

Sequential Photothermal 1064 nm Nd:YAG and 2940nm Er:YAG Fractional Resurfacing and Remodeling vs 2940nm Resurfacing Alone: a Comparative Histological Study

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SUMMARY

BACKGROUND

Photothermal ablative and non-ablative fractional resurfacing and remodeling have become extremely popular due to the lower rate of complications and side effects compared to conventional full-face resurfacing. Clinical results are nevertheless quite different and have prompted researchers to find new strategies useful to improving treatment outcomes. Sequential laser-layering techniques have been successfully used in PWS and more recently in anti-aging with good clinical results. Since temperature seems to play a key role in stimulating neo-collagen and extracellular matrix production, we thought to sequentially combined two different laser wavelengths (1064 nm Nd:YAG and 2940 Er:YAG) in a three-step layering technique. Microscopic assessment of potential benefits induced by each laser pass at the cellular level was the aim of our study.

OBJECTIVE

Our purpose was to study the immediate and delayed photothermal effects induced by three different laser treatments constituting our sequential multilayer fractional resurfacing and remodeling technique at the cellular level.

STUDY DESIGN

Ten subjects affected by mild photoaging and brachial skin laxity suitable for brachioplasty corrective surgery (6M-4F Fitzpatrick II-III: 48-56 y.o.a. – mean 52) were enrolled in our study. The treatment protocol was discussed and informed consent obtained. Thirty days prior to the laser procedure a medical tattoo was performed on medial aspects of both arms. Tattoo dots were placed according to a standardized template measuring 4X the maximum Er:YAG laser scanner area. Immediately before the full-face laser procedure, each of the three laser treatment steps was performed on standardized pre-selected areas of the patients' arms. A full sequential multilayer technique was performed on a fourth brachial area. Four 4 mm punches were taken from each patient, centering them on the line of

separation between treated and non-treated skin. A blue marking identified the non-treated border of each punch.

Sixty days after the laser procedure, four more 4 mm punches were taken with the same technique at the opposite side of the treated areas. All specimens were placed in 10% buffered formaline and further processed histologically with Hematoxylin Eosin, Masson Trichrome and type 1 procollagen AB by the same dermatopathology lab.

Photomicrographs of each slide were taken at scanning magnification and 10X on blue and non-blue sides. Eight patients underwent a brachioplasty procedure enclosing the 4 BX sites.



Fig. 1: Template marking



Fig. 2: Medical tattoo



Fig. 3: Standardized tattoo



Fig. 4: Treated areas post op dots

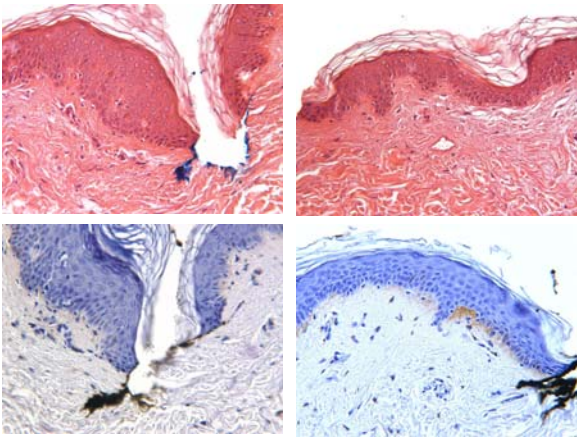


Fig.5: Full layering procedure HE (upper), and type1 procollagen AB (lower). L-side: treated area, R-side: non-treated area.

of superficial collagen fibers associated with a minimal increase of type1 procollagen AB. The full sequential treatment revealed an immediate dermal edema associated with isolated microvaporizations, followed by a delayed improvement in the rearrangement of dermal collagen fibers associated with increased type 1 procollagen AB.

CONCLUSIONS

Histologic findings confirmed the validity and effectiveness of a sequential multilayer fractional resurfacing and remodeling combining 1064 nm Nd:YAG and 2940 nm Er:YAG lasers over single, isolated laser passes.

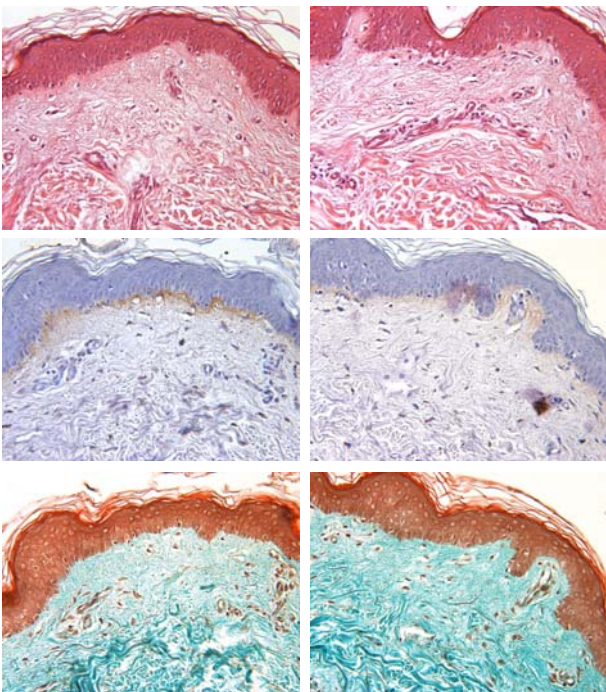


Fig.6: Sixty days post-op photomicrographs: L-side: treated area, R-side: non-treated area. Upper: HE, middle type1 pro-collagen AB; Lower: Masson trichrome.

RESULTS

The 1st laser step (1064 nm Nd:YAG 3 mm 0.3 ms 35 J/cm²) revealed an immediate moderate intradermal edema followed by a delayed moderate increase of type1 procollagen AB limited to the papillary dermis, associated with a more orderly rearrangement of collagen fibers. The 2nd laser step (1064 nm Nd:YAG 3 mm 35 ms 50 J/cm²) showed minimal immediate intradermal edema and no significant modifications after 60 days. The 3rd laser step revealed immediate, isolated microvaporization holes disrupting the epidermis and reaching the papillary dermis, and later an improved rearrangement