Aesthetic Mesotherapy: The US Approach and Contribution

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Long before mesotherapy was used in cosmetic dermatology, it gained recognition in pain management, sports medicine, and rheumatology. In the aesthetic arena, it had few indications and unimpressive results and was used mainly to treat cellulite. However, as the demand for more effective noninvasive cosmetic surgery treatments grows, the popularity of mesotherapy continues to increase nationwide. The latest spike in popularity is due to 2 newly created applications. One is the mesolift, also known as mesoglow, which consists of injecting a mixture of vitamins, minerals, and hyaluronic acid into the skin. The other is the injection of phosphatidylcholine and enzymes (collagenase and hyaluronidase) to treat fat deposits for body sculpting. Thus, US fascination with mesotherapy has been limited to its aesthetic applications. When mesotherapy was introduced to the United States, the procedure was much less aggressive in terms of the ingredients used and the volume of those ingredients as a result of heavy French influence. However, US physicians quickly adopted their own methods and variations on the procedure, and the approach changed radically because of a major difference in the mentality, habits, and expectations between the markets. Today, mesotherapy in the United States has products and protocols that are original and much more efficient. For once, innovation in aesthetic medicine, which usually travels from east to west, is now crossing the Atlantic in the opposite direction. In this article, we will explain some of these products and protocols.

Before proceeding, it is important to mention that there have been no controlled studies of mesotherapy to date, although one is reported to be under way in the United States. Physicians rely mostly on anecdotal experience until the results of such studies are published. Therefore, although it is true that there has been no systematic evaluation of toxicity, there are no reports of such adverse events despite the wide use of mesotherapy today. However, this does not necessarily mean that mesotherapy is completely safe, and dermatologists must keep in mind that no aesthetic treatment should in any way endanger a patient's health—"first, do no harm."

Stemming from a simple and fortuitous discovery by Michel Pistor in 1952, mesotherapy began as a great idea. The concept was to superficially inject active pharmacologic ingredients into the mesoderm, the middle layer of the skin, to treat local affections. Mesotherapy was used mainly in sports medicine and rheumatology. As such, smaller doses were needed to avoid side effects and other interactions. Pistor described it as "a little, not so often and where you need it" treatment.[1] The intent was that these "close-to-the-target" doses would be distributed locally through the mesoderm mesh. As previously noted, mesotherapy acquired its credibility initially in sports medicine and rheumatology. Mesotherapy is a concept of delivering active ingredients into the mesoderm manually or through an electronic injector.

Mesotherapy soon involved a complementary treatment with active ingredients (pentoxifylline and others)

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to stimulate vascular circulation for patients with conditions such as cellulite. However, it is the use of phosphatidylcholine (PDC) that revolutionized the treatment of local fat deposits.

PHARMACOLOGY AND INDICATIONS

Cellulite and Fat Deposits

PDC, a soy extract, is a liquid form of lecithin, which occurs naturally in the body.[2,3] An Italian physician, Maggiori,[4] was the first to inject PDC to treat xanthelasma. From this, Rittes,[5,6] a dermatologist in San Paolo, Brazil, envisioned injecting Lipostabil®, a PDC solution, into the fat pouches on the lower eyelid. Lipostabil was previously used to treat and prevent atherosclerosis and fat embolism.[3] It was available in 5-mL ampoules at 5 mg/mL only in Germany and Italy. In the United States, PDC is available to physicians through compounding pharmacies as a generic product. It is considered to be a nutritional supplement and is not regulated by the Food and Drug Administration. It is dosed at 50 or 100 mg/mL. There were few reports of successful treatments for fat deposits with PDC; one such report was from Ablon and Rotunda,[7] who discussed their results of treating the lower eyelid fat pads.

Since a recent study by Rotunda et al[8] raised questions about which ingredient in PDC solution (PDC or the preservative deoxycholate) is the active one, 50 mg/mL has become the most common dosage. Deoxycholate, a detergent used in many pharmaceutical preparations, was determined to physically damage the fat cell membrane and cause cell death and release of fat content. A follow-up study by Rose and Morgan[9] showed that fat lobules were infiltrated by increased lymphocytes and, in particular, macrophages. The macrophages consisted of conventional forms, foam cells, and multinucleated fat-containing giant cells. The inflammation was associated with serous atrophy and microcyst formation. For the authors, this demonstrated that mesotherapy with PDC and deoxycholate affects the subcutaneous fat, and they theorized that reduction of subcutaneous fat likely follows inflammatory-mediated necrosis and resorption via the macrophages.

PDC is usually diluted in a 2-to-1 ratio with other ingredients, such as collagenase or lidocaine, and injected into the hypodermis by using a needle of at least 6 mm.

For treatment of cellulite, the use of hyaluronidase, in combination with collagenase, is thought to soften the hardened fibrotic septa that contributes to the orange-peel appearance. Hyaluronidase also facilitates the diffusion of the cocktail and helps to prevent posttreatment nodules under the skin, although the nodules are benign and always resolve.

Almost all localized fat deposits can be successfully treated, including those on the abdomen, hips, love handles, upper back (Figure 1), chin, and lower eyelids (Figure 2). Mesotherapy works well for body sculpting but not for weight loss. Its primary use should be for diet-resistant areas in patients who are correctly following a diet regimen. There is no substitute for healthy eating habits.

Mesolift or Mesoglow

Treating aging skin with mesotherapy represents a novel, valid approach. In addition to delivering nutrients to the skin through creams, where they are often unreliable and unpredictable, or through the blood, where they often interact with the gastrointestinal tract and are mostly excreted by the kidney nearly instantly, mesotherapy delivers vitamins, multiple trace elements, minerals, tretinoin, hyaluronic acid, 2-dimethylaminoethanol, and more directly into the dermis with a concentration that was previously unachievable. This advent rendered the treatment doubly effective through its direct delivery and the stimulating effect of the needle itself.

Hyaluronic acid, popular as a soft-tissue filler, is available in a nonreticulated form in concentrations from 10 to 40 mg/mL. This is in contrast to the reticulated or stabilized form of hyaluronic acid used in fillers such as Restylane® and Juvéderm®, which lasts much longer but at a much higher cost. Two other favorites are injectables tretinoin 0.01% or higher and glycolic acid 1% to 10%.

Mesohair

In this application, a new milestone is achieved. After injecting a range of ingredients into the scalp (eg, minoxidil, finasteride, vitamins) for many years with no results, we now have a protocol effective for treating male pattern baldness (MPB). In one study, dutasteride, the only 5α-convertase inhibitor specific to both receptor 1 (skin and liver) and receptor 2 (prostate), has been clinically proven to regrow hair, with significant results in MPB.[10] The price often paid is an increase in side effects—mainly a decreased libido, especially at the most effective dose of 2.5 mg/d or 5 capsules daily.

By blocking the 5α-reductase, the production of 5-dihydrotestosterone is decreased. Dutasteride may block up to 90% of the activity of this enzyme, whereas finasteride, specific only to receptor type 2 (prostate), at best can block 70%. By injecting dutasteride directly into the scalp at a depth of 2 to 3 mm, we were able to reverse MPB and avoid any side effects because most of the medicine stays local and the injected dosage is lower than the oral dosage. Initial treatment is given anywhere from once a week to once every 4 weeks. Dutasteride has a very long half-life (5 weeks).

Figure 1. Love handles and upper back before (A) and 8 weeks after (B) 1 mesotherapy treatment.

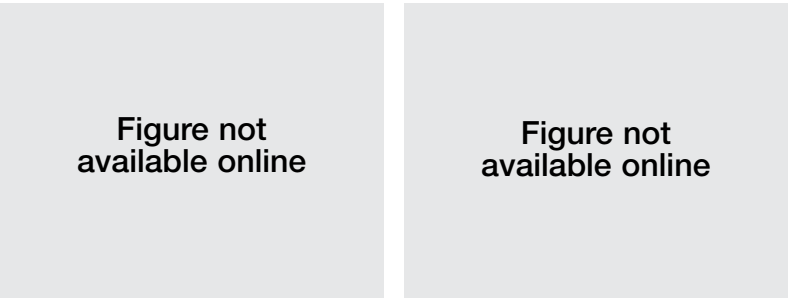

Figure 2. Lower eyelid fat pads before (A) and 12 weeks after (B) 2 mesotherapy treatments 6 weeks apart.

This represents a perfect application of mesotherapy for addressing the problem at its root to avoid systemic interactions and achieve much higher tissue, cellular, and intercellular levels of the ingredients injected. Figure 3 shows the author's own head treatments spaced 8 months apart.

PROTOCOLS

The following protocols are given as an indication. They reflect the author's clinical experience to date. These are only some of the combinations commonly used; these combinations tend to change frequently as experience grows. Physicians should be properly trained, confident, and experienced before attempting to treat patients. Ultimately, expertise is not limited to delivering treatments; it also requires the knowledge to avoid or minimize, and learn how to deal with, the inevitable complications.

Mesofat

Head and Neck

To treat excessive swelling, apply a methylprednisolone dose pack 2 days before treatment, add a drop of corticosteroids to the solution in the syringe, or both.

For infiltration, use a 3-cc syringe to apply 2 cc of PDC 50 mg/mL, 0.5 cc of lidocaine 2%, and 0.25 cc of collagenase 1000 IU/mL. Collagenase should be used only in fat pads resistant to treatment with PDC alone, or it can be used in combination with PDC for a more aggressive approach. Also consider adding 0.25 to 0.5 cc of triamcinolone 10 mg/mL. For eyelid fat pads, apply 1 cc under each eye according to size. Use a 30-gauge, 1-in needle, but do not give dermal injections, since this may cause ulceration (Figure 4; in this case they healed very well). The cheeks and jowls may use 2 to 3 cc on each side. Use a 25-gauge, 1-in needle because it will not bend during infiltration. The chin may also receive 2 to 3 cc on each side; use a 25-gauge, 1-in needle in this area as well. Treatments may be repeated every 6 to 8 weeks if needed.

Body

Use a 12-cc syringe to apply 7 cc of PDC 50 mg/mL, 2 cc of L-carnitine 500 mg/mL, 2 cc of collagenase 1000 IU/mL, and 2 cc of lidocaine 2% (when the piston is pulled back completely, the syringe total will be 13 cc).

Figure 3. Subject with male pattern baldness before (A) and 8 months after (B) 16 mesotherapy treatments.

Figure 4. An eyelid ulcer caused by dermal injections.

Collagenase is not for beginners, as it can cause ulcers if inadvertently injected into the dermis. Substitute it with more L-carnitine; this formula works even without collagenase. Use a standard, 6-mm mesoneedle and, again, avoid dermal injection, the cause of dermal necrosis. Also consider infiltration if working on small areas. Treatments may be repeated every 6 to 8 weeks if they are well tolerated.

Mesocellulite

Use a 12-cc syringe to apply 3 cc of hyaluronidase 150 U/mL, 2 cc of collagenase 1000 IU/mL, 6 cc of PDC 50 mg/mL, and 2 cc of lidocaine 2%. Use a standard, 6-mm mesoneedle and, again, avoid dermal injection. Treatments may be repeated every 2 to 4 weeks.

Mesorejuvenation: Mesoglow

Use a 6-cc syringe to apply 1 cc of multivitamins (mainly vitamins A, C, and E in addition to pyridoxine and despanthenol), 1 cc of hyaluronic acid 20 mg/mL, 1 cc of tretinoin 0.01%, 1 cc of glycolic acid 1%, 1 cc of procaine or 0.5 to 1 cc of lidocaine 2%, and Multitrace-5 Concentrate (trace elements injection of zinc, copper, selenium, manganese, and chromium). There are many other possibilities as well.

Use approximately 1 cc on the neck and 2 to 3 cc on the face, but for the first treatment, use less to test the patient's response. It is optional to use 1 cc on the décolleté area and 1 cc on the hands. Use a standard, 4-mm mesoneedle for an injection depth of 2 to 3 mm.

The frequency of treatments varies. Initially, 4 treatments every 2 to 4 weeks are recommended. This can be increased according to skin damage, and maintenance should take place every 3 to 4 months.

Mesohair

Use a 6-cc syringe to apply 3 cc of biotin and 3 cc of dexapanthenol to areas of nonhormonal hair loss. If the patient has hormonal hair loss, MPB, or is menopausal, apply 3 cc or more of dutasteride 0.01% and 3 cc minoxidil 0.2%. Use all 6 cc to cover the affected areas of the scalp. Use a standard, 4-mm mesoneedle for a depth of 2 to 3 mm. Initially, 4 or more treatments every 1 to 2 weeks are recommended until significant results are yielded. Maintenance should include 1 treatment every 1 to 2 months.

FOLLOW-UP

In general, no follow-up is needed except to assess progress and the need for further treatments or to evaluate concerns and treat any complications that arise.

When following up with further treatment, remember to give fat treatments time to progress, since reabsorption is slow and takes approximately 6 to 8 weeks. For skin rejuvenation and hair treatments, there is an obvious advantage to initially providing frequent treatments; this will kick-start repair and yield quicker results.

COMPLICATIONS

Bruising is the most common complication, especially with such a high number of injections. The severity varies but may be lessened by avoiding nonsteroidal anti-inflammatory drugs and pretreatment vitamin E and by taking the homeopathic ingredients *Arnica montana* and bromelain pretreatment and posttreatment. Undereye bruising is avoidable by introducing a 30-gauge, 1-in needle laterally, starting under the lateral canthus in the middle of the fat pad.

Infections are very rare and avoidable with nonaggressive cleansing of the skin with alcohol. Inflammatory response is invariably present, the extent of which depends on the product and volumes injected. PDC will generate the most inflammation. Skin ulcers and necrosis, though rare, are due mostly to the incorrect injection of collagenase and PDC into the dermis, rather than the hypodermis. Undereye ulcers (Figure 4) tend to be small and heal perfectly well. Edema is an important factor, especially in the treatment of fat pouches in the lower lids. It may be minimized by using the methylprednisolone dose pack pretreatment or adding a cortisonic agent, such as triamcinolone acetonide, to the injection. The daily use of 20 mg of furosemide is helpful, too. In 2005, an outbreak of mycobacterium caused skin infections associated with needle contamination in the unhygienic work areas of a nonlicensed provider.

COMMENT

In the treatments overall, it was determined that fat injections yielded positive, reproducible results in almost all cases when the patients were well screened. We treat

only patients with 1 or 2 areas of excess fat who follow a healthy diet, including a low consumption of carbohydrates, and exercise moderately. This is in no way a treatment for obesity, but rather for body sculpting on limited areas of fat deposits, such as genetically determined or diet-resistant areas.

In the treatment of cellulite, the results are not as impressive and certainly not as reproducible. We have found that when the appearance of cellulite was improved, it was usually associated with excess fat that we were able to shrink. It was the fat shrinkage that seemed to improve the uneven look of the fat deposit, and therefore it appeared that the patient had less cellulite.

The rejuvenation and hair-loss areas achieved the most remarkable results. The simple concept of directly delivering known effective ingredients to the target area is reasonable and in the core of conventional medicine. We can compare using mesotherapy with injecting local versus general anesthesia. Mesotherapy will open the door to new possibilities. Treatment for hair loss is only one of them; many more are certain to come. Future improvement will involve newer, safer, more effective products and new methods of more practical, less painful delivery. The term *mesotherapy* has been very confusing to the public and equally to medical personnel, who equate it with treatment for fat deposits. This is the reason we have proposed using new, more succinct terminology that describes mesotherapy exactly for what it is—a concept of delivery only and nothing more. The new name should be *intradermotherapy*.

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