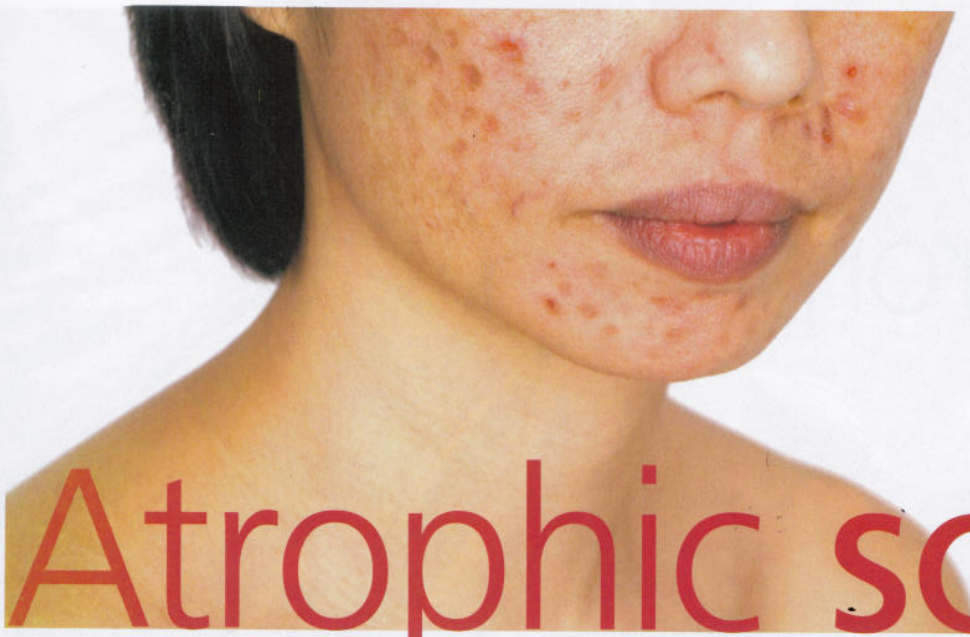


Atrophic scars

Acne scarring can have a major impact on quality of life for sufferers. **Dr Tony Chu** examines the most effective non-ablative treatments for ice-pick, boxed and rolling acne scars

Acne scarring is a common complaint that can occur after even fairly moderate acne. Severe acne will always result in scarring, which can have a major impact on quality of life for the patient. A large number of modalities have been used to treat acne scarring but the vast majority have not given patients particularly good results.

There are three basic types of acne scarring—ice-pick, boxed and rolling scars—which are important to identify because different treatments will be more effective for different scars. Ice-pick scars are hard and fibrotic, and are the least common. Most patients will have a mixture of rolling and boxed scars. Ice-pick scars are deep-pitted scars, with a large amount of fibrosis around them. Boxed scars are difficult to treat because they have sharp edges. The larger these scars are, the easier they are to treat. Rolling scars give the skin's surface a "rolling" appearance. These scars tend to bother my male patients the most.

As ice-pick scars are generally fibrotic, punch excision is the most effective treatment. Boxed and rolling scars may be soft so it is important to assess if they are tethered. If they are soft, you can stretch them out with minimal pressure—if they are tethered, you will need to use additional techniques. Tethering involves the fibrotic tissue pulling the surface skin down into the lower dermis. No matter how much collagen you generate underneath, you cannot raise the skin up and get a good end result. Boxed scars are probably the most difficult to treat.

There are various techniques to treat acne scars. For example, you can use fractional photothermolysis, such as the Fraxel laser, and percutaneous collagen induction using the Dermaroller, which is a fairly new treatment. You can also use chemical reconstruction of skin scars (CROSS) using trichloroacetic acid (TCA), and subcision. I use the last three options routinely in my practice. These non-ablative techniques are important because they have a short downtime. Most people can go back to work a few days after treatment.

Physicians can use multiple modalities, even at the same time. I've often treated patients with Dermaroller, subcision and CROSS in the same session. The treatments are suitable for all skin types and can be used in Asian and Afro-Caribbean skin. There is no need for patients to avoid sun exposure afterwards, and apart from fillers, they give persistent improvement.

Fraxel

The Fraxel laser uses a 1515 nanometre wavelength to deliver energy in multiple pulses as the handpiece is passed over the skin's surface. Each pulse creates a microscopic treatment zone (MTZ). You can select the depth, width and density of the MTZ by determining the energy used—the higher the energy used, the larger the spot size will be. One pulse will produce one MTZ using thermal coagulation. The process does not use vapourisation as you're coagulating the tissue rather than destroying it. The MTZ shape is columnar, with a diameter less than 215 microns, and a depth to width of one to five microns.

Depending on the amount of energy, the Fraxel can be used superficially or deeper in the mid-reticular dermis for mild rhytides. You will need to use higher wavelengths for scarring, particularly for acne scars and deeper scars—the treatment will reach a depth of around 1.5mm.

Two particular studies have investigated the use of the Fraxel laser in acne scars. Alster et al published a study in 2007, which aimed to determine the efficacy and safety of the laser in atrophic acne scars. Fifty-three patients with skin phototypes I–V were given monthly treatments of Fraxel, up to a maximum of five treatments. Patients were given 30%

Lidocaine ointment before treatment. The study used fluences of 8-16 joules/cm², up to densities of 250 MTZ/cm².

Two treatment-blinded assessors evaluated photographs using a quartile grading scale for each visit and six months after. Results showed that the technique was well tolerated. Patients did not require anaesthesia or pain killers following treatment. Seventy percent received two or more treatments and 91% of all patients had a 25%–50% improvement after the first treatment. Eighty-seven percent of patients receiving three treatments had a 51–75% improvement, which persisted for up to six months after the final treatment.

The second study, also published in 2007, was performed in 27 Asian patients with photo types IV–V, treated three to five times every three to four weeks. This group used topical anaesthesia (EMLA) cream applied for one hour under occlusion. Energy levels were similar to the first study, densities were slightly higher and a forced air cooling system was used. Evaluation was carried out with digital photographs and patient self-assessment. The treatment was well tolerated. All patients showed mild erythema and 80% showed initial oedema of the skin. Following the final treatment, 30% reported excellent improvement, 59% showed significant improvement and 11% showed moderate improvement.

Dermaroller

The percutaneous collagen induction technique uses the Dermaroller, which consists of a plastic wheel with stainless steel acupuncture needles embedded in it. Each needle is .25mm in gauge—the needle length for acne scarring is 1.5mm. As each needle enters the skin and is pulled out, it causes damage in the upper reticular dermis, leading to microscopic bleeding within the skin.

There are three phases to the process. The first involves the initial injury by the needles, causing a cascade of cytokines and growth factors to be produced. This is thought to happen from platelets extravasating into the dermis. At this stage, neutrophils—the dominant cell type—are gradually replaced by monocytes. The second phase is tissue proliferation. At this stage monocytes predominate, releasing growth factors including TGFβ and instigating the production of collagen type 3. Keratinocytes also stimulate growth of the epidermis and promote collagen deposition. A certain amount of neoangiogenesis and matrix deposition also occurs.

Phase three, the final remodelling stage, can take several months and you won't see any final improvement for up to six months following the treatment. Collagen type 3 is converted to collagen type 1, the skin becomes tighter and the blood supply normalises.

So what is the treatment process? The patient is EMLA-creamed under occlusion for one hour. You must warn the patient that this will be an uncomfortable procedure, although some patients tolerate it well. The EMLA cream is removed, and I usually then swab with alcohol. The Dermaroller is used four times vertically, four times horizontally and four times diagonally. This technique results in around 250 channels per cm². You do not need to use high pressure—the more pressure you use, the more painful it is. You must warn the patient that the procedure can be more painful over bony prominences.

The aim is to achieve pinpoint bleeding. If the patient has wrinkles around their eyes, stretch the skin and then Dermaroll. After the procedure, cleanse with normal saline. I usually put cold packs on the area afterwards.

Patients are usually fine immediately following the treatment—I've not yet had a patient who has required analgesia after the procedure, even though it's uncomfortable while they're having it. You have to warn the patient after treatment that they look very red—they look sunburnt. This sunburn effect will last for up to four days. Usually by the second day, the skin is completely smooth and patients can put make-up on if they wish. By the third day, the erythema is breaking up and by the following day their skin is back to normal. Only one patient out of the 400 that I've treated has had redness persisting for seven days.

Histologically, you get clefts that develop through the epidermis into the dermis. The tracks are curved, reflecting the pass of the needle, and the holes are around four cells thick. The needles will penetrate around 1.5mm through the peridermis, down into the reticular dermis.

The main advantage of this procedure is that there are no risks. There is a short healing period—the day after treatment, the skin is smooth and the patient can use make-up. There is no permanent injury to the dermis and no sun-sensitivity. Patients require only topical anaesthesia and the treatment can be repeated without any restrictions, and on any skin type. I have performed the procedure on Afro-Caribbean patients as well as Asian patients, without any pigmentary changes.

There has been only one reported study on the Dermaroller, published in 2008. This was a retrospective study in South Africa and Germany. Four hundred and eighty patients were treated for fine wrinkles, scarring or skin laxity, of which 72 patients were treated for post-acne scars, chicken pox scars and burns. Topical anaesthesia with local infiltration and regional nerve blocks were used and, in some patients, general anaesthesia.

All patients were able to return to work after one week and histological examination showed a large increase of collagen six months postoperatively This took the form of a normal lattice-like pattern rather than the parallel bundles seen in ordinary scar tissue. Fifteen patients were treated in Germany for scarring, and they were assessed using a visual analogue scale, patient evaluation and the Vancouver Scar Scale. Patient evaluation ranged from 0 (very poor), to 10 (brilliant). Improvement ranged from 3 at the start of treatment, to 7.5 12 months postoperatively. The Vancouver Scar Scale preoperatively was 7.5 plus or minus 11.5, and one year postoperatively improved to 4.8 plus or minus 15.5.

I have used the Dermaroller extensively. It is variable, but around 75% of my patients achieve a good or excellent result. Following treatment, a number of my patients have cleared their skin of perceptible scarring. The procedure is also effective for chicken pox scars.

CROSS

The chemical reconstruction of skin scars, or CROSS, technique was developed in Korea. The procedure uses 100% trichloroacetic acid, carefully applied to the base of the scar. After around 10 seconds, as soon as the frosting starts, you wash it off. Once treated, the patient should carefully wash the area with plain water. The scar will instantly turn white,

lasting approximately 30 minutes.

If it occurs, erythema usually disappears within 24 hours. After two to three days, the patient will develop a small scab at the base of the scar, which will persist for anything from three to seven days before falling out. The majority of people tolerate this treatment well and results are variable. Some patients get brilliant improvement after the first treatment, particularly with small, sharp boxed scars.

Most patients need three to six treatments. Always do a patch area first—if the TCA is left on for too long, you can burn the patient. Dark skin can show transient pigmentary change, but I have treated Afro-Caribbean skin with no permanent problems.

There has been one published report of the TCA CROSS technique, by Lee et al in 2002. They performed an open study with 65 patients, comparing 65% TCA with 100% TCA. All patients were Asian type IV–V skin, assessed with photographs by two treatment-blinded physicians. Patients were given up to six treatments. No significant side-effects were reported, although one patient had transient pigmentary changes. The results were better with the 100% TCA—all patients treated with 65% TCA gave good or excellent results after six treatments. However, all patients treated with 100% TCA gave excellent results after five or six treatments.

This procedure can also be used in conjunction with the Dermaroller. I'll often treat the patient with the Dermaroller first, followed by the CROSS immediately afterwards—it can enhance the effect.

Subcision

Some physicians prefer not to use subcision, partly because if it isn't performed correctly, the patient won't receive the best results. The technique involves using an 18.5 gauge no-pore needle to separate tethered scar tissue. This is an effective treatment for patients who have thick scarring that will not flatten out when you lightly stretch the skin.

Subcision encourages new collagen production and breaks down old scar tissue. The no-pore needle has a sharp cutting blade, which has to be introduced to the skin very superficially. The aim is to get into the papillary dermis. The needle should be used to go back and forth and fan from side to side. Patients will often end up with swelling and bruising afterwards.

A study using subcision in rolling scars was carried out in 2005. Forty patients were treated, with six-month follow-up data. Patients received 1% Lidocaine with epinephrine as analgesia, and the procedure used an 18-gauge no pore needle. An investigator reported approximately 50% improvement of the scarring in patients, with 90% of patients reporting improvement in their overall appearance.

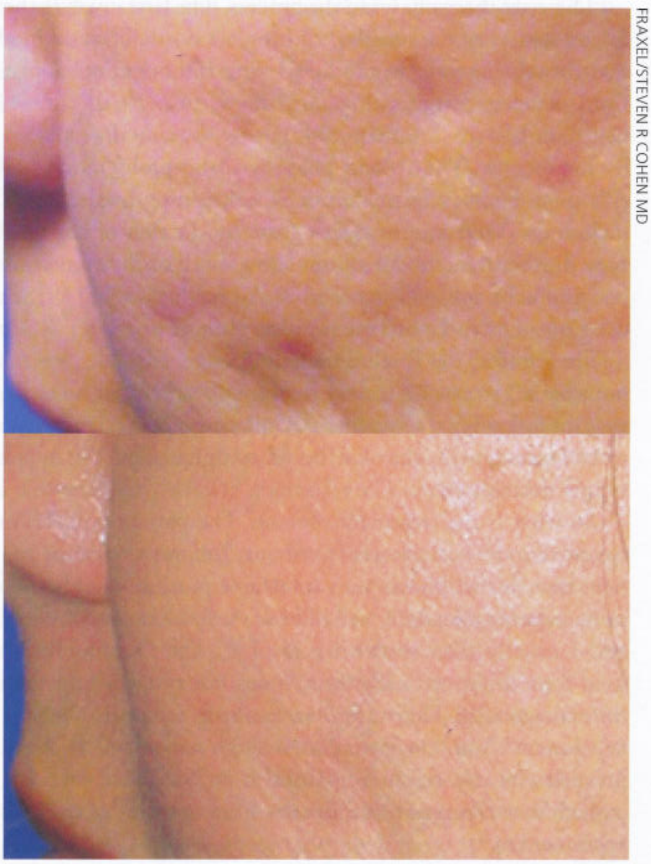
Patients see an instant improvement because of the initial swelling. As this goes down, they can get disappointed—you must reinforce the fact that the collagen will build up over a six-month period. The patient will always suffer from swelling, bruising and pain, which are transient. Some patients can get persistent firm lumps within the skin, which are resolving haematomas. Physicians can get rid of these with an intralesional steroid injection. This is an effective technique to treat thick scarring. Although the Dermaroller can break down tethered scars, I often find that subcision is also necessary.

In the management of acne scarring, it is important to assess the type of scarring present in the patient to determine how you will approach treatment. Assess if the scar is soft or fixed, to see whether it requires subcision. In my practice, the majority of patients are treated with the Dermaroller, particularly for rolling scars. TCA CROSS can be used at the same time as the Dermaroller for boxed scars. The treatment of acne scarring is very satisfying—once you have patients who are happy about themselves, it boosts their confidence and you have a totally different patient.

Dr Tony Chu FRCP is a consultant dermatologist at Imperial College, London

DERMAROLLER/DR APRATIM GOEL

Before and after Dermaroller procedure on atrophic scars



FRAXEL/STEVEN R COHEN MD

Before and after three treatments of Fraxel Re-store for acne scarring