Evaluation Effectiveness of the Voltaic Arc Dermabrasion in Perioral Rhytides Eradication

Antonio Scarano, DDS, MD,† Carmen Mortellaro, MD, DDS‡ Luan Mavriqi, DDS, PhD§ and Alessandro Di Cerbo, PhD

Abstract: Perioral rhytides affect more than 90% of women, 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 rhytides are related to loss in quantity and function of dermal collagen fibers. An electrosurgical technology was used in this study for treatment of perioral rhytides. The authors treated 34 patients (26 women and 8 men) for perioral rhytides with voltaic arc dermabrasion technique. Patient ages ranged between 30 and 65 years and the majority (90%) of these perioral areas had class I and II wrinkle scores. Voltaic arc dermabrasion was used to remove the keratinized layer for point perioral area. Treatments are minimally painful and in the authors’ experience require no anesthetics. No discomfort should be expected once the voltaic arc dermabrasion treatment is concluded. The perioral dermis appears as a pale, erythematous, dull surface. Bleeding is not seen unless excessive abrading occurs with the saline-moistened gauze. No hyperpigmentation, hypopigmentation, erythema, ecchymosis, pain, itching, outbreaks of herpes, infectious processes, and scarring were observed. All patients monitored for fine perioral rhytides showed a reduction in the treated area. Since skin-specific quality of life was significantly improved after “voltaic arc” treatment, this therapy can be recommended for patients with perioral rhytides wishing to improve their appearance.

Key Words: Dermabrasion, electrosurgery, perioral rhytides, skin lesions, voltaic arc dermabrasion

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High-energy, short-pulsed resurfacing lasers are costly necessitate protection from beam hazards, and, as with other resurfacing modalities, may be associated with persistent erythema, hypopigmentation and hyperpigmentation, hypertrophic scarring.\textsuperscript{3,11} Traditional electrosurgery uses high radiofrequency energy that generates heat (400 – 600°C) that abruptly vaporizes intracellular and extracellular fluids, causing tissue desiccation.\textsuperscript{2,12} Cutaneous resurfacing with the use of traditional radiofrequency devices has been reported, albeit rarely.\textsuperscript{12} The electrosurgical equipment does not take in consideration the different tissues conductivity.\textsuperscript{2,3} Good conductors such as vascular tissue or hydrated skin are easy to treat with electrosurgery.\textsuperscript{3,14} To handle this problem a voltaic arc dermabrasion is studied.\textsuperscript{3,14} The voltaic arc acts without getting in tip-tissue contact, creating a gentle coagulation. There is no electric passage zone; for this reason the dermabrasion is not influenced from the tissue electric resistance. An electrosurgical technology was used in this study for treatment of perioral rhytides.

METHODS

The authors treated 34 patients (26 women and 8 men) for perioral rhytides with voltaic arc dermoabrasion technique. Patient ages ranged between 30 and 65 years and the majority (90%) of these perioral areas had class II and III wrinkle scores. Patients of any age and in good health are candidates for laser resurfacing. The optimal candidate is a patient with Fitzpatrick skin types I to III with photodamage and moderate postoperative expectations (Fig. 1A).

Contraindications to the procedure include a history of keloids or connective tissue diseases. Dermatologic conditions, which result in a reduction in adnexal structures, such as history of radiation therapy or scleroderma, should also serve as contraindications because of the absence of stem cells in the appendageal bulge, which reduces re-epithelialization postoperatively. After having read the brochure and discussed risks, benefits and alternatives of face rejuvenation and, after having all of their questions satisfactorily answered, each patient signed the informed consent form, describing the possible complications and untoward effects such as bruising, swelling. Voltaic arc dermabrasion (PLEXR, GMV s.r.l., Grottaferrata, Italy) were used to remove the keratinized layer for point perioral area.

Treatments are minimally painful and in the authors’ experience require no anesthesia. No discomfort should be expected once the voltaic arc dermoabrasion treatment is concluded. Voltaic arc dermoabrasion technique for rhytides, a first “pass” of nonoverlapping and vaporizing voltaic arc, is performed, followed by gentle yet thorough wiping of the desiccated debris with saline-soaked sponges. The perioral skin surface then reveals a pink hue, representing partially denatured papillary dermis. No further special instructions are needed, and the patients go back to work immediately. The results were evaluated 1 month after the treatment by the pre- and post-treatment photographs.

RESULTS

The perioral dermis appears as a pale, erythematous, dull surface. Bleeding is not seen unless excessive abrading occurs with the saline-moistened gauze. Subsequent passes produce a transient blanch lasting only about 10 to 15 seconds (Fig. 1B).

Careful attention must be given to the path of the wand to ensure even treatment. No dermal contraction is seen during treatment (Fig. 1C).

During the first postoperative week, 24 patients areas exhibited edema, while edema was present in 10 patients of treated areas at the day 30 follow-up examination. The results were evaluated 1 month after the treatment. Marked improvement was seen in 18 of the 34 patients, in whom 50% to 75% of rhytides class I–II were improved (fine lines and generalized deep lines with moderate textural changes). Moderate improvement was seen in 16 of 34 patients, in whom 25% to 50% of class II–III rhytides were improved. No hyperpigmentation, hypopigmentation, erythema, ecchymosis, pain, itching, outbreaks of herps, infectious processes, or scarring were observed (Fig. 1D).

DISCUSSION

Increased skin laxity, along with habitual repeated contraction of the underlying facial muscles, results in wrinkles or rhytides.\textsuperscript{2,15} The voltaic arc dermoabrasion system described in this study was shown to be effective for skin tightening, and improving perioral rhytides. In a previous study the voltaic arc dermoabrasion was used with success for removed the xanthelasma\textsuperscript{34} and perioral rhytides.\textsuperscript{34}

Electrosurgery is the application of an alternative electric current with a high voltage on a biological tissue with a thermal effect to achieve an incision or coagulation.\textsuperscript{35} The electrosurgery is one of the most soft tissues surgery used techniques, which may ablative leaving a 100 to 400 μm necrotic tissue layer. It is a surgical technique that uses a high-frequency electric current to realize a simple and easy cut or/and clot. So it is possible to have a precise cut and clotting at the same moment having a free blood operative field.\textsuperscript{35} The electrosurgical equipments do not take in consideration the different tissues conductivity. They are good conductors as vascular tissue or hydrated skin is easy to treat with electrosurgery. To handle this problem a voltaic arc dermabrasion is studied. The voltaic arc acts without getting in tip–tissue contact, creating a gentle coagulation. There is no electric passage zone; for this reason the dermabrasion is not influenced from the tissue electric resistance. During operation it is important to be protected with masks to avoid viral particles inhalation.\textsuperscript{36} Skin resurfacing by the cosmetic surgeon is a process that causes a controlled injury to skin and then stimulates a wound-healing response. In response to injury, fibroblasts in the papillary dermis increase production of type I and type III procollagen in addition to transforming growth factor beta-1 (TGF-β). The collagen increase in turn thickens the dermis, which enhances the tensile strength of the skin and yields....
the clinical appearance of rejuvenation. Ablative resurfacing achieves the outcome of rejuvenation by the destruction of the outermost and thus most photodamaged layers of the skin. The subsequent laying down of newly formed collagen and a tightened skin appearance follows this removal. Voltaic arc dermabrasion technique is a new technique for skin resurfacing. It can yield excellent results when a well-trained surgeon performs the procedure for the appropriate patient. The keys to performing electro-dermabrasion are experience and understanding of its principles to provide sufficient resurfacing to the appropriate depth and minimize scar formation. Careful patient screening is crucial to ensure realistic expectations.

With meticulous postoperative care, the results can be highly satisfying for patients. Voltaic arc dermabrasion technique resurfacing was found to be effective and safe in the treatment of perioral wrinkles in patients with skin types I, II, and III. For the most part, healing was rapid, pain was minimal, erythema resolved within 20 to 30 days, and untoward effects were relatively few and short-lived. The advantage of voltaic arc dermabrasion technique is that postoperative care is unnecessary. Immediately postoperatively, minimal edema resolves within several hours. The majority of patients can apply makeup and return to normal daily life immediately after treatment. A novel device for performing ablative resurfacing has been developed which works by passing of voltaic arc. The "voltaic arc" causes rapid heating of the skin with limited tissue ablation and minimal collateral thermal damage. Using a rabbit model, this study demonstrated how difficult is to effectuate precise skin removal using a radiosurgical unit, while also controlling the tissue removal depth using the voltaic arc dermabrasion. Few reports indicate improvement in facial rhytides and scars after treatment. Epidermal regeneration occurs by 7 days postoperatively with neocollagenesis visible on histologic analysis at 30 days. In conclusion, fine rhytides particularly in the perioral areas may be completely eradicated with voltaic arc resurfacing; deeper creases are also improved, probably secondary to a general tightening effect. All patients monitored for fine perioral rhytides showed a reduction in the treated area. Since skin-specific quality of life significantly improved after "voltaic arc" treatment, this therapy can be recommended for patients with perioral rhytides skin wishing to improve their appearance. Future studies will be necessary to determine its complication profile and efficacy.

REFERENCES