

Treatment of an ear keloid refractory to intralesional triamcinolone injection monotherapy with fractional CO₂ laser and triamcinolone combination therapy: a case report

Young Gue Koh¹, Hye Sung Han², Kwang Ho Yoo², Sun Young Choi²

¹Department of Dermatology, Chung-Ang University Hospital, Seoul, Republic of Korea

²Department of Dermatology, Chung-Ang University Gwangmyeong Hospital, Chung-Ang University College of Medicine, Gwangmyeong, Republic of Korea

Keloid is a benign fibroproliferative disorder characterized by excessive collagen production during abnormal wound healing in keloid-prone individuals. Therefore, the treatment of keloid aims to reduce inflammation and reorganize collagen bundles. Intralesional corticosteroid injection, particularly triamcinolone, is a common first-line treatment, but injections can be difficult in very firm lesions. This case report presents a refractory ear keloid treated with a combination therapy of fractional ablative CO₂ laser and intralesional triamcinolone injection. The patient had a persistent keloid mass in her left ear despite previous intralesional corticosteroid injections. The ear keloid was treated with the combination therapy of fractional CO₂ laser and triamcinolone injection. The keloid size was reduced by more than 50%, and the Vancouver Scar Scale score improved. Combined fractional CO₂ laser and triamcinolone injections may have a synergistic effect on drug delivery in addition to each keloid improvement.

Key words: CO₂ laser; Keloid; Triamcinolone

INTRODUCTION

Wounds heal through an inflammatory phase, a proliferative phase and a remodeling phase. Keloid is a benign fibroproliferative disorder caused by excessive collagen production outside the normal wound healing cycle when injury, inflammation occurs in a susceptible individual [1]. For a single small keloid, surgical removal can be performed. However, surgical damage can cause recurrence. So intralesional corticosteroid injection is used as main treatment and various lasers are used as an adjunctive treatment [2].

Herein, we present a case of refractory ear keloid trig-

gered by piercing treated with fractional ablative CO₂ laser and intralesional triamcinolone injection combination therapy, which was refractory to triamcinolone monotherapy.

A written informed consent was obtained from the patient for the publication of this case report.

CASE REPORT

An 18-year-old Korean female with Fitzpatrick skin phototype III presented with a 3-year history of mass in left ear. She had her ears pierced four years ago and said the mass was getting bigger and harder. She said the

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Correspondence

Sun Young Choi

E-mail: sun02ya@naver.com

ORCID: <https://orcid.org/0000-0003-0248-7708>

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mass persisted despite multiple sessions of intralesional corticosteroids injections. On physical examination, the mass was located on the eminence of the scapha. It was at least 3 cm in size, very firm, and scored 7 on the Vancouver Scar Scale (VSS; Table 1, Fig. 1A) [3].

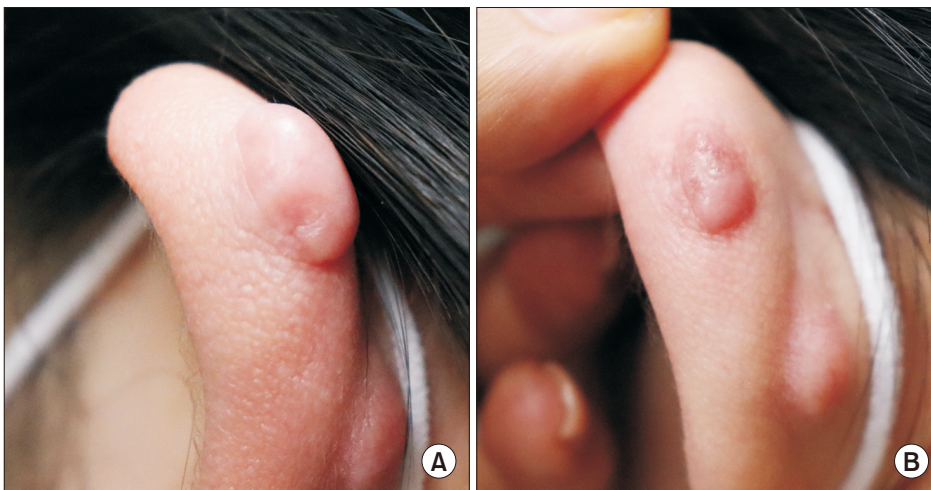
Under the diagnosis of triamcinolone-resistant keloid, we suggested surgery first, but she denied due to invasiveness. Then, we started combination treatment of ablative fractional CO₂ laser 3-4 pass (8 mm spot, 30 W, desnity 200 spots/cm², eCO₂ Plus; LUTRONIC®) and intralesional triamcinolone acetonide injection (20 mg/mL). The lesion was applied with a topical anesthetic mixture of lidocaine (2.5%) and prilocaine (2.5%) 30 minutes before treatment to minimize pain. Triamcinolone injection dose was almost 0 mL injected on the 1st, but close to 0.2 mL on the 3rd. Three sessions of combined treatment were performed at 4-week intervals, with an additional one session of fractional CO₂ laser-only treatment due to injection pain. The size was reduced by more than 50% and the VSS score improved to 4 at 4 weeks after 4th laser treatment (Fig. 1B). There was no adverse event and treatment will continue at same intervals.

DISCUSSION

Various factors contribute to the development of keloids, including patient factors (race, genetic predisposition, gender, and age), topographic factors (high tension with low stretch and low elastic modulus), and environ-

Table 1. Vancouver Scar Scale

Characteristics	Description	Score
Vascularity	Normal	0
	Pink	1
	Red	2
	Purple	3
Pigmentation	Normal	0
	Hypo-pigmentation	1
	Hyper-pigmentation	2
Pliability	Normal	0
	Supple (flexible with minimal resistance)	1
	Yielding (gives way to pressure)	2
	Firm (inflexible not easily moved)	3
	Ropes or banding (blanches with extension of scar)	4
	Contracture (permanent shortening of scar producing deformity or distortion)	5
Height	Flat	0
	<2 mm	1
	2-5 mm	2
	>5 mm	3
Total score		13



Characteristics	Score	Characteristics	Score
Vascularity	1	Vascularity	1
Pigmentation	0	Pigmentation	0
Pliability	3	Pliability	1
Height	3	Height	2
Sum	7	Sum	4

Fig. 1. Clinical photographs and Vancouver Scar Scale of ear keloid. (A) Before treatment. (B) After three sessions of combination treatment of fractional CO₂ laser and intralesional triamcinolone injection with additional one session of fractional CO₂ monotherapy.

mental factors (minor or major prior trauma) [1].

When a wound occurs in an individual with above risk factors, fibroblasts become overactive, increasing the secretion and sensitivity of inflammatory mediators such as transforming growth factor (TGF)- β 1 and TGF- β 2, which increase tissue inhibitors of metalloproteinases (MMPs) and decrease MMP production. Keloid is benign masses caused by the accumulation of collagen types I and III in these abnormal wound healing process [4].

Treatment of keloid focuses on reducing the inflammatory signals and removing the collagen that has developed. Various treatments are used, including application of gel sheets, intralesional corticosteroid injection, corticosteroid tape/plaster and topical agent, cryotherapy, 5-fluorouracil injection, surgery, and laser [2].

The most common first-line treatment is intralesional corticosteroid injection, with triamcinolone acetonide/acetate being the most commonly used. Triamcinolone is available as a micronized suspension, which is easy to mix with saline to achieve the target concentration, and the micronized crystals spread well in the lesion and can be maintained for a long time and provide a lasting effect [5]. Triamcinolone works by promoting bFGF production and inhibiting TGF- β 1 production in human dermal fibroblasts [6]. In vitro, there is no change in collagen type I synthesis in normal fibroblasts, but decreased collagen type I synthesis in keloid fibroblasts with triamcinolone [7]. It can cause a reduction in keloid size with minimal atrophy of surrounding normal tissue. Syed et al. [8] collected fibroblasts from intralesional, extralesional, and marginal lesions of keloid lesions and compared the mRNA expression levels of collagen I/III. Marginal fibroblasts had the highest collagen mRNA expression level and extralesional fibroblasts had the lowest level. If intralesional injections are not successful due to the high collagen density and stiffness of the keloid, triamcinolone injections into the marginal area of the keloid may contribute to reduce fibroblast activity and prevent size growth [8]. In this case, the lesion was very firm, so the triamcinolone was not injected well and caused pain. Nonetheless, it would have helped at the very least. However, since the triamcinolone was resistant to the previous treatment, we decided to perform laser treatment together.

Laser treatments for keloids include 585/595 nm pulsed-dye laser (PDL), ablative fractional CO₂ laser, and 1,064 nm Nd:YAG laser [9,10]. Fractional CO₂ laser is reported to be the most effective modality [9]. Fractional CO₂ treatment of keloids resulted in a significant decrease in procollagen I compared to Nd:YAG laser and histologically improved arrangement of collagen bundles

and increased MMP9 [11,12].

PDL is another effective option as it can activate mitogen-activated protein kinase cascades in fibroblasts of keloids and block activator protein 1 transcription, TGF- β expression, leading to regression [13]. When comparing the efficacy of fractional CO₂ laser and PDL in the treatment of scars, fractional CO₂ laser was reported to be superior in improving pliability and thickness, while PDL was reported to be superior in improving vascularity and pigmentation [14]. In this case, pliability and thickness were more problematic, and previous studies have reported that combined treatment with fractional CO₂ laser is synergistic with intralesional triamcinolone injection in treating keloids and preventing recurrence with increasing drug delivery, which is why we chose fractional CO₂ laser [15].

In conclusion, combining fractional CO₂ laser treatment to keloid that have not responded to intralesional triamcinolone injection monotherapy can be an effective option.

ORCID

Young Gue Koh, <https://orcid.org/0000-0002-6376-0328>
 Hye Sung Han, <https://orcid.org/0000-0002-3556-0740>
 Kwang Ho Yoo, <https://orcid.org/0000-0002-0137-6849>
 Sun Young Choi, <https://orcid.org/0000-0003-0248-7708>

AUTHOR CONTRIBUTIONS

Conceptualization: SYC. Project administration: HSH. Supervision: KHY. Visualization: KHY. Writing—original draft: YGK. Writing—review & editing: all authors.

CONFLICT OF INTEREST

Kwang Ho Yoo is the Editor-in-Chief of the journal and Hye Sung Han is an editorial board member of the journal, but they were not involved in the review process of this manuscript. Otherwise, there is no conflict of interest to declare.

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