

## ORIGINAL PAPER

## Nonsurgical blepharoplasty

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## Abstract

The eyes are an important component of facial aesthetics. They are in the center of an anatomical area of the face very important for rejuvenation procedures, the so-called “periorbital region.” The appearance of the eyes therefore decisively influences the perception of the aesthetics and aging of the entire face. In juvenile age, the skin of the periorbital area is elastic and tonic, without sun damage; the eyebrow is full, well defined, and not descending; there is a clear and visible fold of the upper eyelid, with minimal dermatochalasis; the lower eyelid is tense and well positioned. The aim of this preliminary study is to define a protocol for the use of plasma technology in the treatment of aging signs of the periorbital region. The protocol is aimed to provide predictable, constant, and safe results.

## KEYWORDS

blepharoplasty, eyes, plasma

## 1 | INTRODUCTION

The eyes are an important component of facial aesthetics. They are in the center of an anatomical area of the face very important for rejuvenation procedures, the so-called “periorbital region” (Castro & Foster, 1999; Naik, 2013; Pilkington, Belden, & Miller, 2015). The appearance of the eyes therefore decisively influences the perception of the aesthetics and aging of the entire face (Balin & Pratt, 1989; Naik, 2013). In juvenile age, the skin of the periorbital area is elastic and tonic, without sun damage; the eyebrow is full, well defined and not descending; there is a clear and visible fold of the upper eyelid, with minimal dermatochalasis; the lower eyelid is tense and well positioned (Lee & Yen, 2017).

The appearance of dark circles, “crow's feet” wrinkles, eyelid bags, dermatochalasis (that means skin redundancy of the upper eyelids), and the thinning and drying of the skin, are the main characteristics of aging of the upper part of the face (Kahn & Shaw Jr., 2008; Pilkington et al., 2015). The loss of volume, with deflation and emptying of the upper eyelid, and the sunken appearance of the eye, with a deep furrow at the top, are other manifestations of aging (Kahn & Shaw Jr., 2008).

Once, the only possible treatment for the aging of periorbital area was surgical (blepharoplasty), or laser assisted or by injecting fillers (Lee & Yen, 2017; Naik, 2013). Since about a decade, a noninvasive plasma technology is available to treat dermatochalasis and crow's feet.

The aim of this preliminary study is to define a protocol for the use of plasma technology in the treatment of aging signs of the periorbital region. The protocol is aimed to provide predictable, constant and safe results.

## 2 | MATERIALS AND METHODS

Ten female patients, aged between 40 and 65 years, were enrolled; none of them had concomitant diseases.

The area to be treated was cleaned and disinfected with benzalkonium chloride 0.125%. Local anesthesia with a cream based on lidocaine 2.5% and prilocaine 2.5%, was applied. Each patient thus underwent a nonsurgical “blepharoplasty” session with an Italian fractional plasma generator (Plasmage<sup>®</sup>, by Brera Medical Technologies Srl, Italy). The device is used according to a spot technique, by drawing triangles with bases aligned to the skin fold to be flattened, and

vertices are perpendicular and go in opposite directions, on the two sides of the fold. Starting from the lateral third of the upper eyelid and up to the lateral cantus, we proceeded to practice, again with a spot technique, a series of triangles having their vertices towards the tail of eyebrow, arranged on several lines.

Immediately after the treatment, the area was cleaned and disinfected again, always with benzalkonium chloride 0.125%, without rubbing.

Photographs (front, right and left, right oblique, and left oblique) were taken, before the session, immediately after and 3 weeks later.

Each patient was prescribed to clean the treated area twice a day, without rubbing, with benzalkonium chloride 0.125%; to wash with Marseille soap; not to apply cosmetic creams; to wear sunglasses on the outside; not to expose to the sun; not to practice physical activity or swimming pool activities in the first 5 days after treatment.

### 3 | RESULTS

Immediately after treatment, all patients showed redness and edema of the treated area, and small point carbon deposits where the device's handpiece was applied. These small deposits disappear following post-treatment cleaning.

At once, a more open aspect of the eye is appreciated, and a flattening of crow's feet wrinkles.

Twenty-four hours following the treatment, the eyelids appear to be very swollen due to edema.

After 3 weeks from the treatment, a significant improvement in the appearance of the eyelids is appreciated: the dermatochalasis is considerably reduced, the periocular wrinkles are smoothed and the eyes take on a more youthful appearance. Finally, about 2 months after treatment, the result becomes stable (Figures 1–3).



**FIGURE 1** Front view of a patient: upper, before the treatment, and lower after 2 months



**FIGURE 2** The same patient, in right lateral view. Upper before, and lower after 2 months



**FIGURE 3** The same patient, in left lateral view. Upper before treatment, and lower after 2 months

### 4 | DISCUSSION

Improving the appearance of the eyes is a key goal in all anti-aging therapies. The surgical approach, up to now gold-standard of such therapies, has however constituted a limiting factor for the access of many people

to the treatment (Alster & Bellew, 2004). Hence, the importance of having a minimally invasive, safe, effective, and low-cost method.

Plasma skin regeneration is a novel type of skin rejuvenation technology developed over the last years (Heinlin et al., 2010).

The technology can present itself in four different phases: solid, liquid, gas, and plasma. By adding heat or energy to a gas, this is transformed into plasma: the atoms that make up the gas begin to lose their electrons and become positively charged ions. The lost electrons are then able to float freely. This process is called ionization (Goldston & Rutherford, 1995), and when this process has involved most of the gas, then it is called plasma (Morozov, 2012). Devices using plasma technology deliver thermal energy directly to the tissues at the time of contact, without relying on skin chromophores. On the contrary lasers, which are based on the principle of selective photothermolysis to provide heat to specific targets in the skin (Bogle, Arndt, & Dover, 2007a). A controlled and focused microplasma beam by ionization of the gases contained in the air and appearing as a small electric arc, like a minimal lightning, is produced from a plasma generator (Goldschmidt, 1978). A handpiece allows to convey the plasma beam on the skin to be treated. The controlled thermal damage on the skin surface, directly produced from the plasma, induces new formation of collagen and therefore the improvement of the photodamaged and aged skin. The technology can be used at different energies for reaching different depths in the dermis (Bogle, Arndt, & Dover, 2007b).

Recently, devices have appeared on the market able to shape a "plasmatic arc" between the skin and an electrode when maintained at a suitable distance. Supplying energy to the electrode, the difference of potential between it and the target skin produces an air ionization locally with a resulting plasma discharge that impacts the skin producing a thermal damage in a very selective area.

The device used in our present study is a plasma generator of the latter generation that, thanks to the innovative production of "Fractional Plasma"<sup>®</sup>, assures the total control of the thermal damage produced. It is equipped with a "pen" handpiece, convenient to use in an area such as the eye, and able to shape a small plasma arc between itself and the skin. Of course, the tip of the handpiece should never be placed on the skin, but there must always be a minimal distance between them. As mentioned above, the controlled thermal damage generated by the plasma arc induces new collagen formation (Bogle et al., 2007b). It is therefore important to determine this new formation on the sides of the skin folds to be flattened and in directions that "pull" the fold towards two opposite sides. Hence, the choice to use a spot technique and to "draw" triangles with the base parallel to the fold, as well as "pulling" the eyelid towards the corner of the eyebrow.

All this, allows to obtain a kind of effective blepharoplasty, without surgery.

In fact, all the patients enrolled in our study showed a marked reduction in dermatochalasis. The extent of the improvement depended on the starting situation and the age of the patient. The improvement, already noticeable immediately after the treatment, reached its peak after 3 weeks from the treatment and stabilized after 2 months.

Complications or infections were never observed. Postoperative discomfort was limited to localized redness and edema, which resolved spontaneously in 2–3 days, and in small crusts falling after 10 days.

Patients can undergo further treatment, in the same way as the first one for further improvement.

## 5 | CONCLUSIONS

Further studies will bring more information about this innovative technique.

## CONFLICT OF INTEREST

No conflict of interest.

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