

Updated Management of Atrophic Post Acne Scars: Review Article

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ABSTRACT

Background: Hair follicle and sebaceous gland inflammation causes acne, which is a long-term, chronic skin condition. The androgen-induced sebum overproduction leads to first acne appearance. It is caused by altered and aberrant keratinization, inflammation and the colonization of facial hair follicles by the bacteria *Propionibacterium acnes*. Acne also has a delayed immune response, as well as influences from the environment and genetics. Treatments for post-acne scarring have included topical preparations such as chemical peels, dermabrasion, laser resurfacing and punch excision and punch elevation, as well as fat transfer, implantation of autologous collagen and cultured and expanded autologous fibroblasts. Other treatments have included trichloroacetic acid focal treatment and skin microneedling to improve the dermal extracellular matrix (ECM) proteins.

Objective: To determine the updated treatment modalities in atrophic post-acne scars.

Conclusion: In most types of atrophic acne scars combination therapies typically provide superior outcomes than solo treatments.

Keywords: Management, Atrophic post-acne scars.

Acne Scars:

Eczema, often known as acne, is an inflammatory skin condition that affects the pilosebaceous units. It is characterized by seborrhea and the development of comedones, erythematous papules and pustules. Acne affects 90 percent of people between puberty and 30 years of age, both males and females⁽¹⁾.

Because of permanent and unsightly consequence of inflammatory acne, acne scars are formed. Severity, duration of acne, and time since therapy has been, all are linked to it⁽²⁾.

Mechanisms inducing acne scarring:

Inflammatory processes, follicular rupture, and perifollicular abscess formation are all caused by acne pathogens, and these wound-healing processes involve soluble chemomediators, ECM components, parenchymal resident cells like keratinocytes, and infiltrating blood cells like lymphocytes, which are collectively referred to as immunoinflammatory cells. There are three stages to the wound healing process: inflammation, scarring, and closure. Thus, formation of granulation tissue and renovation of the matrix⁽³⁾.

Treatment of Acne Scarring:

If erythema is present, treatment should begin with managing it. Treatment should target atrophic scarring, with the strategy decided by the types of scars present and whether they are generalized or individual in nature. Patients who receive early treatment and a combination of treatments tailored to their unique needs are most likely to see substantial changes⁽⁴⁾.

Generalized atrophic scars:

Dermabrasion, lasers, chemical peels, microneedling, and radiofrequency are all used in treatment.

1. Laser resurfacing:

Ablative (traditional and fractional):

Non-ablative (traditional and fractional):

In order to give heat energy, they use a monochromatic light source, which then stimulates skin fibroblasts to produce new collagen and elastin⁽⁵⁾. Physicians now have more alternatives as new technologies emerge, giving them a better balance between efficacy and tolerance, as well as adverse effects for each patient. Discomfort during the procedure, considerable recovery time and a high risk of adverse effects are all connected with traditional ablative lasers. While non-ablative lasers are less painful and require fewer treatments, the results aren't as impressive clinically as ablative lasers⁽⁶⁾.

Acne scar removal using lasers:

Traditional CO₂ laser at a wavelength of 10,600 nm. Far infrared light is emitted by the ablative CO₂ laser. 2,940 nm Er: YAG lasers are a less-damaging alternative to the more common CO₂ lasers⁽⁷⁾. Fractional ablation lasers with ablation at a distance. As a result of the development of ablative fractional lasers, which have fewer side effects than fractional technology but are just as effective, ablative lasers were created⁽⁸⁾.

The CO₂ laser has a peak wavelength of 10,600 nm and is a fractional laser. Studies show that fractional CO₂ lasers are effective in treating acne scars; however the improvements are not as dramatic as with regular ablative lasers⁽⁹⁾. Collagen remodeling is induced by non-ablative lasers that use water as their principal chromophore of light. They also show that hemoglobin and melanin absorb different amounts of the substance. They transmit photothermal energy to the dermis without ablating the surrounding epidermis, resulting in



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less epidermal injury and reduced post-procedure downtime for patients⁽¹⁰⁾.

The Nd: YAG laser has a wavelength of 1,064 nm. This product is used to treat dark skin types with the least amount of risk of pigment modification due to its lower scatter and enhanced depth of penetration⁽¹¹⁾. Historically, the 1,320 nm Nd: YAG and the 1,450 nm diode lasers have been utilized for facial rejuvenation and rhytides, whilst the 1,450 nm diode laser has been employed for active acne and acne scarring⁽⁵⁾.

Using newer fractional lasers (fractionated lasers that are non-ablative), acne scarring can be reduced by generating photothermal damage, which drives collagen remodeling while allowing for varied absorption by melanin and haemoglobin levels. In addition to water⁽¹²⁾, Erbium-doped laser with a fractional wavelength of 1,550 nm (EDL), with less dyschromia than ablative lasers, this laser is safe for people with darker skin tones⁽¹³⁾.

Other resurfacing agents:

2. Dermabrasion/microdermabrasion:

Mechanical ablation of damaged skin in order to stimulate re-epithelialization is the goal of these facial resurfacing procedures. When you use dermabrasion, you are removing the epidermis entirely and penetrating all the way down to the papillary and reticular dermis. Only the outer layer of the epidermis is removed in microdermabrasion, which is a more superficial variant. Significant discomfort, scarring, colour changes, milia production, and sun sensitivity are some of the side effects of this procedure⁽¹³⁾.

3. Punch Techniques:

Increased efficacy in the treatment of these scars has been achieved by the use of autologous and non-autologous tissue augmentation, as well as punch replacement procedures⁽¹⁴⁾.

4. Dermal Grafting:

Surgery can be used to repair acne scars by grafting them together. Following the removal of the epidermis, split-thickness or full-thickness grafts get embedded in a bed of scar tissue or dermis. When it comes to fixing unstable scars, such as those caused by persistent leg ulcers or X-ray scars, this procedure can be extremely beneficial. Moreover, it can erase acne scars, nevi pigmentasious on a large scale, and tattoos on the skin⁽³⁾.

Tissue Augmenting Agents:

Transplantation of human body fat: Fat is readily available, and there are few known negative effects associated with its use. There are two stages to the procedure: obtaining the transplant and implanting it. Except as otherwise noted, the injected fat will restore the shape to normal⁽³⁾.

5. Microneedling:

Microneedling (collagen induction therapy): CIT makes use of microscopic needles to puncture the skin numerous times, resulting in microclefs that reach the dermis. Wound healing and growth factor release are

triggered by trauma to the dermis, which leads to collagen formation and deposition in the upper dermis⁽³⁾.

6. Combined Therapy:

An innovative new approach for treating acne scars has just been developed. After a trichloroacetic acid peel, there will be subcision, and finally a fractional laser treatment. This therapy will last for a whole year. Triple combination therapy appears to be a safe and very effective treatment option for a wide range of acne scars with atrophic changes⁽¹⁵⁾.

7. Chemical peels:

Using chemical peels to remove damaged skin and speed up the healing process is referred to as a chemical peel. Macular scars respond better to the treatment because they are more visible. Even after a lot of time, icepick and rolling scars remain⁽³⁾.

It is possible to use a variety of hydroxy acids:

(A) Glycolic Acid:

Fruit and milk sugars contain glycolic acid, an alpha-hydroxy acid that is soluble in alcohol. It works by increasing epidermolysis, weakening the stratum corneum, and distributing melanin in the basal layer. Minor side effects, such as hyperpigmentation or itching, are possible but are not expected to be serious⁽¹⁶⁾.

(B) Jessner's Solution:

It's a great superficial peeling agent that Dr. Max Jessner created with a blend of salicylic acid, resorcinol, and lactic acid in 95 percent ethanol. Keratin's weak hydrogen bonds are disrupted by this substance. General contraindications include the treatment region being inflamed, dermatitis or infection, isotretinoin treatment within six months of peeling and delayed or irregular healing of wounds⁽³⁾.

(C) Pyruvic Acid:

It's an alpha-keto acid that works well as a peeling agent and is found in pyruvic acid. As well as its ability to induce new collagen creation and the formation of elastic fibers, it also has keratolytic, antibacterial, and sebostatic capabilities⁽¹⁷⁾.

(D) Salicylic Acid:

When used on cornified epithelioid cells, salicylic acid dissolves the covalently attached intercellular lipids. Salicylic acid peeling has minimal and temporary negative effects. Examples of these are erythema and drying. Post-inflammatory hyperpigmentation or scarring that persists after treatment is extremely unusual⁽³⁾.

Trichloroacetic Acid (TCA):

When TCA is applied to the skin, it results in keratocoagulation (also known as protein denaturation) and a visible white frost. To achieve the necessary concentration for chemical peeling, it is diluted to 100 ml with distilled water. It is dependent on the proportion of TCA employed, anatomical site and skin preparation on the degree of tissue penetration and damage⁽³⁾.

8. The chemical reconstruction of skin scars (CROSS) technique:

Icepick and thin boxcar scars are good candidates for the CROSS method. TCA peels with concentrations ranging from 65 to 100% are used to treat acne scars. As the number of CROSS therapy sessions increases, so does the clinical improvement⁽¹⁸⁾.

9. Radiofrequency (RF):

There is variety of ways to use non-ablative (RF) treatments, including alone or in conjunction with fractional laser therapy. The dermis is stimulated by a radiofrequency current that creates new collagen and softens scars⁽¹⁹⁾. Acne scarring, particularly icepick and boxcar scarring, responds best to microneedle bipolar RF and fractional bipolar RF treatments. After three to four treatment sessions, patients often see improvements of 25 to 75 percent. Transient discomfort, erythema, and scabbing are common side effects of RF therapy. These symptoms usually subside in 3 to 5 days⁽²⁰⁾.

Individual atrophic scars:

The following techniques may help improve the appearance of acne scars on their own or of generalized atrophic scars after therapy.

1. Fillers:

Soft tissue augmentation with injectable fillers is possible, especially in the case of soft atrophic scars such as those left behind by rolling or boxcar surgeries. Aside from infection and pain, some of the more typical side effects include erythema, lumps, swelling, and abscess development. Temporary fillers, semi-permanent fillers, and permanent fillers are the three main types. By stimulating collagen formation in fibroblasts with hyaluronic acid fillers (HAF), the injection process enhances soft tissue while also enhancing surface skin quality⁽⁶⁾.

2. Punch Technique; Punch excision and punch elevation:

Icepick and boxcar scars should be treated using punch excision. The subcutaneous layer should be excised using a punch instrument that is about the same size as the scar. Sutures should be used to seal the defect along the lines of reduced skin tension. In the case of wide boxcar scars without underlying fibrosis, punch elevation is the most appropriate therapeutic option⁽²¹⁾.

3. Subcision:

Rolling acne scars respond best to subcision, whereas icepick and boxcar scars do not. Acne scars are treated by inserting a needle to cut the fibrous components that hold the scar in place under the dermis⁽²²⁾. You can use an 18- or 20-gauge tri-beveled hypodermic needle or an 18-gauge Nokor™ needle with a triangular tip to separate the fibrous tethers smoothly and thoroughly. To get the best results, you may have to undergo a number of procedures. Swelling, bruising, bleeding, and infection are all possible side effects⁽⁶⁾.

Hypertrophic Scars⁽³⁾:

1-Silicone Gel:

Advantages: There are no side effects and it can be used to repair large scars as well as uneven skin patches. It is non-irritating and does not cause skin maceration⁽³⁾.

2. Intralesional steroid therapy:

Keloids and hypertrophic scars are frequently treated with this method. It is possible that corticosteroids will diminish scar size, thickness, and texture, and that they will alleviate itching and discomfort⁽²²⁾.

3. Cryotherapy:

In clinical settings, it has the potential to make a huge difference. Cryotherapy sessions cause blood flow to slow down and intraluminal thrombus to form, which can lead to anoxia and tissue necrosis⁽²³⁾.

4. Pulsed dye laser (PDL):

Over the last decade, PDL has shown promising results in the treatment of hypertrophic/keloidal scars. Many studies have shown that PDL reduces the amount of fibroblasts and collagen fiber growth, making the skin look more supple and smooth⁽²³⁾.

5. Surgery:

If you have a significant scar on your face, plastic surgery appears to be your best option. The scar is disrupted during this therapeutic technique, making the lesion less noticeable. Full thickness skin transplants or fat-skin composite grafts, in particular in facial surgery, are another useful approach for attaining wound closure with little stress. Neck and retro periorbital areas are the most commonly used donor locations for skin grafts for face abnormalities⁽²⁴⁾.

CONCLUSION

In most types of atrophic acne scars combination therapies typically provide superior outcomes than solo treatments.

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