A great deal has been written about the properties of hyaluronic acid (HA) and its importance to healthy skin. In particular, its hygroscopic properties act as a free-radical scavenger and promote the metabolic processes underlying the production of new collagen fibres.

Biorestructuration versus fillers

In aesthetic medicine, HA is one of the most widely used treatments to fill wrinkles, folds, and scars, and for the augmentation of facial volume and other areas of the body (e.g. breasts and buttocks). For these applications, where fillers are most widely used, HA is modified by means of a process known as cross-linking, which is essential for the longevity of the implant by protecting it from attack by hyaluronidase and free radicals.

The molecule has also been used in aesthetic medicine for its chemical and mechanical abilities to restore natural skin conditions by promoting the repair of age-induced damage, and in cases of oxidative stress and moisture-loss caused by illness or medication. In these cases, the infiltration technique used is different; the HA is not cross-linked and the same area is usually treated in multiple sessions, with a frequency that varies from weekly to monthly, depending on the characteristics of the product used. When natural HA is used, the infiltration plane is usually superficial (dermis) and methods such as the picotage, nappage, and serial puncture are used.

Filling wrinkles and volume augmentation are not the target of this treatment; rather the whole surface of the skin can be restored, including the neck and upper chest (‘risky areas’ for fillers), face and the back of the hand. However, any area of the skin can benefit from this treatment. Depending on the country, this method is known as mesotherapy, biorestructuration, and biorevitalisation.

The techniques have different aims, but are complementary. The filler acts on the structure and corrects physiognomic defects, while biorestructuration aims to ‘care’ for the skin’s natural condition and, by reducing oxidative stress, prolongs the filler’s corrective action.

Dehydrated, inelastic and atrophic skin can benefit from biorestructuration, while effects caused by free radicals and skin damage, such as exposure to sunlight and tanning lamps, smoking, and skin diseases can be prevented and corrected.

Lips: ageing and disease

With ageing, the tegumentary system undergoes significant changes caused by a reduction in moisture, elasticity and sebaceous secretion that make the skin more prone to attack by external, climatic and pharmacological agents, owing to a reduction in its mechanical and immune defences, vascular reactivity, cellularity and collagen fibres.

One example of this is the reduction in collagen fibres caused by physiological conditions such as the menopause (a decrease of one third of the skin’s entire supply in approximately 3 years), or by exposure to sunlight, tanning lamps and smoking. As a result, the labial mucosa appears dehydrated, less elastic and less firm, with reduced definition between the vermillion border and the white lip.

Purpose of the study

Given the positive results to the skin obtained in previous studies, and considering the anatomical and functional identity of the mucosa and vermillion border of the lips, the study leads (M Romagnoli and A Gennai) decided to apply the biorestructuration method to this area, and evaluate its safety and efficacy.

In our personal experience, the biggest problem was the pain associated with the treatment and the potential appearance of ecchymoses as a result of needle trauma. Consequently, it was decided to use a 27-gauge flexible, blunt cannula to administer the treatment, rather than a needle.

Safety profile

No delayed intolerance reactions such as granuloma, abscesses, hardening of the infiltration area, pruritus...
Infiltration techniques

In this study, 1 ml of Viscoderm® 20 mg/ml non-cross-linked HA was used in each session. Lidocaine 2% was administered approximately 1 cm from the labial commissures bilaterally, with 0.1 ml of product using a 30-gauge needle.

Using the same puncture point, a 25-gauge needle was used to create the point of access in which the blunt cannula was introduced and, very slowly, a tunnel was created along the virtual channel between the vermillion border and the white lip (Figure 1). A total of 0.6 ml of product was infiltrated, initially using the anterograde technique, delivering a minimal portion in order to detach the tissue and minimise trauma, and afterwards using the retrograde technique.

The remaining 0.4 ml of material was distributed inside the upper and lower vermilion borders by infiltrating the submucosal tissue and distributing it using the fanning technique, withdrawing the blunt cannula for all but the last 5 mm and then reintroducing it further down to perform two-to-three linear infiltrations for each half of the lip. The infiltration was always performed very slowly to respect the tissue and for the comfort of the patient.

Materials and methods

Twenty patients were recruited for the study (one man and 19 women) with a mean age of 55 years, who were in good health and had not undergone any aesthetic treatments during the previous 3 months.

Photographic images were obtained using a polarised light source, followed by computerised processing of the wrinkles in the skin (Canfield Visia®), and using a normal digital camera, before treatment, 1 month after the second session, and 1 month after the third session. Infiltrations were performed on the vermillion border and lip contour twice every week for a total of three sessions.

Table 1. Average satisfaction scores with treatment

<table>
<thead>
<tr>
<th></th>
<th>Increased definition</th>
<th>Moisture</th>
<th>Firmness</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 0</td>
<td>2.94</td>
<td>3.64</td>
<td>3.14</td>
<td>2</td>
</tr>
<tr>
<td>Day 30</td>
<td>2.64</td>
<td>3.35</td>
<td>2.50</td>
<td>1.93</td>
</tr>
<tr>
<td>Day 60</td>
<td>2.42</td>
<td>2.66</td>
<td>2.42</td>
<td>1.83</td>
</tr>
</tbody>
</table>

4=unsatisfactory, 3=moderate, 2=good, 1=excellent

Table 2. Adverse events

<table>
<thead>
<tr>
<th>Side-effect</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain during infiltration</td>
<td>8</td>
</tr>
<tr>
<td>Pain after infiltration</td>
<td>0</td>
</tr>
<tr>
<td>Erythema</td>
<td>1</td>
</tr>
<tr>
<td>Oedema</td>
<td>7*</td>
</tr>
<tr>
<td>Pruritus</td>
<td>0</td>
</tr>
<tr>
<td>Discolouration</td>
<td>0</td>
</tr>
<tr>
<td>Ecchymosis</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
</tbody>
</table>

*Maximum of 48 hours
Despite some reluctance before the study, eight patients decided to try filler augmentation after completing the protocol.

Discussion

The product’s safety profile was excellent, and any of the adverse events reported can be attributed to the HA’s hygroscopic properties and the infiltration technique used. Pain during infiltration, which was observed in less than half of the patients, did not warrant the interruption of a session, and could be further improved by adding anaesthetic to the preparation in the syringe. Pain was always limited to the time of administration and did not cause discomfort in the hours/days that followed.

With regard to compliance, using a blunt cannula rather than a needle presents certain advantages, such as a reduction in discomfort and pain for the patient and only a mild appearance of ecchymosis, observed in just two of the 20 patients—only in the area around the needle entry point and never along the injection line of the blunt cannula.

This study was conducted in line with previous studies of non cross-linked HA 20 mg/ml, proving the moisturising action, improvement in elasticity, and reversibility of photo-induced damage.

Specifically, a study by Coacci stated that when using instrumental techniques (DermaLab® USB skin testing, Cortex Technology), this substance, when administered intradermally, improves the skin’s elasticity and moisture, with a good degree of satisfaction for both the doctor and patient, and with an optimal safety margin.

In 2008, Lacarrubba and Micali performed an ultrasound study of the skin using Viscoderm® HA, infiltrated once per week over a 4-week period. The results showed a statistically significant increase of subepidermal low-echogenic band (SLEB) echogenicity, likely related to an increased density of dermal collagen fibres by fibroblast activation resulting from treatment (Figure 2).

The author and study partner have demonstrated the product’s safety profile in this delicate treatment area and the degree of satisfaction expressed by patients, who only complained of excessive pain around the mucosal implant and the immediate presence of ecchymoses—characteristics that are typical of this infiltration technique, regardless of the material used.

The main indications arising from the study were the treatment and prevention of reduced moisture, firmness and definition of the lips, as highlighted by the doctor and patient treatment assessments and the computer-processed polarised photographic images (Figure 3), which clearly show the reduction in the folds of the vermilion border and lip contour area and, therefore, better moisture of the skin and mucosae.

At each follow-up visit, the independent doctor and patients filled out an assessment questionnaire that—on a scale from 4 to 1 (4 unsatisfactory, 3 moderate, 2 good, 1 excellent)—evaluated moisture, firmness, volume and definition (Table 1). At the same time, the potential side-effects were also evaluated, as listed in Table 2.

Results

Of the 20 patients who enrolled in the study, 12 patients completed; six failed to follow the protocol correctly; and two patients continued with volume enhancement using a filler after the first session, enthusiastic about the results obtained during the first few days, when a slight oedema was present. Despite some reluctance before the study, eight patients decided to try filler augmentation after completing the protocol.

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Surprisingly, the results with regard to increased volume were also positive. Included in the study were subjects who had not asked for an actual increase in volume, but expressed their satisfaction for the slight improvement. In no case was the treatment found to be completely unsatisfactory and the highest efficacy values were recorded for volume and firmness, the latter being visible after just one session.

Lip biostructuration was revealed as a primary indication in patients—both male and female—who are not interested in lip augmentation, and are therefore not willing to undergo filler treatment. Some such subjects, having overcome the initial impact with the infiltration technique, subsequently asked to be treated with a filler, suggesting that biostructuration is a technique which improves compliance and recruitment for filler procedures owing to the temporary increase in lip volume caused by the hygroscopic properties of HA (as appreciated by some patients).

Biostructuration is particularly popular among patients and doctors who are against the use of fillers owing to the higher risk of delayed adverse events caused by cross-linked agents, and who therefore prefer to use natural HA despite the different indications and results. Furthermore, there are lips that do not require an increase in volume or structural changes that can benefit from biostructuration for improved moisture, firmness and definition of the lips.

The aesthetics of the labial structure—despite having anatomical proportions that should be respected—are highly subject to fashions, which invariably change over time. Today—particularly in Italy—there is an increase not only in the already frequent requests to perform treatments with natural results, but also in the belief that it is far more important to cure and prevent rather than to consider the potential clinical/aesthetic results alone.

This lip treatment, involving an important area both with regard to functional aspects and aesthetic considerations of the face, is perfectly in line with this tendency towards natural results. It is becoming increasingly widespread and commendable, in that it is free of significant adverse events and contributes to the prevention of ageing.

An important contribution to this study was made by the computerised findings obtained using a polarised light source and wood lamp (Figure 4), which revealed both a reduction in wrinkles and an improvement in photo-induced age ‘spots’, testifying to the considerable antioxidant activity.

**Conclusions**

This study undoubtedly requires further confirmation, using a larger case study and more standardised objectives in order to be accredited. However, it provides a useful start and evidence, as the literature available to date does not include any studies specifically with regard to the biostructuration of this area.

**References**

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