

Current Therapeutic Approach to Acne Scars

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SUMMARY The occurrence and incidence of acne scarring is different. Lasting for years, acne can cause both physical and psychological scarring. Scarring frequently results from severe inflammatory nodulocystic acne but may also result from more superficial inflamed lesions or from self-manipulation. There are two general types of acne scars: hypertrophic (keloid) scars, and atrophic (icepick, rolling and boxcar) scars. The management of acne scarring includes various types of resurfacing (chemical peels, lasers, lights, cryotherapy), use of dermal fillers, and surgical methods such as dermabrasion, subcision or punch excision. Individual scar characteristics, including color, texture and morphology, determine the treatment choice. Combining treatment methods may provide additional improvement compared with one method alone. It should be noted that none of the currently available treatments can achieve complete resolution of the scar. The best method of preventing or limiting scarring is to treat acne early enough to minimize the extent and duration of inflammation.

KEY WORDS: acne scars, treatment

INTRODUCTION

Acne vulgaris is one of the most common skin diseases. It affects 80% to 85% of teenagers and young adults (1). In mature adults, up to 7% may have acne persistently into the mid 30s or 40s (2). Acne is a disease of the pilosebaceous unit, involving abnormalities in sebum production, follicular epithelial desquamation, bacterial proliferation, and inflammation. The disease is characterized by a great variety of clinical lesions either noninflammatory or inflammatory. The noninflammatory are open and closed comedones, and the inflammatory vary from small papules with an inflammatory areola to pustules, and large, tender, fluctuant

nodules. In addition, patients may have scars of varying size and type. The characteristic scar of acne is a sharply punched-out pit. Less commonly, broader pits may occur, and sometimes, especially on the trunk, the scars may be hypertrophic (3). Lasting for years, acne can cause both physical and psychological scarring (4) (Figs.1 and 2).

ACNE SCARRING

The occurrence and incidence of scarring is not well understood. Goodman has reported an 11% frequency of acne scars in men and 14% in



Figure 1. Impressive scars disfiguring the entire face of the patient.

women based on clinical examination by dermatologists (5). Layton *et al.* showed a correlation between the severity of scars and the duration of delay between the onset of acne lesions and the start of treatment, emphasizing the need for early aggressive therapy (6).

The considerable variation in scarring that occurs in different individuals suggests that some people are more prone to scarring than others. Scarring frequently results from severe inflammatory nodulocystic acne but may also result from more superficial inflamed lesions or from self-manipulation (7).

Severity is related to both the depth in the dermis/pilosebaceous unit where inflammation and wound healing occur and the duration of inflammation. Erythema and pigmentation changes represent epidermal damage whereas atrophic, hypertrophic and keloidal scars indicate dermal damage (5). Scar form at the site of tissue injury and skin initiates a cascade of wound healing events, which progresses through 3 stages: inflammation, granulation tissue formation, and matrix remodeling (8-10). The first step in wound healing is coagulation and inflammation. In the second step, damaged tissues are repaired and new capillaries formed. In the third step, which takes long, fibroblasts and keratinocytes produce enzymes determining the architecture, which leads to the development of atrophic or hypertrophic scars. When the healing response is too exuberant, a raised nodule or fibrotic tissue is formed; inadequate response results in diminished deposition of collagen factors and formation of an atrophic scar. Pigmentary and

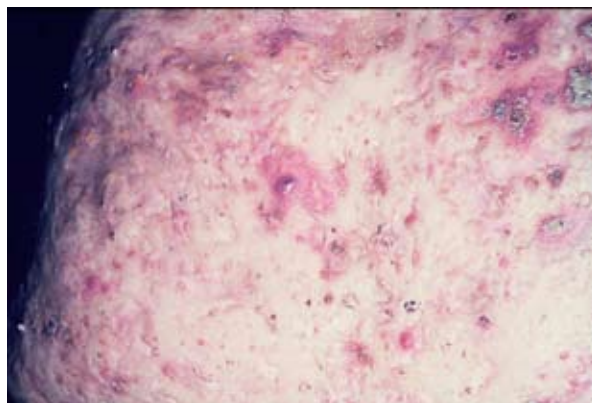


Figure 2. Close view of acne scars resembling the moon face.

vascular changes caused by acne are often temporary; however, changes in texture caused by disruption of collagen are often permanent (10).

TYPES OF SCARRING

There are two general types of acne scars, defined by tissue response to inflammation: scars caused by increased tissue formation and scars caused by the loss of tissue (11).

Hypertrophic scars

Hypertrophic and keloidal scars are associated with excess collagen deposition and decreased collagenase activity. Hypertrophic scars are typically pink, raised and firm, with thick hyalinized collagen bundles that remain within borders of the original site of injury (10). Keloids form a reddish-purple papules and nodules that proliferate beyond the borders of the original wound. Histologically, they are characterized by thick bundles



Figure 3. Keloid scar can sometimes be improved with cryotherapy.



Figure 4. Atrophic scars as a residue after isotretinoin treatment.

of hyalinized acellular collagen arranged in whorls (11) (Fig. 3). Hypertrophic scars and keloids appear predominantly on the back, shoulders, sternal region and over the jaw angles.

Atrophic scars

Atrophic scars occur predominantly on the face (Fig. 4) and more rarely on the trunk (Fig. 5). Jacob *et al.* have proposed an acne scar classification scheme that divides atrophic scars into 3 types: icepick, rolling, and boxcar. They suggest that the most important features of scars are width, depth, and three-dimensional architecture (12).

Icepick scars are narrow, less than 2 mm in diameter, punctiform and deep. The opening is wider than the deeper infundibulum, forming a “V” shape.

Rolling scars are usually wider than 4 to 5 mm with dermal tethering of the dermis to the subcutis. These scars give a rolling or undulating appearance of the skin, forming an “M” shape.

Boxcar scars are round or oval with well-established vertical edges. They tend to be wider at the surface than an icepick scar and do not have the tapering V shape. They can be visualized as a “U” shape with a wide base. Boxcar scars can be shallow or deep (12).

TREATMENT OF SCARRING

The aim of scar treatment is to give the skin a more acceptable physical appearance. Resurfacing techniques destroy the epidermis and allow for re-epithelialization with collagen remodeling.



Figure 5. Atrophic scars on the dorsal region.

They include chemical peels, dermabrasion, lasers, selective photothermolysis, cryotherapy and electrosurgery. Surgical methods include excision, punch elevation and subcision. Dermal fillers may be used to plump up atrophic scars, and makeup may be used to conceal scars. For best results, a combination of techniques and procedures may be needed (11). Individual scar characteristics, including color, texture and morphology, determine the treatment choice (13).

A wide variety of treatments have been used against hypertrophic scars. Surgical excision was used early, but it is associated with a high recurrence rate. Radiation therapy has also been used, alone or in combination with surgical excision. Injection of corticosteroids is also a therapeutic option that some consider a mainstay of treatment (14). Hypertrophic scars may respond better than keloids. A potent steroid can be applied under polythene occlusion daily for eight weeks (15). The 585-nm pulse dye laser (PDL) has been used with good results to treat hypertrophic scars and keloids, reducing erythema, pliability, bulk and dysesthesias, with few side effects. Thick keloids may respond best to PDL plus intralesional corticosteroid or 5-fluorouracil injections (13). Cryotherapy is also widely used, but may be followed by pain, hypo- or hyperpigmentation.

Atrophic scars can be treated with numerous nonsurgical resurfacing techniques and different surgical techniques. Dermabrasion can provide effective treatment for acne scars, but it can be associated with significant pain and recovery time, pigmentary alterations and milia (12). Dermabrasion usually fails to improve icepick or deep boxcar scars. Microdermabrasion is well tolerated but of limited benefit in acne scarring. Medium-depth

chemical peels are most useful for correcting small depressed scars. It should not be used for icepick scars or deep fibrotic scars (11). Lasers of various wavelength and intensity may be used to recontour scar tissue and reduce the redness of skin around healed acne lesions (10). The choice of optimal laser system and settings depends on the characteristics of scarring present (8).

There are 3 primary surgical techniques for acne scars: excision, punch elevation and subcision (11). Scattered individual icepick scars may be removed by punch excision of each scar. It may be used for narrow deep boxcar too. Punch elevation uses partial lateral round excision of the borders of the scar, leaving the deep part of the scar adherent to the fat layer. Elevation should only be used on boxcar scars with sharp edges and normal-looking bases (12). Subcision, or subcutaneous incision, may be used for rolling or depressed scars. This technique releases fibrotic strands that tether the scar to underlying tissue. A sharp needle is inserted under the skin with the blade parallel to the skin surface, then moved in a sweeping motion to cut the subcutaneous fibrotic strands (16,17).

Additionally, acne scars can be treated with dermal fillers, which are quite a safe method, with a low risk of inflammatory reactions (5). Scars may be filled with collagen injections, artificial dermal filler, or autologous fat transfer. Dermal fillers have variable duration of effect (6-12 months).

The skin can be prepared before different procedures with some adjunctive treatment, which can be used to improve and maintain results. Topical retinoids are a good adjunct to resurfacing techniques because the procedures that remove the epidermis involve dermal wound healing and re-establishment of epidermal barriers. Retinoid therapy increases the synthesis of mucopolysaccharides, collagen and fibronectin, and decreases collagenase production. In addition, retinoid therapy shortens the healing time after cosmetic invasive procedure (18).

CONCLUSION

The treatment of scarring is not as satisfactory as the therapy of inflamed and noninflamed lesions. However, if the patient is keen on some attempts at alleviating the scarring, it is worthwhile considering different methods in scar treatment. It is hoped that with better and earlier treatment of inflammatory acne, patients will subsequently have much less scarring from their condition.

The occurrence of scarring is hard to predict. At present, the best method of preventing or limiting scarring is to treat acne early enough to minimize the extent and duration of inflammation. Present data show that the degree and duration of inflammation are directly related to the likelihood of scarring. There are a variety of scars and treatment options that can be used to achieve significant cosmetic improvement, but it must be noted that none of the currently available treatments can achieve complete resolution of the scar. Combining treatment methods may provide additional improvement compared with one method alone.

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