

## Dermabrasion with Non-Ablative Electrosurgery and Peeling with Mandelic Acid and Lactoferrin In the Treatment of Perioral Wrinkles

Guarino Enrico MD PhD<sup>1,2\*</sup>, Fabiani Lucia MD<sup>2</sup> and Pelliccia Roberto MD<sup>2</sup>

<sup>1</sup>University of Camerino, Italy.

<sup>2</sup>Clinica Pantarei, Rome, Italy.

### \*Correspondence:

Guarino Enrico, University of Camerino, Italy, Tel. +393356575464; Fax: +39064112959; E-mail: dr.enricoguarino@gmail.com.

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### ABSTRACT

*Lips and perioral area are fundamental in youthful appearance. The perioral region is the most dynamic anatomic area of the face and is subject to complex and dramatic changes during aging. The ideal and effective treatment for perioral rejuvenation and, above all, smoker's lines, has yet to be identified. All proposed techniques and previous studies reported only subjective results.*

*The propose of this study is to evaluate the treatment of the upper lips and the smoker's lines with a superficial disepithelization with a non-ablative multifrequency electrosurgery and a peeling based on mandelic acid.*

*Patients with upper lip wrinkles were inserted into the protocol. After a light scrub, we proceeded to make a superficial dermabrasion using a multifrequency electrosurgery able to create a voltaic arc. Once the superficial corneal layer of the skin was removed, we made a peeling consisting of mandelic acid combined with lactoferrin until a white Frost was obtained.*

*We treated 25 women with an average age of 60 (Range 52/73). A marked improvement, from 70% to 90%, was observed in 18 patients with class I - II wrinkles. Instead a moderate improvement was observed in 7 cases with class II - III wrinkles, with percentages ranging from 40% to 60%.*

*Dermabrasion controlled by a voltaic arc, combined with peeling with MA and LF, has proved effective for the marked reduction of perioral wrinkles. The arc acts without coming into contact with the tissues, creating a delicate coagulation. To reduce any side effects related to the use of the voltaic arc and to have a homogeneous skin regeneration without dyschromia or scars, we used a mandelic acid which was able to act without inducing erythema, to accelerate the repairing of the skin, to moisturize the skin and give it a tensor effect.*

### Keywords

Perioral wrinkles, Lips, Peeling, Dermabrasion, Electrosurgery, Voltaic Arc Dermabrasion, Perioral Rhytides.

### Introduction

The etiology of facial aging is complex and remains incompletely understood. Age-related changes in all anatomical layers of the face, including the underlying skeleton, soft tissues such as fat compartments and muscles, as well as the skin, interdependently contribute to the phenotype of the aging face [1-8]. The perioral area (defined superiorly by the columella, laterally by the

nasolabial folds and marionette lines and inferiorly by the inferior aspect of the mental symphysis), is a region at particularly high risk for volume-loss and dynamic rhytid formation, especially in women [9-12].

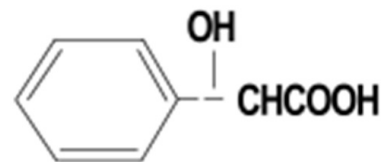
Perioral rhytids affect more than 90% of women and the impact of these problems on the patient's self-esteem can become important enough to affect quality of life in psychological and sociocultural terms. Basic science shows that skin rhytids are related to loss in quantity and function of dermal collagen fibers. Smooth facial skin is correlated with perceived attractiveness, health, and

youthfulness [1]. Consequently, facial rhytids and mottled skin may negatively influence perceived attractiveness, self-esteem, and body image. Aging of facial skin takes place gradually, over 2 to 4 decades, with little clinical evidence. It is recognized afterward by the emergence of furrows and wrinkles together with a loss of tonicity. Other cutaneous signs also appear with aging and are, in part, the result of photoaging. In addition, changes in the deep cutaneous tissues distinct from dermatophylisis are responsible for the deepest facial creases. In some respects, aging of facial skin is not similar to that occurring on other body sites such as the forearms. Such regional anatomical variation has not always been acknowledged in the past although it merits attention. The mechanical properties of skin and skin surface contours reflect the structural organization of aging tissues [2]. In general, the aging process of the face is a gradual progression toward atrophy [2]. Biochemically, the ratio of type I to type III collagen is reduced [4,5] and the elastic fibers spread in a laminar shape between the collagen bundles become tiny and fragmented [6]. These changes result in an overall reduction of the total amount of collagen [7]. In addition to ageing, environmental damaging agents such as actinic radiations may accelerate this decline [8].

Aesthetical treatment of this area is a procedure commonly requested by patients who are typically over 50 years and smoke, or are former smokers [9]. Various methods, including dermabrasion [10-12], carbon dioxide laser [10,11,13], fillers [14], chemical peels [11,15-17], and botulinum toxin [18] are used for treatment perioral rhytids. Dermabrasion can be considered safe to the level of the superficial or mid-reticular dermis [19]; moreover, although small observational studies have proposed fractionated carbon dioxide (CO<sub>2</sub>) laser as a technique with a potential to induce less erythema and edema than dermabrasion, the final outcomes have been demonstrated to be equivalent [10,20-22]. Ablative resurfacing is typically used to treat rhytids, dyschromia, and scarring [23]. Dermabrasion has a long history of success in the treatment of wrinkles and scars [24]. It has recently fallen out of favor because many surgeons have found CO<sub>2</sub> lasers to be more predictable as to the depth of tissue injury [25]. Advantages of dermabrasion include the relatively low cost of equipment [26]. Disadvantages include the potential exposure of health care personnel to blood-borne pathogens aerosolized by the dermabrasion [26]. Mechanical facial resurfacing traces its origins from the early 20th century with the advent of dermabrasion, first described by Kromayer in 1905 [27]. Contemporary techniques include the use of a wire brush or diamond fraise, with erythema variably persisting for 7 to 10 days [28,29]. Dermabrasion produces aerosolized particles that remain airborne for hours after the procedure and may lead to transmission of live virus [30-36].

In the last 25 years mandelic acid, an alpha-hydroxy acid (AHA) called by the German word "mandel" ("almond") and derived from the hydrolysis of an extract of bitter almonds [37], has been extensively studied for its possible uses in the treatment of common skin changes such as photoaging, uneven pigmentation and acne. Mandelic acid (alpha-hydroxybenzeneacetic acid) is an 8-carbon alpha-hydroxy acid with the chemical formula HOCH

(C<sub>6</sub>H<sub>5</sub>) COOH [38] (Figure 1).



**Figure 1:** Mandelic Acid Formula.

The mandelic acid molecule is larger than the glycolic acid molecule, a widely used AHA. In addition, mandelic acid, which has a pK of 3.41, is stronger than glycolic acid, which has a pK of 3.83 at 25°C. The acidity of AHAs may vary considerably with changes in temperature. Mandelic acid has a high melting point, is partially soluble in water, and is freely soluble in isopropyl and ethyl alcohol [39]. It has been used in medicine for many years as a urinary antiseptic. Methenamine mandelate (Mandelamine®, Parke-Davis, Morris Plains, NJ) has the urinary antiseptic action of both methenamine and mandelic acid. In concentrations of 35g to 50g/100L of urine, it inhibits *Staphylococcus aureus*, *Bacillus proteus*, *Escherichia coli*, and *Aerobacter aerogenes*. Chemically, mandelic acid has a structure similar to that of other well-known antibiotics [40]. It is a nontoxic substance that, after being ingested orally, is excreted in the urine.

In 1999, Taylor [41] was interested in mandelic acid stems for its dual nature as an AHA with both potential cosmeceutical activity and well-established antibacterial activity. The earliest trials with mandelic acid had two aims: to determine whether it can produce antiaging effects on the skin similar to those produced by glycolic acid, and to assess the antibacterial action in treating acne and preventing gram-negative bacterial infections after laser resurfacing.

In the last 30 years different authors proposed and demonstrated the safety of 30/50% mandelic acid in active and chronic scars, dyschromia and photoaging with high percentage of success [42-44].

Lactoferrin (LF) is a non-heme iron-binding glycoprotein that is part of the transferrin family of proteins (Figure 2). While one of its main functions is to transport iron in blood, LF possesses a range of protective effects [45] specifically, LF is produced by mucosal epithelial cells and is present in most biological fluids, including tears, saliva, vaginal fluids, semen, nasal and bronchial secretions, bile, gastrointestinal fluids, urine, and most abundantly in milk and colostrum [45,46]. Additionally, LF is present in significant amounts in polymorphonuclear granules, and its net positive charge and distribution in various tissues allow it to play a role in several physiological processes. These include regulation of iron absorption in the bowel, immune response, as well as antimicrobial, antioxidant, anticarcinogenic, and anti-inflammatory properties [46,47]. Moreover LF have a direct effect of on wound re-epithelialization including the enhancement of keratinocyte proliferation and migration as well as the protection of cells from apoptosis [48].



**Figure 2:** Lactoferrin.

### Material and Methods

Patients with class II and III wrinkle scores were inserted into the protocol. Patients of any age and in good health were candidates for this treatment. The optimal candidate was a patient with Fitzpatrick skin types I to III with photodamage and moderate postoperative expectations.

Contraindications to the procedure included connective tissue diseases or a history of keloids. We excluded a patient with a recent herpes simplex infection history. Dermatologic conditions, as well as an history of radiation therapy or scleroderma, should also serve as a contraindication because of the absence of stem cells in the appendageal bulge, which reduce re-epithelialization postoperatively.

After having read the brochure and discussed risks, benefits and alternative kind of treatment, each patient signed the informed consent form, describing the possible complications and untoward effects such as bruising, swelling, erythema, dyschromia.

All the Patients were taken pre-treatment and subsequent photographs with weekly check the first month and once a month for the following six months.

The protocol consisted of two times:

**TIME I:** after cleansing and making a light scrub based on mandelic acid, we made a local block anesthesia with 2% lidocaine and we proceeded to a superficial dermabrasion using a multifrequency electrosurgery (Zeus, Speco) able to create a voltaic arc, with removal of the corneal layer. For our protocol we chose this kind of device for the possibility to use a double control of the treatment, the frequency and the duty cycle. At the same time, we had the control of the voltaic arc power and the possibility to decide to use the cutting or coagulation effect; the result of this combination gave us the advantage to use a very low power with a very superficial and safety disepithelization. For a less aggressive and superficial disepithelization, we used a thin loop tip.

**Time II:** once the superficial corneal layer of the skin was removed, we performed a 50% mandelic acid peel combined with LF, in several states, using pads, until a white Frost was obtained. Once the objective was achieved, the peel was tamponed with a post-

peeling cream carried out were with the patient going to his home.

Patients were given a home care treatment based on, hyaluronic acid, mandelic acid and LF. For all the follow-up period the patient used a total sunscreen.

For the first month, every week, patients were subjected to one check visit to evaluate the results and to prevent or follow any eventual side effects. Every month was made a photo evaluation. A subjective satisfaction test was given to the patients at the end of the protocol.

### Results

In the period from September 2017 to September 2018 we treated 25 women with an average age of 60 aa (Range 52/73. 18 patients were with class I-II and 7 patients with class II-III wrinkles.

In the first postoperative week, patients presented mild spontaneous edema. In 8 (32%) cases, the appearance of light hyperemia was observed, which resolved spontaneously in 7 (28%) cases within the first thirty days of treatment (Figures 3-5). We observed a persistent hyperchromia in 1 patient who had a breast cancer 5 year before, treated with chemotherapy and radiotherapy (Figures 6 and 7).



**Figure 3:** Class I/II wrinkles; Time 0.

**Figure 4:** Class I// wrinkles. Control after 15 days.

**Figure 5:** Class I/II wrinkles. Control after 12 months.



**Figure 6:** Time 0 in patient who had a breast cancer 8 year before, treated with chemotherapy and radiotherapy.

**Figure 7:** Control after 12 months in patient who had a breast cancer 8 year before, treated with chemotherapy and radiotherapy.

In 18 cases was observed a marked improvement, from 70% to 90% of class I - II wrinkles (thin lines and generalized deep lines with moderate structural changes). A moderate improvement was observed in 7, in class II - III wrinkles with percentages ranging from 40% to 60% (Figures 8-9). No cases of hyperpigmentation, hypopigmentation, erythema, ecchymosis, pain, pruritus, herpes outbreaks, infectious processes or scars have been reported.



**Figure 8:** Class III wrinkles. Time 0.

**Figure 9:** Class III wrinkles. Control After 12 months.

## Conclusion

Dermabrasion controlled by a voltaic arc, combined with peeling with mandelic acid, and lactoferrin, described in this study has proved effective for the marked reduction of perioral wrinkles. The voltaic arc, without coming into contact with the tissues, creating a delicate coagulation with a very superficial and safety dermabrasion to the level of the superficial or mid-reticular dermis. Another advantage of the device, that we used in this project, is the possibility to adjust the duty cycle with the possibility of choosing the coagulation effect with a further reduction in the risk of skin damage. Moreover, another advantage of this kind of dermabrasion include the relatively low cost of equipment. In response to the lesion, fibroblasts in the papillary dermis increase the production

of pro-type I and type III collagen, in addition to transforming the growth factor beta-1 (TGF-b), the increase in collagen in turn thickens the dermis, increasing the tensile strength of the skin and making it the clinical aspect of rejuvenation.

To reduce any side effects related to the use of the voltaic arc and to have a homogeneous skin regeneration without discoloration or scars, we have opted for the use of mandelic acid able to act without inducing erythema, accelerating the breakdown processes of the skin, preventing the formation of dyschromia, moisturizing power and tensor effect of the skin. To minimize the inflammatory state, viral and bacterial infection, risk of hyperchromia we decided to use, in combination with mandelic acid, the LF that with his iron-chelating effect have an antimicrobial, antioxidant, anti-inflammatory properties. Moreover, LF have a direct effect of on wound re-epithelialization including the enhancement of keratinocyte proliferation and migration as well as the protection of cells from apoptosis.

In conclusion, perioral wrinkles can be treated, with a high success rate through the combined use of superficial dermabrasion by means of a voltaic arc and a peeling with mandelic acid and LF.

Based on the promising positive results obtained with our protocol, in the future we could evaluate the effectiveness in other areas such as the periocular and frontal areas.

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