A Recalcitrant Keloid Successfully Treated With CO₂ Laser and Indocyanine Green Photodynamic Therapy

Keloids are overgrowths of fibrotic tissues outside the original boundaries of an injury.1 The authors report a case of a recalcitrant keloid successfully treated with CO₂ laser and photodynamic therapy (PDT) using indocyanine green (ICG).

A 74-year-old man visited the department for a cutaneous lesion with intermittent pruritus on his back. The lesion developed 9 years ago after an epidermal cyst had been excised. On physical examination, the authors observed a 5 × 2 cm, erythematous, firm, and well-demarcated mass on the back (Figure 1A). A skin biopsy from the lesion showed excessive collagen formations with reduced vascularity and cellularity in the dermis. The patient was diagnosed with keloid. He was treated with surgical excision, electrosurgery, and intralesional steroid and 5-fluorouracil therapy. These treatments resulted in a temporary decrease in the keloid volume; however, a few months later, the lesion recurred, with a larger size than the previous one (Figure 1B). Therefore, PDT was initiated. For reducing the size of the bulky lesion and facilitating drug penetration, pretreatment with CO₂ ablation was performed. An ablative CO₂ laser (Sharplan 20 C; Laser Industries, Tel Aviv, Israel) was used at a wavelength of 10,600 nm, 1-mm spot, and a power output of 1 W on the first session, and fractionally, at a low-power output of 0.5 W by rapid side-to-side hand movements in the subsequent sessions. The lesion was applied with 25 mg of ICG (0.2% ICG ointment prepared by mixing a solution with petroleum jelly) in a 1-mm–thick layer and over a 5-mm margin from the lesion; this was covered with an occlusive polyurethane film for 1 hour. Then, it was treated with 2 passes of intense pulsed light (CIPL P-NAIN System; Jeisys Medical Inc., Tokyo, Japan). The parameters were as follows: wavelength of 560 to 800 nm with a 560-nm filter, fluence of 23 J/cm², and 171 pulses in 12 milliseconds per shot. After 6 treatment sessions over 10 months, the cosmetic and clinical responses were excellent (Figure 1C). No recurrence has been observed at 2 years of follow-up.

Keloids do not always respond satisfactorily to current treatment modalities, and recurrence is common even with combination therapy.2 In this case, despite intralesional steroid and 5-fluorouracil therapy, the lesion exhibited recurrence and aggravation a few months later. Photodynamic therapy has been reported to induce collagen-degrading matrix metalloproteinase (MMP)-1 and MMP-3 in dermal fibroblasts, while reducing collagen Type 1 mRNA expression.1,2 Given the patient’s financial concerns, the authors chose the cheapest photosensitizing agent, that is, ICG, for PDT.

Indocyanine green is a water-soluble tricarbocyanine dye with peak spectral absorption at 780 nm. Indocyanine green has been systemically administered to treat Kaposi sarcoma by means of photodynamic mechanisms, and its therapeutic use for vascular lesions has been reported.3 In keloids, the angiogenic imbalance has been previously explored, focusing on circulating and tissue-level expressions of vascular endothelial growth factor and endostatin/collagen XVIII.4 Because of ICG’s known phototoxic effect on fibroblasts,5 the authors hypothesized that PDT with ICG would eradicate the proliferating fibroblasts, affecting the expression of MMPs and cytokines related to angiogenic imbalance in keloids.

Photodynamic therapy using ICG has substantial advantages in treating keloids. It is less painful and can be used to treat widespread areas relatively inexpensively. Photoprotection is not necessary, with its spectral...
absorption in the near-infrared range between 600 and 900 nm. To date, there have been no reports of a keloid successfully treated with CO₂ laser and PDT using ICG. In this case, keloid might be successfully treated with CO₂ ablation temporarily; however, PDT using ICG seemed to have an additional effect on preventing the recurrence of the recalcitrant keloid. Further controlled studies with a large number of patients are needed to evaluate this possible therapeutic effect.

References


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