

Advances in treatment of acne scarring: New, effective solutions can improve the lives of your patients

Scarring is one of the most noticeable and distressing consequences of acne, and until the last several years, effective nonsurgical treatment for acne scars was not widely available.¹ The advent of resurfacing technologies, fillers designed specifically for acne scars and other treatments has opened a world of possibility for the millions of people who carry the scars of acne even many years or decades after the underlying condition has resolved.

The rise of effective noninvasive treatments for acne scarring is an important trend for medical aesthetics practitioners. The social and emotional burden of living with acne scars is high. So this is an important juncture to educate and inform potential patients that at long last, safe and effective treatment is within reach, even if they have been disappointed in the past.

In addition, these developments open a large potential market for clinicians who wish to alleviate the burden of scar sufferers. North America is the largest market for acne treatment, and the total direct cost associated with the treatment of acne exceeded \$2.2 billion in 2008.²

While scar procedures are not covered by medical insurance, the market for acne scar treatments is large and expected to grow at least at the 10.3% compound annual growth rate forecast for scar treatment spending generally through 2022³.

An overview of acne scarring

Acne is the most common skin disorder in the United States, affecting 40 million to 50 million Americans.⁴ Acne scarring is one of the many side-effects of acne. More than 80% of patients suffer from acne scars.⁵

¹ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2956966/>

² <http://www.medgadget.com/2015/07/acne-treatment-market-global-industry-size-segments-trends-analysis-and-forecast-2015-2021.html>

³ <http://www.persistencemarketresearch.com/market-research/scar-treatment-market.asp>

⁴ The Burden of Skin Diseases 2004, the Society for Investigative Dermatology and the American Academy of Dermatology Association

⁵ Rusciani, A., Ricci, F., & Curinga, G. (2015). Acne Scar Treatment. In A. D. Katsambas, T. M. Lotti, C. Dessinioti, & A. M. D'Erme (Eds.), *European Handbook of Dermatological Treatments* (pp. 1073–1080). Springer Berlin Heidelberg. Retrieved from http://link.springer.com/chapter/10.1007/978-3-662-45139-7_108

Acne scarring can cause lifelong social and psychological problems such as low self-esteem and depression, research⁶ has shown. Surveys⁷ have found that adults with acne scarring face stigma when dating and seeking jobs.

Acne scarring can also lead to huge financial burdens. In the United States, the costs of acne exceed \$3 billion annually.⁸

There are different types of acne scars. They can be most commonly atrophic (depressed) or hypertrophic (elevated and nodular) and keloid scars. Acne scars are very unique in their presentations so patients are advised to proceed only after consulting a dermatologist.

The body's inflammatory response with acne can cause a loss of tissue as collagen is destroyed. Skin is provided no support and a soft depression or pock mark or jagged ice pick scar is formed. Less commonly, excessive scar tissue is formed as fibroblasts (the dermal cells which produce collagen) are triggered.

Aging can also make scars more noticeable. After the age of 40, 1% of the dermal collagen is lost annually. With this additional loss of collagen combined with reduced skin tone, scars can become more prominent.

The two main goals of treatment are to make the scar smooth (neither depressed nor elevated) and to make the skin color in and around the scar even so that it blends with the surrounding pigment.

Prevent scarring whenever possible

Before we explore trends in scar treatment therapies, it's also important to note that prevention needs to be given high priority in patient education.

Patients and clients, especially adolescents and their parents, need to be informed that early treatment commensurate with the severity of the outbreak improves the odds of keeping scar formation to a minimum. Delaying acne therapy by three or more years is likely to increase one's risk of more significant acne scarring.⁹

This means that acne unresponsive to over-the-counter therapies should be evaluated by a specialist. For medical aesthetic practitioners, this population will benefit from an integrated

⁶ <http://www.sciencedirect.com/science/article/pii/S2210836X11000315>

⁷ <http://www.prnewswire.com/news-releases/new-survey-suggests-adults-with-acne-scarring-face-a-disadvantage-at-work-and-play-55995217.html>

⁸ Bhate, K., & Williams, H. C. (2013). Epidemiology of acne vulgaris. *The British Journal of Dermatology*, 168(3), 474–485. <http://doi.org/10.1111/bjd.12149>

⁹ <http://www.doctoroz.com/article/clearing-embarrassing-acne-scars>

treatment approach that employs as appropriate prescription medications and topicals, skincare regimens (such as VenusSkin's acne care kit) and aesthetic treatments.

Evaluation and patient expectations

Successful treatment of a patient's acne scars is highly correlated with the clinician having a good understanding of the concerns and expectations. Developing a treatment plan should begin with taking a history of the patient's acne and acne scars including if and when acne cleared completely and if oral isotretinoin was prescribed.¹⁰

Many procedures are contraindicated within six months of discontinuation of isotretinoin. It is important to ask the patient if there are specific scars, areas of scarring or features of the scars that are most bothersome. Targeting certain scars or certain features of the scars (hyperpigmentation, for example) may increase the chance of successful treatment and patient satisfaction.

Evolution of acne scarring treatments

Dermatologists and other medical specialists have sought to address acne scarring for decades. Conventional treatment modes include:

Dermabrasion

This technique has been around since the 1950s and uses various abrading tools to erode the superficial skin layers in an even manner, down to the papillary dermis. It is useful in wearing down the raised edges of a scar, but cannot be used in areas with thin skin, such as around the eyes. Operator skill is paramount, since accuracy of abrasion is imperative. Dermabrasion also has the disadvantages of being painful, long healing time of up to a month and can result in the appearance of milia.

Microdermabrasion is a later modification of this technique. Here, the operator uses a forceful stream of aluminum oxide crystals to abrade the skin more superficially.

Subcision

In this technique, used for rolling scars, fibrous tissue holding down the scar is loosened by inserting a hypodermic needle under the scar, and rotating it in a horizontal arc. The resultant bleeding and clot formation stimulates collagen synthesis, elevating and improving the scar by about 50%. Subcision, however, has the disadvantage of causing hypertrophic scars in 5-10%, according to one study.¹¹ This may then require intralesional steroid injections. Better results may be obtained by combining it with the Nd: YAG (nonablative 1320nm neodymium-doped:yttrium aluminum garnet) laser, at intervals of two weeks, to enhance adhesion release.

¹⁰ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3168245/#B4>

¹¹ <http://www.ncbi.nlm.nih.gov/pubmed/10971560>

Skin needling

Also called microneedling, or percutaneous collagen induction therapy, this procedure uses fine needles to puncture the skin about 1,000 times or more a minute. This produces controlled dermal microinjuries, from 0.1 to 1.3 mm in depth. The resulting inflammation promotes neocollagenesis, neo-elastosis, and neovascularization, with the healthy skin in between the fine holes acting as a reservoir of fibroblasts.

The collagen already present is also remodeled. This reduces scarring at the papillary dermis level. The rolling microneedle device creates a network of fine punctures. The attractions of microneedling include relatively little pain because of the extremely fine needles, and the occurrence of minimal skin damage, especially to the epidermis. Since it is not dependent upon chromophores, there is a low incidence of hyperpigmentation and scar formation, even when used on thin or sensitive skin, or skin of type III or above¹².

Punch techniques

Punch procedures are most effective with small deep icepick scars, up to 2 mm deep¹³. These are effectively treated by any of the following: punch excision of the scar, elevation of the underlying tissue and application of a skin graft to cover the excised area.

In punch excision, the scar is removed with a punch biopsy tool, and the skin sutured or allowed to heal by secondary intention. Scar elevation refers to elevating the depressed scar and letting it heal. Skin grafting involves excision and full-thickness skin graft placement.

These techniques have the disadvantages of requiring operator skill, causing increased pain, and requiring a longer downtime, with a higher rate of complications. These include formation of a depressed scar, sinus tract formation and graft failure. Punch procedures are best combined with resurfacing techniques to achieve an optimal result.

Chemical peels

Chemicals such as Jessner's solution, trichloroacetic acid, or phenol are used to peel the skin to varying extents. The main disadvantage is the unpredictable depth of peeling, and the fact that at most, the effect extends to the papillary dermis. Deep scars are therefore not significantly improved. In addition, more than 70% experienced postinflammatory pigmentation¹⁴.

With deeper peels, such as phenol, a somewhat higher efficacy is achieved. However, this is accompanied by a higher chance of scarring and hypopigmentation, which may persist for more than six months¹⁵.

¹² <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3168245/>

¹³ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4295858/>

¹⁴ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4295858/>

¹⁵ <http://www.ncbi.nlm.nih.gov/pubmed/17204096>

A later modification of this method is called chemical reconstruction of skin scars, or CROSS. Higher concentrations of trichloroacetic acid are applied with a sharp wooden applicator, until the scar shows frosting. This results in the dermal collagen becoming thicker, elevating the scar. There is less scarring and dyspigmentation with this process.

Soft tissue augmentation

In this technique, the focus is on filling the space below the atrophic scar with artificial fillers. In January 2015, the U.S. Food and Drug Administration approved the dermal filler Bellafill, the only filler on the market specifically approved for acne scarring.

Previously practitioners used collagen fillers, hyaluronic acid, calcium salts like hydroxyapatite, poly-L-lactic acid, polymethylmethacrylate, and autologous fatty tissue, especially for large rolling scars. Hyaluronic acid, being non-allergenic, is preferred by many clinicians today.

Autologous fat is also useful for this purpose. This non-invasive procedure uses a high pressure jet to place the filler evenly and precisely, and requires great skill for success. The disadvantages include the high dependence on operator skill to ensure low graft failure rates, which may mean several sessions are required.

Autologous fibroblast transfer

This is one of the latest techniques for acne correction. The fibroblasts are harvested from the patient's own body, and are therefore hypo-allergenic. They stimulate neocollagenesis, and may thus offer permanent scar correction. Proponents point to the minimal side effects, such as redness and swelling at the site. The improvement usually persists, even after a year¹⁶.

Revolution in skin resurfacing

The development of laser-based resurfacing has transformed the way acne scars are treated. The development of non-ablative fractionated laser resurfacing offers an improved safety profile. The quest for efficacy then resulted in the ablative fractionated laser. The most recent development in this area is the use of fractional radiofrequency ablation.

Lasers "have revolutionized the treatment of acne [scars]," Jeffrey S. Dover, MD, associate clinical professor of dermatology at Yale University School of Medicine told the American Academy of Dermatology¹⁷. "We have been overwhelmed with the success of fractional non-ablative lasers for improving acne scarring."

Laser resurfacing

Lasers have reshaped this field. The earliest device was the ablative CO2 laser, followed by the Er:YAG laser. The CO2 laser used continuous wave forms to vaporize water molecules in the

¹⁶ <http://www.ncbi.nlm.nih.gov/pubmed/23566237/>

¹⁷ <https://www.aad.org/dw/monthly/2012/acne/lasers-shine-in-the-treatment-of-acne-scars-but-lag-behind-conventional-therapy-for-active-disease#allpages>

dermis, producing ablation of the surrounding tissue, and so stimulating neocollagenesis. However, this damaged a wide field of tissue and depends upon chromophores for its effectiveness.

Laser ablation produced impressive rates of aesthetic improvement, up to 80% and 40%¹⁸ respectively. It also had significant disadvantages, such as pain, long-lived postinflammatory hyperpigmentation by chromophore cell activation, erythema, scarring and infection of the ablated area. All this meant a longer recovery time¹⁹.

Later, modifications were developed, in the form of longer pulsed scanned ablative CO₂ and Er:YAG lasers. These were better absorbed by water in the skin, leading to scar improvement. Nine out of 10 patients reported that the scar had improved by 50%²⁰. Its plus points include a lower penetration, producing less thermal damage. However, there may be increased hemorrhage during the operation because of the difficulty in achieving hemostasis.

Still later came the nonablative, long-pulsed diode and Nd:YAG lasers, which use intense pulsed light (IPL) to target water and blood vessels in the dermis. These, however, showed only modest improvement in scarring after multiple treatments, though the downtime is negligible.

Fractional photothermolysis

The application of fractionated laser was a great step forward. This procedure resulted in improvement²¹ of acne scars by 50-75%. It addressed the shortcomings of the ablative laser, such as dyspigmentation and pain, but was just as effective.

The fractionated laser penetrates the epidermis and dermis to form a grid of vertical columns, called microthermal treatment zones (MTZ), rather than a zone of general ablation. The depth and diameter of the zones can be customized. The healthy skin left between the zones supplies new fibroblasts and growth factors, stimulating the formation of fresh tissue. The technique also tightens existing collagen. This leads to secondary benefits, such as reduced wrinkling and better skin tone. This modality thus boasts multiple advantages, such as faster healing, fewer side effects, and a short downtime²². Repeated treatments are usually necessary.

Ablative fractionated lasers (AFL)

Ablative fractional CO₂ and Erbium laser treatment bring about scar resurfacing by inducing long-term collagen remodeling. The side effects include temporary post-procedure redness, edema and petechiae, which rarely last for more than a week²³. Hyperpigmentation is not an

¹⁸ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4295858/>

¹⁹ <http://www.ncbi.nlm.nih.gov/pubmed/8608377/>

²⁰ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4295858/>

²¹ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4295858/>

²² <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2825126/>

²³ <http://www.ncbi.nlm.nih.gov/pubmed/18649382/>

issue. AFL thus mirrors the efficacy of ablative laser treatment, while lowering the risks and the treatment/ recovery period.

Some devices combine ablative laser with radiofrequency to achieve deeper skin penetration. This results in dermal and epidermal coagulation. By stimulating both resurfacing and dermal remodeling, this is thus used to treat severe scars. When used on darker skin, it produced erythema and swelling for a few hours. This treatment allows return to daily life almost at once.

Fractional radiofrequency ablation

The fractional radiofrequency device represents the next revolution in this field. It works by passing a current through electrode microneedles stuck into the skin at a preset depth, causing multiple microwounds. It ablates and coagulates skin zones, up to a depth of 500 microns. With fractional RF ablation, the epidermis is totally protected from thermal damage, because of the significantly lower temperature reached. The completely insulated needle body ensures that electrocoagulative damage occurs only at the tips of the needles. The resulting inflammation promotes the growth of collagen, elastin and new blood vessels, remodeling of the old collagen, and stimulation of growth factor release from the healthy columns of skin in between the ablated zones.

The mechanism of healing is two-fold. The microwounds stimulate the release of growth factors, and enhance dermal neocollagenesis from the healthy intervening skin columns. This evens out the scar. Patients report up to 75% improvement in the scars after 3-4 treatment sessions. Optimal results are seen after about three months, allowing time for fibroblast activation and neocollagenesis²⁴.

Side-effects, such as pain, erythema and scab formation, are mild, and last only three to five hours, on average²⁵. Compared to fractional laser ablation, this procedure leads to faster healing, and shorter recovery times. There is thus no significant downtime, and patients may return to normal activity almost immediately – a huge benefit.

Fractionated RF does not depend on chromophores for its effect, unlike laser-based treatment. Not more than 5% of the effect impacts the epidermis. The procedure is thus safe for skin of all colors, without producing hyperpigmentation, or scarring, unlike laser-based techniques.

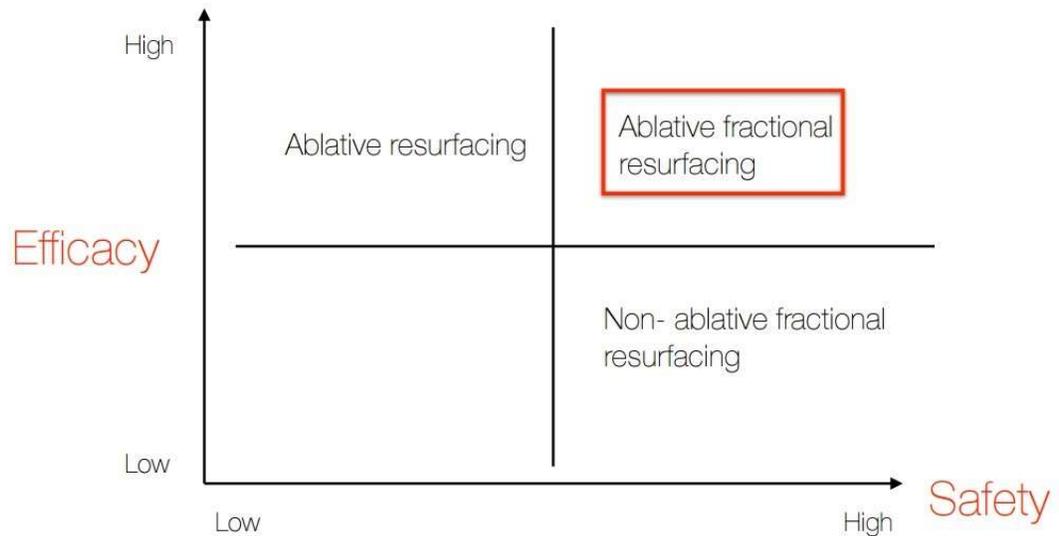
Another big plus point with this technique is the improvement in skin parameters like texture, pore size, tightness and fine lines, apart from the better appearance of acne scars²⁶.

²⁴ <http://www.ncbi.nlm.nih.gov/pubmed/25540589>

²⁵ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4270307/>

²⁶ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4270307/>

Skin resurfacing technologies safety& efficacy:



Versatile and cost-effective

Venus Concept is a leader in innovation in non-ablative lasers that have successfully been used for treating acne scarring including the Venus Legacy™ and Venus Viva™ devices.

If you would like to bring to your patients treatments for acne scarring that achieve superior results with minimal pain and downtime, Venus is an excellent adjunct to your practice.

For example, Venus Viva's fractional radiofrequency ablative technology offers outstanding patient advantages:

- Fewer sessions, and shorter overall treatment time
- Increased precision due to energy and coverage adjustment
- Cosmetic gains in addition to the acne scar improvement
- Less pain
- Effective treatment of all kinds of scars
- Patient satisfaction
- No hyperpigmentation or scarring

Plasma skin resurfacing

Further treatments are also emerging, among which is plasma skin resurfacing (PSR). This uses positively ionized gases to heat the skin over the scar. This effect does not have to be mediated through chromophores, and does not vaporize tissue. Instead, it coagulates the upper dermal collagen and stimulates fibroblast activity. Side effects, such as permanent hypopigmentation, scarring and redness, are very seldom seen, making it a promising new alternative.

Conclusions

This is an exciting and fulfilling time to be a medical aesthetics practitioner when it comes to serving the needs of patients with acne scars. You have the ability to achieve quality of life improvements for them that were not possible in decades past. This also represents a great opportunity to expand this area of your practice.

If you would like to learn more about the most innovative and effective treatments on the market today, we invite you to get in touch. Venus Concept is the industry leader, and our state-of-the-art technology is backed by unparalleled marketing support, practice enhancement, warranty and ease of financing.