

Mesotherapy in Face

N. Vineetha Reddy¹, M. Jyothi², P. Venkatesh³, D. Hepcy Kalarini⁴, R. Prema⁵

¹Student, Department of Pharmacology, Jagan's Institutions of Pharmaceutical sciences Nellore, India

²Professor, Dept. of Pharmacology, Jagan's Institutions of Pharmaceutical sciences Nellore, India

^{3,4}Professor, Department of Chemistry, Jagan's Institutions of Pharmaceutical sciences Nellore, India

⁵Professor, Department of Pharmaceutics, Jagan's Institutions of Pharmaceutical sciences Nellore, India

Abstract: Mesotherapy, as broadly defined, represents a variety of minimally invasive techniques in which medications are directly injected into the skin and underlying tissue in order to improve musculoskeletal, neurologic and cosmetic conditions. This study evaluates the histologic and clinical changes associated with one of the simplest formulations of mesotherapy commonly used for skin rejuvenation. Ten subjects underwent four seasons of mesotherapy involving multiple injections of a multivitamin and hyaluronic acid solution. Treatment was conducted at 4 monthly intervals. All subjects had pre and post treatment photographs and skin biopsies. Skin biopsies were evaluated with routine histology, mucin and elastin stains, and electron microscopy. Patient surveys were also evaluated. Electron microscopic analysis of collagen fibers measurements did show smaller diameter fibers post treatment. No significant clinical or histologic changes were observed after multi vitamin mesotherapy for skin rejuvenation. Multi vitamin and hyaluronic acid solution facial mesotherapy does not appear to provide any significant benefit. Mesotherapy is a technique which involves micro injections of conventional homeopathic medication and vitamins into the mesoderm or middle layer of the skin to promote healing or corrective treatment to a specific area of the body. It is a debatable addition in the therapeutic armamentarium in the management of skin rejuvenation. However, dermatologists have to use this cautiously and judiciously as at present there is a lot of controversy regarding its efficacy and safety despite the fact that mesotherapy is gaining popularity in the west.

Keywords: Analgesic, Ant nociceptive, chronic pain, Herbal medicine, Neuropathic pain.

1. Introduction

Mesotherapy is a non-surgical minimally invasive method of drug delivery that consists of multiple intradermal or subcutaneous injections of a mixture of compounds mélange in minute doses. Plant extracts, homeopathic agents, pharmaceuticals, vitamins and other-based substances should not be used for mesotherapy because of the risk of cutaneous necrosis.

The term mesotherapy is derived from the Greek words *mesos* meaning *middle* or mean and *therapeia* meaning to treat medically i.e. injecting into the middle layer of skin or intradermotherapy. The depth of penetration of the needle should not exceed 4 mm for it to be effective.

Despite it being available for over 50 years and the huge publicity and attention received on the internet, definite

evidence for its efficacy is lacking and the claims are not always based on well-conducted clinical trials.

Facial aging is a complex process with two important components: facial volume loss and repeated muscle that create wrinkles. Fibroblasts are the major dermal cells that produce and maintain the extracellular connective tissues that are crucial for maintaining skin youth. Functional impairment or reduced biosynthetic activity of fibroblasts [fibroblast collapse], which is caused by the loss of physical interactions between fibroblasts and the surrounding extracellular matrix, reflects as skin aging. Aged fibroblasts cannot produce the extracellular matrix. In addition, the number of fibroblasts decreases with age; subsequently, the amount of hyaluronic acid and collagen produced by fibroblasts and the number of cells that comprise the extracellular matrix decrease. The secretion of enzyme that degrades collagen also increases.

With the emergence of anti-aging theories, emphasis on mesotherapy has increased. It was first introduced by Pistor in 1958. The goal of mesotherapy is to delay and improve the skin changes caused by aging. It is a minimally invasive procedure that involves simultaneous injection of small amounts of hyaluronic acids, vitamins, antioxidants, enzymes, and humectants in to the subcutaneous layer to stimulate the biosynthetic ability of fibroblasts and to provide an optimal physiologic environment for fibroblasts to increase collagen and elastin syntheses and supply basic active molecules. It is one of the newest techniques in cosmetic medicine proposed by medical and non-medical professionals. The desired final effect is a firm, bright, and moisturized skin obtained by the injection of suitable products, which are biocompatible and absorbable by the superficial dermis. These products or molecules used in mesotherapy hydrate and activate fibroblasts to promote skin rejuvenation.

2. History

Mesotherapy for the first time was developed in 1952 by Dr. Michel Pistor, a French physician for the management of pain and vascular disorders. Pistor coined the term mesotherapy. He defined it as treatment of the mesoderm (the primary germ layer that develops into connective tissue, muscle and circulatory system). In 1976, he used the following words to describe mesotherapy: little volume, few times and in the right place.

Pistor founded the French society of mesotherapy in 1964 and, in 1987, the French national academy of medicine officially acknowledged mesotherapy as a medical specialty. In the meantime, mesotherapy became popular in most parts of Europe and South America and, more recently, in the United States and Asian countries.

Indications of mesotherapy:

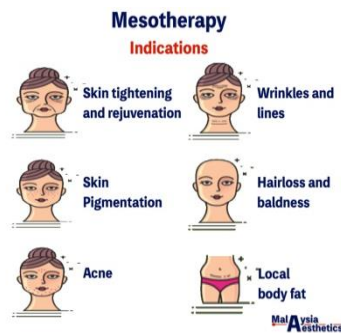


Fig. 1.

Mesotherapy, like corticosteroids, is claimed to have a wide array of applications especially in the field of cosmetic dermatology. However, only the current and widely practiced indications in the field of dermatology along with the drugs used in them are discussed below.

1. Body-cellulite, lipodissolve, body contouring (not very effective).
2. Skin- rejuvenation/glow, lift, pigmentation.
3. Hair-telogen effluvium, androgenetic alopecia.

Cellulite, local fat deposits and facial rejuvenation show good results with mesotherapy; telogen effluvium, androgenetic alopecia, stretch marks and facial pigmentation show moderate results; whereas body sculpting/ contouring and melasma show doubtful results with the same.

An overview of the volume of cocktail to be injected, depth of penetration of mesotherapy needle and number of sessions needed for various uses is given below.

Cellulite:

Cellulite is an abnormal accumulation of fat above the fascia resulting in dimpling appearance of skin resembling an orange peel. It is most commonly seen in the buttocks and thighs of females. It is seen in both normal and obese persons. The venolymphatic system. Therefore, accordingly, the cocktail solution for treatment of cellulite should contain the following agents.

Lipolytic: L- carnitine, caffeine, isoproterenol, thyroxin.

Venostatic: Rutin, aminophylline, pentoxiphylline.

Drainage: Artichoke, ginkgo biloba.

Anesthetic: procaine (also improves circulation).

Connective tissue breakdown: collagenase, hyaluronidase.

However, mesotherapy will be effective only when combined with proper diet and exercise.

Thyroid hormones are recently being used as a part of

injection cocktails to cause reduction in fat. They activate the sympathetic system and thus cause lipolysis by activating beta receptors. One case of thyrotoxicosis was reported after using cocktail containing tri-iodothyronine.

Localized fat deposits/ lipo dissolve/injection lipolysis (chin jowls, double chin, eye pad fats):

Phosphatidylcholine (PC) and deoxycholate (DOC) are the most widely used agents for lipodissolved. PC is an antioxidant derived from soy lecithin. Depth of injection varies from 6mm to 12mm at dose of 250mg. PC, however, cannot be used for the treatment of cellulite, which is a superficial condition.

PC, extracted from soybean lecithin:

(A). Penetrates the adipocytes and breaks down fat, which is then carried to the blood stream and then excreted via the kidneys and bowel. PC is viscous and therefore, to facilitate its injection, an emulsifying agent, deoxycholate, is added; wish is shown to independently cause lysis of the adipocytes.

(B). Promotes lipolysis by stimulating beta receptors and inhibiting alpha2 receptors present on the adipocyte membrane.

(C). Also causes inflammatory cytokine- mediated necrosis and resorption of adipocytes. Once the inflammation subsides, new collagen is formed, leading to retraction of the loosened tissue. Various substances used are.

Lipolytic: DOC (bile salts), L- carnitine (also causes fatty acid oxidation), aminophylline, caffeine and xanthine and organic silicium (also inhibits free radical formation, regenerates elastin and collagen).

Connective tissue breakdown: hyaluronidase, collagenase.

Drainage enhancers: artichoke.

Circulatory enhancers: yohimbine (alpha2 adrenergic blocker), aminophylline, pentoxiphylline.

- Vitamin A and trace elements are important in regulating the turnover, keratinization and repair of keratinocytes.
- Vitamin C enhances the synthesis of collagen and reduces hyperpigmentation as it inhibits melanin production.
- Vitamin E an antioxidant, aids in anti- aging of the skin.
- Vitamin K affects clotting mechanisms and thus regulates the microcirculation of the skin.

A randomized, prospective case-controlled study over a 12-week period by park et al. to study the effect of a mixed solution (i.e., aminophylline, buflomedil and lidocaine) by injecting it into the superficial dermis of the medial aspect of the thigh weekly with the other thigh girth on the treated side as compared with the non-treated thigh as measured by computed tomographic scanning. The study indicated poor patient satisfaction and demonstrated that mesotherapy is not an effective alternative treatment modality for body contouring.

3. Mesolift/ Mesoglow/ Biorejuvenation:

Mesolift/mesoglow is the term used for skin of face and neck rejuvenation. Agents commonly used for mesolift are:

Hyaluronic acid [HA]: glycosaminoglycan, which binds and retains water thus improving the tone and elasticity of the skin. HA used in mesotherapy is not cross-linked (as the main function is to hydrate) in contrast to fillers, where it is cross-linked (as main function is to fill the gap and so need to be stabilized).

Multi vitamins, trace elements: Ionic balance of the skin.

Amino acid, vegetal proteins: protein reconstruction.

Dimethylaminethanol: precursor of PC, converts choline to acetylcholine (Ach) and thus causes muscle contraction leading to muscle firmness (mainly for the upper face).

Hexapeptide 3: Blocks the Ach release and thus relax the muscles and smoothens the wrinkles (mainly for the upper face).

Recently, natural/native freeze-dried collagen sheets are being used over the face after mesolift. Collagen sheets taken up the shape of part of the face where it is applied and, due to its water retaining ability hydrates and makes the skin firm. Advantages being less post-procedure bruise swelling and discomfort.

Ultrasound of the skin is used to evaluate the so called sub epidermal low echogenic band (SLEB), located immediately below the epidermal entrance echo as a marker of photo ageing. It was seen that there was improvement in SLEB with mesotherapy. This can be explain by the hydrating effect of HA in the tissue due to its ability to absorb water many times its normal weigh.in addition, repeated injections into the dermis also can trigger the healing process, activating fibroblasts, producing more collagen.

However, a recent study showed that mesotherapy injection of cocktail-containing multivitamin solution and non-cross-linked hyaluronic acid did not result in any significant clinical improvement and histological effects, which were assessed by quantitatively evaluating changes in collagen types 1,3 and 7; elastin and tropoelastin(using immunohistochemistry) were also statistically insignificant.

Mesobotox:

It involves multiple injections of small doses of botulinum toxin into the dermis (to create a dermal papule) to relax the superficial orbicular muscles of the face and reopen the sebaceous and sweat gland orifice's thus increasing the glow of the skin. In this technique, the patient is asked to frown, purse the lips, give an exaggerated smile and raise eyebrows to makes the desired muscle prominent, and then the injections are given according to mesotherapy principles. Botulinum toxin (100 units) is mixed with physiological saline (1ml, 5ml, 7ml) and xylocaine to make different concentrations. Concentrated toxin is to be used in the thick and short muscles and diluted toxin in thin and flat muscles to avoid excess diffusion.

Alopecia:

There are very few studies throwing light on the role of mesotherapy in treating alopecia. In a recent study conducted by moftah et al, it was seen that mesotherapy with Dutasteride-

containing preparation was significantly effective in female pattern hair loss rather than 0.9% saline after 16 weeks of treatment by four methods of assessment: photographic assessment, hair pull test, measurement, hair pull test, measurement of the hair diameter and patient self- assessment.

Scanning electron microscopic examination of the hair shaft showed the reappearance of the cuticle in two patients in whom it was focally destructed prior to the treatment. However, there are few reports showing alopecia as a side-effect following the use of mesotherapy for alopecia. Two patients developed patchy alopecia after mesotherapy, using heparinoid vasodilator mesoglycan in one patient and homeopathic agents in the second patient. Multifocal scalp abscess with subcutaneous fat necrosis and scarring alopecia were reported as complications of scalp mesotherapy.

Despite the fact that there are no controlled published studies on massotherapies' efficacy in hair diseases, injections of Minoxidil, finasteride, lidocaine, multivitamins and T3/T4 are used in the treatment of alopecia.

Cutaneous Leishmaniasis

Recently, mesogun is also used to deliver meglumine antimonite into the lesions of cutaneous leishmaniasis. This method had equal efficacy and was a comparatively less painful procedure when compared with the classical intralesional method.

Other rare uses:

Mesotherapy is also tried in melisma, striae, vitiligo, hyperpigmentation, psoriasis, eczema and acne to minimize wrinkles and tighten loose skin.

Platelet-rich plasma in mesotherapy:

A small amount of blood is withdraw from the patient and centrifuged at a high speed and the platelet concentrate is injected intradermally into the scalp for scalp mesotherapy. Growth factors and healing proteins from the platelets improve circulation to the hair follicles, causing hair follicle growth and thus causing hair growth.

Growth factors like platelet-derived growth factor, transforming growth factor and vascular endothelial growth factor released from Alfa granules of the platelets increase the proliferation of fibroblasts, production of precollagen type 1 carboxy peptide by the dermal fibroblasts and thus improves the structural integrity of the skin .this property enables platelet-rich plasma [PRP] to be used in photoaged and aged skin. PRP also induces the expression of matrix metalloproteinase, which break down and remove the collagen formation in aged skin. Thus, PRP helps in remodeling of the skin. However, further studies are needed to ensure the safety of PRP as a component of mesotherapy.

Usually done once in every 4-6 months for 1 year, then every year as maintenance therapy depending on the patient's response.

Peptides in mesotherapy:

Acetyldecapeptide-3: reduces and prevents lines and wrinkles by actively generating new skin cells.

Decapeptide-4: for anti-aging and wound healing.

Copper tripeptide-1: helps blood circulation in the skin and revitalizes.

Oligopeptide-24: minimizes scars on skin by forming new skin cell.

Tripeptide-6: hydrates dry skin and maintains its optimum moisture balance and others like, pentapeptide, L carnitine and licorice. Because of the above-mentioned properties, bio-peptides are an important component of mesolift, mesoglow, mesocellulite and mesohair and mesosculpting.

Growth factors and stem cells in mesotherapy:

Thymosin TB-4 a growth factor is injected in to the mesoderm of the scalp, i.e. directly into the hair follicles as a part of scalp mesotherapy. TB-4 causes the growth of hair follicles by improving the circulation, stimulating the stem cells and reviving hair follicles. Stem cells obtained bone marrow are an important component of whitening serum and de-wrinkling solutions because of their proliferative capacity. Stem cells are now an important component of whitening solutions.

Various mixtures and protocols in mesotherapy: materials used in mesotherapy can be broadly classified into two categories;

1. Principal (p)/major
2. Complementary (c)/minor

Cocktail or the mixture should contain at least two to three principal agents for it to be effective.

1. Mesolift:

- Hyaluronic acid (P)
- Silorgamine = silorg + DMAE(P) + taurinox (c)
- Puretinol/vitamin A (P)
- The protocol may involve
- Week 1:2 cc hyaluronic acid+1 cc procaine
- DMAE+ procaine
- Week 2:2 cc hyaluronic acid + 1 cc procaine
- Hexapeptide 3 + procaine
- Week #3 the same as week #1
- Week #4 the same as week #2

2. Mesoglow:

- Hyaluronic acid [p]
- Silorg [p]
- Purascorbol/vitamin C [p] + xadenal[c]

3. Mesolighten:

- Kojic acid [p]
- Azelaic acid [p] + either tretinoin [c] or glycolic acid [c]
- Vitamin C [p]

4. Localized fat dissolve:

- Phosphatidylcholine [p] and Deoxycholicacid [P]+/-vitamin complex+/- taurine +/-L carnitine
- +/- alfa lipoic acid+/- organic silicium+/-

aminophylline amino acids +/- pantothenic acid

5. Meso cellulite: all are principal agents

- L-carnitine
- Aminophylline
- Pentoxiphylline
- DMAE
- Vitamin C
- Procaine

6. Mesostretch: All are principal agents

- Silorgamine = silorg + DMAE or
- Idebe = idebenone + DMAE or
- Centella asiatica, fibronectin, vegetal proteins

7. Telogen effluvium:

- Biotin [p] + multivitamins, trace elements [C]
- Dexenol [p]

8. Androgenetic alopecia:

- Minoxidil [p]
- Dutasteride [p] + zinc, Azelaic acid [C]
- Biotin [p]
- Dexenol [p]

9. Equipment needed:

1. Classical injection method:

- Needles 27G, 30G, 32G
- Syringes-slip tip, luer lock 5 ml, 10 ml, 20 ml
- Liner multiple injector.
- Circular multiple injector
- Multi injector plates-three, five and seven connectors

2. Meso gun:

The benefits of mesogun include faster injections, precise dose delivery, consistent depth of penetration and more comfort for the physician and patient. It has different modes like continuous, dosimetric, nappage and mesoperfusion mode.

3. Skin and scalp rollers:

Available in 48 and 96 needle configuration with four needles in each row with a gap of 5 mm in between. It stimulates comparatively deeper layers of skin and is used mainly in the management of acne, stretch marks and alopecia.

Today mesotherapy is used to:

- Remove fat in areas like the stomach, thighs, buttocks, hips, legs, arms, and face.
- Reduce cellulite.
- Fade wrinkles and lines.
- Tighten loose skin.
- Recontour the body.
- Lighten pigmented skin
- Treat alopecia, a condition that causes hair loss.

The side effects of mesotherapy



Fig. 2. One of the side effect of mesotherapy

Mesotherapy treatment is a cosmetic procedure that is commonly used in Latin America and has seen increased use in the United States, according to the National Institutes of Health. Mesotherapy is administered through several injections that contain a mixture of medicines, minerals and vitamins. Its promoted cosmetic applications include the elimination of excess fat and cellulite. Some frequently treated areas include the upper arms, thighs, abdomen and buttocks. Mesotherapy also aims to restore the face and neck to a more youthful appearance. Side effects linked to mesotherapy are generally regarded as having a minimal effect.

Pain and burning:

The injections used in mesotherapy can cause some irritation to the skin. A topical anesthetic can be applied before the treatment to ensure minimal discomfort. There might be mild burning sensation following the injection as therapeutic enter the body. This feeling is typically fleeting. Any residual soreness usually disappears within a day or two.

Bruising and swelling:

According to onlinesurgery.com, the side effects of mesotherapy are generally mild. The most frequent reaction is bruising or swelling at the injection sites. Tiny bumps can also form. These irritations usually clear within two weeks. To accelerate the rate of healing, a homeopathic supplement called arnica can be applied topically or taken orally. Some patients experience a minor itch that lasts anywhere from a few hours to a few days completion of the treatment.

Miscellaneous side effects:

Other side effects linked to mesotherapy include temporary of numbness and skin discoloration. Some patients become nauseous or develop hematoma (localized swelling filled with blood). Some patients have scarring at the site of the injection. In the unlikely event that the injection device was not thoroughly sterilized, a potentially serious infection can result.

- Immediate or delayed allergic reaction to the injected drugs/solutions.
- Lecithin is known to cause inflammation and swelling.
- Skin infection.
- Pigmentation at the injection site.
- Bruising at the injection site.
- Ulceration and scarring at the injection site. And panniculitis.

Benefits of mesotherapy:



1. Your skin gets a high concentrate of vitamins and other ingredients

The high concentration serums, vitamins, and other nutritious blends of potent ingredients makes you skin feel refreshed and rejuvenated. When done correctly, mesotherapy ensures that the products are delivered to your skin properly.

2. It can be an alternative to expensive surgeries

It can be a part of your anti-aging skin routine and is less invasive than other procedure and plastic surgeries. You do not need to go under the knife to look better. The concentrated serums are delivered to your skin using needles. And you get natural-looking, Healthy skin, also. There is no downtime.

3. It brightens your skin

Whether you are looking for an anti-aging solution or want to boost the radiance of your skin, will get customized ingredients for your skin. The skin gets an energy boost, and you can see visible results right after the first session.

4. It brightens your skin

Depending on the ingredients, Mesotherapy can address skin issues, such as age spots, pigmentation and melisma. It can brighten up your face and even out your skin tone.

5. It keeps your skin hydrated

Mesotherapy can also help in boosting the skin's moisture content and make it appear plump, firm, and healthy.

Mesotherapy is not a complicated process. However, you need to go for an initial consultation with your dermatologist and discuss your concerns. He / She are the best person to understand the needs of your skin and the type of ingredients it might need.

Depending on the intensity of your treatment and the ingredients used, the number of sessions may vary. Treatments are usually customized. Here is a brief overview of what exactly happens during the procedure.

Disadvantages of mesotherapy:

Some patients may require several treatments for optimal results, and the amount of fat eliminated may be less than the fat that can be eliminated through surgery.

Mesotherapy is not suitable for people that need to lose more than 15 pounds of fat. The results of mesotherapy will be visible in few weeks (4 to 8 weeks), as the body requires time to

eliminate the fat. In other surgical liposuction treatments, there are visible results immediately after the procedure. This treatment is not suitable for people that have a needle phobia.

Expect during the procedure

You have to stop using nonsteroidal anti-inflammatory drug (NSAID) and aspirin (in case you are using any of them) for a week before the facial procedure because they might increase your risk of burning and bleeding.



During the treatment:

- The doctor might apply a topical anesthetic on the areas that are to be treated. This however, depends on your pain tolerance levels.
- The doctor uses a micro needle to inject the ingredients in to the target area. You will receive a series of injections.
- The injections are delivered at different depths of around 1 to 4 millimeters in to your skin. This, again, depends on the skin issue you have.
- Depending on the skin issue, its intensity, and the effects, you might need several mesotherapy sessions. The doctor can tell you exactly how many sessions per week you might need to get the desired results.
- There haven't been enough studies on mesotherapy and its effect. But every cosmetic therapy comes with its share of undesirable effects. And mesotherapy is no exception.

Injection techniques:

After obtaining informed consent, the physician will clean the skin of the patient with alcohol- free antiseptic solution and topical anesthetic can be used. Then, multiple injections are given with the needles mentioned above or mesogun is used. Each session takes about 10-30 min. in general, one to three sessions in acute cases, such as sports injuries, and 10-15 with maintenance sessions every 6 months or a year for chronic conditions such as cellulite may be required. There is no standardized formulation for mesotherapy and ingredients vary depending on indications. Commonly used techniques are:



Point by point

It involves injection of 0.02-0.05 ml of drug solution perpendicular to the skin (4 mm deep), about 1-2 cm apart. Mainly used for fat reduction.

Nappage (French for covering)

It involves more superficial (2 mm deep) injections, given at a 45-degree angle from the skin while applying light, constant positive pressure on the plunger. At each site, a drop of solution is introduced. Relatively, this is a more discomforting procedure to the patient.

Epidemic

It is the most superficial (1 mm deep) of all the techniques in which the basal layer of the skin is not penetrated. The needle is introduced and dragged along with light, positive pressure applied to the plunger. It is done in a grid pattern at 1-cm intervals over the entire affected area.

Papule forming

It involves injection of the drugs at the dermoepidermal junction, between 2 mm and 4 mm, raising a small papule. Mainly used for wrinkles, alopecia and mesobotox.

Mesoperfusion

Some experts use a special technique called "mesoperfusion", wherein the same volume is injected over 10 min instead of 30 s as in a normal session.

Before and after the treatment differences:



Methods to improve patient satisfaction:

1. Individuals who are receiving mesotherapy should be informed beforehand that development of itching, bruising, soreness, burning sensation and swelling at the site of injection are normal and shows that the drug is working.
2. Procedure should be briefly explained to the patient.
3. Proper counseling should be given regarding the results of procedure prior to the procedure so that the patient will not expect complete cure.
4. Local application of ice packs before and after the procedure increases the numbness and decreases the post-procedure swelling.
5. Using local anesthetic is not mandatory, but makes the procedure more comfortable. To reduce the burning sensation, topical lidocaine 1 h before the procedure can be used.
6. Loose clothing after the procedure.

Massaging the treated site in between the sessions decreases the formation of nodules.

No needle mesotherapy:

It is a new modification of mesotherapy by which both ionized and neutral drugs can be transported into the dermis and subcutaneous tissue. In this technique, the selected site is first pre-treated with dual wavelength laser light and then has four components:

A. *Electroporation:* electric waves of three different frequencies creating electropores of about 40-250 microns on the skin. Then, the desired substances are made to pass through these pores by electro repulsion. However, neutral substances also can pass through the pores due to their shape.

B. *Active current:* improves the vascularity and thus ensures that sufficient amount of product reaches the site.

C. *Hydrophoresis:* water-soluble substances penetrate inside the skin.

D. *Cryophoresis:* cold temperature locks the substances in the skin cells.

No needle mesotherapy (NNM) is used mainly in the treatment of cellulite, also skin rejuvenation, hyperpigmentation of photo aging, reduction of wrinkles, pores and skin lifting tightening. Advantages of NNM when compared with mesotherapy are

- (a) It is completely painless,
- (b) No bruising, erythema, swelling,
- (c) Materials can penetrate to deeper levels,
- (d) immediate/rapid response and
- (e) Cost effective

Contraindications of mesotherapy:

1. PC-no specific contraindications, to be used in caution with ant phospholipid antibody syndrome.
2. Aminophylline-history of hypersensitivity to the drug, active peptic ulcer, seizure disorder.
3. L carnitine-to be used with caution in patients with seizure disorder.
4. Hyaluronic acid-known hypersensitivity to the drug, use of other quaternary ammonium compounds [as they precipitate HA].
5. Pentoxiphylline, aminophylline-recent cerebral, retinal hemorrhage.
6. Mannitol-renal disease, pulmonary edema.
7. Caffeine-hypotension, ventricular tachycardia, anxiety, gastrointestinal side-effects.
8. General-age <18 years, diabetes mellitus, body mass index >30, pregnancy, lactation.
9. Severe cardiac, renal disease, thromboembolic phenomenon.

Legal issues related to mesotherapy:

1. Using of off-label drugs like aminophylline, procaine and isoproterenol unprofessionally and carelessness in mesotherapy, which can subject the

physicians to negligence is a burning issue. Doctors can protect themselves by taking an informed consent and by discussing the off-label uses of the drugs with the patient.

2. It is also seen that few physicians give alcohol to patients prior to mesotherapy for its sedative effect, which comes under negligence or medical malpractice on the part of the doctor.

Complications:

Local:

In contrast to the claims of mesotherapy being a safe, minimally invasive procedure, several side-effects have been reported. Non-specific adverse effects include nausea, vomiting, mild pain, skin hyperesthesia, edema, itching and erythema.

Due to faulty technique: atypical mycobacterial infections (mycobacterium fortuitum), ulcers and scarring, nodularity and irregularity. Other side effects include atrophy, lipodystrophy, subcutaneous oleomas (due to mineral oil or sesame seed oil injections per se or use of oil even as a vehicle for vitamins B12 or phosphatidyl choline) lichenized eruption, post-inflammatory hyperpigmentation and rare complications like koebnerization in psoriasis, localized urticaria pigmentosa, granuloma annul are, non- infectious granulomatous panniculitis and mycobacterium abscessus infection. Treatment options for complications are limited. For mesotherapy induced panniculitis, one of the potential effects of this procedure, dapson may be effective. Topical and oral steroids and colchicine have been tried with some success in the treatment of oleoma. However, complete surgical excision remains the treatment of choice to prevent recurrence.

Systemic:

Hypersensitivity reactions, infections, infections like HIV, hepatitis and, most importantly, non-tuberculosis mycobacterium [mycobacterium immunogenum], rise in liver enzymes with or without liver toxicity and demyelination of nerves due to large doses of doses of Phosphatidylcholine. Ischemic colitis occurred in patients who were receiving mesotherapy and anti- obesity medications due to the combined vasoconstriction effect.

4. Conclusion

In recent years, mesotherapy gained popularity due to its non-invasive, painless nature, but, till date, the mode of action of many products used in mesotherapy is either doubtful or unknown and there are no clear cut guidelines on the technique and the medicines used. Thus, the use of this technique is debatable.

In spite of this, many new substances like platelet rich plasma, peptides, growth factors and collagen are finding their way to enter the field of mesotherapy. Many new indications and new modifications like no needle mesotherapy are also on the rise.

To conclude, we must be cautious about rejecting new ideas. Just as absence of proof is not proof of absence of scientific validation is not proof that it does not work. Thus, continued research and well-designed controlled scientific studies are required to substantiate the claims of effectiveness of these new products and techniques and to formulate guidelines and recommendations regarding their use for aesthetic applications.

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