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# Subcision for Acne Scarring: Technique and Outcomes in 40 Patients

MURAD ALAM, MD,<sup>\*†</sup> NAYOMI OMURA, MD,<sup>\*‡</sup> AND MICHAEL S. KAMINER, MD<sup>\*‡§</sup>

*\*SkinCare Physicians, Chestnut Hill, Massachusetts; †Section of Cutaneous and Aesthetic Surgery, Department of Dermatology, Feinberg School of Medicine, Northwestern University, Chicago, Illinois; ‡Department of Medicine (Dermatology), Dartmouth Medical School, Hanover, Massachusetts; and §Section of Dermatologic Surgery and Cutaneous Oncology, Department of Dermatology, Yale School of Medicine, New Haven, Connecticut*

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**BACKGROUND.** Treatment of acne scars is a therapeutic challenge that may require multiple modalities. Subcision is a technique that has been anecdotally reported to be of value in treating so-called “rolling scars.”

**OBJECTIVES.** To assess the efficacy of subcision in the treatment of “rolling” acne scars.

**METHODS.** A standard technique was developed for subcision. This was then applied to the treatment of rolling scars in patients, 40 of whom completed treatment and the prescribed follow-up. Six-month follow-up data were obtained from both patients and investigators.

MURAD ALAM, MD, NAYOMI OMURA, MD, AND MICHAEL S. KAMINER, MD, HAVE INDICATED NO SIGNIFICANT INTEREST WITH COMMERCIAL SUPPORTERS.

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OPTIMAL MANAGEMENT of acne entails prevention through appropriate medication, but once acne scarring has occurred, surgical interventions tend to be more efficacious.<sup>1</sup> A range of surgical techniques can be used to treat acne scars. Among these, resurfacing modalities can make scars less perceptible by ablating the epidermis and part of the dermis and then permitting remodeling of the skin. Dermabrasion,<sup>2</sup> demonstrated to smooth superficial to moderately deep acne scars, has been largely replaced over the last decade by laser resurfacing, which also appears to be effective and may be less operator dependent.<sup>3</sup> Medium to deep chemical peels can similarly reduce textural irregularities of the type seen in facial acne scars. Microdermabrasion, a superficial abrasion with aluminum oxide crystals, has been touted as beneficial for mild acne scarring, although supporting evidence is limited.<sup>4</sup> Non-ablative laser resurfacing and radiofrequency methods are other new modalities.<sup>5</sup> In some cases, resurfacing may be insufficient to camouflage deeper or more fibrous scars, and cold steel interventions such as punch excisions may be required. Filler substances have like-

wise been used with variable success to raise depressed scars to the height of the surrounding skin. Bovine and human collagens, inorganic liquid materials, and immunologically inert semisolid fillers, among others, are in current use, but the perfect filler has not yet been devised.<sup>6,7</sup>

**RESULTS.** Subcision is associated with patient and investigator reports of approximately 50% improvement. Ninety percent of treated patients reported that subcision improved their appearance. The side effects of swelling, bruising, and pain are transient, but patients may have persistent firm bumps at the treatment site.

**CONCLUSIONS.** Subcision appears to be a safe technique that may provide significant long-term improvement in the “rolling scars” of selected patients. When complete resolution of such scars does not occur, combining subcision with other scar revision procedures or repeat subcision may be beneficial.

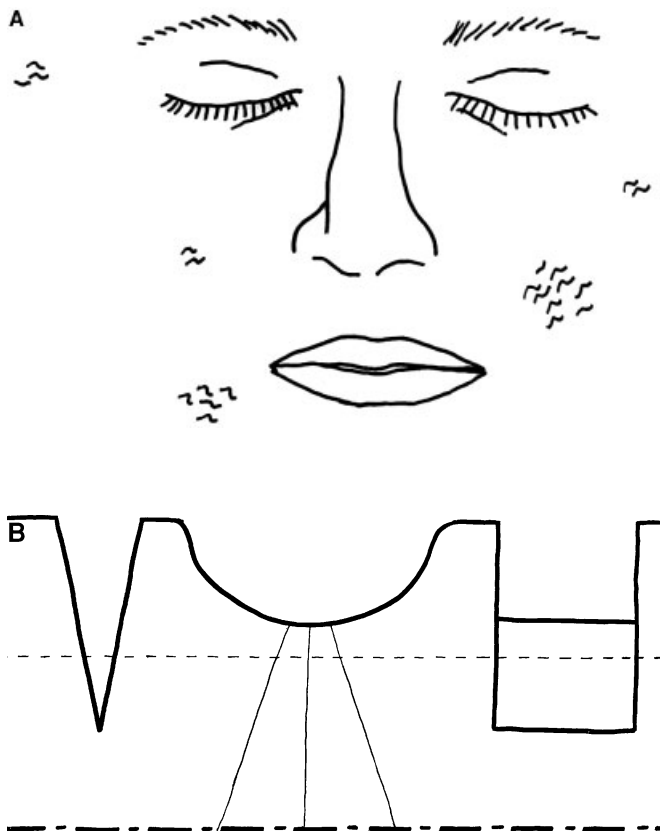
A consensus is developing that multiple surgical modalities applied in a sequential manner to treat individual cases of acne scarring can yield results superior to those possible with just one technique. Punch excisions and other forms of scar modification may thus be used as a precursor to full-face laser resurfacing.<sup>8</sup> Combination resurfacing approaches can include focal chemical peeling, laser resurfacing, and dermabrasion.<sup>9</sup>

Recently, we and others have attempted to standardize the treatment of acne scarring by better classification of the observed defects.<sup>10</sup> Scars vary in size, depth, and contour, with surgical interventions that are successful for one type possibly being less effective for another. Morphologic features of particular scars may thus dictate which treatment approach is selected.

Subcision is a simple surgical intervention that may be useful for a subset of acne scars. “Rolling scars,” which resemble broad-based, gently undulating hills and valleys rather than craters with steep edges (Figure

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Address correspondence and reprint requests to: Murad Alam, MD, Department of Dermatology, 675 N. St. Clair, Suite 19-150, Chicago, IL 60611, or e-mail: murad@alam.com.

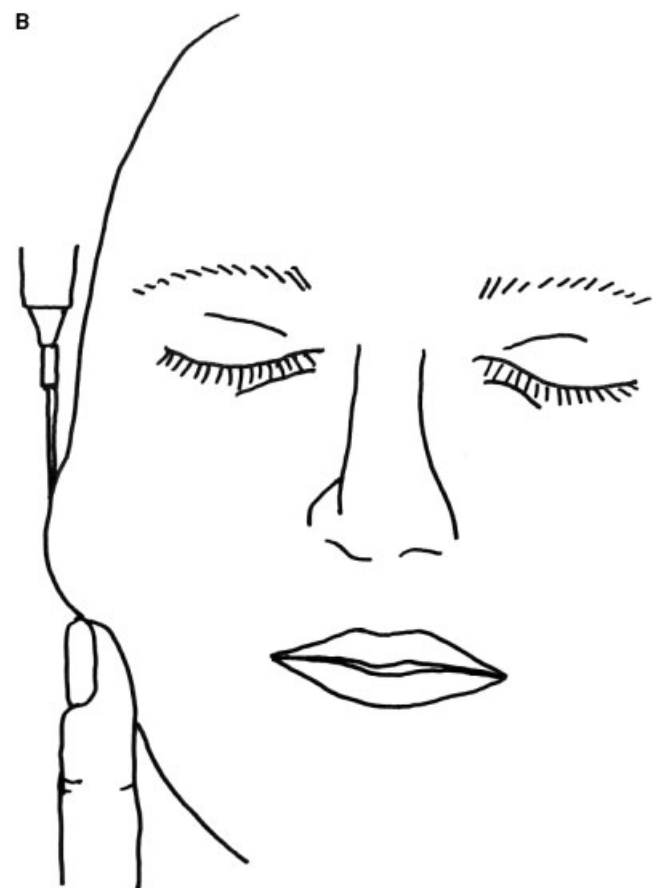
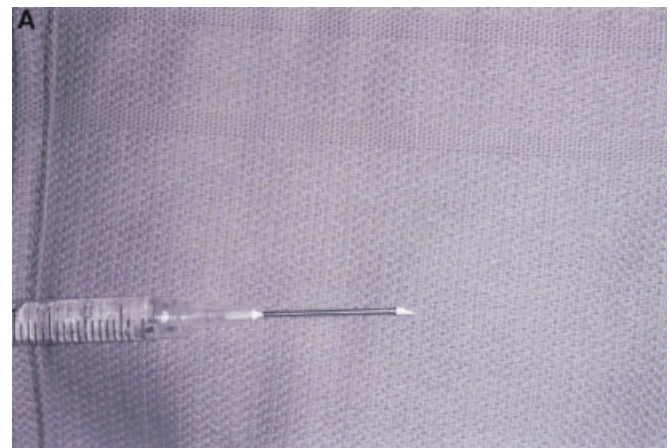


**Figure 1.** (A) Schematic drawing of rolling scars on a patient's face (wave-shaped undulating marks represent hills and valleys of rolling scars, which are commonly observed in multiple areas, including the cheek, temple, and lateral perioral region); (B) close-up schematic showing, from left to right, ice-pick scars, tethered rolling scars, and boxcar scars (ice-pick scars are V-shaped, culminating in a deep point; rolling scars have a rounded base, are typically more shallow, and may have fibrotic tethers, represented by the three fanning vertical lines; boxcar scars have a flat broad base and can be relatively shallow, as represented by the higher horizontal bar within the rectangle, or deeper, as represented by the base of the triangle; note that the relatively superficial, evenly dotted horizontal line represents the hypothetical depth limit of ablative resurfacing and the deeper, patterned horizontal line represents the deep reticular dermis to which the base of the rolling scars may be tethered).

1), may be made less noticeable after being subcised. Defined and described by Orentreich,<sup>11</sup> subcision is a method for subdermal undermining of depressed areas. The process as modified by us entails introducing a tribeveled 18-gauge hypodermic needle (Nokor, Becton Dickinson, Franklin Lakes, NJ, USA) just under the dermis to release fibrous attachments tethering the epidermis and dermis to the subcutis (Figure 2). The back and forth motion of the needle parallel to the skin results in audible rasping and popping as the underside of the dermis is released from its attachment to the subcutis. Minimal postoperative bruising culminates in speedy recovery. Patches of rolling scars may be less evident after treatment (Figures 3 to 5). Residual scars

may be more amenable to further reduction by modalities such as laser resurfacing.

The literature on the effectiveness of subcision for acne scarring is extremely limited. In this study, we assessed the outcomes of 40 patients treated with this procedure.



**Figure 2.** (A) Subcision needle and syringe; (B) schematic drawing demonstrating tenting of patient skin as a subcision needle is inserted and moved (a finger is used to stabilize the needle as it is gently tugged away from the patient's face during the process of subcision to reduce the risk of damage to deep structures).



**Figure 2.** (C) close-up schematic of a subcision needle severing tethers that may bind down rolling scars (a spear-shaped needle tip is shown approaching an array of three fanning vertical connective tissue tethers, which are joining the rounded base of the rolling scar to the deep horizontal line that represents the deep reticular dermis); (D) anesthetized and marked area with a Nokor needle approaching; (E) insertion of a needle; (F) tenting of skin as the area is subcised.



**Figure 3.** (A) Before and (B) after views of subcision of a depressed chin scar.

## Patients

From April to December 2000, 47 patients were treated with subcision for acne scarring. Among the 40 patients within this group who completed this study, 11 patients were male and 29 were female. The mean age of the patients was 39 years, with a range from 23 to 56 years. Most patients had more than one scarred site amenable to subcision. Upper cheeks were treated in 55% of patients, lower cheeks in 41%, perioral areas in 34%, the chin in 21%, and temples in 17%.

## Operative Technique

Subcision procedures were performed under constant conditions, in the same facility and by the same surgeon using a substantially identical technique. Areas to be treated were determined after assessment of each patient's scarring and consultation with the patient. Before every procedure, instructions were given to discontinue, if medically feasible, any drugs (eg, aspirin, vitamin E) that could prolong bleeding. A fine-tip

water-resistant surgical marking pen was used to place dots on the depressed rolling scars in the affected parts of the face. The operative sites were then prepared and draped in a sterile fashion. A solution of 1% lidocaine with 1:100,000 epinephrine was infiltrated into the superficial subcutis. Anesthesia was sufficient to permit needle entry 1 cm beyond the border of the scarred area(s), to ensure hemostasis, and to induce moderate hydrodissection along the dermal-subcutaneous junction. An 18-gauge Nokor needle was inserted subdermally just distal to each target region and was slowly advanced parallel to the dermis. Rapid, repetitive advancement and retraction of the needle (similar to liposuction motion) under the scarred area were subsequently performed to abrade the underside of the dermis while dislodging any fibrous attachments to the deeper tissues. This action was repeated in a fan-like pattern to treat the entire lesion. Larger scarred areas were treated through two or three entry sites to achieve triangulation of the treatment zone and thorough soft tissue release. Care was taken to remain superficial to deep vessels and the proximal branches of the facial nerve. Pressure dressings placed over the treated sites were removed 24 hours after the procedure.

## Measurement of Outcomes

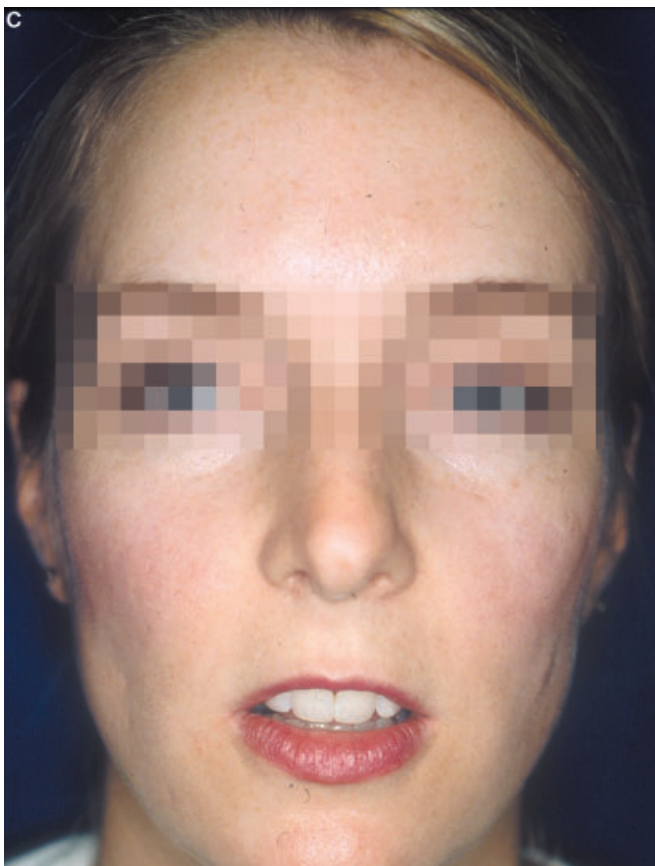
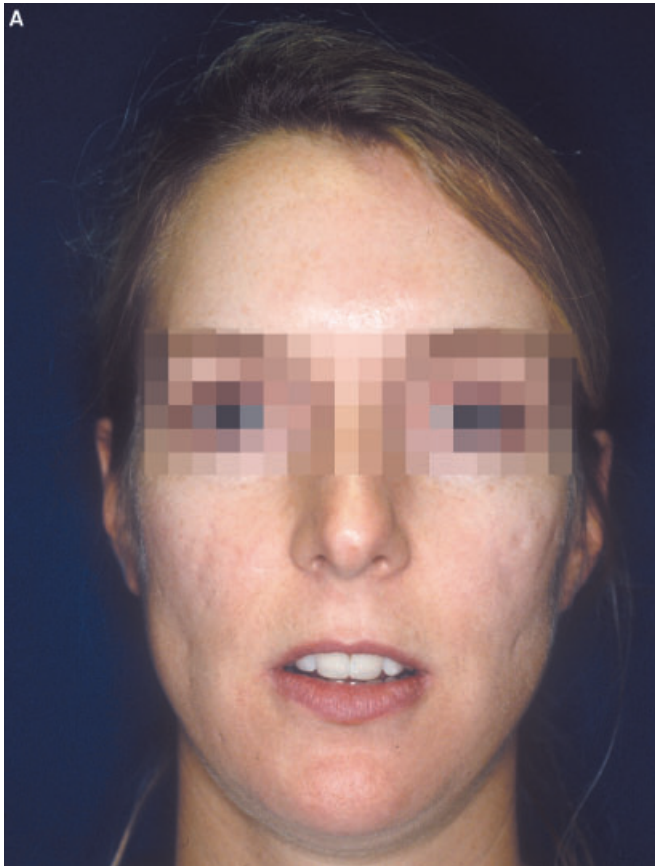
Outcomes of subcision procedures were assessed by investigator and patient ratings. Preoperative and at least 1-month postoperative photographs of the affected anatomic sites were also obtained.

At 1 month and subsequent (6 month) follow-up visits, the investigators rated the degree of improvement of treated acne scars. Close visualization, including comparison with preoperative photographs, and palpation were performed. Complications, if any, were recorded.

The patients were asked to complete a questionnaire assessment of their experience with subcision. Responses to questionnaires were elicited via telephone and by a health professional other than the surgeon who performed the subcision. The patients were assured that their responses would be recorded in an anonymous manner and would not be available to their surgeon, except as grouped results. Data collection was completed over a period of 1 month.

## Results

Of 47 patients treated with subcision, 40 were compliant with the subsequent protocol, including 1-month and 6-month postprocedure follow-up and questionnaire completion. Each of the 7 patients who did not complete the study received subcision, without any complications noted by the investigators. Subject





**Figure 5.** (A) Before and (B) after views of glabellar subcision.

dropout from the study was due to missing one or more follow-up visits and/or the failure to complete the questionnaire. All summary statistical data are based on the results for the 40 patients for whom whole data were obtained.

Investigator ratings at 1 and 6 months postprocedure indicated, on average, 50 to 60% improvement in the appearance of the treated sites (Table 1). The least improvement noted was 30 to 40%, and the most was 80 to 90%. No significant complications were observed. Ecchymoses, edema, and erythema had resolved completely by the 1-month follow-up appointments. Small, firm indurations were palpable in most of the treated areas 1 month after surgery, but these were rarely noticeable.

Patient questionnaires were administered, on average, 6.2 months postprocedure (see Table 1). Forty-four percent of patients reported having undergone other types of scar revision in the past. These included bovine collagen injections ( $n = 6$ ), microdermabrasion ( $n = 6$ ), dermabrasion ( $n = 4$ ), punch excisions ( $n = 4$ ), injectable alloderm (Cymetra) ( $n = 3$ ), and laser resur-

facing ( $n = 3$ ). An additional 11% had firm plans for such additional procedures, most often laser resurfacing. Ninety percent of patients reported that subcision had improved their appearance. Among those noting improvement, the mean estimate for overall degree of improvement was 51%. The depth of the scars was estimated to be improved by 52% and the visibility of scars by 54%. When asked to compare the actual improvement with what they had expected, the patients found that the actual results were moderately better than their expectations. All patients were also asked to rate on a scale from 1 (least) to 10 (most) the extent to which they had experienced specific adverse events associated with the surgery (Table 2). Pain during and after the procedure (rating = 3.4 of 10), slow postoperative recovery (2.9), firm bumps that developed in the treated area (2.6), and all other unwanted side effects (0.7) were not very troublesome to most patients. Swelling and bruising following the procedure were the most common complaint, which was still rated at only 4 of 10. Eighty-four percent of the patients said that they would undergo subcision again knowing what they know now. Ninety-seven percent were willing to have a second subcision procedure. Eighty percent would recommend subcision to their friends with acne scarring.

## Discussion

Subcision is a simple procedure for revision of rolling acne scars. Any area on the face can be treated in minutes with an inexpensive specialized needle. Treated scars can become substantially less noticeable. Improved but somewhat persistent scars can be subcised again or further smoothed by a resurfacing technique, such as laser resurfacing.<sup>12</sup>

The term subcision is trademarked (US trademark registration number 1,841,017, granted June 1, 1994, to David Orentreich), which means that it functions as a brand name for this procedure. Apart from originally describing the procedure, David and Norman Orentreich have been instrumental in further refining the subcision technique.<sup>13,14</sup> They do not advocate use of a Nokor needle, as we describe in this article, but rather of disposable tribevellated hypodermic needles. Instead of restricting themselves to one type of needle (eg, the 18-gauge needle we describe), they select among 16 to 30-gauge needles depending on the type of scar to be treated. In his adaptation of subcision, Goodman discussed the use of 19-gauge needles,<sup>15</sup> and for the treatment of cellulite, Hexsel and Mazzuco reported preferring 18-gauge Nokor needles.<sup>16</sup>

**Figure 4.** Before (A) front and (B) side views of cheek subcision; after (C) front and (D) side views.

**Table 1.** Summary of Results (Based on 40 of 47 Patients Treated)

Patient Questionnaire Item	Investigator Rating %
Patient questionnaire item (at 6.2 mo postprocedure)	
Patients reporting other types of scar revision procedures in past	44
Patients reporting improvement after subcision procedure	90
Among improved, mean estimate for overall degree of improvement	51
Estimate for improvement of scar depth	52
Estimate for improvement of scar visibility	54
Investigator ratings (at 6 mo postprocedure)	
Mean estimate for overall degree of improvement	50–60
Range for degree of improvement	30–90

A few precautions need to be observed during subcision. Anesthesia must be sufficient to ensure patient comfort and minimize bleeding. Placement of the needle should be meticulously planned, always in the superficial fat. The extremely sharp cutting edge, indispensable for subcision, is a threat to deeper facial structures and must be oriented parallel to the underside of the dermis. Subcision should be performed with caution in areas where the major motor nerves, particularly the facial nerve and its branches, are vulnerable. For instance, care should be taken to avoid deep subcision in the preauricular cheek, where the facial nerve emerges, and over the temple and mandibular rim, where facial nerve branches are superficial and easily injured. If there is doubt about the safety of the procedure at a particular site, subcision should be deferred.

Appropriate patient selection is vital. Subcision is ineffective for treating deep pitted scars and shallow or deep “boxcar” scars, which are scars with depressed flat bases and vertical walls (similar to varicella scars). Conversely, bumpy, rolling scars with indistinct borders respond well to subcision and are impractical to excise. Subcision is therefore but one of a group of procedures that can be used to correct acne scars. Deep-pitted and boxcar scars are best rectified by 2 to 4 mm punch excisions, followed by careful suturing or punch elevation of the scar without tissue removal. Linear depressions and grooves may be filled with soft tissue augmentation materials. Fine textural abnor-

malities respond to smoothing by laser resurfacing, which should be performed after excisional surgery so that surgical scars can be obscured.

This study demonstrates that both investigators and patients find that subcision improves rolling acne scars. Surprisingly, these two groups are also in close agreement regarding the degree of improvement, which they estimate at just over 50%. An improvement of such magnitude is especially significant given the simplicity of the subcision procedure and the dearth of alternative procedures for treating rolling scars. Moreover, the side effects are minimal to negligible, with patients, at most, complaining occasionally of transient ecchymoses or edema. The visible improvement lasts at least 6 months and may be permanent.

Exactly how subcision works to improve scars is not clear. Orentreich and Orentreich postulated two mechanisms, including the releasing of tethers binding down the scar and the reactive formation of new connective tissue. This explanation seems plausible, if difficult to confirm. In our experience, deeper, wider, and more noticeable rolling scars improved more dramatically after subcision than scars that were initially small or shallow. When subcision was applied to scarred regions in which both rolling and pitted or boxcar scars were found, the latter types of scars were much less improved than the rolling scars.

Patients planning to have their scars subcised should be told what to expect. Bruising and swelling can last up to a week postprocedure. Over the ensuing month, small indurations can develop at the treated sites; these are usually palpable rather than visible and are directly responsible for some of the improvement of the depressed scars. Induration usually resolves by 3 months after the procedure. Patients are usually greatly reassured when they are told that their indurated areas will spontaneously remit to some degree and that these areas are in part necessary for correcting the indentations that previously existed. If bumps are slow to improve, patients can be asked to perform firm massage with a fingertip for a few minutes a day for several weeks.

**Table 2.** Reported Adverse Events after Subcision (Patient Rating Scale: 1–10)\*

Adverse Event	Mean Rating
Postoperative swelling/bruising	4.0
Procedure-associated pain	3.4
Slow postoperative recovery	2.9
Firm bumps at treatment site(s)	2.6
All other unwanted effects	0.7

\*1 = minimal significance; 10 = maximal significance.

Subcision is not appropriate for all types of scars or all patients. However, for patients desiring overall improvement of acne scars, subcision can be an important component of a multistep treatment plan. Those reluctant to undergo more complex procedures, such as laser resurfacing, and those who have personal objections to the implantation of fillers may also benefit from subcision. Subcision is a safe, easy to perform, well-tolerated, and effective surgical technique for selected acne scars. As such, it is a useful tool for dermatologists who perform scar revision.

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## Commentary

This valuable technique is well presented in this article. The method of scar and wrinkle “subcision” dates back to much earlier descriptions by dermatologic surgeons in the 1960s and 1970s (Resnik) and again as “scar undermining,” described as part of the technique for using Fibrel (Mentor Corp., Santa Barbara, CA). A cutting undermining needle was developed by Gotlieb to create a pocket for the placement of Fibrel. I use this technique regularly for the scars described in this article and

place either a dermal or a fascial graft in the “subcised” pocket to keep it elevated during collagen reformation, subcising the fibrotic bands that hold down the retracted scar as a necessity for elevation of all contracted scars. This article should revitalize this technique as another tool for the treatment of cutaneous scars.

GARY MONHEIT, MD  
Birmingham, AL