Endpoint Depth When Removing Xanthelasma Using CO₂ Laser Ablation: A Case Report

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The carbon dioxide (CO₂) laser is one of the treatment options used for xanthelasma palpebrarum. However, even if the full dermal layer is removed, the lesion can recur due to the residual lipid deposits. A 44-year-old male patient with xanthelasma on both upper eyelids was treated with a pulsed dye CO₂ laser. On the right upper eyelid, we carried out a CO₂ laser treatment until the yellowish plaque was almost invisible and the full thickness of the dermal layer was removed. On the left upper eyelid, the dermal layer was partially removed and an additional squeezing out of yellowish particles was done. The lesion treated by the squeezing out of lipid droplets showed better long-term results than the lesion treated up to the deeper dermal layer.

Key words

Xanthelasma; CO₂ laser

Received October 1, 2021
Accepted November 2, 2021

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INTRODUCTION

Xanthelasma palpebrarum (xanthelasma) is the most common form of xanthoma and usually occurs around the eyelids.¹ Although xanthelasma has benign features, it is progressive and permanent; thus, it can recur and cause cosmetic problems when it is removed incompletely.¹ Therefore, complete excision is necessary through appropriate treatment for xanthelasma.

Methods to remove xanthelasma include surgical excision; various laser ablations, such as carbon dioxide (CO₂), argon, erbium-doped yttrium-aluminum-garnet (Er:YAG), and pulsed-dye lasers;^{1,2} chemical peeling, and cryosurgery.^{3,4} Surgical treatment can completely remove the lesion; however, there is a possibility of postoperative scarring and complications. On the other hand, laser treatment is relatively simple, though frequent treatment is generally required because the lesion cannot be removed at once.

Among these various laser treatments, CO₂ laser ablation is considered the gold standard treatment for xanthelasma.¹ Various studies have been conducted on scarring, recurrence, and hypopigmentation that occurred after the removal of xanthelasma using a CO₂ laser.^{1,5,6} However, there are no data to date regarding the optimal depth and additional manipulations when treating xanthelasma with a CO₂ laser. Our study was conducted to propose an appropriate treatment modality for xanthelasma by using CO₂ lasers at different depths and with the additional manipulation of both upper eyelids on the same person.

CASE REPORT

A 44-year-old male patient (Fitzpatrick skin phototype III) visited the hospital with a yellowish papular lesion on the medial aspects of each upper eyelid that developed 2 years prior. The papule size spontaneously increased up to 1.5 × 0.5 cm (Fig. 1A). There was no pain or discharge, and there were no signs of infection, such as induration or heating sensation. The patient had no medical history associated with lipid disorders and had not previously undergone laser or surgical treatment for the lesion. Considering this aspect of the lesion, we assumed this lesion to be xanthelasma and planned a treatment for lesion removal using a CO₂ laser.

The whole face was washed with soap, and a eutectic mixture of local anesthetics (EMLA) cream was applied to both upper eyelids for 30 min before laser treatment. A pulsed dye CO₂ laser (Lasun25-Dentalas; Medsun, Seongnam, Korea). It was set at a pulse rate of 90 Hz and a spot

size of 4 mm. To identify the need for additional manipulation and optimal depth in CO₂ laser treatment, different treatment procedures were performed on each eyelid. On the left side, the dermal layer was partially removed, leaving the deep dermal layer. The yellowish plaque was then squeezed out using smooth tooth forceps. On the right side, the full depth of the dermal layer was removed until the yellowish plaque was almost invisible (Fig. 1B).

After the treatment, local pinpoint bleeding was observed on both sides, but hemostasis was achieved after a few seconds of compression. For the post-procedure treatment, both sides were treated using Comfeel® Thin (Coloplast, Humlebaek, Denmark) with daily changes for a week, followed by topical ofloxacin (Tarivid®; PT. Ferron Par Pharmaceuticals, Bekasi Regency, Indonesia) treatment for another week.

The patient came back for a follow-up 1 month after the procedure. The yellowish pigment of xanthelasma faded and was almost visually undetectable on the left side compared to the right side (Fig. 1C). There were no complications, such as scarring or hypopigmentation, on either side during the follow-up period up to 6 months.

DISCUSSION

Xanthelasma is yellowish or orange-colored and as-

Fig. 1. (A) Preoperative findings: Papular lesions are observed on the medial side of both upper eyelids. (B) Immediate postoperative findings: Full dermal layer was removed on the right upper eyelid. Partial dermal layer was removed on the left upper eyelid, and the lipid deposit was squeezed out. (C) Postoperative findings: After 1 mo of the laser treatment, the yellowish pigment on the left side is almost invisible compared to the right side.

ymptomatic, presenting as a single or multiple lesion.⁷ It is a plaque-like or flap-like lesion, has irregular margins, and has various skin lesion manifestations, such as soft, semisolid, calcareous, velvety, or papules.^{6,8-10} It occurs mainly on the eyelids, more often in women than in men, and is known to occur mainly between the ages of 30 and 50 years.^{3,11,12}

Histopathologically, xanthelasma is composed of touton giant cells and foamy histiocytes that are located superficially, such as near capillaries.¹³⁻¹⁵ These histiocytes include many lipid vacuoles and cholesterol crystals. Stored lipids are mainly cholesterol, which exists in the esterified form.^{16,17} Xanthelasma is mainly present in the superficial reticular dermis layer, but may also invade the deep dermis or muscular layer.^{7,12}

Generally, a recurrence of the lesion after the CO₂ laser occurs due to incomplete removal.¹ Recurrence is also known to be highly related to lipid deposits in xanthelasma. According to a previous study comparing the effects of the superpulsed mode and the fractional mode of the CO₂ laser, there was no recurrence in the xanthelasma treated with the fractional CO₂ laser, in which the epidermal layer with lipid deposits and the underlying dermal layer were removed together. However, in xanthelasma treated with a superpulsed CO₂ laser, the lipid deposit might not be removed uniformly, resulting in recurrence.⁶ It is possible to infer that complete removal of lipid deposits as well as the depth of the removal of xanthelasma using a CO₂ laser is important to prevent recurrence. In other words, the remaining lipid deposits after removal with a CO₂ laser can cause a recurrence of lesions.

By comparing the treatment of xanthelasma that occurred on both eyelids of a single patient, it was confirmed that the action of squeezing out using forceps showed better results than removing the full dermal layer. Although we removed the full dermal layer, this was not confirmed histopathologically, and there might be a possibility of incomplete removal. The recurrence could have been caused by lipid deposits in the remaining deep dermal layers. In addition, considering that lipid deposits exist in the form of vacuoles, extraction using forceps could be a better method for removing the entire lipid deposit in the deep dermal layer.

Our method was able to exclude bias that could be caused by the treatment application to different patients since we were able to compare both sides in a single patient. However, there were a few limitations to our study. Our method could not distinguish the histological layer, and the procedure proceeded depending on visualization by the naked eye. Further multicenter

studies are needed because of the limited sample size. Nevertheless, our study is meaningful in that it provided a guideline for treatment using a CO₂ laser to treat xanthelasma.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

FUNDING

None.

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How to cite this article: Park JD, Kim SY, Jeong HG, Wee SY. Endpoint depth when removing xanthelasma using CO₂ laser ablation: a case report. *Med Lasers* 2021;10:246-249. <https://doi.org/10.25289/ML.2021.10.4.246>