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Plasma energy-based skin resurfacing for the treatment of blepharoptosis: efficacy of the Plasmage® device. A prospective multicentre clinical study.

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Abstract

We conducted a prospective clinical study of 176 patients in 9 different clinics throughout Europe and the Middle East to measure the efficacy and tolerability of fractional plasma® energy based device (Plasmage® device from Brera Medical Technologies s.r.l., Italy) for the treatment of blepharochalasis. We used the GAIS score (Global Aesthetic Improvement Scale) as a measure of efficacy.

The average GAIS score obtained was 3,21 +/- 0,61. The score did not significantly vary depending on skin type or age group. The study did show the best GAIS score for the 65 patients aged 41 to 50 with a GAIS average score of 3,46+/-0,56. 21% of patients reported skin redness and enhanced skin sensitivity for a period of 4-6 weeks. 100% of these adverse effects vanished completely.

The treatment of blepharochalasis using Plasmage® device (by Brera Medical Technologies s.r.l., Italy) shows promising results and appears as an interesting alternative to surgical intervention or CO2 laser with low adverse effect and a reduced down time.

Introduction

The periorbital region is one of the first areas to show signs of aging and is therefore one of the most frequent facial regions receiving cosmetic treatments[1]. Blepharoplasty surgery has been routinely used for eyelid reconstruction but can be traumatic to patients and has a lengthy recovery time[2,3] . Hence, non-invasive alternatives for eyelid skin rejuvenation are becoming increasingly popular.

Although CO_2 lasers have been considered the leading standard for facial skin resurfacing, these devices have several drawbacks including a prolonged healing time, occasional excessive damage to the skin, a risk of hyperpigmentation[4] and a reported reluctance of physician to use such device to treat the periorbital area.

Plasma energy delivery represents an alternative skin regeneration technology that has various benefits over traditional laser skin resurfacing. It has been demonstrated in previous studies that plasma energy applied to upper eyelid could improve collagen production and clinically improved appearance, without any serious adverse events[5,6,7]. Histological studies performed on patients with plasma resurfacing have confirmed continued collagen production, reduction of elastosis, and progressive skin rejuvenation beyond 1 year after treatment[8].

Plasmage® system (Brera Medical Technologies s.r.l., Italy) allows finely-tuned, fractional plasma® energy delivery with extreme precision, which reduces risk of excessive skin injury and shortens skin recovery time.

In study, we investigated for the first time a prospective clinical study of 176 patients in 9 different clinics throughout Europe and the Middle East to measure the efficacy and tolerability of fractional plasma® energy based device Plasmage® (Brera Medical Technologies s.r.l., Italy) for the treatment of blepharochalasis in adults.

We used the GAIS score (Global Aesthetic Improvement Scale) as a measure of efficacy and collected from each clinical center complete data for each patient prior to the upper eyelid blepharo treatment, just after and 6 weeks after to measure tolerability and any potential side effects.

Materials and Methods

Study design and ethics

This was an open-label, prospective, observational study conducted at nine sites across Europe and the Middle East between January and June 2017. The primary objective was to describe the efficacy of plasma energy therapy delivered by the Plasmage® device (Brera Medical Technologies s.r.l., Italy) for treating blepharochalasis in adults. The study was performed in accordance with the Declaration of Helsinki and national regulations and in compliance with Good Clinical Practice with the International Conference on Harmonization Guidelines for Good Clinical Practice. All participating subjects provided their written informed consent. Independent

ethics committee approval was not required for this observational study performed during routine clinical practice.

Healthy adults 35−74 years of age with blepharochalasis were enrolled by investigators during routine consultation for eyelid reconstruction. Subjects had to have a Fitzpatrick skin phototype of II-III-IV. Subjects could not have had laser or radiofrequency treatments to the periorbital area within the last 4 weeks, could not be planning to have any botulinumtoxin, fillers, or other cosmetic procedures for the duration of the study in the periorbital area, and could not have generalized disorders of muscle activity, autoimmune disease, or infection around the eyes. Women could not be pregnant or breastfeeding.

Study conduct and assessments

Subjects were to have both upper eyelids treated by the Plasmage® system. A topical anesthetic cream (i.e. lidocaïne and tetracaïne based) was applied to the treatment area according to the manufacturer's recommendations and then removed before the treatment. Treatment was performed by delivering successive fractional plasma® energy doses in a dotted formation, separated by about 1 mm of intact tissue, to allow shrinking of the tissue and recovery without hyperpigmentation. Practitioners could determine the precise areas of skin to treat on a case-by-case basis. They were recommended to use the power and frequency parameters of the preset Blefaroplasma® program within the Plasmage® device, although these could be reduced to allow additional touch-ups at a lower power. Following treatment, subjects were instructed to apply a provided cortisone cream to treated skin regions for 3 days and a sterile petroleum jelly overnight

until complete healing. Subjects were also instructed to avoid direct exposure to the sun for 5 weeks and to wear a +50 sun protection factor sun block cream over treated skin regions for 90 days. Subjects were to return for a follow-up visit between 20 and 30 days after treatment.

The treating physician took photographs of each subject at inclusion and at follow-up visit. Six photographs were taken at each time, with eyes open and closed from the front and at left and right 45° horizontal angles.

Efficacy of treatment was measured during the follow up visit by the treating physician using the Global Aesthetic Improvement Scale (GAIS) score based on before and after pictures with GAIS score of 0=worse, 1=no change, 2=improved, 3=much improved, 4=very much improved.

No Adverse events (AEs) were recorded by the subjects and treating physicians during the follow up visit between 20 and 30 days.

Plasma energy delivery device

All treating physicians in this study used the Plasmage® system (Brera Medical Technologies s.r.l., Italy).

The device generates fractional electrical discharge at the tip of its handpiece. The electrical discharges induces a ionization of air between the tip and the skin. The ionized air is the plasma beam. It generates a controlled heat on the surface of the skin and induces a controlled sublimation of the tissue [5].

The device offers a preset program to treat blepharochalasis adapted to the average skin thickness and conductivity of the body area. The parameters are

Power: 2W (Level 4)

Fractional Setting: Level 3

Energy Density/shot: 6mJ/mm^2

Note that delivery of energy is dependent on longevity of exposure and density of microfocused heating zones.

Data analysis

Descriptive analyses were used. Safety was analyzed in all treated subjects and had at least one follow up to evaluate safety. Efficacy was analyzed in all subjects completing the study according to protocol. Missing data were not replaced.

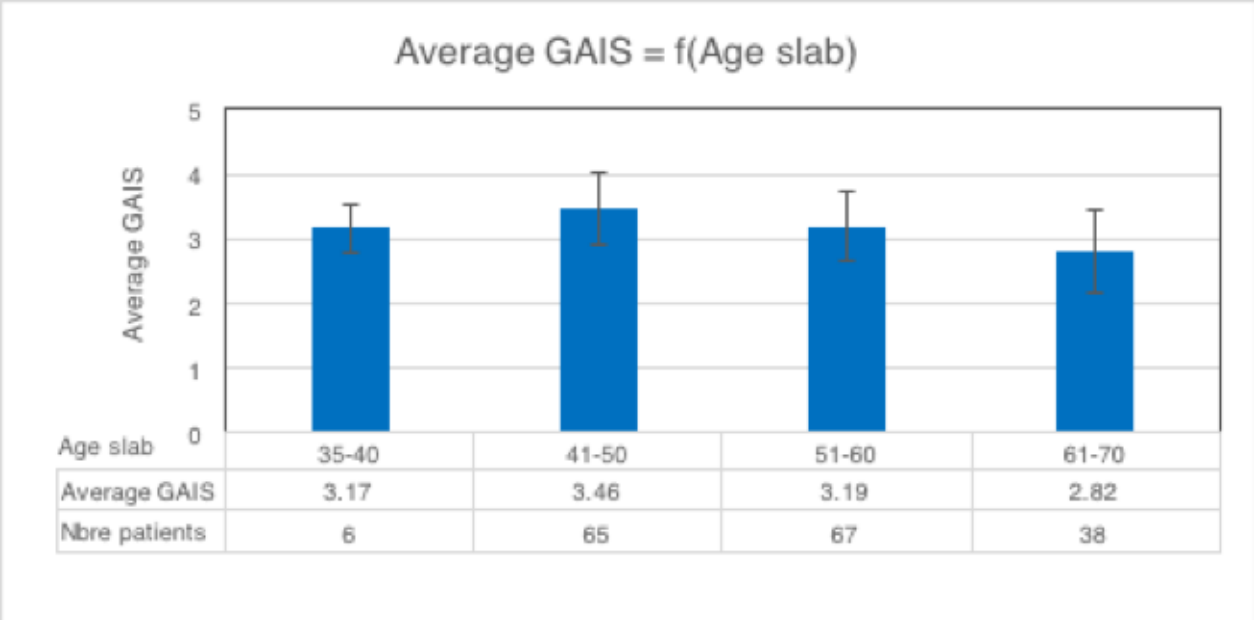
Results

Subjects

This observational study was conducted between 01st January and 31st August 2017. During routine clinical practice, treating physicians enrolled 240 subjects total, of which 176 (73%) completed the study according to protocol.

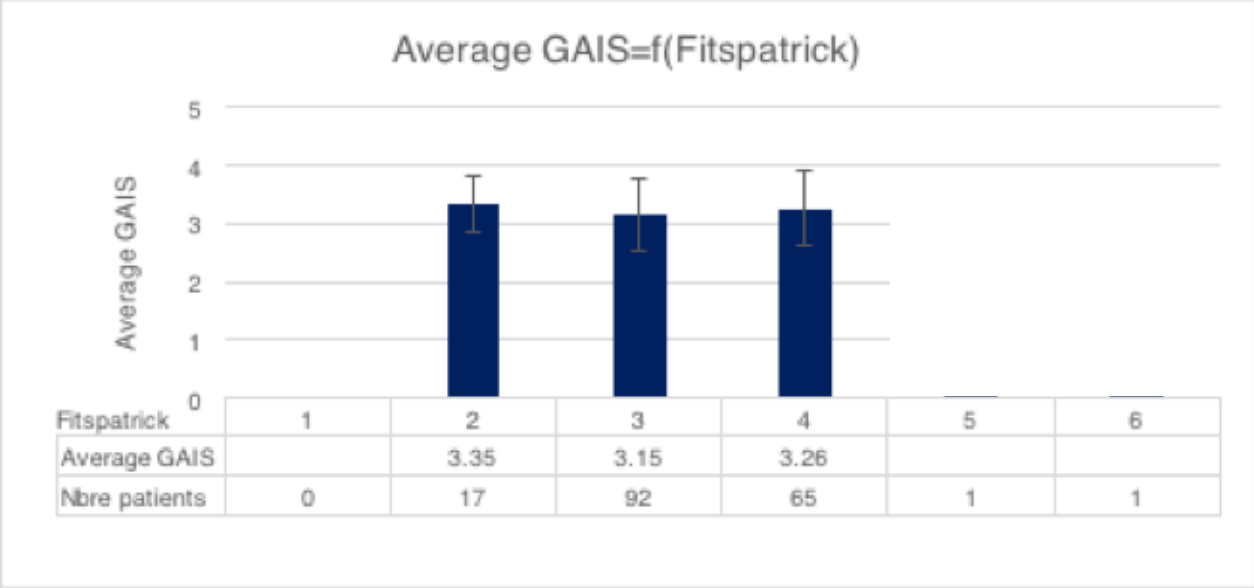
Most subjects were female (87%), and the median age was 53 years old. Patients skin type according to the Fitzpatrick scale were ranging of type II (17 patients), type III (92 patients) and type IV (65 patients). One patient of skin phototype V and one patient of skin photoype VI were also including in the study, but not in the statistics of the results. Patient profile are summarized in table 1 & 2.

Table 1 – Patients GAIS score depending on age slab



Age slab	35-40	41-50	51-60	61-70
Average GAIS	3.17	3.46	3.19	2.82
Nbre patients	6	65	67	38

Table 2 - Patients GAIS score depending on skin type



Fitspatrick	1	2	3	4	5	6
Average GAIS		3.35	3.15	3.26		
Nbre patients	0	17	92	65	1	1

Tolerability

The treatment was well tolerated by 91% of the patients with an average rating of their pain by the patients, according to a numeric scale, of 3 on a scale of 1-10 (10 being unbearable pain). Few patients reported feeling significant pain (score of 4 ad above). The treating physician had to re-apply the local anesthetic for better tolerability. In some cases, the treating physician declared having used injectable anesthetics through facial blocks to obtain a good tolerability and quicker action. Injectable lead systematically to a reported pain score of 1 or 2 which is no to low pain.

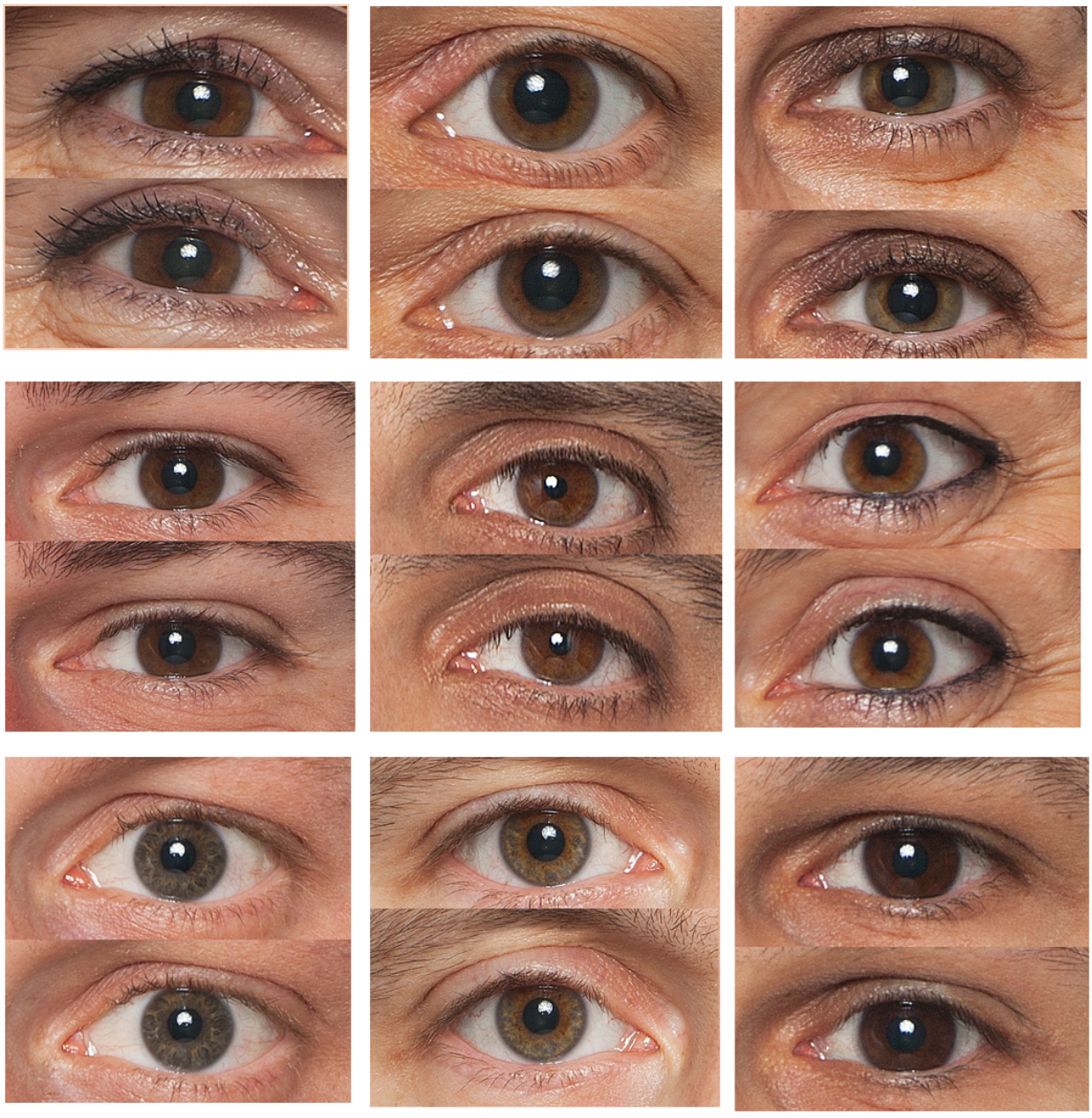
Efficacy in treating blepharochalasis

Treating physicians reported operating with two type of objectives depending on the patient: chalasis or most frequently wrinkles around the periorbital area. Protocol did not vary whether the treatment targeted one or the other. In both type of cases, the Plasmage treatment had as an objective to tighten the skin in the upper eye lid and in some cases in the crow's feet area.

The average GAIS score obtained was 3,21 +/- 0,61. The score did not significantly vary depending on skin type. Skin type II, III and IV on the Fitzpatrick scale showed respectively average GAIS score of 3,35+/-0,48; 3,15+/-0,61 and 3.26+/-0,64. No patients of skin type I participated to the study. One patient of skin type V and one patient of skin type VI were recruited and both showed a GAIS score of 3 with no healing or depigmentation issues reported *(Not in the statistics for the low number of cases treated).*

The study showed a best GAIS score for the 65 patients aged 41 to 50 with a GAIS average score of 3,46+/-0,56. While patients 35-40 showed an average score of 3,17+/-0,37, patient 51-60 an average score of 3,19+/-0,53. The lowest GAIS score were observed on patients 61-70 (38 patients in the study) who showed an average score of 2,82 +/-0,64.

Picture 1: Before / After picture of a series of patients representing the cohort. Pictures are courtesy of Dr Jacques Andre David



Adverse effects

37 patients (21%) showed skin redness after 6 weeks and all reported transient increased skin sensitivity. This side effect was reported to have vanished during an additional follow up visit of all 37 patients 3 to 4 weeks later.

No episode of hyperpigmentation was reported, even in the two cases of skin type V and VI.

No other adverse effect was observed.

Discussion

This study is the first of its kind by the size of the cohort and the consistency of the results across skin type and age group. Treatment of blepharochalasis using the fractional plasma® energy based device Plasmage® (Brera Medical Technologies s.r.l., Italy) showed consistent efficacy with an average GAIS of 3,21 +/- 0,61 consistent over age group (36 to 68) and skin type (II to Iv). Further investigations would have to be conducted to confirm these results for younger patients and for phototype I, V and VI.

Overall tolerability can be considered as excellent with an average reported pain score of 3 on a scale of 1 to 10 when using only topical anesthetic cream. However, some patients required a second application of the local anesthetic or local injection of anesthetic. This

underlines the necessity of an efficient anesthesia strategy to allow good tolerability of the Plasmage® treatment.

The only adverse effect reported out of 176 patients was a transient redness of the skin during the first follow up meeting (after 4-6 weeks). This adverse effect was reported for 37 patients (21% of the cohort) and was resolve for all 37 patients during a second follow up meeting 3 to 4 weeks later by the use of repair cream based on vitamin K and Zinc and silicon gel.

In conclusion, the treatment of blepharochalasis using Plasmage® device (Brera Medical Technologies s.r.l., Italy) showed out of 176 patients an average GAIS score of 3,21 +/- 0,61on a scale of 0-4. GAIS 3 being much improved. These results demonstrate that Plasmage® technology could be considered as a first choice for minor skin excess or for patients that would not be suitable for surgery. For major skin excess, this treatment option shows very satisfying results as well and hence appears as an interesting eyelid rejuvenation treatment with low adverse effect and a reduced down time.

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