



# EVALUATION OF SAFETY AND EFFICACY OF 8 WEEKLY TREATMENTS OF DERMABRASION AND RF FOR WRINKLES REDUCTION

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Dafna Moskovitch, M.Sc. CRA  
Clinical Manager

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# Introduction

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Skin aging is a natural and inevitable process that reverses the biological characteristics acquired during development and leads to cell death. It is divided into two processes: intrinsic and extrinsic aging (photoaging). Both are accompanied by changes in morphological and bio mechanical properties of skin. The main clinical characteristics of aged skin are increased rugosity and loss of elasticity (laxity).

Histopathologically, it is observed that with age there is an increase of collagen network density and reduced stability of cross-links. Elastin, the main component of elastic fibers in the dermis, shows signs of decrease of its function, providing less resistance and traction capacity. Atrophy of subcutaneous fat is also noted [1].

Many therapeutic modalities can improve skin aging. These are divided into topical and procedural agents. Topical agents include retinoids, hydroquinones, and combination therapies. Procedural agents include chemical peeling, microdermabrasion, lasers, and intense pulse light, and non-ablative radiofrequency [2].

Radiofrequency (RF) is an effective treatment for skin tightening, such as sagging and/or laxity. In contrast to most lasers, which target a particular chromophore, RF depends on the electric property of the target tissue and does not require any chromophore. Therefore, RF can be used safely for all skin types. The objective of RF is to stimulate changes in collagen conformation and induce neocollagenesis by thermal power generation in deep layers of the skin and subcutaneous tissue [3].

Dermabrasion is a form of mechanical peel which removes the superficial epidermal layer and causes local disruption of the stratum corneum and superficial viable epidermis. Therefore, the technique is associated with minimal to no pain or bleeding and relatively fast recovery time. The treatment is used in facial rejuvenation, acne scars, stretch marks, clogged pores, hyper pigmentation and to enhance cosmetic delivery. Currently, 3 types of dermabrasion are used: diamond, aluminum oxide crystal, and hydradermabrasion. Diamond dermabrasion is the most used method, and aluminum oxide the least [4].

This work aimed to evaluate the efficacy and safety of diamond dermabrasion, followed by 2 kinds of radio frequency delivery methods.



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# Patients and methods

This was a prospective, single center, case study which included 8 patients with facial wrinkles. The patients were selected during the period from March 2021 to June 2021. Patients presented with facial wrinkles who didn't receive any previous cosmetic treatment or facial surgery and patients who accepted to be included in this study and signed a written consent were included in this study.

Exclusion criteria were: Pregnant or lactating women or who were under hormonal therapy, patients with a history of skin cancer, immunosuppression, bleeding coagulopathies or use of anticoagulants, history of chronic diseases (chronic renal failure, hepatic insufficiency, cardiovascular disorders, uncontrolled diabetes mellitus, thyroid disorders, anemia), any active condition in the treatment area as herpes simplex, sores, psoriasis, eczema, history of keloid formation or abnormal wound healing, other previous cosmetic treatment, or facial surgery, history of using medications known to induce photosensitivity as isotretinoin.

All patients received a session every 1 week for a total number of 8 sessions and followed up for 1 month after treatment.

## The technique of Dermabrasion

Treatment area was the entire face (forehead to jowls, excluding submental area) (Figure 1). A mixture of gentle soap, aloe vera, liquid containing 13% alpha-hydroxy acids and crystal peeling cream was applied to all treatment areas. The hand pieces of the device (PLG, Forma System, Formatk Israel) was then gently applied to the treatment area while rotating. 2 minutes for each side and one minute on the forehead. The dermabrasion mixture was cleaned from the patient skin for the FR part of the treatment.



Figure 1: Dermabrasion: Treatment area



## The technique of RF

Treatment areas were left and right cheeks (including nasolabial fold) down to the jawline, periorbital areas, and forehead. No anesthesia was utilized. Ultrasound gel was applied to all treatment areas. The hand pieces of the device (R-Sonic and SMART-ST, Forma System, Formatek Israel) were then gently applied to the treatment area to create constant, uniform coupling. Treatment was conducted according to the protocol for the specific treatment area and hand piece. R-Sonic for lower face (Figure 2A) – vibration level 1 and RF levels 7-8 were used for at least 5 minutes each side (including 1 minute of pre-heating until reaching 42°C). SMART-ST - For lower face and periorbital regions, Deep Mode was used and for forehead periorbital and cheekbone areas, Shallow Mode was used (Figure 2B).

Immediately after the RF part ended, a moisturizer containing active peptides was applied. Each treatment session duration lasted an average of 75 minutes.



Figure 2: A) R-Sonic treatment area B) SMART-ST Treatment areas

All patients were instructed to apply sunscreen preparations with (SPF 30) or more to the entire face when going outdoors at daytime, and to avoid the use of any other rejuvenation modalities during the treatment. All patients were also instructed to daily apply a cream containing 4% Kojic acid + 5% Arbutin for skin pigmentation reduction. Any possible complications, including edema, erythema, burning sensation, hypopigmentation, hyperpigmentation, infection, and scarring were recorded at each visit.

# Clinical evaluation of treatment efficacy

Facial digital photographs were taken for every patient using a digital camera (Canon EOS Rebel T5i, EFS 18-55mm) at baseline, every other session, after completion of the treatment and after 1 months for follow up (not all patients). Clinical assessment was performed for each patient according to Glogau's score of photoaging [5] (Table 1). Evaluator opinion: at the end of every other session and after 1 month duration an evaluator assessed the percentage of improvement of each patient, and the patients were asked to assess the percentage of their satisfaction with treatment.

Score	Typical Age	Skin features
I- Mild	The 20s–30s	Early photoaging Mild dyschromia No keratoses Minimal wrinkling Minimal, no makeup Minimal, or no scarring
II- Moderate	The late 30s–40s	Early senile lentiginos Dyschromia Early actinic keratoses Parallel smile lines Early wrinkling Some foundation wore Mild acne scarring
III- Advanced	Usually aged 50–65	Dyschromia, telangiectasias Visible keratoses Wrinkling at rest Always wears makeup Moderate acne scarring
IV- Severe	Patient aged 60–75	Actinic keratoses Prior skin cancers Wrinkling throughout Makeup cakes & cracks Severe acne scarring

Table 1: Glogau's classification of photoaging

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# Results

## Clinical results

The patients included 8 females. Their ages ranged from 47 to 79 years with a mean of 63.8. Regarding skin phototyping for patients according to Fitzpatrick classification, 3 patients (40%) were phototype I, 3 patients (40%) were phototype II and 2 patients (20%) were phototype III.

## Evaluation of efficacy of therapeutic procedures

According to Glogau's score, 3 patients (40%) were grade II, 3 patients (40%) were grade III and 2 patients were grade IV (20%) before the treatment while after treatment, 5 patients (63%) became grade II and 3 patients (37%) became grade III (Figure 3).

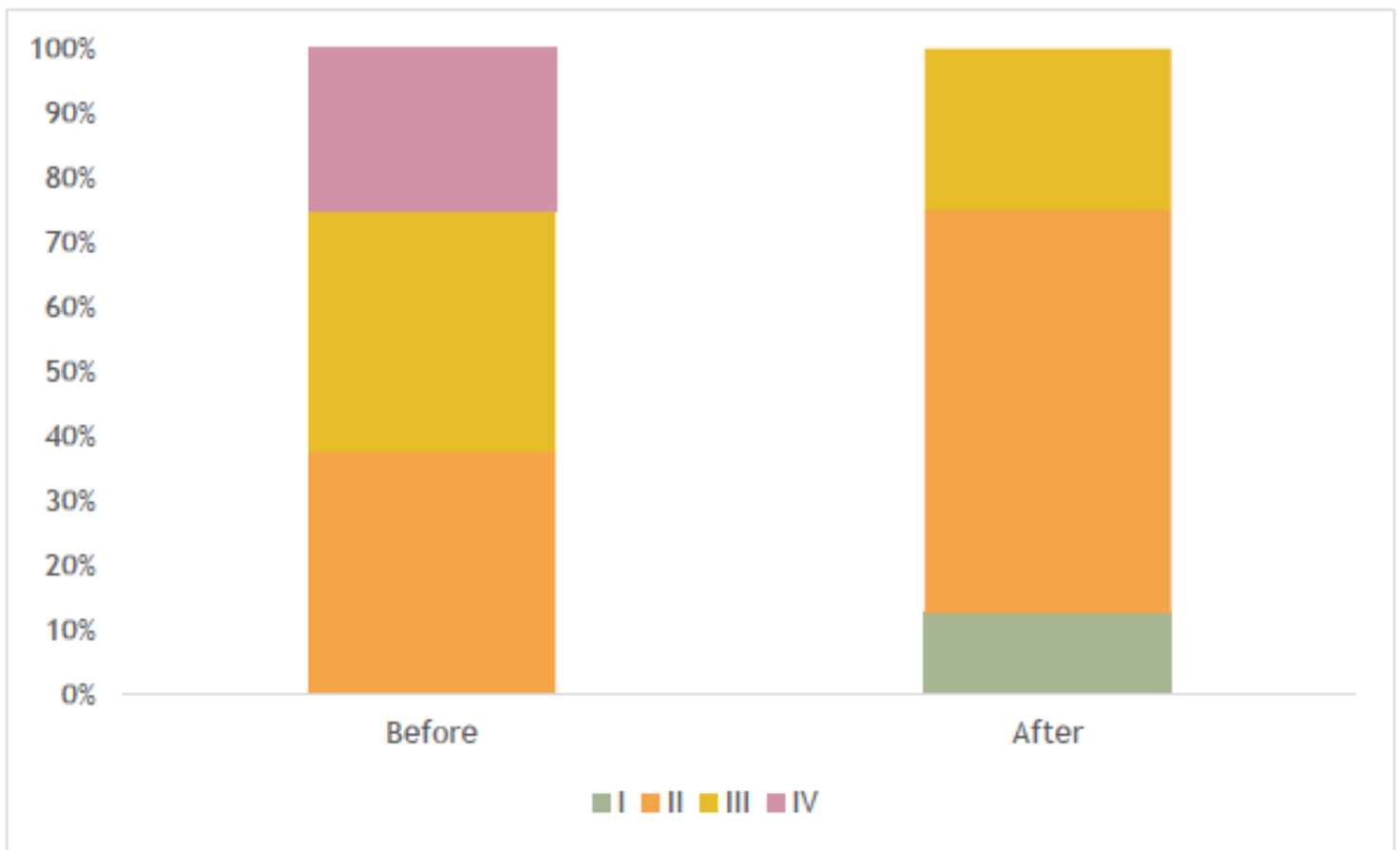


Figure 3: Glogau's score distribution before and after the treatment series

## Patients' satisfaction after treatment

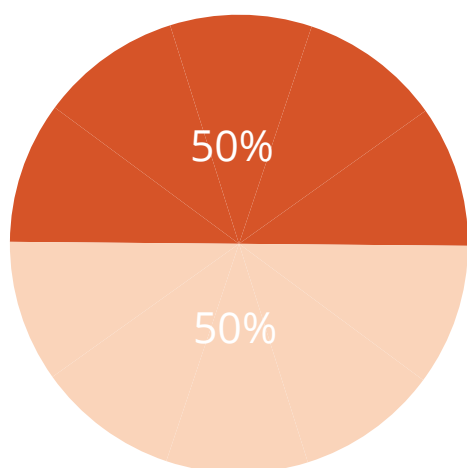
**50%**

indicated that the level of cosmetic improvement was between 25-50%

**50%**

indicated that the level of cosmetic improvement was 25% or less (Figure 4).

No side effects were recorded except for transient erythema which resolved within an hour from the end of the treatment.



- More than 75%
- Between 50-75%
- Between 25-50%
- Less than 25%

Figure 4: Distribution of patients' opinion regarding the cosmetic improvement achieved after the treatment series (a few days to 1 month after).



Figure 5: Female patient 57 years old A) Before treatment series B) After treatment series.

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# Discussion

There are two types of skin aging: intrinsic and extrinsic aging. Intrinsic aging reflects the genetic background and depends on time. Extrinsic aging is caused by environmental factors such as sun exposure, air pollution, smoking, and poor nutrition. Extrinsically aged skin is characterized by photo damage as wrinkles, pigmented lesions, patchy hypo pigmentation, and actinic keratosis [1] [2] [3] [4]. There are multiple processes involved in facial aging. The weakening and repositioning of soft tissue as well as soft tissue volume loss led to excess skin and deep creases on the lower face and the exposure of bony prominences on the upper face. Finer lines and rhytides occur from repetitive facial movements [6]. Fritz et al., 2004 were the first to report on a study comparing multiple RF treatments to a single RF treatment, for mild to moderate laxity of the middle and lower face. They concluded that two RF treatments produced significantly better improvement than a single treatment, although overall improvements were modest in both groups [7]. Friedman and Gilead, 2007 used the RF for facial rejuvenation. Photographic analysis showed moderate to significant improvement in 69% of the patients [8]. El-Domyati et al., 2011 showed a noticeable increase in epidermal thickness at the end of treatment and at 3 months post-treatment, especially in the granular cell layer with a significant increase in both type I and III collagens at the end of treatment [2]. Yokoyama et al., 2014 reported that, immediately after session, the treated skin of all cases showed erythema, which was temporary and disappeared the next day. No burns or post-inflammatory pigment deposition was observed. No additional adverse events were noted [9]. In our study, patients also experienced transient erythema. Radio frequency devices remain a dominant technology in the noninvasive management of skin aging, as it is a safe and effective treatment for a broad range of skin conditions. It can induce wrinkle reduction, cellulite improvement, laxity, body, and skin contouring improvement [10]. The radio frequency heat seems to have different biological effects. The rise in skin temperature can cause immediate effects on collagen structure with stimulation of dermal fibroblasts inducing a synthesis of new collagen fibers (known as neocollagenesis) and elastic fibers (known as neoelastogenesis) [11].

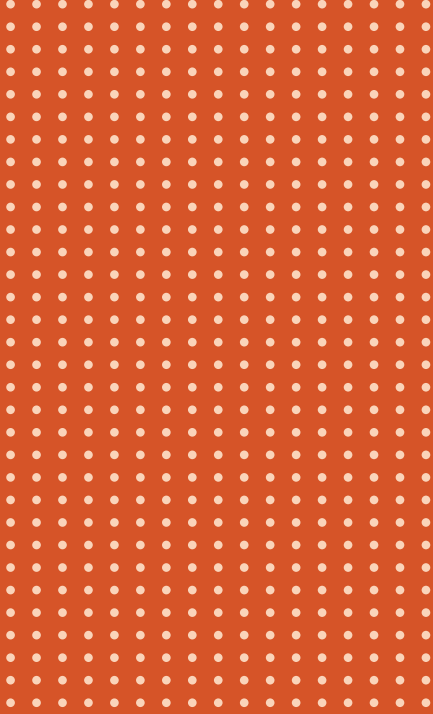
The limitations of this study were lack of control group, relatively small number of patients and short period of follow up. However, the results were encouraging. Well designated randomized controlled studies are required with larger number of patients and additional sessions to confirm the efficacy of these procedures in facial rejuvenation and to determine their long-term effectiveness. Moreover, a combination with IPL which is another modality that the Forma system offers, is recommended to be added to the treatment protocol for more patients to get better results.





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