

# What I tell my patients about acne scarring

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Acne is the most common skin condition in adolescence and affects over 80% of teenagers.<sup>1</sup> Scarring can occur in up to 90% of patients with acne<sup>2</sup> and, although it is not life-threatening, it can have severe psychological repercussions, particularly during the teenage years. Yet, because acne scars are so common, many people, particularly men, are not bothered by them and do not seek treatment. For example, famous Hollywood stars with marked acne scarring are Robert Redford and Bill Murray. However, the same does not apply to women, who can become very distressed at the ravages of acne on a previously flawless complexion.

Acne scars can be classified into three types:<sup>3</sup>

- Boxcar scars (Figure 1a) are round or polygonal depressions that have sharp vertical edges. They can either be shallow (0.1 to 0.5 mm in depth) or deep (more than 0.5 mm in depth). Only the shallow scars can be improved with resurfacing techniques.
- Rolling scars (Figure 1b) have rounded borders and are shallow. The skin may be tethered down into the subcutaneous fat by fibrous bands that can be released by subcision. Rolling scars may also respond to laser resurfacing.
- Ice pick scars (Figure 1c) are narrow, deep scars that make the skin appear as if it has been penetrated by an ice pick. They usually extend into the deep dermis or subcutaneous fat and, for this reason, they cannot be corrected with skin resurfacing treatments, such as dermabrasion or laser resurfacing, which treat only the skin's outermost layers.

## Treatment modalities

There are several modalities of treatment for acne scarring, and some are more effective against one or more types of scars than others. In a given patient, several techniques are usually combined to achieve the best results. These can be classified into the following three types.

- Resurfacing techniques. Scars are eliminated by the removal of the superficial layers of the skin. Healing will produce a proliferation of collagen in the dermis that will result in smoother skin. These techniques include punch excision, punch elevation, punch excision with skin graft replacement, dermabrasion, laser resurfacing, chemical peels and the chemical reconstruction of skin scars (CROSS) technique.

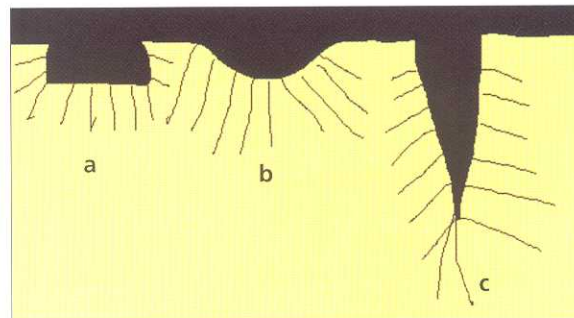


Figure 1. Types of acne scar: boxcar (a), rolling (b) and ice pick (c)

- Subsurfacing techniques. All the action occurs in the dermis and the epidermis is undisturbed. Using this method, the fibrous tethering of the scars is cut off and the depressions are filled with collagen produced by the patient's own stimulated fibroblasts. Subsurfacing techniques include subcision, isolagen, intense pulsed light (IPL) and the N-Light pulsed-dye laser.
- Fillers. These are substances that are injected into depressed areas in the dermis, with the intent of evening them out. Many different types of substances are used for this purpose.

## Resurfacing techniques

### Punch excision

This method is particularly indicated for deep scars, such as ice pick scars, and deep, narrow boxcar scars. Skin punches are used, most commonly 2 or 3 mm in diameter. Under local anaesthesia, the scar is totally removed as far down as the subcutaneous tissue. The defect is then sutured with non-absorbable suture, size 5-0 or 6-0, which should be removed after three days.

### Punch excision and skin graft replacement

This technique uses the punch excision of the scar, but instead of suturing the defect, it is filled with a cylinder of normal skin taken from another area of the body. The most common donor site is behind the ear, where scars are better hidden. In our experience, many patients seem to find the result less satisfactory than with simple punch excision.

### Punch elevation

In this method, the scar is cut loose from the bottom with a punch, but not discarded. It is elevated to the level of the surrounding skin and sutured. We do not use this technique frequently, because the resulting scar is much more evident

than the one produced by punch excision. In addition, the cylinder of elevated skin is, in most cases, centred by the puckered scar.

### **Laser resurfacing**

This technique involves laser removal of the upper layers of the skin, which then heals in a much smoother fashion. The most common lasers used for this purpose are carbon dioxide (CO<sub>2</sub>) and Erbium:YAG (Er:YAG) lasers. Many dermatologists find it useful to treat patients who have residual scarring after punch excision or subcision, as this improves the texture of skin. Laser resurfacing helps shallow scars, but ice pick and deep boxcar scars will not be eliminated.

### **Chemical peels**

Chemical peels work by applying an acid to the surface of the skin that causes the outer layers to disintegrate, peel off, and be replaced by new, smoother skin. Peels are classified according to the depth of the coagulation of the tissues, into superficial (burning of the epidermis and papillary dermis), medium (to the upper reticular dermis) and deep (as far as mid-reticular dermis). The deeper the peel, the more painful the procedure and the longer the recovery time.

Deep peels can be achieved with phenolic acid – a substance to be used with much caution, as it is cardiotoxic and produces permanent lightening of the skin. Most deep peels are performed in a surgical centre and anaesthesia or sedation is usually needed. After a chemical peel there will be some facial oedema and reddening, followed by peeling away of the burned skin. Normal activities can be resumed in three days for superficial peels and in two weeks after medium peels. Complications include scarring, bacterial or herpetic infection and pigmentary changes. Chemical peels are inexpensive, rapid and can produce good results, depending on the type of acne scars.

### **Dermabrasion**

Dermabrasion is controlled sanding of the skin, performed under general anaesthesia. The epidermis and variable depth of the dermis are sanded off, leaving a raw surface that will re-epithelialize from cells in the pilosebaceous apparatus.

Microdermabrasion is the peeling of the epidermis, performed by a closed vacuum system that uses aluminium oxide crystals. This is a clean procedure, as the skin particles are suctioned into a waste canister. However, as it does not affect the dermis – where the scars are – microdermabrasion is not useful for acne scars.

### **The CROSS technique**

The CROSS technique<sup>4</sup> uses 100% trichloroacetic acid (TCA) on the scar site. It can be used for all types of scars and all skin types. TCA is applied

with a sharpened wooden applicator, which is pressed down firmly over the entire depressed area of the scar. The coagulated skin will appear as white spots on each acne scar, on a background of slightly-to-moderately congested red skin. Healing is said to be more rapid with the CROSS technique when compared with conventional full-face, medium-to-deep chemical peeling. This is a new technique and more experience is needed to identify the possibility of complications; namely, persistent redness, permanent darker or lighter discolouration of the skin, bacterial infections or herpes simplex infections, or further scarring.

### **Subsufficing techniques**

#### **Subcision**

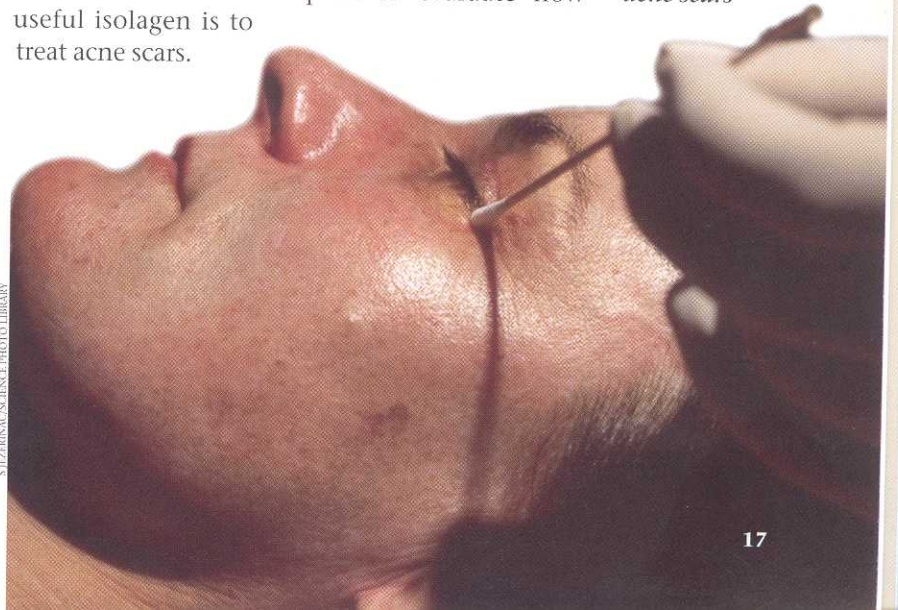
Subcision is a very useful technique, first described by the Orentreichs in New York in 1995.<sup>5</sup> Under local anaesthesia, a bevelled needle is inserted under the scar, severing its tethering to the surrounding dermis. Inevitably, blood vessels are also severed and this produces bruising, which will resolve some days after the procedure. The bruising has an important function in the procedure, because the extravasated blood contains macrophages that will synthesise growth factors stimulating collagen deposition.<sup>6</sup> Many patients need more than one session, even if it is to correct one or more recalcitrant areas.

#### **Isolagen**

Isolagen uses the patient's own fibroblasts to produce new collagen in the affected area of the dermis. A small piece of the patient's skin is obtained from behind the ear and dermal fibroblasts are cultured in the laboratory. The clinician receives the suspension of fibroblasts, which are injected under the scars. The effects will take longer to evaluate than with dermal fillers because there must be production of collagen by the injected cells, which can take several months.

Fibroblastic activity can be stimulated by concomitant use of the pulsed dye laser at low fluences. At present, a protocol is being developed at the Hammersmith Hospital to evaluate how useful isolagen is to treat acne scars.

*Chemical peels are inexpensive, rapid and can produce good results, depending on the type of acne scars*



### ***N-Light pulsed dye laser<sup>7</sup> and IPL***

These are useful, well-tolerated treatments for acne scarring. There are no detectable changes to the skin immediately after treatment; however, in the following weeks, there is a progressive reduction of scar depth due to increased collagen deposition through two mechanisms:

- Dermal heat wounding, which leads to a repair mechanism of fibroblast activation and subsequent collagen remodelling
- Cytokine activation leading to secondary collagen remodelling via heat shock proteins, vascular endothelial growth-factor and  $\beta$  fibroblast growth-factor modulation. Sessions should be repeated every two or three months to achieve optimum results.

### **Dermal fillers**

Dermal fillers are injected into the dermis to elevate the scar and to give the face a smoother look. The main downside of dermal fillers is that the patient's organism recognises them as non-self and destroys them, so that their effect fades with time and new injections become necessary.

Dermal fillers work better on rolling scars because ice pick scars are too deep to be elevated and the sharp margins of the boxcar scars would remain. However, fillers can be combined with other techniques, particularly subcision, for a better result. The most commonly used dermal fillers include:

- Bovine collagen. This sterile, purified collagen is marketed as Zyderm I<sup>®</sup>, Zyderm II<sup>®</sup> and Zyplast<sup>®</sup> (all Inamed, UK). It is obtained from the hides of isolated cattle to avoid the possibility of prion contamination; however, the epidemic of bovine spongiform encephalopathy (BSE) has decreased the popularity of this filler. Reapplication is needed every three to six months. Bovine collagen can be immunogenic and an allergy test must be performed before it is used. Zyplast cannot be used in the central forehead because it may provoke local necrosis.
- Autologous collagen. This is autologous fat, which is harvested and frozen so that the adipocytes rupture. Its advantage compared to bovine collagen is that it can last for years because it is not recognised as alien. Its disadvantage is the complexity of its preparation.

- Artecoll<sup>®</sup> (Rofil Medical International, the Netherlands). This consists of polymethylmethacrylate microspheres suspended in bovine collagen. The latter is eventually eliminated, but the spheres induce new collagen deposition, with results lasting for at least two years. The collagen component may be immunogenic.
- Hyaluronic acid. This is a polysaccharide, normally found in the dermis. Hylaform<sup>®</sup> (Inamed, UK) gel is obtained from the combs of domestic fowl; it degrades and is eliminated with time, usually after one year. Therefore, it should be injected into the mid-to-deep dermis. Restylane<sup>®</sup> (Q-Med, UK) is a hyaluronic acid derivative obtained from streptococcal fermentation and does not require an animal source. However, it is still degraded so that reapplication will be needed after approximately one year.
- Reviderm<sup>®</sup> intra (Rofil Medical International, the Netherlands). This consists of dextran beads, measuring around 50  $\mu$ m, suspended in hyaluronic acid of non-animal origin. Even if the acid is reabsorbed, the beads promote new collagen formation and long-lasting correction.

Dermal fillers are simple to apply, but can also be the source of several types of complication, particularly pain, bruising, bacterial or viral infection, hypersensitivity reactions and local skin necrosis. Rare cases of blindness have been reported, secondary to retinal artery thrombosis after periorbital injection of Zyplast.

### **The success of treatment for scarring**

Many patients are afraid that once acne scarring has occurred it cannot be modified, which can be the source of much anguish. However, although scars may not disappear completely, they can improve substantially. Before starting treatment for acne scars, the physician should enquire about the past use of isotretinoin, as patients who have received this drug in the past six to 12 months might develop further scarring as a result of the procedures.

Today, there are many techniques used to treat acne scarring and, in most patients, a combination of several of these methods will achieve a good improvement<sup>8</sup> ■

### **References**

1. Chu AC. Acne and other facial eruptions. *Medicine* 1997; **25**: 30-33.
2. Goodman GJ. Acne and acne scarring: why should we treat? *Med J Austr* 1999; **171**: 62-63.
3. Jacob CI, Dover JS, Kaminer MS. Acne scarring: a classification system and review of treatment options. *J Am Acad Dermatol* 2001; **45**: 109-117.
4. Lee JB, Chung WG, Kwahek H, Lee KH. Focal treatment of acne scars with trichloroacetic acid: chemical reconstruction of skin scars method. *Dermatol Surg* 2002; **28**(11): 1017-1021.
5. Orentreich DS, Orentreich N. Subcutaneous incisionless (subcision) surgery for the correction of depressed scars and wrinkles. *Dermatol Surg* 1995; **21**: 543-549.
6. Goodman GJ. Therapeutic undermining of scars (Subcision). *Australas J Dermatol* 2001; **42**(2): 114-117.
7. Seaton ED, Charakida A, Mouser PE *et al.* Pulsed-dye laser treatment for inflammatory acne vulgaris: randomised controlled trial. *Lancet* 2003; **362**(9393): 1347-1352.
8. Whang K-K, Lee M. The principle of a three-staged operation in the surgery of acne scars. *J Am Acad Dermatol* 1999; **40**: 95-97.

## **Key points**

- Acne scars can be classified into three types: boxcar scars, rolling scars and ice pick scars.
- The techniques for treatment of acne scarring can be classified into the following three types: resurfacing techniques, subsurfacing techniques and dermal fillers.