

Line-field Confocal Optical Coherence Tomography (LC-OCT) for Monitoring Tumor Clearance in Basal Cell Carcinoma After Cryotherapy

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Introduction

Line-field confocal optical coherence tomography (LC-OCT) is a noninvasive imaging modality that integrates the principles of reflectance confocal microscopy and optical coherence tomography. This novel technique enables real-time, high-resolution visualization of skin structures, achieving a spatial resolution of approximately 1 μm and a penetration depth reaching up to 500 μm , thereby allowing detailed assessment of both epidermal and dermal layers [1]. Due to these characteristics, LC-OCT has emerged as a valuable tool in dermatology, particularly in the detection and characterization of skin cancers such as basal cell carcinoma (BCC), where it has demonstrated a high sensitivity and specificity

in distinguishing BCC from other cutaneous lesions [2]. While surgical excision is the standard treatment for BCC, cryotherapy represents a minimally invasive alternative for selected cases, especially in patients who refuse or are not suitable candidates for surgery [3]. However, posttreatment monitoring remains crucial to confirm tumor clearance and detect potential recurrence.

Case Presentation

A 54-year-old male with a history of severe childhood burns resulting from a traumatic injury presented with a 0.9 cm pigmented lesion on the right clavicular region. Based on clinical and dermoscopic assessment, the lesion

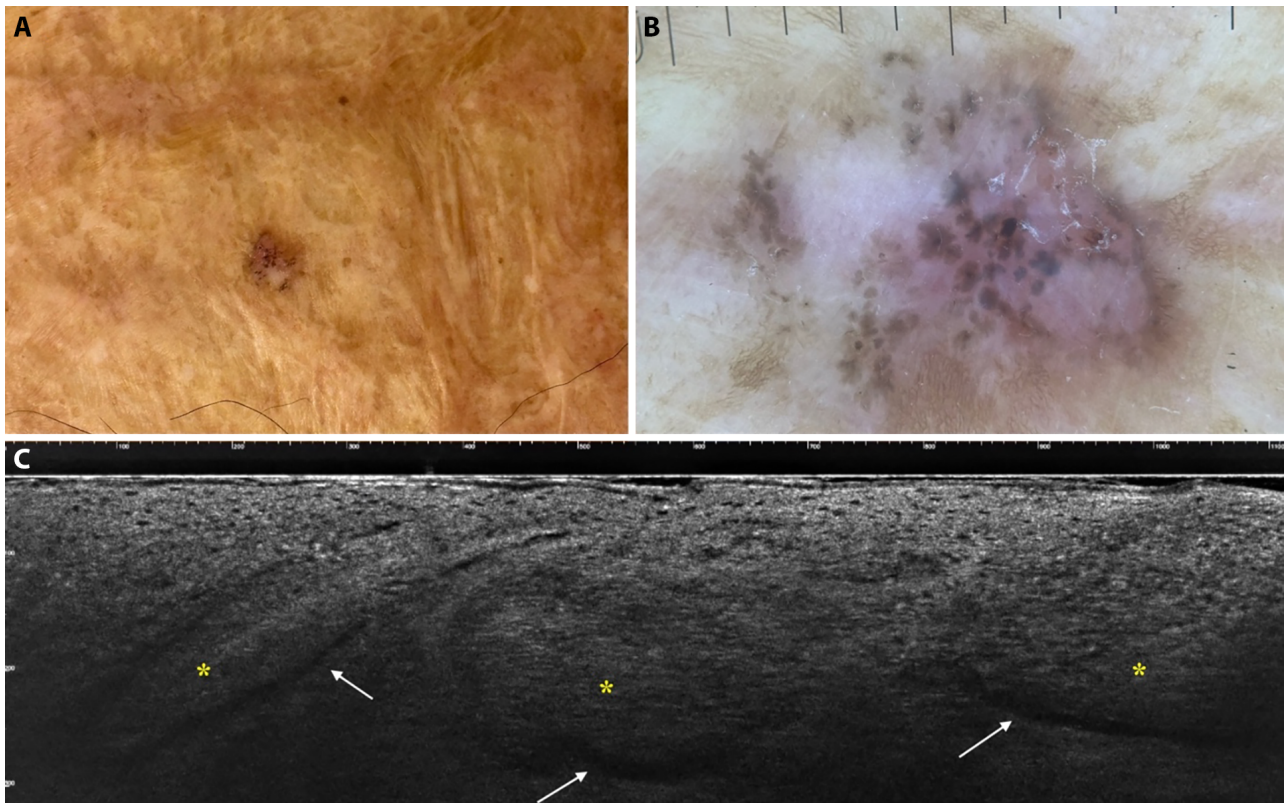


Figure 1. A: Clinical presentation of pigmented lesion located in the right clavicular region arising on skin previously damaged by a childhood burn injury. B: Polarized dermoscopic image shows a 0.9 cm lesion, displaying pink and white structureless areas with on-focus linear vessels and leaf-like structures, consistent with the diagnosis of superficial pigmented BCC. C: LC-OCT examination reveals disruption of the dermal-epidermal junction with the presence of elongated and hemispheric macrolobules (>100 μ m) (yellow asterisks) surrounded by a dark rim (clefing) (white arrows).

was confirmed as a superficial pigmented BCC (Figures 1A–B). LC-OCT showed BCC tumor islands located in the dermis and connected to epidermis (Figure 1C). Given the lesion’s anatomical location and the patient’s preference for a non-surgical treatment option, cryotherapy was selected as the therapeutic modality. The lesion was subjected to two freeze-thaw cycles using liquid nitrogen spray, with the first cycle lasting 15 seconds and the second cycle lasting 10 seconds. Posttreatment evaluation was conducted six months after the procedure through clinical examination (Figure 2A), dermoscopy (Figure 2B), and LC-OCT (Figure 2C). LC-OCT imaging revealed re-epithelialization of the treated area, with no evidence of residual tumor nests or atypical basal cell structures. The epidermal architecture appeared fully restored, and no sign of neoplastic infiltration was observed. The skin healed without significant scarring or pigmentary changes, and no recurrence of the lesion was noted at the six-month follow-up.

Conclusion

The body of literature on LC-OCT in the context of BCC diagnosis is expanding, consistently demonstrating its excellent diagnostic performance. Notably, LC-OCT has shown superior diagnostic accuracy compared to both dermoscopy and reflectance confocal microscopy [4]. While the follow-up of BCCs treated with non-surgical modalities has traditionally relied on clinical evaluation and dermoscopy, LC-OCT has already been successfully employed in the follow-up of superficial BCCs treated with imiquimod 5% cream [5]. To the best of our knowledge, this is the first reported case of BCC treated with cryotherapy and monitored using LC-OCT. This case highlights the utility of LC-OCT in the noninvasive monitoring of BCC following cryotherapy. By enabling precise visualization of epidermal and dermal structures, LC-OCT facilitated the accurate detection of tumor clearance. This non-invasive imaging strategy may reduce the need for repeated biopsies and improve patient comfort during follow-up.

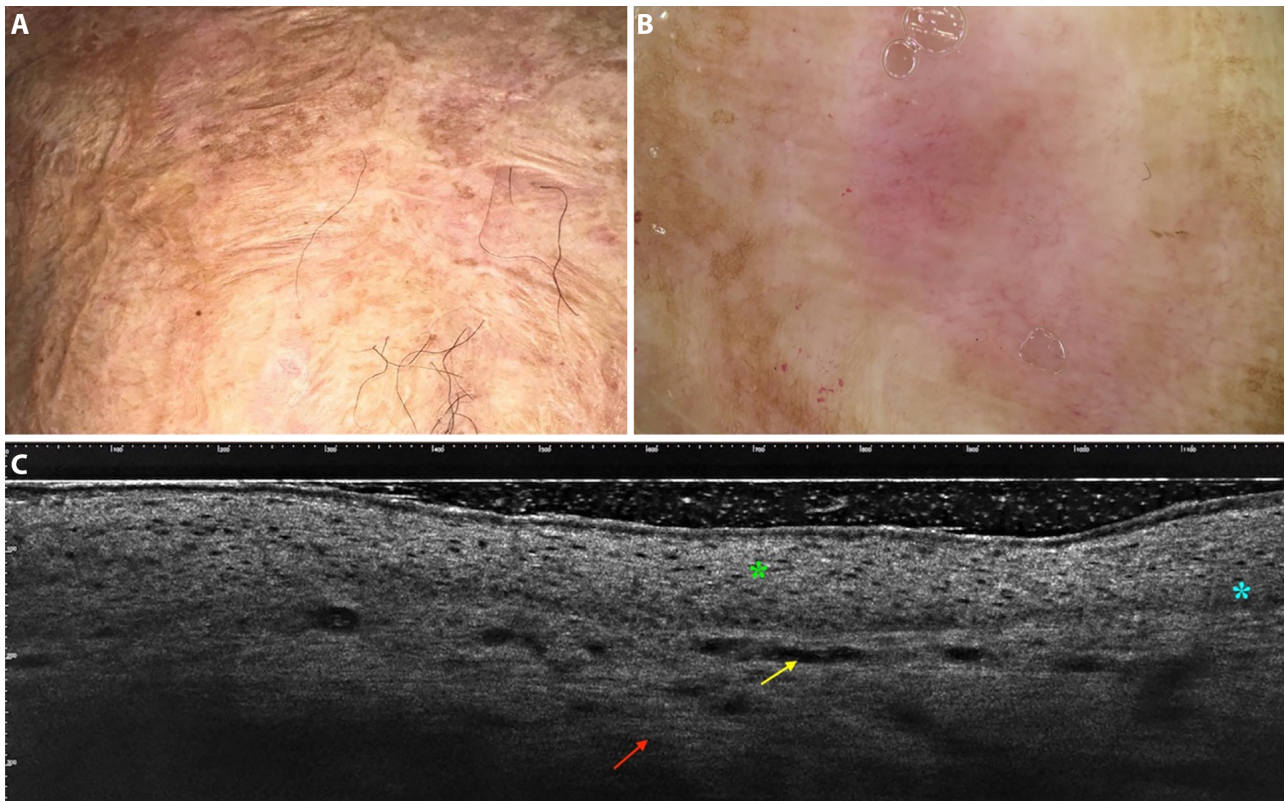


Figure 2. A: Clinical image of the right clavicular region showing complete resolution of the lesion six months after cryotherapy. B: Polarized dermoscopic image of the previously treated BCC six months post-cryotherapy revealing only a scarring area characterized by a white background with dense vascular structures. C: LC-OCT examination demonstrates reconstitution of the epidermis (green asterisk) with a well-defined dermal-epidermal junction (light blue asterisk) and abundant collagen fibers (red arrow) and vessels (yellow arrow) in the dermis, indicative of the healing process following cryotherapy. No lobule, atypical cell, or basal cell carcinoma element is evident.

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