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CASE REPORT
Clinical experience with FRAC3 Non-ablative Skin Tightening

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ABSTRACT

The goal of skin tightening can be achieved by various methods which, among others, include chemical peels, radiofrequency therapy and laser therapy. The efficacy, downtime and potential side effects of these methods vary highly between "groups" of methods as well as within the same method group, depending on treatment parameters used. A method which would combine efficacy with no-downtime and minimize the chance of unwanted side effects is highly desirable. A new FRAC3® Nd:YAG laser modality appears very promising in this respect. Between 2010 and 2012, we performed the FRAC3® skin tightening procedure on over 100 patients. Procedure satisfaction rates of good to excellent were reported by over 90% of the patients treated. Here we present six representative clinical cases selected among the treatment data on over 100 patients.

Key words: skin tightening, subsurfacing, dermatoplastics, heat shock proteins, radiofrequency, Nd:YAG, removal of sun damage, bulk heating.

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I. INTRODUCTION

Skin tightening can be achieved by various methods which focus on controlled traumatization of skin tissue. This, in turn, activates the skin's natural repair mechanism, leading to collagen synthesis and the formation of elastic fibers. The final desired result is "rejuvenated" skin tissue.

In the beginning, deep chemical peels were performed [1-3]. While effective, such treatments were connected with up to ten days downtime and had the potential to cause serious side effects. Chemical peels were followed by methods which caused punctual trauma to the skin [4, 5] (e.g. mechanical skin "needling" methods), which reduced the downtime period to four days. However, these methods also had relatively poor results and the treatments had to be repeated often.

Next was the development of the so-called "no downtime" procedures, which were carried out by radiofrequency devices, IPL and infrared laser devices. Essentially, these methods cause bulk heating of the skin (and also adjacent tissue to varied degrees). Efficacy varies between these methods. Split-face studies comparing a radiofrequency device with long-pulsed Nd:YAG showed better outcomes in the case of the Nd:YAG laser therapy [6, 7].

Recently a novel self-induced, non-ablative, three-dimensional fractional FRAC3® method for skin treatments was described [8]. The method utilizes the short pulse duration and high peak power density of Nd:YAG laser pulses. The pulses produce a three-dimensional fractional pattern in the epidermis and dermis, with damage islands that are predominantly located at the sites of skin imperfections. The measurements demonstrated the emergence of isolated "fractional" hot islands within the skin. The method appears promising with regard to being able to fulfill the efficacy, safety and no-downtime requirements of skin rejuvenation procedures with clinical evidence supporting the theory [9, 10, 11]. We used the novel FRAC3® method to perform over 300 skin tightening treatment sessions on over 100 patients.

II. CASE DESCRIPTION

A representative sample of 6 cases among the treatment data on over 100 patients (96% were female) who underwent the FRAC3® skin tightening procedure in our clinic between 2010 and 2012 was selected. At least 3 treatment sessions in the first year were suggested to the patients. The first session was offered as a test. After at least 2 weeks each patient was asked to decide whether to proceed with further sessions or not (the shortest interval between two sessions therefore being 2 weeks). Face and off-face treatments started in January 2010.

Two Nd:YAG laser systems with FRAC3® capability (XP Max and SP Dynamis, Fotona, Slovenia) were used. A fluence range between 15 J/cm2 and 35 J/cm2 was used for the therapies. The

energy was delivered either by a handpiece (R33) with a 6 or 9 mm spot size or via a scanner with a 6 mm spot size. The repetition rate was set from 5 – 9 Hz and the pulsewidths ranged from 0.1 – 1.6 ms (FRAC3® modality).

We used short FRAC3® laser pulses to target the dermal skin layers with a heat pattern, which can be described as "sparks of heat" within the tissue, creating isolated "fractional" hot islands within the skin. Through the use of a handheld infrared thermometer, we aimed to achieve optimal heating conditions – e.g. maintaining a skin surface temperature of 41°C for 2 – 10 minutes, depending on the treatment site.

Depending on the basal skin temperature (usually between 29 – 34°C) and skin type (including thickness, microcirculation, pigmentation) at least 4 passes were necessary. The goal was, as mentioned previously, to obtain a temperature between 40 – 42°C on the skin surface, which had to be maintained for at least 2 minutes. For the peri-orbital area the acceptable temperature was up to 39°C.

The heating of the neck area over the thyroid gland has to be avoided: in order to treat the overlying skin in this area, we pulled the skin aside to treat it. In this way only a small triangle of skin was left untreated. The upper cheek and malar mound region was treated up to 1 cm below the orbital rim in order to protect the eye cavity. Contraindications are considered to be conditions such as excessive sun tan with melanin content of more than 45 (Cortex DSM II), pregnancy, age of under 20 years, heavy smokers, and no hair removal desired in the treatment site (for male patients).

III. RESULTS

A majority of treatments were performed on the face and neck region. Treatment results are shown in Figs. 1 – 4.

Fig. 1: Mouth line; pre-treatment (top); post-treatment (bottom) - after 3 treatment sessions; female patient, age 50.

Fig. 2: Cheek; pre-treatment (top); post-treatment (bottom) – after 2 treatment sessions; female patient, age 50.

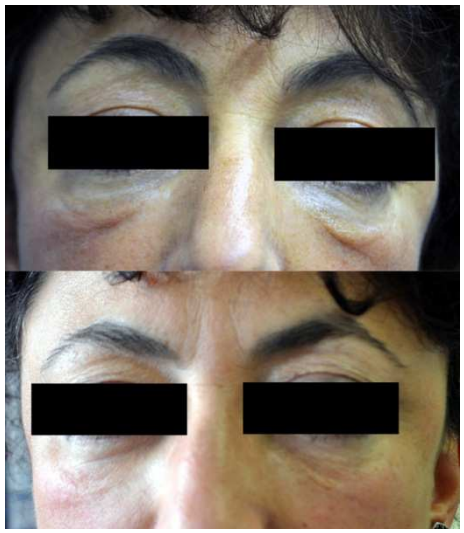

Fig. 3: Tear Troughs; pre-treatment (top); post-treatment (bottom) - after 5 treatment sessions; female patient, age 50.

Fig. 4: Neck; pre-treatment (top); post-treatment (bottom) - after 3 treatment sessions; female patient, age 40.

Other regions treated included, for example, the abdominal area (Fig. 5) and upper arms (Fig. 6).

Fig. 5: Abdominal area; pre-treatment (top); post-treatment (bottom) - after 5 treatment sessions; female patient, age 45.

Fig. 6: Upper arm; pre-treatment (left); post-treatment (right) - after 2 treatment sessions; female patient, age 55.

When taking in to account reports from over 100 treated patients, the results were rated as good to excellent in over 90% of the cases, with less than 5% describing the results as poor.

Photographs, in general, show good results. In addition to the better complexion of the skin surface there also appeared to be an improvement of various forms of sun damage to the skin, as well as a reduction of teleangiectatic vessels. Pain management during the treatment was usually not necessary. Numbing ointment can be used prior to the treatment for patients with anxiety.

It was not recommended to perform other treatments after the procedure. Treatments with corticosteroids (at least) up to 14 days after the procedure are not advised in order to prevent the inhibition of new collagen production.

No serious side effects were observed, with the exception of a single burn on the lower eyelid / malar mound region in one patient, which healed without scarring and complications.

IV. DISCUSSION

The demand for no-downtime procedures in skin tightening led to different volumetric (bulk) heating procedures. By evoking a bulk heating of the skin, a relatively high portion of the energy is absorbed in deeper structures, like fat tissue, for example. This was confirmed in some cases where damage of the fat tissue by radiofrequency devices had been observed.

Previous studies and our experience show a bright future for the FRAC3® procedure. The treatment, based on causing a three-dimensional fractional micro damage pattern within the skin, appears to be safe and effective. Clinical findings suggest that the dermal layers are, in fact, targeted, and the result is a "rejuvenated" skin tissue due to new collagen and elastic fiber formation.

An additional enhancement to the procedure would be the integration of an active temperature measurement/control system, which would lead to even more effective treatments compared to simply carrying out a certain number of passes, which is the currently accepted “cook book recipe” nowadays..

In addition to skin tightening, a further positive side effect for women was observed following FRAC3® therapy – accidental hair removal. This, of course, has to be taken into consideration, as it can also be regarded as an unwanted side effect in certain anatomical regions for male patients, for example. We also observed a reduction of teleangiectatic vessels and skin sun damage.

For certain indications (e.g. wrinkles), a combination of the FRAC3® method with an Er:YAG laser treatment can lead to additional improvements in skin tightening.

In the future, a split-face study comparing the outcome of aesthetic treatments using radiofrequency and FRAC3® laser treatment is planned.

V. CONCLUSIONS

FRAC3® is an effective non-ablative skin rejuvenation procedure with no downtime, minimal chance of minor side effects and with a high patient satisfaction rate.

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