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Carbon dioxide laser ablation in the treatment of basal cell carcinoma in an elderly female

Yogesh M. Bhingradia¹, Anusuya Sadhasivamohan², Vijayasankar Palaniappan³

¹Department of Dermatology, Shivani Skin Care and Cosmetic Clinic, Surat, Gujarat, ²Department of Dermatology, Ramnad Skin Care, Ramanathapuram, Tamil Nadu, ³Department of Dermatology, Dermatology Venereology and Leprosy, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India.

***Corresponding author:**

Yogesh M. Bhingradia,
Shivani Skin Care and Cosmetic
Clinic, Surat, Gujarat, India.

yogeshbhingradia@gmail.com

Received: 29 November 2024
Accepted: 26 January 2025
Epub Ahead of Print: 10 March 2025
Published:

DOI
10.25259/JCAS_131_2024

Quick Response Code:



A 90-year-old female presented with multiple irregularly pigmented plaques on her cheeks, chin, and forehead accompanied by a single large non-tender ulcer on her left temporal region sized 12 cms × 11 cms [Figure 1a-d]. The lesions had gradually developed over 5 years. Systemic examination revealed no abnormalities. A provisional diagnosis of basal cell carcinoma (BCC) and melanoma was considered. Histopathological examination was suggestive of BCC [Figure 2a and b]. Given her advanced age and comorbidities, surgical excision was deemed unsuitable and

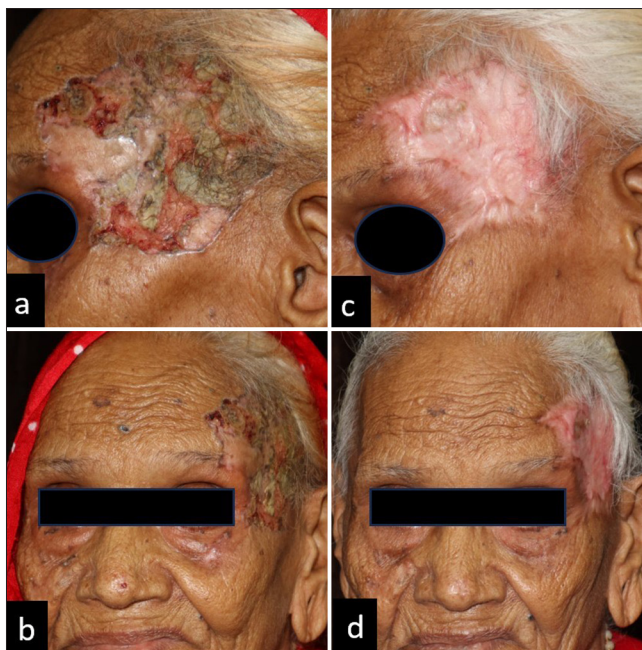


Figure 1: (a) A single large ulcer of 9 × 9cms on the left temporal region showing pigmented, thread-like borders, rolled edges, crusting, and bleeding on the surface. (b) Multiple irregularly pigmented plaques on cheeks, chin and forehead. (c,d) After one session of CO₂ laser ablation using 10,600nm wavelength, 0.7ms pulsewidth, 0.5ms interval and 1 watt power.

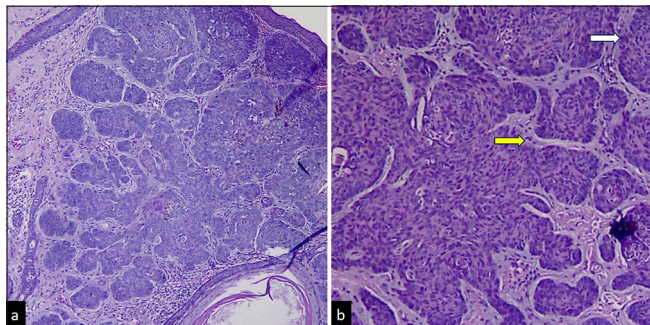


Figure 2: (a) H&E $\times 10$ shows nests of basaloid cells with hyperchromatic nuclei and scant cytoplasm. (b) H&E $\times 40$ shows basaloid tumor cell nests with peripheral palisading pattern (white arrow) and cleft forming from the adjacent tumor stroma (yellow arrow).

superpulsed carbon dioxide (CO₂) laser ablation therapy was considered. A margin of approximately 3 mm of clinically normal-appearing skin surrounding the lesion was ablated to ensure complete removal and reduce the risk of recurrence. Two weeks post-laser, a punch biopsy confirmed complete lesion removal, with histopathology revealing no residual tumor, aligning with clinical findings. The patient has shown complete disease resolution with minimal scarring and has been on regular 3-monthly follow-ups for one year, with no recurrence or residual disease observed.

BCC is a slow-growing, locally invasive tumor with distinctive features in individuals with skin of color. The treatment for BCC with Mohs micrographic surgery is the gold standard for high-risk lesions.¹ Several non-surgical treatments also exist for BCC. Topical agents such as imiquimod and 5-fluorouracil for low-risk superficial BCC, radiotherapy, which is a non-invasive and painless modality requiring multiple sessions, and Hedgehog pathway inhibitors such as vismodegib and sonidegib for advanced or metastatic cases but used with caution in older people. Intralesional therapies such as methotrexate, bleomycin, and interferons cause pain, ulceration, and necrosis, making them less favorable as first-line treatments.^{2,3}

Among minimally invasive options, laser-based therapies such as CO₂, pulsed dye, erbium-yttrium aluminum garnet (YAG), and neodymium-doped yttrium aluminum garnet (Nd-YAG) lasers have shown promising results. CO₂ lasers, in particular, emit long-wave infrared rays that selectively target water as the chromophore, leading to precise tissue destruction while preserving surrounding structures.

The thermal coagulation zone of 80–150 microns ensures adequate hemostasis and minimizes collateral damage. Studies have demonstrated the effectiveness of CO₂ lasers for superficial and nodular BCC with excellent cosmetic outcomes and low recurrence rates.⁴

This case highlights the potential of CO₂ laser ablation as a safe and effective alternative for managing BCC in elderly patients with comorbidities. The procedure offers excellent cosmetic results, minimal complications, and rapid recovery, making it a valuable option when surgical excision is not feasible.

Authors' contributions: Yogesh M. Bhingradia: Concept and design, writing the manuscript, conducting experiments, interpretation of data, providing samples, collecting data. Anusuya Sadhasivamohan: Concept and design, writing the manuscript, conducting experiments, interpretation of data, providing technical assistance, collecting data. Vijayasankar Palaniappan: Concept and design. Writing the manuscript, conducting experiments, interpretation of data, providing technical assistance, collecting data.

Ethical approval: Institutional Review Board approval is not required.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Bhingradia YM, Sadhasivamohan A, Palaniappan V. Carbon dioxide laser ablation in the treatment of basal cell carcinoma in an elderly female. *J Cutan Aesthet Surg*. doi: 10.25259/JCAS_131_2024