Recontouring, Resurfacing, and Scar Revision in Skin Cancer Reconstruction

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KEYWORDS

• Scar revision • Skin cancer • Laser resurfacing
• Z-plasty • Dermabrasion • Chemical peels • Wound healing

"He jests at scars that never felt a wound."
William Shakespeare (1564–1616)

Patients attach tremendous significance to facial scars. Years after undergoing removal of a cutaneous malignancy, most patients judge the success of surgery primarily by their postoperative appearance. Proficiency in scar revision and refinement is essential. Any full-thickness surgical incision produces a scar of some type. As a result, careful planning of the primary reconstruction sets the stage for all subsequent interventions. In some cases, the need for secondary procedures is anticipated at the outset; in other situations the need may be identified later. Failure to address residual deformities after initial reconstruction mars an otherwise favorable surgical result.

There is more artistry inherent in scar revision and flap refinement than many people recognize. A striking artistic demonstration of resurfacing is provided by the recent restoration of Michelangelo's frescos on the ceiling of the Sistine Chapel. This example is compelling because the restorers made use of chemical and mechanical restoration techniques that have close parallels in facial plastic surgery. Before its restoration, the Sistine ceiling suffered centuries of degradation. Cracks allowed for water damage from rain. Light and humidity blistered paint and left mottled stains. And, there were caked deposits of soot and heavy glue as a consequence of misguided eighteenth century restoration attempts to brighten the already dimming frescos.[1] The results of these restoration efforts, illustrated in **Fig. 1**, bear witness to the power of resurfacing techniques.

This article reviews the secondary procedures available to improve flaps and scars after reconstruction of skin cancer defects. To place these procedures in context, we discuss the pathogenesis, evaluation, and management of the more commonly encountered cosmetic and functional problems. Mastery of these refinements may allow the surgeon to transform an adequate surgical result into an excellent one.

ETIOLOGY AND PATHOGENESIS OF SCAR FORMATION

Common factors predisposing to heavy scarring include tissue ischemia, traumatic tissue handling, and infection or inflammation.[2] Wound healing involves stages of initial coagulation, inflammation, re-epithelialization, fibroplasia, and maturation.[3] During healing, clinical characteristics of the wound bed heavily influence the balance between

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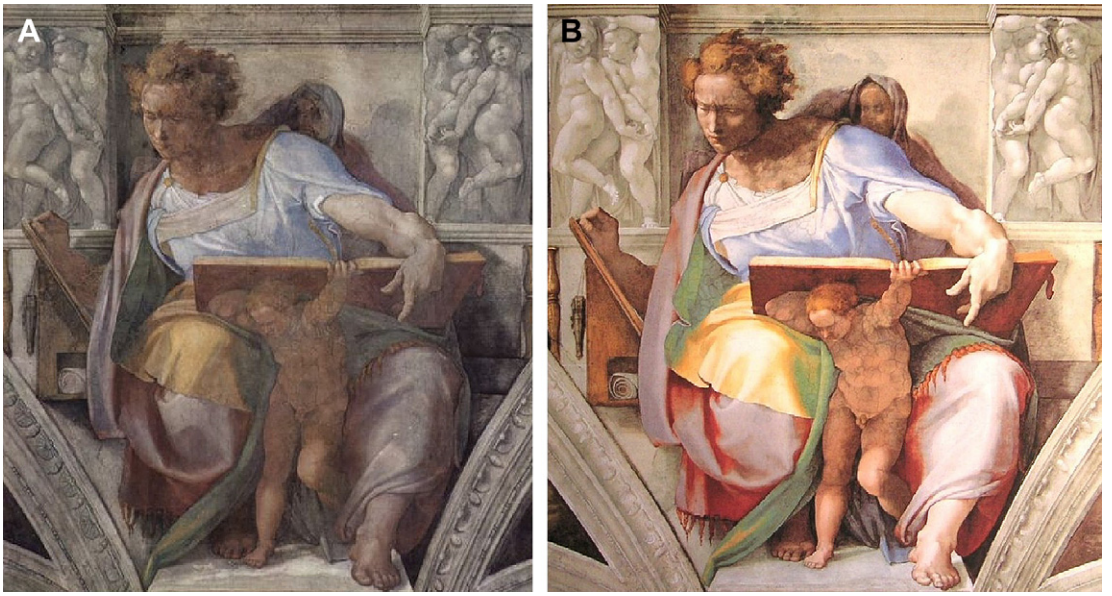

Fig. 1. "Daniel," Sistine Chapel ceiling fresco, by Michelangelo di Lodovico Buonarroti Simoni, 1475–1564. (*A*) Before restoration. (*B*) After restoration.

regeneration and scarring.[2] Scarred skin is characterized by loss of lamellar architecture and disordered collagen and fibroelastic tissue deposition (**Fig. 2**). Although clinically significant infection is uncommon after skin cancer reconstruction, low-grade inflammation may still induce collagen deposition and interfere with blood supply. Subtle influences easily affect the cascade of physiologic events responsible for healing.

Many of the factors that adversely affect surgical outcomes are controllable at the time of initial reconstruction.[4] Poor flap design and inappropriate incisions contribute to unacceptable scars, often because of compromise of flap vascularity or violation of aesthetic subunits. Excessive tension causes widened scars, and inadequate wound edge eversion predisposes to depressed scars. Uneven approximation of wound edges, insufficient undermining, or lack of deep closure also leaves unsightly scars.[5] Mobile areas of the face are at higher risk for scars. Failure to anticipate potential deformities arising from scar contracture across concave or mobile surfaces also predisposes to disfigurement.

Several patient factors also increase the likelihood of unfavorable scarring. Diabetes, Accutane

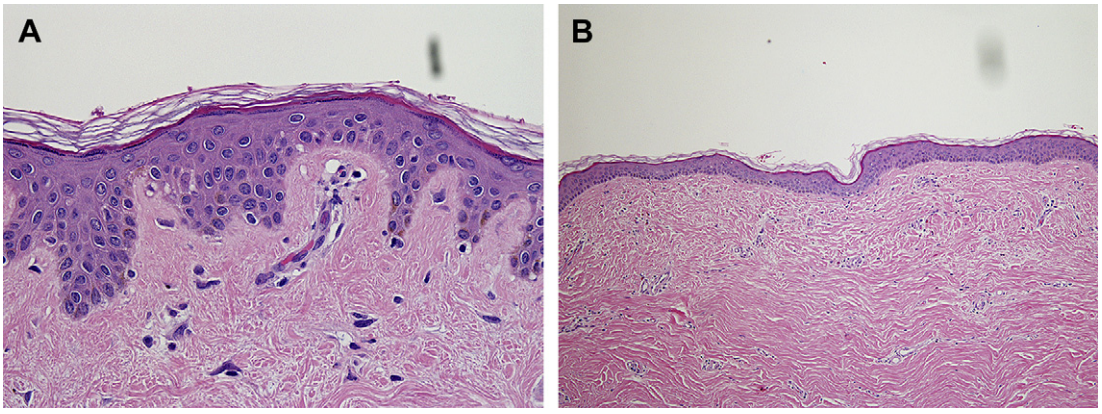

Fig. 2. (*A*) Normal skin (*B*) Scarred skin.