



The skin rejuvenation associated treatment—Fraxel laser, Microbotox, and low G prime hyaluronic acid: preliminary results

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Abstract

Minimally invasive facial rejuvenation procedures reached an all-time high in the 2016. This reveals a growing interest in a smoother, younger, and tighter look accessible using the esthetic medicine tools like botulinum toxin and dermal filler injections, laser, and microdermabrasion. Forty-five patients from 35 to 52 years old (medium age 43.8), 38 women and 7 men underwent 5 sessions of Fraxel laser, 1 session of very low G prime HA, and Microbotox injection treatments from January 2016 and January 2017, were included in this study. In this study, we demonstrated that the usage of three treatments together, like mBTX, Volite, and Fractional laser, have a better result despite every single technique alone. The clinical result showed 98% (44 patients, 6 males, 38 females) of the patients had a smoother skin surface, brighter, more hydrated, and elastic skin; 68% of our patients (31 patients, 5 males, 26 females) showed less skin defects and staining as well as less small wrinkles, thanks to Fraxel laser treatment; 98% (44 patients, 6 males, 38 females) showed tighter skin with less sebaceous gland secretion. The aim of this study was to demonstrate that the combination of three techniques acts better and faster than single treatment to contrast facial aging and to improve skin texture and quality.

Keywords Fraxel · Microbotox · Very low G prime hyaluronic acid

Introduction

According to the ASAPS statistics, minimally invasive facial rejuvenation procedures reached an all-time high in the 2016. This reveals a growing interest in a smoother, younger, and tighter look using non-surgical tools like Botox, Dermal Filler injections, and laser. Botox injections increased by 8% with millions of procedures performed and nowadays, esthetic medicine is considered an excellent alternative to plastic

surgery, when patients are not looking for a surgical treatment [1–3].

Facial aging alters skin in several ways [4]: collagen production slows, loss of ability to retain moisture, reduction of fat cells, elastin production decreases, less turnover of new skin cells, etc. All these factors contribute to alter skin quality and texture and, according to the literature, skin aging is directly linked particularly with those last two features, in particular in sun-exposed skin area.

It is possible to consider two different kinds of mechanism of aging: intrinsic and extrinsic. The first one is linked to genetics while the extrinsic factors are exposure to UV radiation, pollution, and cigarette smoking, practically everything that can accelerate the intrinsic skin aging; therefore, it is possible to consider facial aging like a multifactorial process.

As we age, some facial muscles tend to be hyperactive [5] with the depressors overpowering the elevators. This can be observed in the lateral brows and on the mouth angles. The forehead lines become apparent as a result of the hyperactive frontalis and create dynamic wrinkles. When we are young, our skin springs back due to its elasticity, but as we get older, the dynamic wrinkles will eventually end up in static wrinkles.

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One non-surgical tool to contrast the skin aging and improve skin quality and texture is the combination of microbotulinum toxin A, hyaluronic acid (HA) fillers, and laser.

Microbotulinum toxin A is a technique that is becoming more and more popular. Treatment is relatively easy to perform and it consists in a series of injections (micro-droplets) of diluted onabotulinumtoxinA at 0.8- to 1.0-cm intervals into the dermis or the interface between the dermis and the superficial layer of facial muscles. The intent is not to completely paralyze the underlying facial muscles but only to weaken the superficial fibers that are inserted into the undersurface of the skin, which are responsible for the fine lines and wrinkles on the face and neck. Moreover, Microbotox injections decrease sweat and sebaceous gland activity to improve skin texture and sheen and to target the superficial layer of muscles that find attachment to the undersurface of the dermis causing visible rhytides. It works very well for stretching wrinkles and for recovering the natural skin texture and quality.

HA fillers are substances injected into the face in order to fill volume deficits and improve surface contours. They have rapidly gained remarkable acceptance over the past decade as a method of reliably enhancing the topographic features of the human face. Treatment can be performed deep or intradermally and HA can be used to fill superficial cutaneous depressions such as fine lines and for additional improvement of skin quality attributes such as hydration and elasticity.

Laser, in particular Fraxel laser, works creating a series of tiny microthermal zone deep in the skin which the skin repairs by pushing out the “old and damaged” cells, replacing them with new skin cells. In other words, laser triggers the body’s natural healing process accelerating the production of collagen and new healthy skin [6].

The aim of this study is to demonstrate that the combination of that three techniques is better than single treatment and their association can boost the improvement of the skin texture and quality to rejuvenate patients’ face.

Materials and methods

Forty-five patients from 35 to 52 years old (medium age 43.8), 38 women and 7 men underwent 5 sessions of Fraxel laser, 1 session of very low G prime HA, and Microbotox injection treatments from January 2016 and January 2017, were included in this study.

All of the patients were Caucasian, with no history of surgical or non-surgical procedures to improve skin quality (in particular semi-permanent or permanent filler and Botox users), without facial scars and facial tattoos. Patients with history of endocrinologic, cardiologic, dermatologic, and oncologic illnesses were excluded. Moreover, people who were chronically taking drugs like corticosteroids,

immunomodulators, and other medicines that may have interfered with skin response were also excluded from the study.

Before starting each treatment session, we did a complete assessment of the patient in order to give the best result possible. We considered some different parameters: horizontal or vertical facial asymmetries, proportion and shape of the face (forehead height, distance between the eyebrows), tics or spastic abnormalities related to facial muscles, any skin discolorations, eyelid condition (upper ptosis, skin laxity of the lower face, chronic edema), brow ptosis and potential hyper-compensation of the frontal muscle, contraction of the orbicularis muscle (for crow’s feet), smile dynamics (muscle hyperactivity, dental exposure, and degree of occlusion), hyperactivity of the mental muscle (orange peel chin), and platysma bands.

Evaluations of specific parameters must be carried out when the patient is seated, in natural head position, both at rest and in facial dynamic movements. A change of position of the subject, such as flexion or extension of the head, can cause major changes in the whole image and can lead, therefore, to a different assessment of the result.

It is generally accepted that all esthetic procedures must be photographically documented. We acquired a photographic record before and after the treatment, and at any subsequent step, obtaining the consent for the processing of personal data, privacy, and patient waive.

Microbotox, HA fillers, and Fraxel laser were performed in different sessions. Firstly, patients were treated with five sessions of Fraxel laser, one session every 3 weeks; then, we used to treat patients with Microbotox (one session) and lastly, we injected very low G HA filler (one session).

All the patients received a full facial treatment including neck.

Treatment sessions

Microbotox

Onabotulinumtoxin A (Vistabex®, Allergan Inc., Irvine, CA) was used. For glabellar, crow’s-feet, forehead, and infraorbital regions, the concentration of Microbotox used is 20 units in 1 mL of solution [7].

Vistabex was resuspended at the recommended dilution of 1.25 mL. The Microbotox solution is mixed in the syringe by adding lidocaine (0.5 ml of the recommended dilution with 0.5% lidocaine solution equivalent to a final solution of 20 U of toxin). Each 1 mL syringe of Microbotox solution is used to deliver 80–100 injections (0.01 ml approx.). The upper face and periorbital area usually require 1 mL per side. The injections are delivered intradermally using a 30- or 32-G needle raising a tiny blanched weal at each point.

Care must be taken to just penetrate the needle into the skin as superficially as possible. A resistance should be felt on pressing the plunger, and a small raised, blanched bleb in the

skin should be seen. This indicates good depth of injection. If the solution is easily injected, the needle has probably been inserted too deeply and is subdermal or intramuscular.

The initial prick may be painful, but within 1 or 2 s, the injection point becomes anesthetized and no longer bothers the patients as the rest of the injections are completed in remaining areas. At the end of the procedure, patients do not experience any pain. The duration of improvement after a session of Microbotox typically lasts for 3–4 months and in some cases up to 6 months.

We used Juvapen® (Juvaplus SA Neuchâtel Switzerland) to inject Botox; it is a device that allows to use every time the same dose of toxin with less variability than manual injection. Patients experienced less pain, less edema, and a shorter treatment time. On the other hand, this device allows to save a lot of toxin (approx. 20%). Juvapen has 6 preset doses from 0.0125 to 0.1 ml [8].

Fraxel laser

Fractional photothermolysis is a non-ablative resurfacing laser technique, in which the laser creates microthermal zones of “injury” randomly integrated onto the skin. Within these areas, localized epidermal necrosis occurs alongside collagen denaturation, followed by expulsion of the necrotic debris and neocollagenesis. In the non-ablated areas, these islands of normal skin serve as an epithelial bridge with factors that facilitate a quicker healing process [9].

We used 1550-nm (Fraxel SR1500 RE:Store; Solta Medical, Hayward, CA).

Energy was set in accordance with Classification and Features of Skin Types as described by Fitzpatrick (Table 1).

Topical anesthetic (lidocaine hydrochloride, 7%, and tetracaine hydrochloride, 7%) was applied to the treatment area for 45 min prior to treatment [10]. Proper laser safety precautions were instituted. All subjects were discharged with a nonchemical sunscreen as well as instructions for antiviral medication for those who had a history of facial and/or labial herpes. Each session last about 30 min. All the face and neck areas were treated.

Table 1 FitzPatrick skin type table

FitzPatrick skin type	Skin tone	Tanning history
I	Ivory	Never tan/always burns
II	Beige	Find it difficult to tan/usually burns
III	Light brown	Tans gradually/mild burns sometimes
IV	Medium brown	Easily tans/burns rarely
V	Dark brown	Easily tans/very rarely burns
VI	Very dark brown	Tans very easily/never burns

Very low G prime HA filler

Several classes of facial fillers are available. The safest and most widely accepted filler is crosslinked hyaluronic acid (HA). HA is considered a volumizer in that its effect depends largely on the bulk effect of the injected product rather than inflammation and the stimulation of collagen production. It is accepted that the HA molecular weight is the most important feature to predict its function. In this study, our goal is to improve skin quality and texture. Juvederm® Volite (Allergan Inc., Irvine, CA) has very low G HA filler (Table 2).

We treated all the patients in one session only. The minimum quantity was 2 ml of Volite and the maximum was 4 ml (average 2.5 ml per patient).

When injections were performed, we stretched the skin to increase tension using an oblique injection angle; the product was injected intradermally and very slowly with microaliquot droplets. We stopped the injection before retruding the needle backwards.

Usually, we started the procedure in the lateral malar region because this allowed calibration of injection technique to individual patient needs and microarchitecture in a lower visibility area; patient experienced less pain in this area and if a lump is induced; it was less visible [11].

We treated all the face and neck depressions.

Results

We followed up our patients for 12 months with clinical checks at 1, 3, and 6 months. We gave our patients a clinical questionnaire (from 1 to 10) asking them to rate the satisfaction level which in 100% of our patients got an average of 7.8. The clinical result showed the following data:

- 1) In 98% (44 patients, 6 males, 38 females) of our patient population, a smoother skin surface, brighter, and more hydrated and elastic skin;
- 2) Sixty-eight percent of our patients (31 patients, 5 males, 26 females) showed less skin defects and staining as well as less small wrinkles, thanks to Fraxel laser treatment;

Table 2 Formulation of Juvederm® Volite

Juvederm® Volite	
HA (mg/ml)	12
HA molecular weight (higher/lower)	Majority lower molecular weight
Cross-linking technology	Vycross
Lidocaine hydrochloride (%w/w gel)	0.3
Syringe type	COC
Syringe fill (ml)	1.0

- 3) Ninety-eight percent (44 patients, 6 males, 38 females) showed tighter skin with less sebaceous gland secretion.

The complication rate was 21%. Among these, the more frequent were as follows: 12% hematoma (Volite and mBTX),

6% nodules formation (Volite), 25% pain during laser, and 17% during Volite injection. No side effects were noted with the mBTX injections; in particular, there were no cases of facial asymmetry.



Clinical case 1: Before and after



Clinical case 2: Before and after

Discussion

Esthetic medicine aims to rejuvenate skin and to restore facial balance. One of the most important aspects for facial balance is the quality of skin and its texture and facial aging is directly related with that.

Skin aging is a complex biological process influenced by combination of endogenous or intrinsic (genetics, cellular metabolism, hormone, and metabolic processes) and exogenous or extrinsic (chronic light exposure, pollution, ionizing radiation, chemicals, toxins) factors [4, 7]. These factors lead together to cumulative structural and physiological alterations and progressive changes in each skin layer as well as changes in skin appearance, especially, on the sun-exposed skin areas. In contrast to thin and atrophic, finely wrinkled and dry intrinsically aged skin, premature photoaged skin typically shows a thickened epidermis, mottled discoloration, deep wrinkles, laxity, dullness, and roughness. Gradual loss of skin elasticity leads to the phenomenon of sagging. Slowing of the epidermal turnover rate and cell cycle lengthening coincides with a slower wound healing and less effective desquamation in older adults. This fact is important when esthetic procedures are scheduled. On the other side, many of these features are targets to product application or procedures to accelerate the cell cycle, in the belief that a faster turnover rate will yield improvement in skin appearance and will speed wound healing. A marked loss of fibrillin-positive structures as well as a reduced content of collagen type VII (Col-7) may contribute to wrinkles by weakening the bond between dermis and epidermis of extrinsically age skin. Sun-exposed aged skin is characterized by the solar elastosis. The sparse distribution and decrease in collagen content in photoaged skin can be due to increased collagen degradation by various matrix metalloproteinases, serine, and other proteases irrespective of the same collagen production [4].

Three primary structural components of the dermis, collagen, elastin, and GAGs have been the subjects of the majority of anti-aging research and efforts for esthetic anti-aging strategies pertaining to the skin from “anti-wrinkle creams” to various filling agents.

Presentation of aging of the entire face is associated with the gravity impact, muscles action, loss of volume, diminishing and redistribution of superficial and deep fat, and loss of bony skeleton support what all together lead to the face sagging and changes in shape and contour. Regardless of the fact that aging is a biological inevitable process and not a pathological condition, it can be correlated with various skin and body pathologies, including degenerative disorders and benign and malignant neoplasms.

The mainspring of any skin anti-aging therapy is to achieve a healthy, smooth, blemish-free, translucent, and resilient skin. In clinical practice, “to look better” does not mean to “look younger.” That is why it is so important to understand

patients’ wishes and to orientate them to the treatment modality that will give the most satisfying results whereas knowing all available treatment techniques. The age, previous procedures or surgery, general health status, type of the skin, style of life, and many other factors should be taken into consideration before choosing the strategy for the individual case. The desired therapeutic anti-aging effect of the skin is a continuous, step-by step process, which combines various methods of the skin bio-revitalization and rejuvenation, augmentation, and restoration of each skin layer individually and in the light of many other factors from a style of the life to the immune, genetic, emotional, and health status in general. What we did in this study was trying to prevent or treat skin aging in three different ways, all together, to improve skin quality and texture because there are many factors that lead together [7].

Microbotox acts weakening the superficial fibers that are inserted into the undersurface of the skin, in this way diminishing wrinkles. In addition, the smooth lustrous appearance of the forehead skin due to decreased sweat and sebaceous gland activity was an additional effect that leads to improved skin quality and texture [5].

MBTX has a standardized injection and dilution technique. It is more convenient to use Botox from a bottle of 100 units that has been reconstituted with 2.5 mL of saline (standard dilution).

Further dilution, adding lidocaine like it said before, to the appropriate Microbotox concentration is done in the syringe itself. This allows the bottle of standard Botox to be retained should it be needed in a more concentrated form for masseteric injections or when needed to administer more concentrated Botox to key points of the face. This decreases the likelihood of delivering a droplet volume that is too large, which could diffuse out of the target zone and create unintended effects.

For which concern lower face and neck treatment, according to Wu, the most important target is the platysma muscle. When it is treated (usually with 200/250 microdroplets), clinically the cervico-mental angle and jawline appear sharper and the jowls appear lifted as the platysma is allowed to conform more closely to the underlying neck shape. This is the platysma effect. Neck bands are reduced and the skin appears smoother and firmer. Disturbing crepiness, skin bunching, and creasing, which happen on contraction of the platysma in middle-aged patients to older patients, are significantly reduced giving the appearance of a smoother and cleaner neck skin. Patients express a feeling of desired tightness of the neck and jawline. The Microbotox helps to tighten the skin envelope through the bulk atrophy of sweat and sebaceous glands as well by directing the force of platysma pull inward to the cervico-mental angle.

For which concern the mid and the upper face, we need to consider different key points. Glabellar lines, frontal lines, crow’s feet lines, bunny lines, lower eyelid, and internal and

Fig. 1 It is useful to practice delivering the microdroplets consistently. Using a standard 2.5-mL dilution of 100-unit Botox, a 0.1-mL droplet contains 4 units. A 0.05-mL droplet contains 2 units. The Microbotox droplet is very tiny as shown in the diagram, and a 0.05-mL droplet can further be divided into 20–30 smaller Microbotox droplets each bearing a small dose of Botox



external eyebrow are the traditional target points for botulinum toxin injections [10, 12, 13].

MBTX is injected as a complement to skin rejuvenation. Treatment could be painful and it is more difficult to inject precisely and to reduce pain when treating manually. In our study, we excluded this problem using Juvapen® [8].

Despite of the treatment of the lower face and neck, where the muscular action is more important, for mid and upper face, the most relevant effect was the reduction of secretion of sebaceous gland. Usually for these face areas, we used 150–180 microdroplets (Fig. 1).

Fraxel laser treatment is the universally accepted treatment for skin pigment alterations and photoaged damaged skin. There are studies that confirm (clinically and histologically) the ability of Fraxel laser to induce microdamage in dermis and in this way, it promotes the skin proliferation and rejuvenation. Moreover, fractional laser treatment can improve skin texture and reduce skin wrinkles [6, 9, 14–16].

Volite is a low G prime HA. It is commonly used to augment skin texture and quality in association or not with conventional Botox treatment. It has certain ability to modify skin quality as the increase of GAG D3 and D8, collagen, fibrillin, and AQP 3. In other words, with the injection of Volite, we increase hydration and elasticity that allow the skin to look brighter and softer.

On the other hand, Volite can help to reduce wrinkles acting like a common HA filler [11].

What we noticed during the study was that the skin quality augmented more than every single treatment alone. According to the fact that skin aging is due to multiple factors, if we act in different ways, we can obtain better result in order to boost

skin quality and texture. As we discuss above, every single treatment acts in a specific pattern and, if it is possible to combine multiple techniques, skin aging could be contrasted at 360°. The total cost for this treatment is about 3 to 4000 dollars which is distributed along 5 months, thus becoming more affordable for the patient.

Conclusion

Skin aging is due to multifactorial agents [4]. In esthetic medicine, there are a lot of techniques to contrast these agents. Usually, only one treatment is used per time but, if it is possible to act in different ways, a better skin quality and texture could be obtained to reverse the effect of skin aging [4, 7].

In this study, we demonstrated that the usage of three treatments together, like mBTX, Volite, and Fractional laser, have a better result despite every single technique alone. Nowadays, new technologies have allowed us to facilitate treatments; thanks to them, the experimental studies obtain more precise and predictable results in a shorter time [17–19].

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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