

Elastic and collagen fibres synthesis through Oxyneedling® technique

Combination with MBE medical oxygen infusion for a non-ablative stimulation

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Preface

The Micro-needling technique consists in treating the skin with a sterile roller on which surgical iron microneedles of different lengths (from 0,5 mm to 2 mm) and diameter of 0,20 mm have been fitted.

These microneedles are able to penetrate the corneous stratum of the epidermis thus reaching the papillary derma and stimulating the synthesis of collagen and elastic fibers in a natural way .

It is important to underline that microneedling is not an ablative procedure, as it does not destroy the epidermis, as occurs instead with laser, dermabrasion and chemical peeling. Oxyneedling® on the other hand, is a therapeutic procedure which combines Oxygen Infusion and needling. It is performed thanks to a specific sterilizable MBE accessory which is connected to a detachable needling DTS head. Only thanks to this accessory it is possible to carry out micro-needling whilst performing oxygen infusion at the same time: an economic advantage, this, both in terms of time and cost. Oxyneedling® on the other hand, is a therapeutic procedure which combines Oxygen Infusion and needling. Oxygen Infusion enables oxygen to penetrate transcutaneously, either through glandular annexes or by way of an intercellular and/or transcellular path. For it to be considered Oxygen Infusion the gas must be 94 – 98% pure and must be ejected at 2,5 atm through special handpieces fitted with disposable mini hyperbaric chambers. The higher the exit pressure, the greater the gas penetration (Fick's first Law).

Aims of the study

The aim of our study was to try and understand if the already good results obtained with classic needling procedure could be improved.

To do so, we isolated a sample of female patients presenting more or less

The combination of needling with MBE medical oxygen infusion represents an innovative therapeutic procedure. In this comparative clinical trials, it has been identified a sample of thirty women aged between 35 and 45 years old in areas like coulotte de cheval, abdomen and face. For each patient these are the variables which were evaluated: skin hydration, sebum content, skin elasticity and, histologically, derma restoration.

the same morphological features, phototype and medical history : 30 women aged between 35 and 45 years old, non smokers, using contraceptive pill , with no systemic conditions, all undergoing esthetic medicine treatments and phototype III (Fitzpatrick classification). After having been informed and after having accepted the conditions, the patients were retreated in the following areas: saddlebags, abdomen and face. All the patients were treated with both the therapeutic procedures: one side with Oxyneedling® and the other with classic needling technique.

Materials, methods and evaluation criteria

The study was performed, evaluating the action of classic needling carried out using DTS roller with needles 1,5mm long for the face and 2 mm for saddlebags and stomach and with diameters of 0.20 mm.

After this MBE Oxygen Infusion is performed.

For each patient these are the variables which were evaluated: skin hydration, sebum content, skin elasticity and, histologically, derma restoration.

The parameters described and the biopsy necessary for the histological evaluation were measured always in the same area of treated skin and were taken at Time 0 (before treatment), at Time 1 (1 week after treatment), at Time 2 (45 days after treatment) and at Time 3 (180 days, 6 months after treatment). To block the tissue's biochemical reactions, each skin sample is fixed by immersion in 4% pFA solution in a saline phosphate buffer at PH 7.2-7.4- 0,1 M for 24 hours.

The biotypical samples are dehydrated in an ascending series of alcohols, then organic solvents are infiltrated into them. Finally they are infiltrated with warm liquid paraffin. Divided into pieces, they were sectioned in their full width with a rotary microtome in 5-8 micron sections. Different stains were adopted for the slides according to the evaluation specifics: H&E stain, Verohef, Weigert and Blue Mallory.

To stain the obtained sections, paraffin was solubilized with organic solvents and the tissue was rehydrated with a decreasing series of alcohols.

The slides obtained were analyzed and photographed with a photo-

microscope Zeiss Axiophot fitted with a Nomarsky differential interference contrast.

Skin elasticity, sebum and hydration was measured using a Soft Plus probe device produced by Callegari SPA which enabled objective evaluation.

The value of the three parameters analyzed was collected at an environmental temperature of between 15° and 30° and with the patient at a normal body temperature.

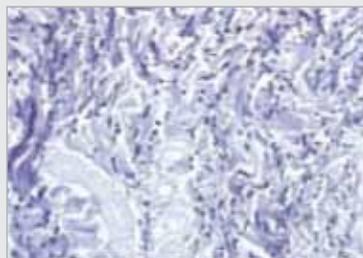
Results

Classic needling stimulation, as far as the replication of fibroblasts (dermal cells), the improvement in hydration and skin elasticity and the regularization of sebum production, is concerned, has given similar results. The doctors who carried out the study agree in their preference for DTS Rollers because of their ergonomics, the quality of the surgical iron used and the safety of the device.

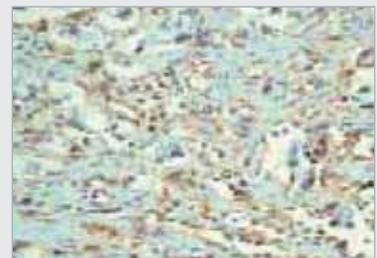
Using DTS roller there is a 38,3% improvement in elasticity and 29,9% in hydration and a level between 25 and 45 of sebum production. Completely different are the results of elasticity and



■ Fig.1: Fibroblasts cover the wound creating a sort of "cellular bridge" between the damaged edges.



■ Fig.2: At a microscopic level, the cell, stimulated by Oxyneedling®, promotes the ATP catalysis metabolic processes



■ Fig. 3: Dermal angiogenesis and reorganization of collagen and elastic fibers.

hydration improvement reached combining needling with Oxygen Infusion: The combination of Oxygen Infusion and DTS Roller determine a distinct improvement which reaches 55,3% of elasticity and 39,4% of hydration and sebum reproduction results which are more or less equal to the others. Analyzing the sample of people who underwent treatment it is notable that all respond positively to therapeutic stimulation performed with Oxygen Infusion. Given the longitudinal nature of this data, value levels (cross-section analysis) obtained at the beginning of treatment and in subsequent moments of therapy application, as well as the variations observed between one moment and the next (longitudinal analysis) were compared thanks to a multivariate analysis of the variance (MANOVA) according to repeated measurements.

Cross-section analysis has allowed us to verify the existence of significant differences between the procedures analyzed which significantly differ from each other.

However the results obtained have allowed us to define all the presented therapies absolutely EFFECTIVE.

Conclusions

The statistic evaluation, the microscopic and macroscopic observation of the obtained data, all fully confirm the effectiveness of the Needling technique showing a percentage of improvement in elasticity and hydration and in the regularization of sebum production. This technique has proved itself even more effective when performed simultaneously with Oxygen Infusion.

By exploiting the principle of repeated micro traumas in presence of Oxygen with a pureness be-

tween 94% and 98%, it is possible to induce an exudative hematoma, which triggers the beginning of the migration and proliferation of fibroblasts. This enables the development of a granulation tissue. This is a temporary neoformation of connective tissue which will be progressively remodeled. The main actors in this process are fibronectin, which probably functions as a grid on which the neo-synthesized collagen organizes itself, and the metalloprotease, essential in the remodeling of the derma.

Reference for contacts:

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Key words

Needling, oxygen infusion, growth factors, angiogenesis, metalloprotease, type III collagen.

Abstract

Elastic and collagen fibres synthesis through Oxyneedling® technique.

Combination with oxygen infusion for a non-ablative stimulation. This technique has proved itself to be very effective when performed simultaneously with oxygen infusion. In fact, this technique induces an exudative hematoma, which triggers the beginning of the migration and proliferation of fibroblasts. This enables the development of a granulation tissue. This is a temporary neoformation of connective tissue which will be progressively remodeled. The main actors in this process are fibronectin and the metalloprotease.