Received: 18 November 2022 | Accepted: 24 February 2023

DOI: 10.1111/jdv.19051

JEADV JOURNAL OF THE EUROPEAN ACADEMY OF DERMATOLOGY & VENEREOLOGY

ORIGINAL ARTICLE

Similar local recurrence and survival in patients with T1 radial growth phase melanoma on head and neck treated with 5 or 10 mm margins: A retrospective study

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Funding information
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Abstract

Background: Melanoma guidelines recommend surgical excision with 10 mm margins for T1 melanomas (invasive melanomas with Breslow thickness ≤1 mm), including those in radial growth phase, which are without metastatic potential; however, such margins may be problematic on head-and-neck.

Objective: We compared outcomes of wide (10 mm margins) versus narrow (5 mm margins) excisions in patients with radial growth phase T1 melanoma on head-and-neck including face.

Methods: We retrospectively examined 610 consecutive patients excised with wide versus narrow margins, from 2001 to 2018, at six European centres. In all cases, radial growth phase, and clear margins with 5 or 10 mm of clearance, were ascertained histologically. Multivariable models investigated associations of margins and other factors with overall survival and local recurrence.

Results: Three hundred and sixteen (51.8%) patients received wide excision, 219 (69.3%) with primary wound closure, 97 (30.7%) with reconstruction; 294 (48.2%) patients received narrow excision, 264 (89.8%) with primary wound closure, 30 (10.2%) with reconstruction ($p < 0.001$). Median follow-ups were 88 months (wide) and 187 months (narrow) (inter-quartile ranges 43–133 and 79–206, respectively). Ten-year overall survival (95% confidence interval) was 96.7% (94.2%–99.3%) in wide and 98.2% (96.4%–100%) in narrow patients. Ten-year local recurrence incidence was 6.4% (4.1%–10.1%) in wide and 7.8% (5.3%–11.6%) in narrow groups. Lentigo maligna melanoma subtype appeared associated with increased risk of local recurrence in narrow versus wide patients (15.0% vs. 7.5%; $p = 0.190$).
Conclusions: Narrower excision margins for T1 radial growth phase melanoma are not associated with worse overall survival (hazard ratio 0.97, $p = 0.996$) or increased local recurrence (subdistribution hazard ratio: 0.87; $p = 0.751$) compared to wider margins, and may be safely applied to such lesions, although caution may be required in the presence of lentigo maligna melanoma.

INTRODUCTION

Thin melanomas (T1, Breslow thickness ≤1 mm) constitute nearly 70% of newly diagnosed cutaneous melanomas: standard treatment is wide local excision (WLE) with 10 mm margins[1–3] and outcomes are excellent.[4] A large proportion of primary T1 melanomas is diagnosed in radial growth phase (RGP) – a histologically determined early disease stage, according to the stepwise model of Clark et al.,[5–8] in which melanoma cell proliferation is mainly confined to the epidermis, although the papillary or, rarely, the superficial reticular dermis may be invaded by small clusters of non-proliferating cells, unable to metastasize.[9,10]

In the subsequent vertical growth phase (VGP), the melanoma cells expand into the dermis, and have the potential to metastasize.[11,12] The differing behaviours of RGP versus VGP melanomas[6–12] reflect differences in patient outcomes[13] with consequences for treatment planning.

As regards the width of surgical margins for thin melanomas, a clinical trial conducted by the World Health Organization that evaluated 612 patients with invasive melanoma <2 mm thick, randomized to excision with either 1 cm or with 3 cm margins,[14] found no differences in regional nodal involvement, distant metastases, disease-free survival (DFS) or overall survival (OS) between the groups.[15]

Current melanoma guidelines[1–3] reaffirm a WLE with 10 mm margins for T1 melanomas. However, no studies have evaluated growth phase in relation to surgical margins,[14,15] and current guidelines do not indicate whether growth phase affects the adequacy of margins.[1–3] A WLE with 10 mm margins cannot always be performed on the face and other parts of the head and neck. Furthermore, patients with melanoma at such a site, and candidates for WLE with 10 mm margins, may decline the procedure after being informed of potential side effects, such as scarring or other cosmetic problems, and functional compromise. The guidelines[1–3] acknowledge these difficulties by noting that final surgical margins may vary depending on lesion location and functional or cosmetic considerations. However, it is important to investigate whether a narrower WLE is oncologically safe.

In the present study our primary aim was to investigate whether a narrower (5 mm) WLE, is oncologically safe in patients with T1 melanomas in RGP on the head and neck including face. We retrospectively assessed patients who declined WLE with a 10 mm margin, preferring to accept a 5 mm margin instead, and compared outcomes in these two groups. We confined our attention to T1 melanomas in RGP, since the clinical behaviour of melanoma in RGP may be similar to that of in situ melanoma, for which a WLE of 5 mm is acceptable.[1] Our secondary aim was to compare the need for reconstructive surgery in the two groups.

METHODS

Seven hundred and five patients aged ≥18 years, with localized T1 primary cutaneous melanoma in RGP on the head and neck including face, consecutively treated between 2001 and 2018, were considered for study inclusion. Patients were diagnosed and treated at the Istituto Nazionale dei Tumori, Milan, Italy; Queen Mary University, London, United Kingdom; the University Hospitals of Brescia, Genoa, and Modena, all in Italy; and the Istituto Oncologico Svizzera Italiana, Bellinzona, Switzerland.

Fifty-two (7.4%) cases had missing data and were excluded; 17 (2.4%) cases with a history of other invasive cancer (other than basal cell carcinoma) and 7 (1.0%) primary mucosal melanomas were also excluded. A further 19 cases (2.7%) were excluded as they had incomplete excision margins after WLE (including cases with melanocytic atypia at resection margins). Thus 610 patients were included in the study. The following were retrieved from the prospectively maintained databases: age, sex, site, melanoma subtype, Breslow thickness, Clark level, tumour-infiltrating lymphocytes, and regression.

All slides were reviewed by pathologists according to a common protocol.[16] The diagnosis and staging of all cases were revised according to the eighth edition of the American

Joint Committee on Cancer (AJCC) Cancer Staging Manual.[17] Patients received an initial diagnostic excision. After histologic confirmation of T1 RGP melanoma, patients who accepted the surgical procedure recommended by the then-current guidelines,[18–22] underwent WLE to achieve histologically determined lateral margins of 10 mm, with preservation of the deep muscular fascia.[18–22] Patients who declined the standard procedure[18–22] underwent WLE to achieve histologically determined lateral margins of 5 mm, again with preservation of the deep muscular fascia.

Surgery was only performed after discussing benefits and risks with the patient, and obtaining informed consent. Patients whose final WLE margins were 5 mm, constituted the narrow group; those whose final WLE margins were 10 mm constituted the wide group. After WLE, patients were followed by physicians of the melanoma units involved in the study, according to a predefined protocol (every 6 months for the first 5 years, and once a year for the following 5 years). Recurrences subsequent to definitive surgery were classified as local if they developed within the primary scar; regional if they were satellites, in-transit metastases, or occurred in regional lymph nodes; and distant if non-regional skin, subcutaneous, nodal or visceral metastases developed. The study was conducted in accordance with applicable laws, regulations and guidelines for the protection of human subjects.

Statistical methods

The primary aims of the study were to compare OS, DFS and crude cumulative incidence of local recurrence (CCI of LR), between the wide and narrow groups, all assessed from the date of diagnosis. OS was time to death for any cause. DFS was time to recurrence or death, whichever occurred first. OS and DFS curves were estimated using the Kaplan–Meier method and compared using the log-rank test. The CCI of LR was estimated in a competing risk setting, with regional relapse, distant relapse, and death considered as competing events; CCI curves were compared using the Grey test.

The secondary study aim was to compare the need for reconstructive surgery in the two groups: associations between the requirement for reconstruction and each group were assessed with a logistic model that estimated odds ratios (OR) compared by the Wald test.

General and clinicopathological differences between the groups and centres were assessed by standardized mean difference (SMD).[23,24] SMD, a measure of the magnitude of mean differences, takes continuous values from 0 to infinity: the higher the SMD the greater the difference. An SMD of around 0.3 is considered to indicate a possible between-group imbalance, however the clinical relevance of SMDs also needs to be assessed.

Associations between margin group, a priori selected clinicopathological characteristics, and outcomes, were assessed by Cox (OS, DFS) and Fine and Grey (CCI of LR) univariable and multivariable models. The multivariable LR model included width of excision margins, melanoma subtype, Breslow thickness, and Clark level. The multivariable Cox models additionally included tumour-infiltrating lymphocytes, and regression. Treating centre was modelled as a random effect. Continuous variables were modelled using three-knot restricted cubic splines to obtain a flexible fit.[25]

Median follow-up was estimated from OS data using the reverse Kaplan–Meier method.[26] The analyses were conducted using SAS version 9.2 and R software.[27]

RESULTS

Margins, tumour characteristics and wound closure

All patients underwent an initial excisional biopsy followed by one or more WLEs: 316 (51.8%) received a WLE with median 9.7 mm margins (range 8.2–10.8 mm; interquartile range [IQR]: 9.2–10.4 mm) and 294 (48.2%) received WLE with median 4.6 mm margins (range 3.3–5.7 mm; IQR: 4.1–5.2 mm). In 127/610 (20.8%) cases more than one re-excision was performed to achieve a histological margin of 5 or 10 mm, 59/316 (18.7%) in the wide group and 68/294 (23.1%) in the narrow group.

The characteristics of the two groups are summarized in Table 1. Overall, 53.9% patients were female. The most common (79.2%) subtype was superficial spreading melanoma (SSM). Mean Breslow thickness was 0.3 mm (range 0.2–0.4 mm). Tumour-infiltrating lymphocytes were absent in 84.8%, non-brisk in 12.1% and brisk in 3.1% of cases. Patients in the wide group were slightly older (49 vs. 45 years, SMD 0.467); had lower Breslow thickness (0.3 vs. 0.4, SMD 0.792), less often had Clark level III (1.3% vs. 11.2%, SMD 0.421), and less often had regression (3.8% vs. 12.2%, SMD 0.315). The SMD of 0.792 for Breslow thickness and SMD of 0.421 for Clark level suggest that the wide margin group has slightly more favourable prognostic characteristics: this might be important only if our study indicated that outcomes in the narrow margin group were inferior to those in the wide margin group.

Of the 316 patients in the wide group, 219 (69.3%) received primary wound closure and 97 (30.7%) required reconstruction with skin graft or flaps. Of the 294 patients in the narrow group 264 (89.8%) received primary wound closure and 30 (10.2%) required a skin graft or flaps. The difference in reconstruction frequency between the groups was significant (5 vs. 10 mm: odds ratio 0.26; 95% CI: 0.16–0.40; $p < 0.001$).

Survival, local recurrence and second primaries

After median follow-ups of 88 months (1st and 3rd quartiles 43–133) and 187 months (1st and 3rd quartiles 79–206) in the wide and narrow groups, respectively, 10-year OS was 96.7% (95% confidence interval, CI, 94.2–99.3) and 98.2% (95% CI 96.4–100; $p = 0.087$), respectively; DFS was 89.6% (95% CI 85.8–93.6) and 89.3% (95% CI 85.7–93.0; $p = 0.921$), respectively; and CCI of LR was 6.4% (95% CI 4.1–10.1) and 7.8% (95% CI 5.3–11.6; $p = 0.563$) respectively (Figure 1).

TABLE 1 Clinicopathological characteristics of the 610 patients with T1 melanoma in RGP on head and face according to the width of excision margins.

	Overall	10 mm margin	5 mm margin	
	N = 610 (%)	*N* = 316 (%)	*N* = 294 (%)	SMD
Sex, *N* (%)				0.007
Female	329 (53.9)	171 (54.1)	158 (53.7)	
Male	281 (46.1)	145 (45.9)	136 (46.3)	
Age (years)				0.467
Median (1st and 3rd quartile)	46.5 (38.2–57.6)	49 (40–62)	45 (36.6–52.9)	
Mean (95% confidence interval)	47.7 (46.7–48.7)	50.5 (49.0–52.0)	44.7 (43.4–46.0)	
Centre, *N* (%)				
INT, Milan, Italy	428 (70.2)	215 (68.0)	213 (72.4)	0.803
IOSI, Bellinzona, Switzerland	8 (1.3)	5 (1.6)	3 (1.0)	
QMU, London, UK	24 (3.9)	18 (5.7)	6 (2.0)	
University Hospital of Brescia, Italy	44 (7.2)	23 (7.3)	21 (7.1)	
University Hospital of Genoa, Italy	50 (8.2)	26 (8.2)	24 (8.2)	
University Hospital of Modena, Italy	56 (9.2)	29 (9.2)	27 (9.2)	
Subtype				0.020
Lentigo maligna melanoma	127 (20.8)	67 (21.2)	60 (20.4)	
Superficial spreading melanoma	483 (79.2)	249 (78.8)	234 (79.6)	
Breslow thickness (mm)				0.792
Median (1st and 3rd quartile)	0.3 (0.2–0.4)	0.3 (0.2–0.3)	0.4 (0.3–0.4)	
Mean (95% confidence interval)	0.32 (0.31–0.33)	0.28 (0.26–0.29)	0.36 (0.35–0.37)	
Clark level, *N* (%)				0.421
II	573 (93.9)	312 (98.7)	261 (88.8)	
III	37 (6.1)	4 (1.3)	33 (11.2)	
Tumour-infiltrating lymphocytes, *N* (%)				0.183
Absent	517 (84.8)	273 (86.4)	244 (83.0)	
Non-brisk	74 (12.1)	38 (12.0)	36 (12.2)	
Brisk	19 (3.1)	5 (1.6)	14 (4.8)	
Regression, *N* (%)				0.315
Absent	562 (92.1)	304 (96.2)	258 (87.8)	
Present	48 (7.9)	12 (3.8)	36 (12.2)	

Abbreviations: INT, Istituto Nazionale dei Tumori; IOSI, Istituto Oncologico Svizzera Italiana; QMU, Queen Mary University; SMD, standardized mean difference.

Analysis of LR differences between the groups according to melanoma subtype (Figure 2) showed that for lentigo maligna melanoma (LMM), the CCI of LR, at both 5 and 10 years (no events after 5 years), was numerically lower (not significant) in the wide compared to the narrow group (7.5%, 95% CI 3.2–17.5 vs. 15%, 95% CI 8.2–27.5; $p = 0.190$).

During follow-up, 16 patients developed in situ melanoma, seven developed T1a melanoma in RGP; eight developed T1a melanoma in VGP, six developed T1b melanoma, and four developed T2a melanoma. In addition, three patients developed two other primary melanomas (in addition to the first): in all three cases the second and third primaries were T1a in RGP and T1b, respectively. None of the patients with multiple melanomas developed regional or distant recurrence during follow up.

Association analyses

The results of the univariable and multivariable Fine and Grey models analysing LR in relation to excision margins, histotype, Breslow thickness and Clark level, are shown in Table 2. Neither excision margin, Breslow thickness, nor Clark level were significantly associated with CCI of LR. For the LMM subtype (against SSM) the subdistribution hazard ratios for LR were 1.90 (95% CI 1.00–3.59; $p = 0.049$) univariable, and 2.03 (95% CI 1.08–3.80; $p = 0.027$) multivariable.

The results of the univariable and multivariable Cox models for OS and DFS are shown in Table 3. In the univariable and multivariable OS models width of excision margins was not associated with OS (HR: 0.91; 95% CI: 0.32–2.61; $p = 0.865$, and HR: 0.97; 95% CI: 0.30–3.12; $p = 0.996$, univariable and multivariable models, respectively). As regards

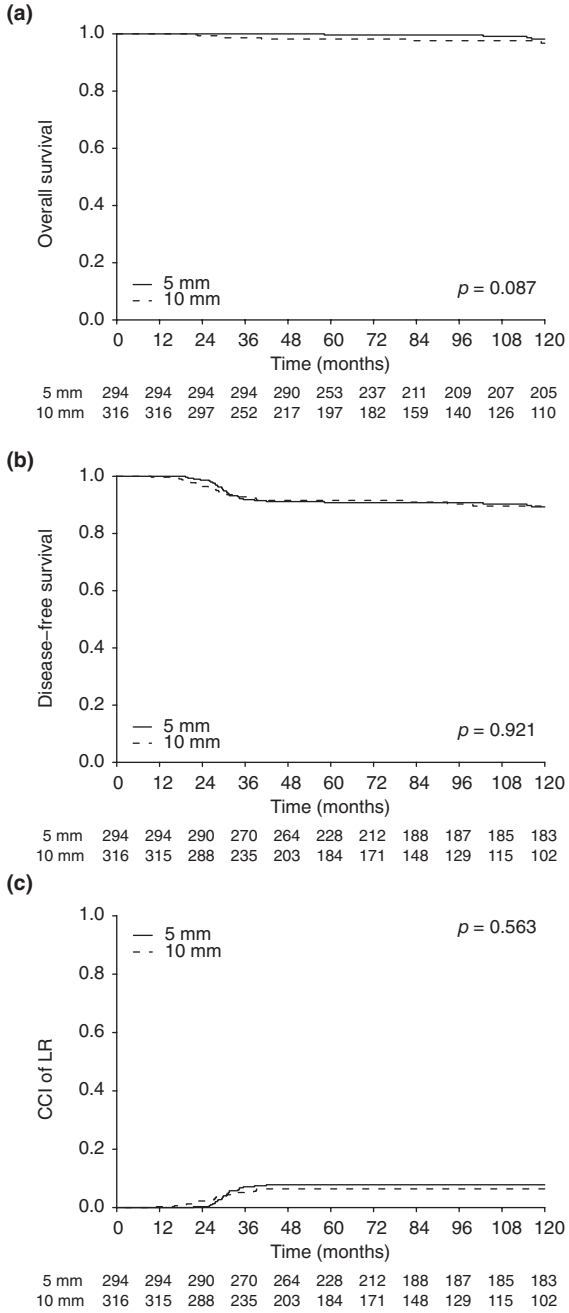

FIGURE 1 (a) Kaplan–Meier curve of overall survival for patients with T1 melanomas in radial growth phase occurring on head and neck, according to width of excision margin (10 vs. 5 mm). (b) Kaplan–Meier curve of disease-free survival for patients with T1 melanomas in radial growth phase occurring on head and neck, according to width of excision margin (10 vs. 5 mm). (c) Kaplan–Meier curve of crude cumulative incidence of local relapse for patients with T1 melanomas in radial growth phase occurring on head and neck, according to width of excision margin (10 vs. 5 mm).

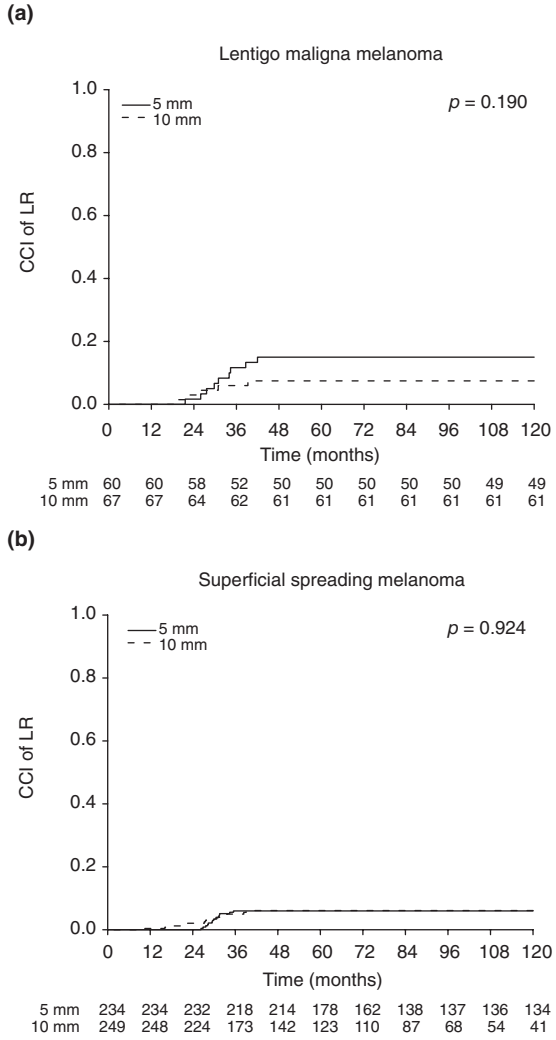

FIGURE 2 (a) Crude cumulative incidence curve of local relapse of lentigo maligna melanoma according to width of excision margin (10 vs. 5 mm). (b) Crude cumulative incidence curve of local relapse for superficial spreading melanoma according to width of excision margin (10 vs. 5 mm).

DFS, by univariable and multivariable models, excision margin width (HR: 1.05; 95% CI: 0.55–2.01; $p = 0.886$, and HR: 0.77; 95% CI: 0.38–1.55; $p = 0.458$, respectively) was not associated with DFS, while higher Breslow thickness (HR: 0.4 vs. 0.2 mm: 2.48; 95% CI: 1.27–4.87; $p = 0.023$ and HR: 2. 81; 95% CI: 1.38–5.73, $p = 0.06317$, respectively) was significantly associated with worse DFS. LMM was associated with worse DFS (HR: 1.82; 95% CI: 1.02–3.23; $p = 0.042$) in the multivariable model only.

Overall there were 41 (6.7%) LRs, including 18 (5.7%) in the wide group and 23 (7.8%) in the narrow group, five (0.8%) regional relapses, including two (0.6%) in the wide group and three (1.0%) in the narrow group, and two (0.3%) distant metastases (both in the wide group and both more than 7 years after primary surgery). There were two melanoma-related deaths: these occurred in the two wide-group patients who developed distant metastases.

DISCUSSION

Our main study finding is that treating primary T1 melanomas in RGP with a WLE of 5 mm margins – instead of the

TABLE 2 Result of univariable and multivariable Fine and Grey models for local relapse.

	Univariable models			Multivariable models		
Covariates	**sHR**	**95% CI**	***p***	**sHR**	**95% CI**	***p***
Width of excision margins			0.811			0.751
5 mm versus 10 mm	1.11	0.48–2.52		0.87	0.36–2.08	
Subtype			0.049			0.027
LMM versus SSM	1.90	1.00–3.59		2.03	1.08–3.80	
Breslow thickness (mm)			0.350			0.227
0.4 versus 0.2	2.09	0.77–5.67		2.28	0.89–5.85	
Clark level			0.645			0.779
III versus II	0.72	0.18–2.89		0.82	0.20–3.31	

Abbreviations: LMM, lentigo maligna melanoma; SSM, superficial spreading melanoma.

10 mm margins recommended by the current guidelines[1–3] – did not significantly affect CCI of LR (HR: 0.87; $p = 0.751$), OS (HR: 0.97; $p = 0.996$), or DFS (HR: 0.77; $p = 0.458$) (Tables 2 and 3), even though the wide group had slightly more favourable prognostic factors than the narrow group (Table 1).

To our knowledge this is the first study to investigate the oncological adequacy of 5 mm margins in a large series of patients with primary T1 melanoma in RGP. In fact few studies have been concerned with thin melanoma in RGP: in general they found that RGP was associated with better outcomes than VGP.[28,29] Rawlani et al.[30] retrospectively examined 5-year recurrence-free survival in a series of 79 primary cutaneous melanomas of the head and neck, of varying Breslow thickness (60% ≤1 mm). Reduced margins were used on melanomas located on or near the face, where use of recommended margins may have increased the risk of functional or cosmetic defect. Reducing excision margins was not associated with increased LR rates and the authors concluded that margins could be safely reduced in melanomas in close proximity to critical head and neck structures.

McKinnon et al.[31] retrospectively analysed 2681 melanomas ≤2 mm thick to investigate whether narrower margins increased the risk of LR or mortality. They found that the risk was small and inversely related to margin width. However when cases with a small margin (<8 mm in fixed tissue, corresponding to <10 mm in vivo) were excluded from the analysis, margin no longer predicted LR, whereas lesion thickness retained its predictive significance. These findings indicate that a small margin (<8 mm in fixed tissue) is associated with increased LR risk (which is nonetheless small); however in this study growth phase was not considered, and thickness could be up to 2 mm, whereas we were concerned only with lesions in RGP up to 0.8 mm thick.

We emphasize that in our study margins were measured on the histological specimens, while some melanoma guidelines[2] refer specifically to clinical margins. The lower limit of the margin range was 8.2 mm in the 10 mm group and 3.3 mm in the 5 mm group. These apparently inadequate histological margins were probably adequate clinically because histological margins are generally smaller than clinical margins because of tissue shrinkage during fixation.[32]

In our cohort all adverse events (mainly LR, because regional relapses and distant metastases were rare) occurred 24 and 36 months after diagnosis. In an analysis of outcomes after LR in 648 melanomas of Breslow thickness <0.75 to >4.0 mm, Dong et al.[33] found that LR generally occurred within the first 2 years, and that most patients recurred by 5 years. However for patients with melanomas <0.75 to 1.5 mm, median disease-free interval was over 2 years, consistent with our findings.

As regards the secondary aim of our study, we found that less than 10% of patients in the narrow group required reconstructive surgery with skin graft or flaps, compared to nearly 30% in the wide group. This difference was significant and suggests that narrower margins can reduce the infection, poor healing, scarring, and psychological problems often reported for excisions on the face or close to other critical structures.[30] Lau et al.[34] investigated a series of stage IA melanomas, diagnosed according to AJCC 2009[35] and treated with standard 10 mm margins. They found that postoperative morbidities were self-reported in 25% of patients. This rather high proportion suggested that the need for 10 mm excision margins should be re-evaluated, particularly when the lesion is close to critical structures on the head and neck. For similar reasons, the 2009 Cochrane review suggested that a trial comparing 5 mm with 10 mm excision margins for facial melanomas would be useful.[36]

Although we found that melanoma subtype was not significantly associated with risk of LR, it is noteworthy that among patients with LMM, those with narrow margins had 15% CCI of LR at 10 years compared to 7.5% in the wide group (Figure 2). This difference was not significant ($p = 0.190$). Dong et al.[33] also found that all subtypes (including LMM) had similar median times to LR, consistent with our findings. However, in their large case–control (LR-no LR) study of T1 melanomas, MacKenzie Ross et al.[37] found that higher LR was significantly associated with LMM, as well as with desmoplastic melanoma (DM), ALM, and other melanomas mainly composed of spindle cells. In the review of Chen et al.[38] DM, an uncommon subtype, was also found associated with a significantly higher LR rate than other melanoma subtypes, and resection with greater than 10 mm margins significantly

TABLE 3 Results of univariable and multivariable Cox models for overall and disease-free survival.

	Overall survival						Disease-free survival					
	Univariable models			Multivariable model			Univariable models			Multivariable model		
Covariates	**HR**	**95% CI**	***p***	**HR**	**95% CI**	***p***	**HR**	**95% CI**	***p***	**HR**	**95% CI**	***p***
Excision margin widths			0.865			0.996			0.886			0.458
5 versus 10 mm	0.91	0.32–2.61		0.97	0.30–3.12		1.05	0.55–2.01		0.77	0.38–1.55	
Subtype			0.568			0.984			0.130			0.042
LMM versus SSM	0.72	0.23–2.25		1.01	0.29–3.54		1.53	0.88–2.64		1.82	1.02–3.23	
Breslow thickness (mm)			0.286			0.270			0.023			0.017
0.4 versus 0.2	3.03	0.76–12.06		2.43	0.52–11.38		2.48	1.27–4.87		2.81	1.38–5.73	
Tumour-infiltrating lymphocytes			0.810			0.478			0.439			0.518
Non-brisk versus Absent	0.95	0.21–4.20		1.08	0.23–4.95		0.63	0.25–1.59		0.60	0.23–1.52	
Brisk versus Absent	1.93	0.25–14.81		4.97	0.37–44.54		1.60	0.49–5.19		1.18	0.29–4.85	
Clark level			0.678			0.537			0.896			0.955
III versus II	0.65	0.09–4.96		0.51	0.06–4.37		0.93	0.34–2.59		1.03	0.35–3.02	
Regression			0.578			0.552			0.324			0.936
Present vs Absent	1.52	0.35–6.72		0.52	0.06–4.45		1.50	0.67–3.34		0.96	0.40–2.31	

Abbreviations: LMM, lentigo maligna melanoma; SSM, superficial spreading melanoma.

predicted survival irrespective of tumour thickness.[38] These studies[37,38] were not specifically concerned with T1 melanomas in RGP; nevertheless in combination with our findings, they suggest that reduced excisions for melanoma subtypes associated with a higher LR are potentially inadequate. Our series included no ALM or DM, consistent with the fact that, for various reasons, these subtypes are rarely diagnosed at an early stage.[39,40]

In the multivariable models for DFS applied to our series, the only variables associated with this outcome were Breslow thickness and melanoma subtype. As regards OS, no significant association was found either in the univariable or multivariable models (the latter characterized by very low number of events).

The main strengths of the study are that it comprised a large series of patients recruited from several Italian, Swiss and UK specialist melanoma centres, and that follow-up was long. Limitations are that it is retrospective, and that the wide and narrow groups were defined by patient decisions to accept or refuse, respectively, the guideline recommendations that excisions be wide. Because of this bias, it is possible, particularly in terms of the strength of physician accounts of the possible aesthetic and functional sequelae of wide excision. Another limitation is that the histopathological review was not centralized, although all the slides were reviewed according to a common protocol.[16]

To conclude, our data indicate that WLE with narrow (5 mm) margins in primary T1 melanomas of the head and neck in RGP is not associated with worsened outcomes, and is associated with significantly fewer reconstructive surgeries. Nevertheless, full discussion with the patient is essential before narrower margins are applied, and caution is warranted in the presence of LMM. Our findings may be useful for future melanoma treatment guidelines.

ACKNOWLEDGEMENTS

The authors thank Don Ward for help with the English, and Elena Morittu and Antonio Florita for editorial assistance. The authors also gratefully acknowledge the financial support of the Emme Rouge no-profit Foundation.

FUNDING INFORMATION

The Emme Rouge no-profit Foundation provided financial support for this study.

CONFLICT OF INTEREST STATEMENT

Andrea Maurichi, Francesco Barretta, Roberto Patuzzo, Rosalba Miceli, Gianfranco Gallino, Ilaria Mattavelli, Andrea Leva, Catherine Harwood, Daniele Bergamaschi, Tiffanie-Marie Borg, Michal Shimonovitz-Moore, Giuseppe Spadola, Elena Tolomio, Consuelo Barbieri, Paola Queirolo, Ausilia Maria Manganoni, Giovanni Pellacani, Vittoria Espeli, Sandra Leoni-Parvex, Mara Cossa, Alessia Belotti, Barbara Valeri, Umberto Cortinovis, and Mario Santinami declare no conflict of interest. Cristina Mangas declares: Payments or honoraria for lectures, presentations, speaking, manuscript writing and educational events by Novartis, BMS, Sanofi, and Helsinn. Support for travel and attending meetings by Novartis. Participation in Data Safety Monitoring Board or Advisory Board for: Novartis, MSD, BMS, Pierre-Fabre, Amgen, and Immunocore.

DATA AVAILABILITY STATEMENT

Data that support the findings of this study are available on request from the corresponding author [AM] in anonymized format.

ETHICS STATEMENT

The study was conducted in accordance with applicable laws, regulations and guidelines for the protection of human subjects.

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How to cite this article: Maurichi A, Barretta F, Patuzzo R, Miceli R, Gallino G, Mattavelli I, et al. Similar local recurrence and survival in patients with T1 radial growth phase melanoma on head and neck treated with 5 or 10 mm margins: A retrospective study. J Eur Acad Dermatol Venereol. 2023;00:1–9. https://doi.org/10.1111/jdv.19051