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# Atrophic Acne Scars; Insight about Future Management Lines: Review Article

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## ABSTRACT

**Background:** Acne is a common chronic skin illness that occurs when the pilosebaceous unit (hair follicles and their accompanying sebaceous gland) become inflamed or blocked. Both atrophic (lower) and hypertrophic (higher) scarring from acne can occur. In order to get desirable results, a multimodal approach is often required, depending on the kind and severity of the scarring. As a result, there is a wide variety of approaches to treating acne scars.

**Objective:** Review of the literature on future management lines of atrophic acne scars.

**Methods:** We looked for data on Acne atrophic scars, and future management, in medical journals and databases like PubMed, Google Scholar, and Science Direct. However, only the most recent or extensive study was taken into account between July 2001 and September 2022. References from related works were also evaluated by the writers. There are not enough resources to translate documents into languages other than English, hence those documents have been ignored. It was generally agreed that documents such as unpublished manuscripts, oral presentations, conference abstracts, and dissertations did not qualify as legitimate scientific study.

**Conclusion**: An effective treatment plan will incorporate multiple approaches, such as medicinal, surgical, and laser tools. Quantifying the advantages and determining the longevity of the impacts requires more primary research, such as randomised controlled trials.

**Keywords:** Atrophic Acne Scars, Surgical Treatment, Non-surgical treatments, Skin resurfacing.

## INTRODUCTION

The term "acne" refers to a skin condition characterized by a localized inflammation caused by an increase in oil production from the sebaceous glands located at the base of the hair follicles. The adrenal glands of both boys and girls produce male hormones, which drive the oil (sebaceous) glands to become active around puberty. This is when acne begins to appear. Glands called oil glands sit just under the skin and secrete oil at all times through tiny pores. This oil has both lubricating and barrier properties, making it ideal for use on the skin. Cells adjacent to the oil gland entrances can obstruct them under specific conditions. Because of this, oil secretions from the skin's surface accumulate. When healthy tissue is lost due to an injury or a disease, fibrous tissue forms to fill the void [(1)].

Atrophic acne scar: The term "atrophic" means "wasting away" in the medical field. A cluster of inflamed skin is what an acne lesion is when it forms. As a result of the inflammation, the supple, flexible layers of your skin are broken down, and your skin becomes rigid. Because of this, your skin's texture will alter, becoming more rough and uneven. Acne scarring of this type is known as atrophic scarring. Ninety percent to one hundred percent of teenagers suffer from acne. Most people's acne clears up by the time they're twenty-five, but 1 percent of men and 5 percent of women still get acne lesions even when they're forty. In the early stages of acne, scarring can occur, potentially affecting 95% of patients of both sexes. A person's susceptibility to developing post-acne scarring is influenced by individual differences in the cell-mediated immune response. A person with acne scars is severely impaired in both physical and social functioning [(2)].

Acne scars are classified according to both clinical and histological criteria, which is the most common method used in clinical practice [(3-5)]. According to the clinical and histological characteristics: Scars that thin out healthy tissue (atrophic scars): Acne scars, known as atrophic scars, are wide, shallow, saucer-like indentations caused by a lack of collagen deposition during the wound-healing process of acne lesions. Unlike keloids and hypertrophic scars, these are extremely frequent. Light-induced scarring of the macula Macules with abnormal pigmentation or erythema (if the scar is inflammatory and relatively new, under a year old) are two common manifestations of scarring. Patients with olive skin may see greater pigmentation in their scars as a typical post-inflammatory reaction, although this should fade away between three to eighteen months. Sunscreen is necessary. It's possible that corrective care isn't always necessary.

## TREATMENT

Acne scars can be difficult for a physician to treat successfully. Due to differences in size, shape, and severity, they rarely respond to a uniform treatment strategy. Acne scarring can be treated in a number of ways. Different forms of acne scars require different approaches to treatment. Scar formation is mostly determined by a combination of genetics and the body's response to injury [(6)].

## NON-SURGICAL TREATMENTS

Dermal fillers and injectables are a popular method of treating soft tissue atrophy, most notably in the form of rolling or boxcar scars. Single puncture, linear threading, fanning, crosshatching, bolus, and micro-droplet injections are just a few of the many surface-level injection techniques available. Common adverse reactions consist of infection, pain, redness, lumps, swelling, and abscess development. Temporary filler s,



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semipermanent fillers, and permanent fillers are the three broad categories of fillers [7].

Atrophic scars often leave pitted or depressed regions of skin, which can be treated with soft tissue fillers. The effects won't last forever, so you'll have to get more treatments. Temporary fillers usually only last a few months, so you'll have to get touch ups very often. Injectable hyaluronic acid fillers (HaF) are an example of a filler that improves the quality of soft tissue and the skin over it by increasing collagen production by fibroblasts [8]. Semipermanent fillers induce the creation of fibrous tissue, which can last for up to two years. Injectable Poly-L lactic acid (PLLA) and calcium hydroxylapatite (CaHyaluronic Acid) have been shown to be effective in treating atrophic acne scars, and because they integrate permanently into the skin, they pose no risk of allergic reaction or infection. Two new case studies strengthen the clinical evidence supporting the use of injectable PLLA for the treatment of atrophic acne scars [9, 10].

## SKIN RESURFACING

Laser Therapy: Acne scars can now be treated with lasers, which have become increasingly popular due to their effective and rapid advancement in recent years. It is an efficient method of treatment that requires less effort from the patient than other options [11]. Acne scars, with the exception of deep ice pick scars, can be effectively treated with both nonablative and ablative lasers. Ablative lasers work by melting, evaporating, or vaporising the scarred tissue, which then can be removed. The carbon dioxide laser and the Erbium YAG laser are the most often used ablative lasers for treating acne scars. These work by sanding away superficial layers and stimulating the underlying collagen fibres to contract. Although nonablative lasers do not eliminate tissue, they do induce new collagen to grow and skin tightening, which in turn elevates the scar. Nd:YAG and Diode lasers are the most popular types of nonablative lasers now in use [12].

There was some improvement in the acne scar from using a non-ablative laser, but it wasn't nearly as noticeable as using a different type of laser. By contrasting the performance of a 1450-nm diode laser and a 1320-nm Nd:YAG laser, the concept of fractional photothermolysis was born as a novel approach to laser therapy for the skin. YAG laser for the treatment of atrophic face scars [4]. By selectively destroying skin tissue, fractional photothermolysis avoids the side effects of laser resurfacing, dermabrasion, and chemical peels by stimulating a wound healing response that modifies the activation of prolonged neocollagenesis. A wide range of treatment efficiencies was mentioned, from icepick to boxcar to rolling scars. There are fewer side effects and faster tissue regeneration with this technology than with conventional ablative lasers [13]. If you have an atrophic scar, you can use the pinpoint irradiation technique just as effectively as fractional photothermolysis. With the use of microscopic thermal wounds, icepick acne scars can be treated and the skin rejuvenated. In addition, this method almost never has any complications [14].

**Emerging laser technologies:**

In comparison to conventional nanosecond lasers, the shorter pulse lengths and less energy impacts of a picosecond 755nm Alexandrite laser may have fewer negative consequences [6]. In 2014, Picosecond 755nm alexandrite laser picosure is FDA-approved for the treatment of tattoos and pigmented lesions. Also tested for use on acne scars, this technique can treat more area with each pulse by employing a diffractive lens array to spread out the light's beams by a factor of 500 m. In studies, the picosure performed as well as fractional ablative lasers at reducing the visibility and roughness of atrophic rolling scars [15].

Facial resurfacing procedures like microdermabrasion and dermabrasion mechanically ablate damaged skin and stimulate re-epithelialization. Dermabrasion, a long-standing method, treatments that use a motorized instrument tipped with an abrasive material to remove the epidermis and to penetrate to the level of the papillary or reticular dermis, thereby triggering remodelling of the skin's structural proteins, can be effective in the clinical treatment of scars and in improving the skin's overall appearance. The epidermis is stripped away during a microdermabrasion treatment, speeding up the skin's innate exfoliation process. Unlike microdermabrasion, which just removes the outermost layer of skin, dermabrasion exposes the underlying papillary or reticular dermis, which triggers structural protein remodelling in the skin. In most cases, microdermabrasion can be performed without any sort of discomfort or need for anaesthetic, and many sessions are often necessary. Several distinct types of microdermabraders can be found. All microdermabraders share a common feature: a pump that, when coupled with the device's hand piece and vacuum, produces a stream of aluminium oxide crystals [16]. There are times when crystals of sodium chloride, sodium bicarbonate, or magnesium oxide are employed. These substitute crystals are less expensive than aluminium oxide crystals, however they are not as effective and are not as abrasive [17]. Microdermabrasion is less effective than dermabrasion and shouldn't be used on deep scars, although it has less negative effects. Pain, photosensitivity, bruising, a burning or stinging sensation, and temporary peeling of the treated region are common side effects. Under either local or general anaesthesia, dermabrasion can be completed. High-speed brush, diamond cylinder, fraise, or hand-held silicon carbide sandpaper are the main tools for this task. Reactions such as prolonged erythema, bacterial or viral infection, hypertrophic or keloidal scarring, sun sensitivity, and temporary or permanent hypopigmentation or hyperpigmentation, especially in patients with dark skin, are common [18].

This form of dermabrasion has just recently gained popularity among medical professionals. Since no electrical equipment or freezing sprays are employed in

this approach, the risk of pigment loss or permanent alteration in pigmentation is reduced in compared to typical dermabrasion treatments. Patients of colour, including those with varying degrees of skin pigmentation, should rest assured that this is also safe for them. Even for individuals with the severe acne and darkest skin, this hand sanding procedure is safe and can be repeated [18].

**Chemical Peeling:**

Chemical peels are a common dermatological technique for correcting flaws and enhancing the skin's appearance. Chemical peels are common because of their adaptability and ease of use. A chemical exfoliating agent is administered to the skin during the peeling process, causing the destruction of epidermal and/or dermal layers. The depth to which the peeling solution is able to penetrate the skin determines whether or not it is considered a superficial, medium, or deep peel [19]. The discomfort of the treatment, the length of time it takes to heal, the severity of any side effects, and the overall outcome are all affected by the depth of the peel. Chemical peels are indicated for the treatment of dyschromias, ageing skin, wrinkles, and acne scars [20]. Pigmentary changes, infections, milia, acneform eruption, and scarring are all possible side effects of chemical peels. If applied to a boxcar scar, trichloroacetic acid can reduce its visibility by 50–90%, while it has no impact on rolling or ice pick scars [4].

**SURGICAL TREATMENT**

During a punch excision, a scar is removed using a punch biopsy instrument, and the wound is then either closed surgically or left to heal on its own. Common reasons for a punch excision include ice-pick and boxcar scars. Though punch techniques have been touted as an efficient means of treating ice pick scars, they are not without risk, as they can result in graft failure, graft depression, and the development of a sinus tract. A biopsy punch of the proper size is utilised to remove the scar, and the scar can be closed, elevated, or grafted afterward depending on its diameter, depth, and shape. After undermining the scar, it is cut out and closed using a punch in a path that is perpendicular to the lines of tension in the skin that have been released. The intention is to replace a larger, more prominent scar with a thinner, more discrete linear closure. Depressed scars with typical surface textures can be elevated to the same level as the surrounding skin by making a punch incision all the way to the subcutaneous tissue and then lifting the base of the scar. After removing a part of the scar, a full-thickness, autologous punch graft is placed in its place in a procedure known as a punch excision and graft. Common donor sites include the buttocks and the area behind the ear [21].

**Subcision:**

Treatment of superficial atrophic acne scars can be aided by subcision, a more physically demanding method. There is a 50-60% success rate when used to cure rolling acne scars, however it is less effective when used to treat icepick and boxcar scars. A thin needle is put into the scar's edge and then worked back and forth under the scar's base to release the fibrotic adhesions responsible for the scar's sunken appearance. The tissue breakdown and subsequent bleeding also provides a possible site for collagen deposition during the wound-healing phase [22].

**NEW APPROACH**

Radiofrequency: The electromagnetic radiation's frequency ranges from 3 gigahertz to 300 gigahertz, and it does not ionize materials. Radiofrequency (RF) generates an electric current at predefined depths in the dermis, causing heat damage and, in turn, collagen synthesis. Patients have reported anything from a 25% to 75% improvement in their scars after receiving repeated treatments [23]. Fractional bipolar RF, which is based on the "sub-lative rejuvenation" idea and produces low epidermal disturbance with substantial dermal remodelling, can boost the efficacy and possibly minimize the negative effects of fractional photothermolysis. Radiofrequency treatment has been demonstrated to be effective for all forms of superficial scars, although ice pick scars have showed the most improvement [24].

Plasma resurfacing is a cutting-edge method because it uses non-laser devices to create plasma, a cloud of neutrons, from nitrogen atoms and a spark of radiofrequency. These devices include the RF dot matrix and the gold micro needle RF. Rare but undesirable side effects include hyperpigmentation, redness, swelling, loss of epidermis, infection, and scarring [23].

To date, studies using RF have shown that bipolar fractional microneedling and fractional bipolar RF are the most effective treatments for removing acne scars. On average, you'll need three or four treatments, with one or two passes, and three months after treatment to see these kinds of outcomes. That's because it takes some time for the dermal matrix to be replaced, what with the activation of fibroblasts and all. Pain, redness, and scabbing are temporary side effects of radiofrequency (RF) that usually disappear within three to five days. However, RF causes substantially less pain than fractional laser treatment [25].

Patients may also notice an improvement in the appearance of their skin, including smoother skin, smaller pores, less visible fine lines and wrinkles, and tighter skin. Lipotransplantation (Ft): It's cheap, easily accessible, and won't cause any unwanted tissue reactions like rejection or allergies. There are two parts to it [26], the process of obtaining and implanting the graft. After the injection phase, the fat graft has full access to its blood supply because it is located in several tunnels. When there is significant loss of subcutaneous fat, such as in severely depressed scars or scars with aberrant shapes, autologous fat transplantation may be an appropriate therapy option [27].

**Stem Cell Therapy:**

These days, it seems like there's a new medical solution for every conceivable ailment that involves stem

cell therapy. Dual characteristics of a stem cell, more study into stem cell therapy is needed as a potential future treatment for atrophic scar[28, 29].

## CONCLUSION

Acne scars can be treated, but only if the doctor has a firm grasp on the different types of scars and how to best treat them. If you have an atrophic acne scar, there is no cure on the market that will make it disappear completely. Scarring from acne can be avoided if the condition is treated as soon as possible once it appears. In order to achieve considerable progress, it is often necessary to combine methods, such as medical, surgical, and laser equipment. To further quantify benefits, define duration of effects, compare cost-effectiveness of therapy, and evaluate patients' psychological progress and quality of life, more primary research is needed, such as randomised controlled trials.

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