Combination Treatment of Triamcinolone Acetonide and Ablative Fractional Laser for Hypertrophic Scars

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Hypertrophic scars are defined as visible and elevated scars that do not spread into the surrounding tissues and often regress spontaneously. They can be itchy, painful, and erythematous, so it is a challenging problem for doctors to manage them. This is because hypertrophic scars are caused by the proliferation of dermal tissue and the excessive accumulation of collagen, long-lasting inflammation, and fibrosis. Triamcinolone acetonide was used because it reduces the collagen and inflammatory process. A fractional laser was also used to flatten the overgrown tissues. Four patients who were treated with triamcinolone acetonide and fractional laser to treat a hypertrophic scar were included retrospectively. All patients were injected with triamcinolone acetonide and fractional laser simultaneously. The results were evaluated every session using the Vancouver Scar scale (VSS) and all patients were asked to express a 4-point subjective scale of satisfaction. Measuring the wound with photographs, the VSS score showed improvement over time. The average VSS score of pretreatment and posttreatment was 12 and 4, respectively. The average number of treatments was 12.75, and the average interval of treatments was 5. Using a patient satisfaction scale, the patients were satisfied (Poor: 0%, Fair: 25%, Good: 50%, Excellent: 25%). No significant adverse effects and complications were encountered. The simultaneous treatment using triamcinolone acetonide and fractional laser can be an effective treatment modality for treating hypertrophic scars.

Key words

Hypertrophic scar; Triamcinolone acetonide; Fractional laser

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INTRODUCTION

Hypertrophic scars are firm, raised within the site of injury, occasionally symptomatic, and usually develops within 4 to 8 weeks of injury.¹ These scars are characterized by proliferation of the dermal tissue, with excessive deposition of fibroblast-derived extracellular matrix proteins and especially collagen, over long periods and by persistent inflammation and fibrosis.²

Numerous methods have been introduced for hypertrophic scars, but to date, none have been established as the optimal treatment. Among various methods, corticosteroids are usually used to control inflammation and reduce the bulk of hypertrophic scars.³ Triamcinolone acetonide, which is the most common corticosteroid used for the treatment of scars, have been shown to cause hypertrophic scar regression *in vivo*, mainly by decreasing collagen and glycosaminoglycan synthesis, by reducing the inflammatory process in the wound, by decreasing fibroblast proliferation and by increasing hypoxia.²

Recent advances in laser technology and applications, there is increasing evidence that fractional lasers are an emerging therapeutic option for the aesthetic restoration and functional enhancement of traumatic scars at virtually any location on the body.⁴ Fractional ablative lasers create zones of ablation at variable depths of the skin with the subsequent induction of a wound healing and collagen remodeling response.⁴ Laser treatment results in deep destructions, leading to cascade induction of heat shock proteins, and subsequently, accelerated healing process, delayed collagen synthesis, and regeneration. Also, lasers result in better penetration of drugs and other medications.³

In recent years, the combined treatment of conventional methods shows good results. For example, Manuskiatti and Fitzpatrick found clinical improvement of hypertrophic scars after treatment with an intralesional injection of triamcinolone acetonide combined with ContractubexH gel, which appears to be superior to intralesional triamcinolone administered alone in the treatment with

no significant side effects.² Khan et al.⁵ demonstrate that combined treatment of intralesional triamcinolone with 5-fluorouracil is more effective and gives rapid response with fewer side effects.

Although combination therapy may result in synergistic effects, the studies on this issue are not enough. In this study we would like to introduce about usefulness of combination treatment of triamcinolone acetonide and ablative fractional laser for hypertrophic scar.

CASE REPORT

Patients

The 4 patients who were visiting our plastic and reconstructive surgery department during 2013-2018 were enrolled in the study, and patients developed hypertrophic scars due to trauma, burn and surgical procedure. Patients who had previously received other treatments for hypertrophic scar, who had less than 1 year of hypertrophic scar formation or who are currently taking steroid drugs are excluded.

Study design

Each patient received combined treatment of intralesional triamcinolone acetonide and fractional laser for hypertrophic scar. To minimize pain, topical anesthetic cream (eutectic mixture of lidocaine and prilocaine; EMLA[®] cream 5%, Astra Zeneca, Sweden) was applied under an occlusive dressing for at least 1 hour. The injection was conducted using 27 gauge needle intradermally and concentration of triamcinolone acetonide (10-40 mg/ml) was determined by the location and thickness of the scar. Consecutively, Fractional CO₂ laser (LineXel[®]; UTI Co. Ltd, Seoul, Korea), the pulse duration of 260-400 ms, with a distance between spots of 0.85-0.9 mm, and spot size of 1 mm was conducted. Settings were customized for each patient at each treatment session according to scar thickness.

Table 1. Patient's characteristics and results

No	Sex/Age	Location	Number of treatment	Interval of treatment	Satisfaction scale	Pre VSS score	Post VSS score
1	F/10	Rt. Lower leg	9	4 weeks	3	10	4
2	F/41	Abdomen	15	4 weeks	4	13	4
3	F/31	Rt. Upper arm	16	4 weeks	4	13	3
4	F/51	Lt. forearm	11	4 weeks	3	12	5
Mean	33.25		12.75	4 weeks	3.5	12	4

VSS, Vancouver Scar scale.

Clinical assessment

Clinical photographs were taken to evaluate patient satisfaction and objective improvement in every session. Photographs (Nikon D90; Nikon Corp., Tokyo, Japan) were taken under identical settings at baseline evaluation, every treatment visit (before and after session) and 1 month after the last session.

Results were evaluated every session using Vancouver Scar scale by experienced independent physician and all patients were asked to express a 4-point subjective scale of satisfaction (Poor: 1, Fair: 2, Good: 3, Excellent: 4).

All of the participants were women and mean age was 33.25 (range from 10 to 51). The average number of treatments was 12.75, and the average interval of treatments was 4 weeks. Most patients were satisfied with their appearance after the final session (Table 1).

Measuring the wound with photographs, Vancouver Scar scale shows improvement over time. The average score of pretreatment was 12, but in 1 month after the

last session, the score was decreased to 4 (Fig. 1, 2). Particularly, in pliability and scar height section, a decrease in score was observed evidently (Table 2).

There are no significant side effects and complication. The most frequent side effect was transient erythema. It occurred in 2 of 4 patients, lasted for 2-3 days and all patients completely healed within 3 days spontaneously.

DISCUSSION

Hypertrophic scars are annoying and reduce the quality of life of patients in many ways. Although wide variety of treatments have been advocated for hypertrophic scar, such as pressure therapy, intralesional interferon, topical and intralesional corticosteroids, intralesional bleomycin, laser therapy, silicone gel sheetin, onion extract gel, and other therapies directed at collagen synthesis, treatment of hypertrophic scars can be complex and often requires a multimodal approach to therapy.² We evaluated the state of vascularity, pigmentation, pliability and height. The improvement was made in pliability and height more than in vascularity and pigmentation. Fractional ablative

Fig. 1. Photographs of a 10-year-old female prior to treatment (A). After 16 session of treatment (B).

Fig. 2. Photographs of a 41-year-old female prior to treatment (A). After 15 session of treatment (B).

Table 2. Patient's Vancouver Scar scale

	Vascularity		Pigmentation		Pliability		Height		Total	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	2	1	2	1	3	1	3	0	10	4
2	3	0	3	2	4	1	3	1	13	4
3	3	1	3	1	4	1	3	0	13	3
4	2	1	2	2	5	2	3	0	12	5
Mean	2.5	0.75	2.5	1.5	4	1.25	3	0.25	12	4

CO₂ laser improves rhytides, dyschromia, and textural irregularities. In addition, it was recently reported that ablative fractional CO₂ laser can resurface mature scars to correct abnormal texture, thickness, and stiffness.⁶ It has been reported that scars treated with triamcinolone acetonide (T) showed decreased levels of the proteinase inhibitors alpha macroglobulin and alpha 2-antitrypsin in the scar. This leads to decreased collagenase (matrix metalloproteinase 1/MMP1) degradation which controls excessive and abnormal collagen seen in hypertrophic scars.⁷

In this study, we tried to investigate the interaction between existing treatment, and verify its safety. The results of our series indicate that combination same-session therapy with laser and laser-assisted delivery of triamcinolone acetonide offers efficient, safe, and effective treatment of challenging hypertrophic scars.

The limitation of our study is that the number of enrolled patients is small that diversity is not secured and could not evaluate the result accurately. Also, the lack of comparison with control group is another limitation. Despite of the effort to quantify scar assessments such as using the Vancouver scar scale, The evaluation itself was subjective and failed to provide an objective evaluation.

Among the many methods of hypertrophic scar, combination treatment of triamcinolone acetonide & ablative fractional laser for hypertrophic scar can be useful meth-

od. In the future, we should carry out more generalized research by conducting research on more patients.

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