Cosmetic light therapies and the risks of atypical pigmented lesions

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Light therapies, including intense pulsed light (IPL) therapy and laser therapy, are increasingly used for elective treatment of pigmented lesions. These treatments are usually well tolerated and might result in reduced risk of scarring compared to treatment with surgical excision. However, the associated risks of treating pigmented lesions with light therapies are debated and not well studied.

Case

A 56-year-old healthy white woman was referred to a dermatologist for evaluation of an atypical pigmented lesion on her left cheek. It began as a dark spot more than 10 years before and was treated as a "sunspot" or solar lentigo (SL) by an aesthetician with 1 session of IPL therapy. The lesion partially faded with treatment, but eventually repigmented, grew, and developed areas of depigmentation in the 6 months before presentation. She had a history of blistering sunburns, indoor and outdoor tanning, and limited sun protection. She had no personal or family history of cutaneous malignancy. On examination, she had fair but photodamaged skin. On her left cheek, there was an irregularly shaped variegated dark brown patch measuring 3.0 cm by 2.0 cm with surrounding depigmentation (**Figure 1**). Dermoscopy results revealed an irregular, annular-granular pigment pattern. There was no regional lymphadenopathy.

The clinical differential diagnosis included lentigo maligna and lentigo maligna melanoma with features of regression. Findings of 2 scouting biopsies of the most atypical areas showed lentigo maligna melanoma on gross and dermoscopic inspection, with the deepest portion having a Breslow thickness of 0.44 mm. The patient underwent an uncomplicated wide local excision with 1-cm margins followed by a cervicofacial advancement flap procedure (**Figure 2**). The pathology findings of the wide local excision did not indicate a more advanced stage of cancer than already determined and the margin findings were negative. She was diagnosed with stage T1aN0M0 melanoma. Based on current guidelines, there was no further investigation or treatment. She has been disease free for 1 year since her diagnosis.

Discussion

Laser therapy is a single wavelength and is a coherent and collimated form of light energy. In contrast, IPL is a polychromatic, noncoherent and noncollimated light with varying pulse durations.[1] The associated risks of treating pigmented lesions with light therapies are debated and not well studied, and several cases of pseudomelanoma, malignant melanoma, and metastatic melanoma identified after light treatment of pigmented lesions have been reported in the literature.[2-7] It is unclear if these lesions represent inappropriate treatment of melanoma with laser therapy or subsequent development of melanoma following light treatment of a benign melanocytic lesion.

Theoretical risks of light therapy include inadvertently treating a melanoma that is misdiagnosed as a benign lesion; incompletely destroying all melanocytes and incurring the possibility of residual cells undergoing

Editor's key points

- Light therapies, such as intense pulsed light therapy and laser therapy, are being used more often for elective treatment of pigmented lesions because of their tolerability and risk reduction of scarring.
- The risks of light therapies are debated and not thoroughly studied. Cases of pseudomelanoma, malignant melanoma, and metastatic melanoma have been identified after light treatment of pigmented lesions, but whether light therapies cause melanoma is yet to be determined.
- A biopsy should be considered in cases where diagnosis is unclear or where repigmentation occurs following light therapy to improve the primary care provider's ability to diagnose and manage pigmented lesions.

Points de repère du rédacteur

- Les luminothérapies, comme la thérapie par lumière intense pulsée et la thérapie au laser, sont de plus en plus utilisées pour le traitement électif des lésions pigmentées, en raison de leur tolérabilité et de la réduction du risque de cicatrices.
- Les risques des luminothérapies font l'objet de débats et ne sont pas étudiés en profondeur. Des cas de pseudomélanomes, de mélanomes malins et de mélanomes métastatiques ont été observés après une luminothérapie pour des lésions pigmentées, mais il reste à déterminer si les luminothérapies causent les mélanomes.
- Une biopsie devrait être envisagée dans les cas où le diagnostic est incertain ou si une pigmentation se produit à nouveau à la suite de la luminothérapie, dans le but d'accroître la capacité des professionnels des soins primaires de poser le diagnostic et de prendre en charge les lésions pigmentées.

Figure 1. Lentigo maligna melanoma affecting the patient's left cheek, with the deepest portion having a Breslow thickness of 0.44 mm

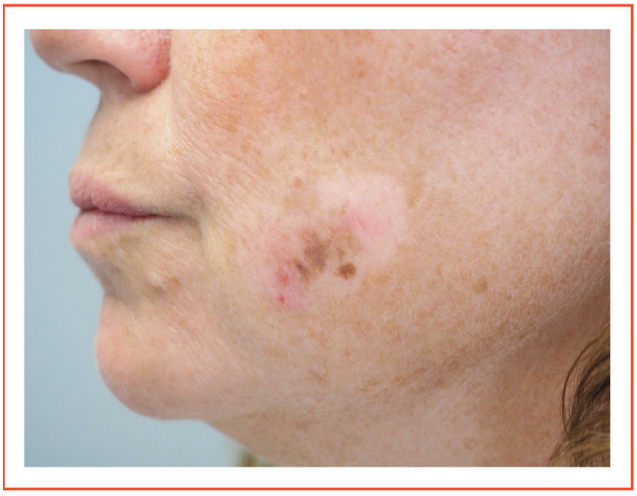
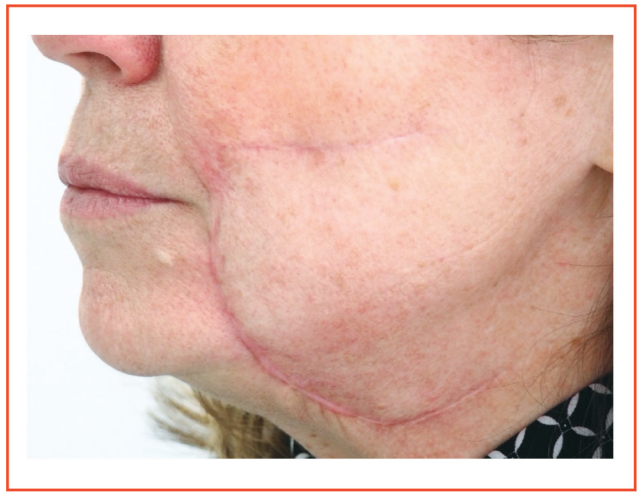


Figure 2. Postoperative cervicofacial advancement flap



malignant transformation; having difficulty with clinical monitoring of the remnant or recurrent lesion; or inducing malignant transformation of melanocytes.

In contrast to excisional biopsy, light therapy does not permit histologic evaluation of pigmented lesions, and therefore does not provide tissue diagnosis or margin assessment. Thus, it is possible that in some case reports that describe melanoma after treatment, subtle melanoma might have been seen if histologic examination was performed before treatment; light therapy in these cases represents an incorrect treatment based on clinical misdiagnosis.[2,3]

Clinical and dermoscopic monitoring of a remnant lesion for melanoma after laser therapy can be also challenging, as light therapy rarely removes all melanocytes. Histologic investigations have shown that even with maximum penetration depth of laser and IPL therapies, residual nests of melanocytes are still left intact.[2,8] These persistent dermal melanocytes can generate recurrent lesions, which can transform into melanoma.[3] A common result of incomplete treatment of melanocytic lesions is pseudomelanoma from proliferation of melanocytes via downregulation of E-cadherin and tumour necrosis factor–□, leading to repigmentation.[4,9] Moreover, at the cellular level, there is an increased expression of tumour suppressor gene p16 and increased cell migration capacity.[5,10] However, in vitro, Hafner et al[11] concluded that laser irradiation did not cause substantial alterations of global gene expression or of genes associated with malignant melanoma. The clinical relevance of these in vitro studies remains to be determined.

In vivo research on laser therapy suggested no malignant degeneration of congenital melanocytic nevi (MN) after use; however, melanocytes persisted in all lesions, especially in the deeper portions of the dermis.[12] Research on IPL therapy is more limited. Sorg et al[13] observed the effect of IPL irradiation on 9 patients. Biopsy results of the area and histologic examination showed no evidence of thymine dimer production—an indicator of DNA damage that is directly linked to skin cancer—among these patients. Similar findings by Chan et al[14] found that histologic analysis of tissue irradiated by laser and IPL therapies after 6 months of treatment showed no signs of toxicity or tumour formation.

To date, there has been no report of true malignant transformation of MN following laser or IPL treatment.[15] However, laser-induced progression of MN to malignant melanoma cannot be excluded with certainty since the time interval between laser therapy and melanoma progression was too short in reviewed studies.[2] Aside from MN, there are several reports of melanoma following laser treatment of lentigo simplex,[2] nevoid lentigo,[16] SL,[6,7] pigmented actinic keratosis,[7] seborrheic keratosis,[6] and other, nonspecified pigmented lesions.[15,17] However, most studies are retrospective and do not specify the original lesion type clinically or histologically. To our knowledge, there have been no reports of true malignant transformation of SL following laser or IPL therapy.

Conclusion

There are well-described risks and benefits associated with light therapy for melanocytic lesions. However, there remains insufficient evidence to support or negate the idea that benign melanocytic lesions transform into melanoma after light therapy. The extent of our patient's surgical intervention might have been minimized if the lesion was assessed by a physician before cosmetic removal consideration. A biopsy should be considered in cases where the diagnosis is unclear or where repigmentation occurs following light therapy. Biopsies have been shown to improve the primary care provider's ability to diagnose and manage pigmented lesions,[18] which is particularly important where dermatologist access in Canada is limited.

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Competing interests
None declared

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