Original Article

Efficacy and safety of erbium-doped yttrium aluminium garnet fractional resurfacing laser for treatment of facial acne scars

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Abstract

Background: Acne scarring has lifelong sequelae and are extremely disturbing to patients, both physically and psychologically. The use of ablative fractional lasers for the treatment of acne scars is becoming increasingly popular. But studies regarding the efficacy and safety of the same in the Indian skin is limited. **Objective:** To evaluate the efficacy and safety of Erbium-doped Yttrium Aluminium Garnet (Er: YAG) 2940 nm fractional laser resurfacing in the treatment of acne scars in 10 patients at a tertiary care teaching hospital **Methodology:** All 10 patients received four treatment sessions with Er: YAG fractional laser at 1-month interval. Subjective assessment in percentage of improvement was documented after four sessions. Subjects were instructed to report any cutaneous side-effects including erythema, oozing, crusting, dyschromia, scarring or secondary infection and about interference with daily activities in the post-treatment period. Photographs were taken before each treatment session and 1 month after the final session. A clinical assessment by comparing the photographs was done. Patient's satisfaction of improvement was noted at the end of four sessions. **Conclusion:** Er- YAG laser resurfacing is both effective and safe in the treatment for acne scars.

Keywords: Ablative, acne scars, efficacy, fractional, laser, safety.

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INTRODUCTION

Acne scars are seen after inflammatory acne and is caused by the destruction of collagen.[1] They have a lifelong sequelae and are extremely disturbing to patients, both physically and psychologically.[2] They are very difficult to treat.[3] A number of treatment modalities are available which includes dermabrasion, subcision, chemical peeling, fillers and punch technique but these are not very effective. Lasers have been increasingly used for the treatment of acne scars. Ablative lasers show good clinical improvement but have a lot of adverse effects like dyspigmentation and post- procedure erythema, especially in people with dark skin. Non ablative lasers do not cause many adverse effects but do not show much clinical improvement. To overcome the drawbacks of the ablative and non ablative lasers, fractional laser resurfacing techniques were developed.[4] However studies on the efficacy and safety profiles of this type of laser in Indian skin is lacking.

MATERIALS AND METHODS

This was a prospective study performed in a tertiary hospital from March 2014 to April 2015 and included patients with clinically diagnosed scarring secondary to acne. Ethical clearance was obtained from the ethical committee of the institution. Patients who were 18 yrs of age and above with presence of acne scars were included. Patients with known photosensitivity, pregnancy, lactation, keloidal tendency, use of oral retinoids in last 6 months, infections like herpes labialis, active acute illness, and unrealistic expectations were excluded. A written informed consent was taken from each patient enrolled in this study. A detailed history and clinical

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examination was carried out. Area to be treated was cleansed with a mild cleanser and normal saline. Topical anesthesia with 2.5% lidocaine and 2.5% prilocaine cream (EMLA) was applied 60 minutes before treatment. They were treated with fractional ablative resurfacing module using 2940 nm Er: YAG handpiece. Parameters for each sitting were kept constant in all patients. Long pulse mode was used for all four sessions. 3 passes in vertical, horizontal, and oblique directions with up to 50% overlapping was given. Ice packs were applied for at least 10 minutes after procedure. Strict photoprotection and topical steroid cream was recommended 3 days post-procedure. Photographic documentation using identical camera settings and patient positioning was obtained at baseline and before each session. Patient satisfaction was graded after four treatment sessions as

Grade 1: <25%, minimal to no improvement
Grade 2: 26-50%, moderate improvement;
Grade 3: 51-75% marked improvement
Grade 4: >75% almost complete clearance of scarring

Subjects were asked to report any side effects like pain, erythema, oozing, edema, crusting, scarring, hyperpigmentation or secondary infection during and after the procedure in the treatment period of four months. They were asked about interference with daily activities in the post treatment period. Data was analyzed using percentage and frequency,

RESULTS

A total of 10 patients with acne scars participated in the study. The skin phototype of all these patients were IV-V. The study comprised of 6 males and 4 females and all were in the age group of 18-35yrs. Most of the patients (50%) reported a marked improvement in the acne scars at the end of 4 sittings. Moderate improvement was seen in 40% of the patients. Only 10% that is one out of the 10 patients reported no improvement at the end of 4 sittings. The most common adverse effects were pain during the procedure and erythema following the procedure. Most of the patients (80%) reported erythema following the procedure which lasted for 1-2 days. Only 1 patient had prolonged erythema which lasted 4 days. One out of the ten patiens did not have any erythema following the procedure. Some amount of pain was complained by 80% of the patients during the procedure. One out of them had severe pain. . No other side effects like oozing, crusting, dyschromia, scarring, secondary infection or exacerbation of acne lesions were reported.

Table 1: Grading of improvement by patient and side effects

Patient Si No.	Grade of improvement	Side effects
1	3	Erythema,
2	3	Erythema, severe pain
3	2	Eythema, mild pain
4	3	Erythema, mild pain
5	2	Mild pain
6	2	Erythema Mild pain
7	2	Erythema Mild pain
8	3	Erythema Severe pain
9	3	Prolonged erythema Mild pain
10	1	Erythema

Figure 1: Before treatment

Figure 2: After four sessions

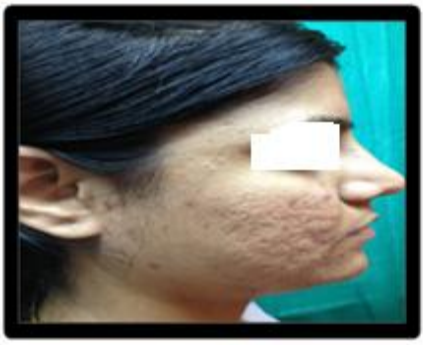

Figure 3: Before treatment

Figure 4: After four sessions

Figure 5: Before treatment

Figure 6: After four sessions

Figure 7: Before treatment

Figure 8: After treatment

DISCUSSION

This study demonstrated the efficacy and safety of Erbium-doped Yttrium Aluminium Garnet fractional resurfacing laser for treatment of facial acne scars. Acne scars are the result of impaired resolution following inflammatory acne. They are classified as ice-pick scars, rolling scars and box scars on the basis of the shape and depth of these scars.[4] The use of ablative carbon dioxide lasers dates back to 1980s.[5] These are based on the theory of selective photothermolysis.[6] These lasers though had a good efficacy did not have a good safety profile. Thus non-ablative lasers were developed with better safety profile but their efficacy was unpredictable.[7] Manstein and Colleagues devised Fractional photothermolysis (FP) in 2004.[8] But the results of these lasers were not satisfactory. Thus lasers with the combination of FP theory and ablative lasers technology were devised. FP targets water as a chromophore. Epidermal keratinocytes, collagen and blood vessels are the water rich targets in skin. Ablative laser resurfacing using CO2 or Er: YAG lasers has shown an efficacy of 25% to 90% for the treatment of acne scars and is considered the gold standard. But post procedure complications like erythema, infection, scarring and pigmentary changes especially in dark skin like the Indian skin were common. [4] A study done by Nirmal *et al* has reported ablative fractional photothermolysis as an effective and safe treatment for atrophic acne scars in Indian skin.[7] A study done by Ahmad *et al* on the use of CO2 fractional laser in the treatment of acne scars showed 25% to75% improvement in most patients. Another study done by Saryazdi *et al* showed an objective and subjective

improvement of about 20-70% and 30-70%, respectively, without any erythema, permanent hyperpigmentation and other adverse effects.[9] Our study also showed similar findings. This study demonstrated that at the end of four sitting 50% of the patients reported a marked improvement in the acne scars. Moderate improvement was seen in 40% of the patients. Only 10% that is one out of the 10 patients reported no improvement in acne scarring at the end of 4 sittings. All the patients reported improvement in skin texture. The most common adverse effects were pain during the procedure and erythema following the procedure. Most of the patients (80%) reported erythema following the procedure which lasted for 1-2 days. Only 1 patient had prolonged erythema which lasted 4 days. One out of the ten patiens did not have any erythema following the procedure. Some amount of pain was complained by 80% of the patients during the procedure. One out of them had severe pain. Two out of the ten patient did not experience any pain during the procedure. No other side effects like oozing, crusting, dyschromia, scarring, secondary infection or exacerbation of acne lesions were reported.

CONCLUSION

The results of this study suggest that ER: YAG fractional laser may be a useful tool in treating acne scarring with minimal side effects.

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