Resurfacing of Pitted Facial Acne Scars with a Pulsed Erbium:YAG laser

Sung Dae Kwon, M.D., Soo Nam Kim, M.D., Young Chul Kye, M.D.

Department of Dermatology, College of Medicine, Korea University, Seoul, Korea.

Background **: Laser resurfacing has beneficial effects for the treatment of several skin conditions. Recently, the pulsed erbium:YAG laser has been shown to be a highly effective treatment for several kinds of pitted facial scars.**

Objective **: The purpose of this study was to assess the efficacy and safety of pulsed erbium:YAG laser skin resurfacing at the setting of low or high energy for pitted acne scars.**

Methods **: 65 patients with pitted acne scars were included in this study. All patients had skin types III or IV. All patients were instructed to use tretinoin cream 0.05% nightly for 2-4 weeks prior to the laser treatment. The pulsed erbium:YAG laser with a 2 mm handpiece at the setting of 500 mJ/pulse, 3.5-5 W in 45 patients and 1,000 mJ/pulse, 7-10 W in 20 patients was used. Two weeks after laser treatment, topical application of hydroquinone 4%, tretinoin 0.05%, and hydrocortisone 1% cream was recommended for 2-4 weeks. Facial photographs were obtained at baseline and 2 week intervals postoperatively. The results of treatment were evaluated for the changes of skin texture and color at 1 month, 3 months, and 6 months.**

Results **: In 45 cases treated with 500 mJ/pulse energy, pitted acne scars were improved about 46.7 % on average and no erythema and postinflammatory hyperpigmentation was observed after 6 months. In 20 cases treated with 1,000 mJ/pulse energy, pitted acne scars were improved about 64% on average and erythema in two patients and postinflammatory hyperpigmentation in one patient were observed after 6 months.**

Conclusion **: The results of laser treatment for pitted facial acne scars at the setting of high energy are better than those of laser treatment at the setting of low energy.**

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Key Words : Resurfacing, Erbium:YAG laser, Pitted facial acne scars

Laser resurfacing is a new method for facial rhytides and acne scars. Recently, the pulsed erbium:YAG laser has been shown to be an effective treatment for several kinds of pitted facial scars. The erbium:YAG laser has a 2,936 nm wavelength and penetrates the skin to a depth only 30 μ m for 430 mJ/pulse using a 2mm spot size handpiece because the erbium:YAG laser is strongly absorbed by water.[1,2] A maximum temperature of about 30℃ is achieved in the adjacent skin.[1,3] The feature of the erbium:YAG laser is that ablation of the skin is followed by the onset of pinpoint bleeding with exposure of the dermoepidermal junction. Because of bleeding during the laser peeling, it is difficult to keep the field clear.[3,4] In addition, char free ablation can be done. Skin resurfacing with a carbon dioxide laser, chemical peeling, or dermabrasion has been an effective therapy for acne scars with similar complications.[5] The frequent complications are pigmentary disturbances, erythema, infection, and scarring.[6] To obtain optimum results, proper pre- and post-treatment

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Reprint request to : Sung Dae Kwon Sung, M.D., Department of Dermatology, College of Medicine, Korea University, Seoul, Korea

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are important.[6,7,8] Pre- and post-treatment are especially important in pigmented skin.[9] The purpose of this study was to evaluate the efficacy and safety of the pulsed erbium:YAG laser at the setting of low or high energy for skin resurfacing of pitted facial acne scars.

MATERIALS AND METHODS

65 patients with pitted acne scars (45 females, 20 males; mean age, 25.1 years) were included in this study. All patients had Fitzpatrick skin phototypes III or IV. Prior to laser surgery, all patients were instructed to use 0.05% tretinoin cream nightly for 2-4 weeks. Topical EMLA cream was used for anesthesia. After one hour occlusion with EMLA cream, laser treatment with a pulsed erbium:YAG laser (Derma™20; ESC Medical Systems, Yokneam, Israel) was done. 45 patients (13 males, 32 females; mean age, 25.4 years) were treated with a 2 mm handpiece at the setting of 500 mJ/pulse, 3.5-5.0 W. 20 patients (7 males, 13 females; mean ages, 25.7 years) were treated with a 2 mm handpiece at the setting of 1,000 mJ/pulse, 7-10 W. Pinpoint bleeding appeared after 4-6 laser passes in patients treated with 500 mJ/pulse energy and 2-4 laser passes in patients treated with 1,000 mJ/pulse energy. Laser treatment was stopped at the time of pinpoint bleeding on the base and margin of the scars. Tissue debris was removed with a saline soaked gauze after every laser pass in order to check for bleeding. After laser treatment, oral levofloxacin, 100 mg and prednisolone, 10 mg three times a day were given for 3-5 days. To prevent herpes simplex, oral acyclovir, 200 mg 5 times a day was given for 5 days.

After two weeks of laser treatment, topical application of hydroquinone 4%, tretinoin 0.05%, hydrocortisone 1% cream were recommended nightly for 2-4 weeks. Facial photographs were obtained at baseline and two week intervals postoperatively. The results of treatment were evaluated for the changes of skin texture and color relative to the normal untreated surrounding skin at 1 month, 3 months, and 6 months. The results were assessed by two blind assessors and a quartile scale of improvement was used to judge improvement($\leq$ 25%, 25-50%, 50-75%, $\geq$75%).

RESULTS

In 45 patients treated with the erbium:YAG laser at the setting of 500 mJ/pulse, seven patients improved less than 25%, 10 patients improved 25-50%, 25 patients improved 50-75% and three patients improved more than 75% after 6 months post-laser treatment (Table 1 and Fig. 1). On average, patients treated with 500 mJ/pulse energy improved about 46.7%. In 20 patients treated with the erbium:YAG laser at the setting of 1,000 mJ/pulse energy, three patients improved 25-50%, 11 patients improved 50-75% and seven patients improved more than 75%. On average, patients treated with 1,000 mJ/pulse energy improved about 64% (Table 1 and Fig. 2).

In patients treated with 500 mJ/pulse energy, the erythema disappeared gradually within two months after discontinuation of hydroquinone, tretinoin, and hydrocortisone cream. After three months of laser treatment, mild erythema on laser irradiated sites remained in six patients(13.3%). After six months of laser treatment, erythema had disappeared. Minimal postinflammatory hyperpigmentation was observed only in three patients(6.7%). This disappeared three months after treatment.

In patients treated with 1,000 mJ/pulse energy, erythema were observed in five patients(25%) three months after laser treatment. Erythema remained slightly in two patients(10%) six months after laser treatment. Postinflammatory hyperpigmentation was observed in four patients(20%) immediately after treatment. Three months after laser treatment, postinflammatory hyperpigmentation was observed in two patients(10%). In one patient(5%), minimal postinflammatory hyperpigmentation was observed six months after laser treatment.

No hypertrophic scarring was observed.

DISCUSSION

The pulsed erbium:YAG laser skin resurfacing technique has been an effective and safe therapy for several kinds of skin conditions.[4,10,11,12,13,14] According to the histological findings, the effects on papillary dermis of pulsed erbium:YAG laser irradiation are almost the same as the effects of carbon dioxide laser resurfacing and chemical peeling.[7,8,11,15,16,17,18] During laser therapy, bleeding sites

Table 1. Results of resurfacing of pitted acne scars with a pulsed Er:YAG laser

Improvement	No. of patients treated with 500 mJ/pulse energy	No. of patients treated with 1,000 mJ/pulse energy
≤25%	7	
25-50%	10	3
50-75%	25	11
≥75%	3	6
Average improvement	46.7%	64%

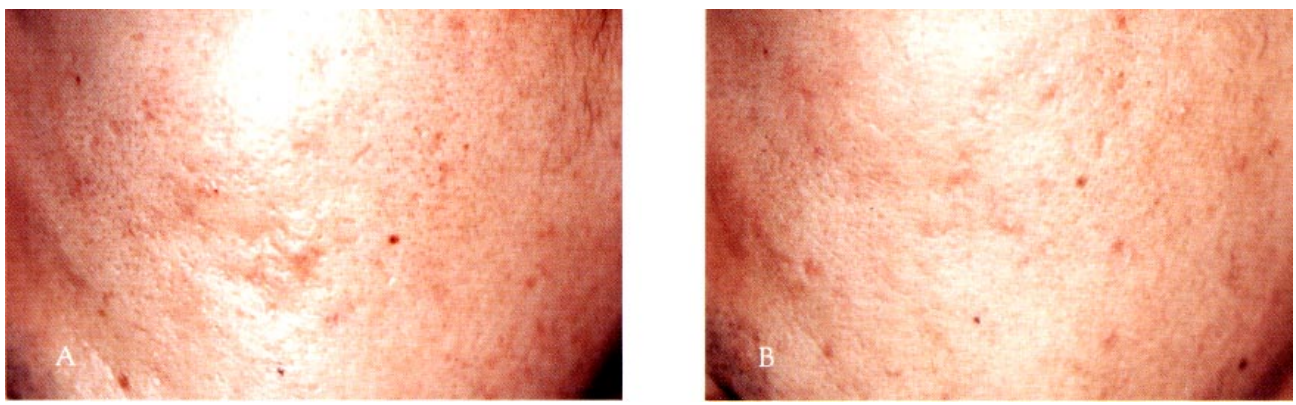

Fig. 1. A) Before and B) 6 months after treatment with pulsed Er:YAG laser in 500 mJ/pulse energy.

Fig. 2. A) Before and B) 6 months after treatment with pulsed Er:YAG laser in 1,000 mJ/pulse energy.

were compressed with saline soaked gauze intermittently. After laser treatment, bleeding sites were compressed with saline soaked gauze for 5-10 minutes for hemostasis. Bleeding was no problem in all patients. The main difficulty was keeping the field clear.

The results of treatment for pitted acne scars with high energy erbium:YAG laser therapy were better than those of treatment at low energy. However, postinflammatory hyperpigmentation and erythema were more severe and appeared more frequently in the cases treated with high energy erbium:YAG lasers. To prevent or reduce the complications of laser skin resurfacing, proper pre- and post-treatment are usually recommended.[6,7,8,9] Especially, in pigmented skin, pre- and post-treat-

ment are very important.[9]

No hypertrophic scarring was observed in all patients after erbium:YAG laser treatment.

In summary, pulsed erbium:YAG laser skin resurfacing at the setting of high energy with proper pre- and post-treatment is an effective treatment for pitted acne scars.

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