



BRIEF REPORT

A Case of Squamous Cell Carcinoma Treated with Photodynamic Therapy with Ablative Carbon Dioxide Fractional Laser

Soo Hyun Kwon, Ji Young Yang, You Chan Kim

Department of Dermatology, Ajou University School of Medicine, Suwon, Korea

Dear Editor:

Surgical excision is the main treatment of cutaneous squamous cell carcinoma (SCC). However, owing to its high incidence in older age groups, some patients may not be suitable for surgery. We report a rare case of invasive SCC treated with methyl aminolevulinic acid photodynamic therapy (MAL-PDT) with ablative CO₂ fractional laser.

An 83-year-old female presented with a 2-year history of an asymptomatic erythematous crusted plaque on the right temple (Fig. 1A). She had undergone laser therapy once,

without a successful outcome. Skin biopsy revealed atypical keratinocytes invading the dermis. The keratinocytes were pleomorphic and hyperchromatic with atypical mitotic figures (Fig. 1B, C). The patient refused to undergo surgery and radiotherapy; thus, she was treated with MAL-PDT with ablative CO₂ fractional laser 3 times, with a 630-nm light-emitting diode at a light dose of 37 J/cm². Ablative CO₂ fractional laser (eCO₂; Lutronic Inc., Seoul, Korea) was performed with 1,000 μm beam size, 30 W peak power, 60 mJ pulse energy, and 100% total density.

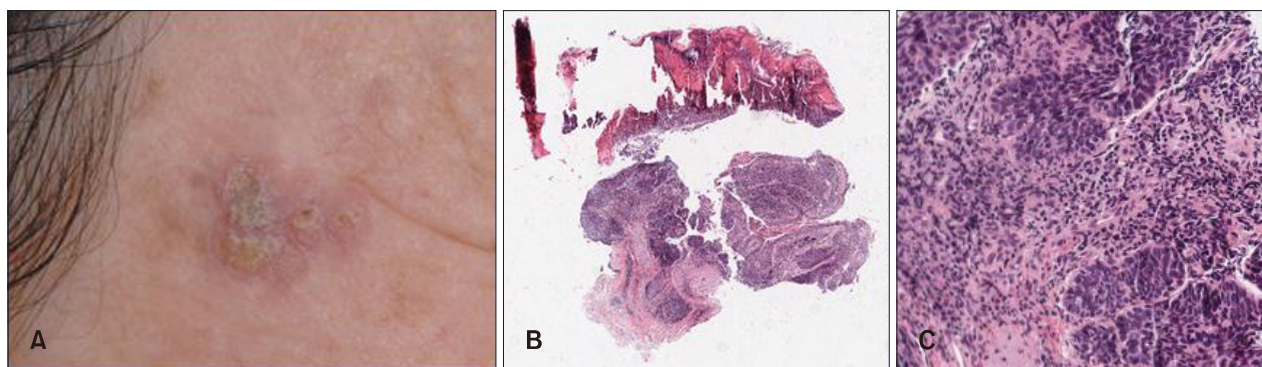


Fig. 1. Clinical and histopathologic features of squamous cell carcinoma (SCC). (A) Erythematous crusted plaque on the right temple. (B, C) Skin biopsy specimen with serous crust and atypical keratinocytes invading the dermis, which led to the diagnosis of invasive SCC (H&E: B, original magnification; C, ×200). We received the patient's consent form about publishing all photographic materials.

Received June 19, 2018, Revised December 14, 2018, Accepted for publication March 25, 2019

Corresponding author: You Chan Kim, Department of Dermatology, Ajou University School of Medicine, 164 WorldCup-ro, Yeongtong-gu, Suwon 16499, Korea. Tel: 82-31-219-5190, Fax: 82-31-219-5189, E-mail: maychan@ajou.ac.kr
ORCID: <https://orcid.org/0000-0003-4840-594X>

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Copyright © The Korean Dermatological Association and The Korean Society for Investigative Dermatology

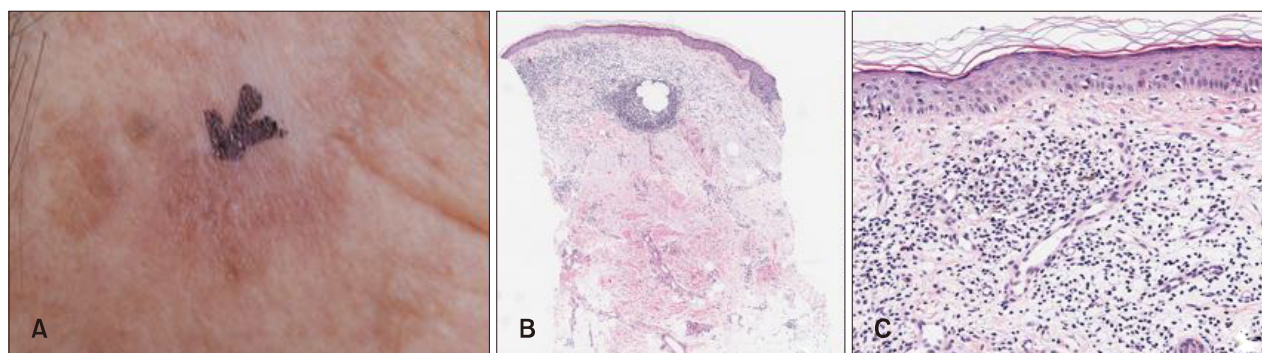


Fig. 2. Clinical and histopathologic features after treatment. (A) Brownish patch on the treated area. (B, C) Skin biopsy specimen revealed no residual tumor (H&E: B, original magnification; C, $\times 100$).

Immediately after ablative CO₂ fractional laser, we applied MAL to the lesion and covered it with occlusive dressing for 2 hours, after which PDT was performed. The second and third sessions were conducted 3 and 7 weeks later, respectively. Two months after the last treatment, a brownish patch remained on the treated area; however, no residual tumor was seen on the skin biopsy (Fig. 2). Two years after the last treatment, we found that there was no recurrence.

Generally, owing to limitations in the ability to treat deep-set disease with local treatment, PDT alone is not recommended for SCC lesions with a potential for regional spread¹. PDT has reduced efficacy for microinvasive and nodular invasive SCC, for which 24-month clearance rates of 57% and 26%, respectively, have been reported². In a systematic review article, after an apparently successful initial response of SCCs to PDT, pooled average recurrence of 26.4% (12.3% to 43.7%; 8 studies) was significantly higher than other treatments³.

PDT with ablative CO₂ fractional laser is more efficacious than conventional MAL-PDT for treating microinvasive SCC lesions⁴. We report a rare case of invasive SCC treated with MAL-PDT with ablative CO₂ fractional laser, without recurrence for 24 months after the last treatment. Ablative fractional laser facilitates the delivery and uptake of topical MAL deep into the skin, enhancing porphyrin synthesis and photodynamic activation⁵. The ablation fraction laser was used intentionally to drill tiny holes, so the tumor mass debulking effect seems to be minimal. In the case of SCC, PDT with ablative CO₂ fractional laser may be particularly useful because of the deep invasion of the lesion. Among patients with SCC who are not suitable for surgery or radiotherapy, MAL-PDT with ablative CO₂ fractional laser might be another noninvasive treatment option. However, this type of treatment should be carefully decided and close follow up is necessary after treatment as

SCC is a disease that can progress to metastasis.

ACKNOWLEDGMENT

This work was supported by the GRRC program of Gyeonggi province (GRRC AJOU2016B04, Photonics-Medical Convergence Technology Research Center).

CONFLICTS OF INTEREST

The authors have nothing to disclose.

ORCID

Soo Hyun Kwon, <https://orcid.org/0000-0002-2336-9770>

Ji Young Yang, <https://orcid.org/0000-0002-2929-0908>

You Chan Kim, <https://orcid.org/0000-0003-4840-594X>

REFERENCES

1. Zhao B, He YY. Recent advances in the prevention and treatment of skin cancer using photodynamic therapy. *Expert Rev Anticancer Ther* 2010;10:1797-1809.
2. Morton C, Szeimies RM, Sidoroff A, Wennberg AM, Basset-Seguín N, Calzavara-Pinton P, et al; European Dermatology Forum. European Dermatology Forum Guidelines on topical photodynamic therapy. *Eur J Dermatol* 2015;25:296-311.
3. Lansbury L, Bath-Hextall F, Perkins W, Stanton W, Leonardi-Bee J. Interventions for non-metastatic squamous cell carcinoma of the skin: systematic review and pooled analysis of observational studies. *BMJ* 2013;347:f6153.
4. Choi SH, Kim KH, Song KH. Effect of methyl aminolevulinate photodynamic therapy with and without ablative fractional laser treatment in patients with microinvasive squamous cell carcinoma: a randomized clinical trial. *JAMA*

Brief Report

Dermatol 2017;153:289-295.

5. Haedersdal M, Katsnelson J, Sakamoto FH, Farinelli WA, Doukas AG, Tam J, et al. Enhanced uptake and photo-

activation of topical methyl aminolevulinate after fractional CO₂ laser pretreatment. *Lasers Surg Med* 2011;43:804-813.