

Subungual Melanoma

For a Conservative Approach on the Thumb Scale

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Abstract: Melanoma management requires consideration of both oncologic and reconstructive principles to optimize both the likelihood of cure and quality of life. The plastic surgeon is encountering melanoma management that requires not only oncologic but also reconstructive surgery while considering both esthetic and functional results. Management of acrolentiginous melanoma typically involves the partial amputation of the thumb or the toe, with removal of the distal phalanx and the adjacent interphalangeal joint. The simple partial amputation of the second phalanx, preserving the pulp and the interphalangeal function (joints and tendinous insertions), and a made-to-measure ungual transfer provide excellent functional and esthetic results while maintaining similar oncologic outcomes. This report attempts to clarify the management of melanoma of the thumb.

Key Words: subungual melanoma, thumb, partial toe transfer

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Hand and subungual melanoma management, especially of the thumb that is involved in the pollicidigital key pinch, still remains controversial. The main challenge of this surgery is to obtain satisfying functional and esthetic results while also achieving an optimal oncologic result. Progressively, the management has become more conservative,^{1–3} and currently a proximal amputation of the interphalangeal joint is recommended for subungual melanoma of the thumb.⁴ The purpose of this review is to clarify subungual melanoma of the thumb to be treated with a more conservative approach, thus preserving function while limiting aftereffects for the donor site.

Classic Management

In our institution, subungual melanoma represents 2% of all cutaneous melanomas. This low incidence compared

with the other locations of melanoma is similar to literature data, with this site representing from 1% to 3%.^{6–8} According to the 1999 SOR report (French Guidelines), the excised margins are performed depending on thickness (Breslow) (Table 1). This technique cannot be applied to the toes and fingers, since these locations were excluded from former studies. Thus SOR experts have developed protocols for these specific locations. They recommend a partial amputation of the thumb or the toe, removing the distal phalanx and the adjacent interphalangeal joint. Only prominent lesions or those with in-transit nodules require complete amputation of the finger.⁴ Yet this radical attitude is controversial.

Melanoma Aggressiveness

Melanomas of the extremities tend to be more aggressive. Some report survival rates lower than in other locations.^{9,10} According to Glat et al,¹¹ this is likely due to delayed presentation and therefore higher-stage disease at time of diagnosis and not due to increased aggressiveness of melanoma in these locations. In their study, among 30 patients with ungual melanoma from 1982 to 1995, the average time to diagnosis was 23 months, with an average Breslow of 3.68 mm. Park et al⁷ also estimated a delay of 2 years.

Acrolentiginous melanoma tends to be more aggressive, with an earlier tendency to metastasize (SNC, liver, nodes, and bones) and with a higher mortality rate than other kinds of melanomas. Nevertheless, as Harmelin et al⁹ stated, the first factor of melanoma prognosis is the Breslow stage. There are 2 stages of local melanoma, the first superficial and the second vertical. Superficial growth is associated with low metastatic potential because the vessels are not infiltrated. Consequently, it is the stage and not the histologic type which is more predictive of the prognosis.

Kuchelmeister et al,¹⁰ in their study on 112 melanomas, showed that the 5-year survival rate is worse for acrolentiginous melanoma than for superficial extension melanoma but that there is no significant difference compared with nodular melanoma. However, this article compared histologic subtypes without consideration of the Breslow scale.

Urist et al,¹² in their study on 3445 patients, observed that ungual melanomas have a higher recurrence rate than a melanoma from another location. But again, the depth of invasion was not taken into account. According to Haneke,¹³ the most important prognosis is the thickness; the histologic type is a less significant factor. Thus, poor prognosis is not

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TABLE 1. Excisional Margins According to the Breslow

Breslow (mm)	Excisional Margins (cm)
Intraepidermidis melanoma	0.5
≤1 mm	1
1 mm < Breslow ≤2 mm	1–2
2 mm < Breslow ≤4 mm	2
>4 mm	3

linked to specific location. Acrolentiginous melanomas are often discovered at advanced stages. It is important to take into account the Breslow (scale or score) before estimating the aggressiveness of this melanoma.

The recent modifications of the management of external ear melanomas offer an excellent framework in which to consider a more conservative approach for the thumb. Historically, the surgical treatment of external ear melanoma was the total amputation of the ear.³ This evolved to treatment with only partial ear amputation. A retrospective study on 998 head and neck melanomas has shown that the prognosis for external ear melanoma is the same as for other locations.¹ Narayan and Ariyan³ proposed partial amputation of the ear. Their recurrence rates were identical to the total amputations of the ear. The Breslow scale was again determined to be the most significant prognostic factor. SOR now recommends management according to the Breslow scale, meaning that superficial melanomas will thus be treated by partial excision, given usual margins.

Management Improvement

Treatment is becoming progressively more conservative for the thumb as well. Since the first reported case of subungual melanoma in 1834 by Napoleon's first surgeon, Alexis Boyer, surgical strategy has changed.¹⁴ Transmetacarpal or thumb proximal-joint total amputation had been the rule.¹⁴ In 1992, Park et al⁷ published a report of 100 subungual melanomas followed up for 10 years (1979–1989). They showed no significant differences between a proximal amputation of the interphalangeal and a more proximal one of the thumb (metacarpal or tarsophalangeal) in terms of 5-year survival. In these 100 cases, 45% were acrolentiginous melanomas. Fifty-two were located on the hand, with 31 on the thumb. The average Breslow was the same between the 2 groups (3.7 mm). Heaton et al¹⁵ then showed a survival rate of 9.5 years in 46 subungual melanomas treated with partial amputation.

More recently, studies have justified an even more conservative approach. Effectively, according to Quinn et al¹⁴ in a study of 38 cases of subungual melanomas of the thumb, no significant differences can be found in terms of local recurrent between a thumb interphalangeal proximal amputation and a trans-P2 amputation. In this study, 29 melanomas were discovered at a local ulceration stage, 24 were acrolentiginous melanomas, the average Breslow was 3.05 mm, and none were metastatic at the time of the diagnosis; 22 were discovered at a II stage. Still, according to Quinn et al,¹⁴ it is possible to plan even more distal amputations, ie, distally to the thumb. They even propose excision

without amputation in some cases (in situ melanomas). Ariyan¹⁶ proposed amputation only if the melanoma reached the proximal area of the finger or its distal area, with a more proximal lesion “in transit.” He suggested that in situ or minimally invasive (without specifying specific depth) unguinal melanoma can be treated with partial amputation, preserving the length of the finger. The distal phalanx can be covered with an advanced flap. O’Leary et al,¹⁷ in a study of 93 cases of subungual melanomas, showed that no treatment was superior in terms of local recurrence or survival for in situ melanomas. The 5-mm margin is acceptable. But for higher Breslow, they performed an amputation at the distal interphalangeal joint, but with no proof that it is more beneficial than a distal amputation. In a study of 13 patients, 9 of which had an in situ melanoma, Lazar et al¹⁸ showed that the simple local excision of the unguinal unit with a simple curettage of the periosteum of the dorsal side of the distal phalanx is adequate treatment, with 4 years’ median follow-up.

For years, conservative management of the distal phalanx for in situ melanomas has been a standard of practice. Yet, other studies go even further. Tseng et al⁸ analyzed their data from 1980 to 1994 on 116 melanoma patients (26 fingers, 90 toes) of whom 48 had acrolentiginous melanomas. They compared the local and general recurrence rates between 2 Breslow groups: the first less than 1.5 mm and the second greater than 1.5 mm. The separation of the 2 groups was arbitrarily decided. No local recurrence or metastasis was noticed among the patients who had an acrolentiginous melanoma less than 1.5 mm Breslow and treated with a simple skin excision with a 1-cm negative margin. The authors do not recommend amputation for acrolentiginous melanomas with a Breslow less than 1.5 mm. According to van Aalst et al,¹⁹ in situ melanomas only require a complete excision of the unguinal unit. Invasive melanomas that require, according to the Breslow, 1-cm margins (classic management of other locations) must be amputated distally from the distal interphalangeal joint, and those that require 2-cm margins must be amputated proximally to the distal interphalangeal joint. Moehrle et al⁶ analyzed 62 patients with subungual melanomas staged I or II, of which 34 were located on the long fingers and the thumb (28 on toes). Half (31) had proximal amputation of the distal interphalangeal joint. The other 31 patients had functional surgery, with limited resection of the distal phalanx. Breslow mean was 1.68 mm in the functional group and 2.65 mm in the amputation group. No statistical significant differences could be found between groups in regard to survival (survival mean of 54 months) and recurrence. There is a trend towards a conservative management; however, only few studies with short series are available. Second phalanx conservation in some types of melanomas (in situ or low Breslow) seems interesting because no bone involvement has been described. Skin and subcutaneous tissues only are involved in melanoma, which may allow overall preservation of bone. Mohs technique has recently been used, with the same survival and local recurrence rates as other classic techniques. According to Cook,²⁰ Mohs technique is particularly adapted to unguinal melanoma because finger function is preserved, with the same survival rate. Nevertheless,

the use of this technique is not widespread and requires a histopathologist.

Thumb Reconstruction

The thumb composes 40% of hand function.²¹ Thus, thumb amputation can lead to functional, esthetic, and psychological impairment.^{22,23} After proximal interphalangeal amputation, P1 residual length may be just sufficient to allow pollicidigital key pinch. Because flexion tendon distal insertion has been removed, P1 stump flexion is lost. Importantly, pulp excision leads to critical sensitive impairment. Thus, functional results would be better with a more conservative approach. The aim is to obtain optimal oncologic, as well as functional and esthetic, results. So, dorsal thumb face amputation can be performed; that is to say, unguial unity, second phalanx dorsal part, and unguial bulge. There are 2 reasons for this approach. First, sensitive pulp, as well as joint mobility, can be preserved. Second, made-to-measure toe-to-thumb transfer can be allowed. Ungual reconstruction is still controversial. It depends on many factors, including age, sex, profession, personal motivation, and use of tobacco products. Options include the following:

1. Conducted cicatrization: esthetic and functional results are poor because of the risk of retractile and painful scar.
2. Skin graft: according to Lazar et al,¹⁸ a good choice for unguial reconstruction. Effectively, this is a simple technique with a low morbidity rate. However, it must be used secondarily in unguial thumb reconstruction.
3. Regional flap: cross-finger flap may be performed. Index first phalanx anterior face is used to cover the thumb dorsal face. However, there is always a pulp diminution due to lack of nail contrapressure.¹³ Moreover, this flap is not satisfying for esthetic reconstruction because of the absence of nail. The nail also stabilizes the pulp and plays a role in grip-precision during opposition with the second or third finger.²³ Prosthetic nail-on flap or graft is not satisfying because of the skin/prosthesis interface. Glue irritations and/or intolerance are found, or else the glue may be too weak, leading to a bad fixation. It may be an alternative for a patient who does not want a complicated procedure or who has a contraindication to microsurgery.²⁴
4. Nonvascularized unguial unity transfer is a simple technique performed under local anesthesia. Results are inconsistent, according to Lazar et al.¹⁸ Atrophy and nail deformation are frequent complications of this technique.²⁵ Moreover, vascularized free-transfer results are better in comparison to nonvascularized free transfers (100% versus 50%).^{25,26}
5. Made-to-measure unguial transfer is an attractive procedure. No pulp tissue is removed; only dorsal bone, skin, and unguial apparatus can be removed. The hallux is better than the second toe for thumbnail reconstruction.^{25,27} The bone fragment must be taken on the lateral part of P2 to be interdependent with the pedicle,²⁸ so the exact size of the thumb can be removed. Nail curvature allows diminishing the nail lateral dystrophy according to Foucher.⁵

Ungual apparatus lesions can lead to important psychological consequences. According to Sleilati et al,²⁹ function is the main aim in thumb reconstruction, but purely esthetic concerns are significant as well. Esthetic outcomes require that function has been completely preserved. In their study, they used partial toe transfer with exteriorized pedicle for reconstruction with a 3-week weaning period. This technique can only be performed in motivated young patients aware of the microsurgery risks. Thumb function must not be altered. Moreover, according to the literature, free flaps are not deleterious in case of melanoma and can be performed in the same operating time as the excisional portion of the surgery without compromising the long-term follow-up.^{30–32}

Clinical Example

A 49-year-old right-handed woman was brought to our institute by her dermatologist for management of a subungual melanoma of the right hand. This patient was an administrative assistant with no medical history. She was a nonsmoker. Seven years before the procedure, she had developed unguial pigmentation. Five years later, she presented for evaluation, and a matrix biopsy was performed that revealed a melanocytar hypertrophy. Clinical surveillance was decided upon. Two years later, the lesion continued to change, and an excisional biopsy of the nail was performed (Fig. 1). The pathology revealed an acrolentiginous melanoma with a Breslow at 1.9 mm. The margins were 4 mm laterally and 1 mm in depth. There was no sign of regression or ulceration. Clinically, there was no evidence of nodal or metastatic spread. The patient was very reluctant to undergo an amputation. The medical oncology and surgical committee chose a partial amputation of the second phalanx of the thumb, with a sentinel-node biopsy, followed by immediate reconstruction by a made-to-measure unguial transfer of the homolateral big toe (partial toe transfer).

First, sentinel-node biopsy was performed, with scintigraphic detection according to the usual technique. Two nodes were sent to pathology. Then, the thumb partial amputation was performed (Figs. 2 and 3), removing the dorsal skin 2 cm around the lesion without affecting the pulp. In depth, the second phalanx (P2) dorsal stick was removed without affecting the palmar side, the interphalangeal joint, or the tendon system. Finally, the right big toe was removed



FIGURE 1. Subungual melanoma (margin at 2 cm).



FIGURE 2. Dorsal resection of the second phalanx.



FIGURE 3. Superior view of the resection.

according to the Foucher technique,⁵ taking the unguis unit, a corresponding bone fragment on the lateral edge of P2 and the P2 dorsal skin, as well. It was a long pedicle flap on the foot artery. P2 lateral edge osteotomy was performed after the total sacrifice of P2. This allowed the immediate closure of the donor site. Then the toe was transferred to the receiver site. Fixation was achieved with axial wire and unrotation wire (crossed osteosynthesis). Terminoterminal anastomosis was performed with microscopic approach. The pedis artery was anastomosed with the dorsal vein of the first metacarpal interspace. The dorsal plantar vein was anastomosed with a radial superficial vein. Epiperineural anastomosis was



FIGURE 4. One-year result.

achieved between the lateral plantar collateral nerve of the first toe and ulnar collateral nerve of the thumb. The sentinel lymph nodes were negative, and local excision had a 1 cm negative margin. The tumor was classified IB according to the IUAC (International Union Against Cancer). There was no indication for further removal of axillary lymph nodes or adjunctive treatment.

Postoperative follow-up was normal. She left the hospital 10 days postoperatively. Splints were removed 6 weeks later. There was no evidence of disease recurrence at 3.5 years' follow-up. Functionally and esthetically, the patient was satisfied with the result concerning the donor and the receiver site (Fig. 4).

CONCLUSION

In summary, melanoma management has become increasingly more conservative, with preservation of oncologic outcomes. Interphalangeal proximal amputation is recommended in finger localization, whereas the Breslow scale is used in all other localizations. More conservative therapy seems to be interesting in finger localization of melanoma because it is a skin cancer. Thus, only light bone resection or dorsal bone resection of the second phalanx may be required with local soft tissue excision.

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