

Long-Term Efficacy of a Fractional Resurfacing Device

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Background and Objective: Recently, there has been much debate regarding the long-term efficacy of fractional resurfacing devices. While pulsed CO₂ laser resurfacing is considered a highly effective treatment, fractionated resurfacing is a newer modality and its long-term efficacy has yet to be assessed. We report the long-term outcomes of subjects previously treated with fractional CO₂ resurfacing for photodamaged skin and acne scars.

Study Design/Materials and Methods: Ten subjects from our previous studies who received fractional resurfacing for the treatment of acne scarring and photodamage returned for long-term follow-up visits at 1 and 2 years, respectively. Investigators graded maintenance of improvement on a quartile scale based on clinical photography.

Results: Subjects maintained 74% of their overall improvement at their long-term visits compared to 3-month follow-up visits. While clinical improvement was maintained long-term, the results were not as remarkable as those seen at 3-month visits. The authors speculate that results seen at 3 months may be enhanced by persistent inflammatory changes, as evidenced by heat shock protein 47 activity and ongoing collagen remodeling seen in previous histologic studies. Relaxation of tightening is to be expected with any procedure along with the natural progression of aging. However, patient satisfaction was upheld long-term.

Conclusion: Fractional CO₂ laser resurfacing does have long-term efficacy and persistence of improvement of acne scarring and photodamage compared to baseline. However, additional treatments may be necessary to enhance long-term results. *Lasers Surg. Med.* 42:168–170, 2010.

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Key words: acne scar; photodamage; CO₂ laser; fractional photothermolysis; skin resurfacing; fractional deep dermal ablation; ablative resurfacing

INTRODUCTION

The efficacy of fractional CO₂ laser resurfacing has been shown to approximate traditional ablative resurfacing in the treatment of acne scars [1] and photodamaged skin [2] with a significantly improved risk profile. Traditional CO₂ resurfacing has fallen out of favor due to the risk of complications following procedures. On the other hand, non-ablative devices are safer yet less effective. The development of ablative fractional photothermolysis

addressed the shortcoming of these traditional ablative and non-ablative device modalities. However, fractional deep dermal ablation is a newer modality and the long-term efficacy has yet to be well established.

In this study, we evaluate the long-term efficacy of subjects previously treated with a fractional CO₂ laser resurfacing device (Fraxel re:pair[®]) for the treatment of photodamaged skin and acne scars.

METHODS

Ten subjects ($n = 6$ acne scar subjects; $n = 4$ photodamaged skin subjects) that were previously enrolled in Institutional Review Board (IRB) approved studies at the University of California, Irvine for the treatment of acne scars [1] and photodamaged skin [2] using a fractional CO₂ laser resurfacing device returned for long-term follow-up visits at 1 and 2 years, respectively. Subjects were between 24 and 63 years of age and Fitzpatrick skin type I–V. Standardized digital facial photographs (FinePix S2 Pro (f-stop 27), Fujifilm, Corp., Valhalla, NY) were taken at long-term follow-up visits to document clinical responses. Photographs taken at 3-month visits (taken in the original studies as above), 1- and 2-year follow-up visits were compared to baseline photographs (taken in the original studies as above) and graded by the authors using a quartile scale of improvement (Table 1) for overall clinical improvement in skin texture, rhytides, pigmentation, skin laxity, and acne scars where appropriate. Average scores of percent overall improvement at 3 months versus baseline were compared

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TABLE 1. Quartile Scale of Improvement

0	No improvement
1	≤25% Improvement
2	26–50% Improvement
3	51–75% Improvement
4	76–100% Improvement

to values of percent overall improvement seen at 1 and 2 years versus baseline to calculate the percent maintenance of improvement seen long-term.

RESULTS

The authors recognize that this is a modestly sized study. Therefore, in order to better characterize the long-term efficacy of fractional resurfacing, all subjects were evaluated as a whole in addition to evaluating acne scarring and photodamaged patients as separate populations. When combining all subjects, the average investigator score of improvement on the quartile scale at 3 months and long-term compared to baseline was 2.3 and 1.7, respectively (Table 2). The results thus show 74% maintenance of improvement at the respective long-term follow-up visits compared to 3-month follow-up visits for the photodamaged skin subjects and acne scarring subjects combined. When evaluated separately, acne scar subjects had 83% maintenance of their overall improvement at 1 year follow-up (average investigator score of improvement on the quartile scale = 1.5) compared to 3-month follow-up visits (average investigator score of improvement on the quartile scale = 1.8) (Fig. 1a–c). Photodamage subjects had 67% maintenance of their improvement at 2 years (average investigator score of improvement on the quartile scale = 2) compared to 3-month follow-up visits (average investigator score of improvement on the quartile scale = 3) (Fig. 2a–c). None of the subjects that were evaluated long-term regressed back to their baseline appearance. Interestingly, one of the subjects that was graded as a 0 (no improvement) at 3 months was upgraded to a 1 (<25% improvement) at 1 year. This improvement was secondary to diminution of hyperpigmentation on her cheeks, which made it possible to

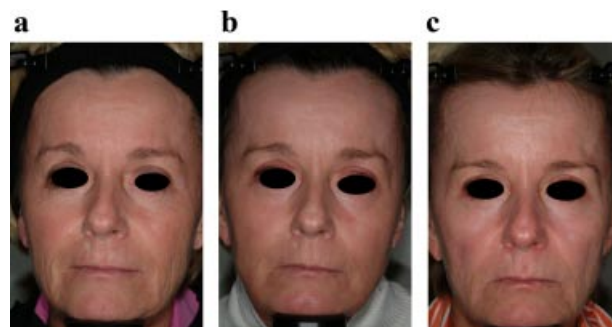


Fig. 2. **a:** Photodamaged patient at baseline, **(b)** at 3 months, and **(c)** at 2 years. [Figure can be viewed in color online via www.interscience.wiley.com.]

evaluate the improvement in acne scarring. All subjects reported that they were pleased with their immediate and long-term results. However, these subjective results were not graded.

DISCUSSION

Clinically, subjects did maintain overall improvement long-term as a result of fractionated ablative CO₂ laser resurfacing. However, the results at 1- and 2-year visits were not as remarkable as those seen at 3-month follow-up visits. The authors speculate that results seen at 3 months may be enhanced by persistent inflammatory changes and edema, a concept supported by the persistence of heat shock protein (HSP) 47 activity at the 3-month time point. HSP 47 is consistent with continued collagen synthesis and remodeling seen in previous histologic studies [3]. As with any procedure, results tend to fade over time due to relaxation of the tightening process and the natural progression of aging. Long-term patient satisfaction was upheld regardless.

In conclusion, fractional CO₂ laser resurfacing is associated with long-term efficacy and improvement of acne scars and photodamaged skin when compared to baseline. However, the persistence of this benefit is moderated after

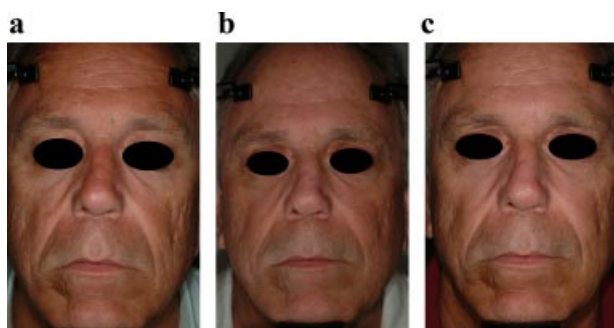


Fig. 1. **a:** Acne scar patient at baseline, **(b)** at 3 months, and **(c)** at 1 year. [Figure can be viewed in color online via www.interscience.wiley.com.]

TABLE 2. Subject Assessments

Subject #	3-month follow-up	1 year follow-up	2-year follow-up
1	0	1	N/A
2	2	2	N/A
3	0	0	N/A
4	3	1	N/A
5	2	2	N/A
6	4	3	N/A
7	4	N/A	3
8	2	N/A	1
9	3	N/A	2
10	3	N/A	2

1–2 years, and additional treatments may be necessary to enhance long-term results.

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