway to specifically compare the safety of 1 cm vs 2 cm excision margins.²⁰ The width of excision margins around tumours of the auricle is of particular concern, as even a small amount of excess tissue resection can have a significant impact on form and function. Our practice has been to exert clinical judgement when planning resections on a case-by-case basis, with a tendency towards conservative margins.

Many reconstructive options have been described following the excision of auricular tumours.¹ The majority of our patients have FTSGs onto the perichondrium, which we find that it provides a robust reconstruction with excellent cosmetic outcomes.

Conclusion

We present a 17 year, single-centre experience of treating melanoma of the external ear. Our cohort of patients is predominantly male, with a low SLNB-positivity rate and good long-term survival statistics. The majority of our patients have been treated with cartilage-preserving surgery and FTSGs, without any local recurrences or evidence of perichondral tumour invasion. The practice of cartilage-preserving surgery is gaining popularity as studies like ours demonstrate its safety.

Conflict of interest, ethical approval and funding

The authors declare no conflict of interest. Neither funding nor ethical approval was required for this retrospective study.

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