

# DERMABRASION IN OUR PRACTICE

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## Abstract

Dermabrasion is a technique of facial resurfacing that allows the physician to sculpt the skin surface by surgically abrading, or planing the contours of the skin. User technique, device settings, and the combination of dermabrasion with other skin resurfacing treatments enable the physician to treat a wide variety of skin defects.

## Introduction

Dermabrasion in its simplest form, using a pumice and alabaster, has been used to treat the skin surface since circa 1500 BC.<sup>1,2</sup> Modern dermabrasion devices consist of an electric engine, which rotates an abrasive tip (wire brush or diamond fraise). The tips vary in size, shape, and texture and can achieve speeds of 33 000 revolutions per minute.<sup>2</sup> The technique used, tips selected, the speed and rotation movement, and the pressure applied to the skin surface enable the surgeon to control the depth of injury.

As a means of scar revision, dermabrasion interrupts the remodeling phase of wound healing. Histologically, dermabrasion creates an abrasive injury in the papillary or mid reticular dermis that superimposes a second intention wound healing mechanism on the primary scar. Histological examination of scars treated with dermabrasion demonstrate increased collagen bundle size as well as unidirectional orientation of the collagen fibers parallel to the epidermal surface. Altered levels of alpha6 and beta4 integrin expression have been identified in the stratum spinosum, and changes in tenascin expression have also been identified.<sup>3</sup>

## Patient Selection

Dermabrasion is ideally suited to treat skin defects that involve the epidermis, papillary dermis, and upper reticular dermis since it enables the surgeon to recontour both the defect and the surrounding skin. Acne scars, partial thickness Mohs defects, rhinophyma, traumatic and surgical scars, and tattoos are often treated by dermabrasion either alone or in combination with other modalities. Other lesions that may be treated with dermabrasion include actinic and seborrheic keratoses, angiofibromas, solar elastosis, and rhytides.<sup>4</sup>

The key to obtaining excellent results and satisfied patients is to clearly identify patient expectations and manage them appropriately. Especially when performing dermabrasion for cosmetic purposes, it is important to have the patient explain clearly what they want treated and expect as the end result. It is often helpful to have preoperative and postoperative photographs from other patients that may assist in defining expectations.

It is important to identify patients preoperatively who may have preexisting conditions that may increase the probability of postoperative complications. Careful history should be obtained to identify any previous history of koebnerizing

conditions such as lichen planus or psoriasis. A family or personal propensity towards hypopigmentation or hyperpigmentation, keloids, or hypertrophic scars should be examined thoroughly. Patients who have undergone extensive undermining of the area to be abraded are not ideal candidates since the underlying vasculature and blood supply have been compromised. For example, for patients who have recently undergone facelifts, a 6-month delay before dermabrasion is appropriate.<sup>5</sup> Similarly, many patients seeking treatment with dermabrasion for acne scars have been treated with isotretinoin, and it is important to carefully identify the date of their last isotretinoin treatment. Treatments within 6 months of taking isotretinoin have been associated with an increased risk of scarring.<sup>6</sup>

Several pretreatment considerations may lead the physician to obtain pretreatment labs or preoperative skin preparation. Since dermabrasion aerosolizes skin particles, preoperative HIV and hepatitis evaluations are appropriate. Patients with a history of atopy or impetigo may be prescribed antibiotic prophylaxis. All patients undergoing perioral or full-face dermabrasion should be prescribed antiviral prophylaxis.

Pretreating the skin with topical medications may also be useful in certain dermabrasion patients. A 2- to 3-week pretreatment course of daily tretinoin has been shown to increase re-epithelialization, and therefore, speed recovery times. In Fitzpatrick's types 2 and 3 skin, a 2- to 4-week course of 4% hydroquinone is useful to minimize postoperative hyperpigmentation as well.

## Technique

The use of correct dermabrasion techniques cannot be overemphasized. Held incorrectly, or without attention given to the direction of rotation, one may inadvertently cause deep injury to the skin, particularly in regions over bony prominences such as the malar eminence, or free margins such as the upper lip.

Dermabrasion technique begins with the physician's contact with the hand engine of the dermabrader. The engine is held with the forefingers of the hand placing the butt of the engine into the palm with the neck stabilized by the extended thumb (Figures 1a and 1b). A tight skin surface is necessary to prevent gouging of the skin and thus a 3-point retraction should be obtained using both hands of the assistant and the free hand of the surgeon to stretch the treatment surface. Refrigerant spray (Frigiderm, containing Freon 114)



can be applied to the treatment area to provide a more solid substrate for controlled dermabrasion. When used, it should be applied to obtain a 5- to 10-second freeze time. The refrigerant spray also provides some amount of anesthesia and is particularly helpful when dermabrading acne scars.

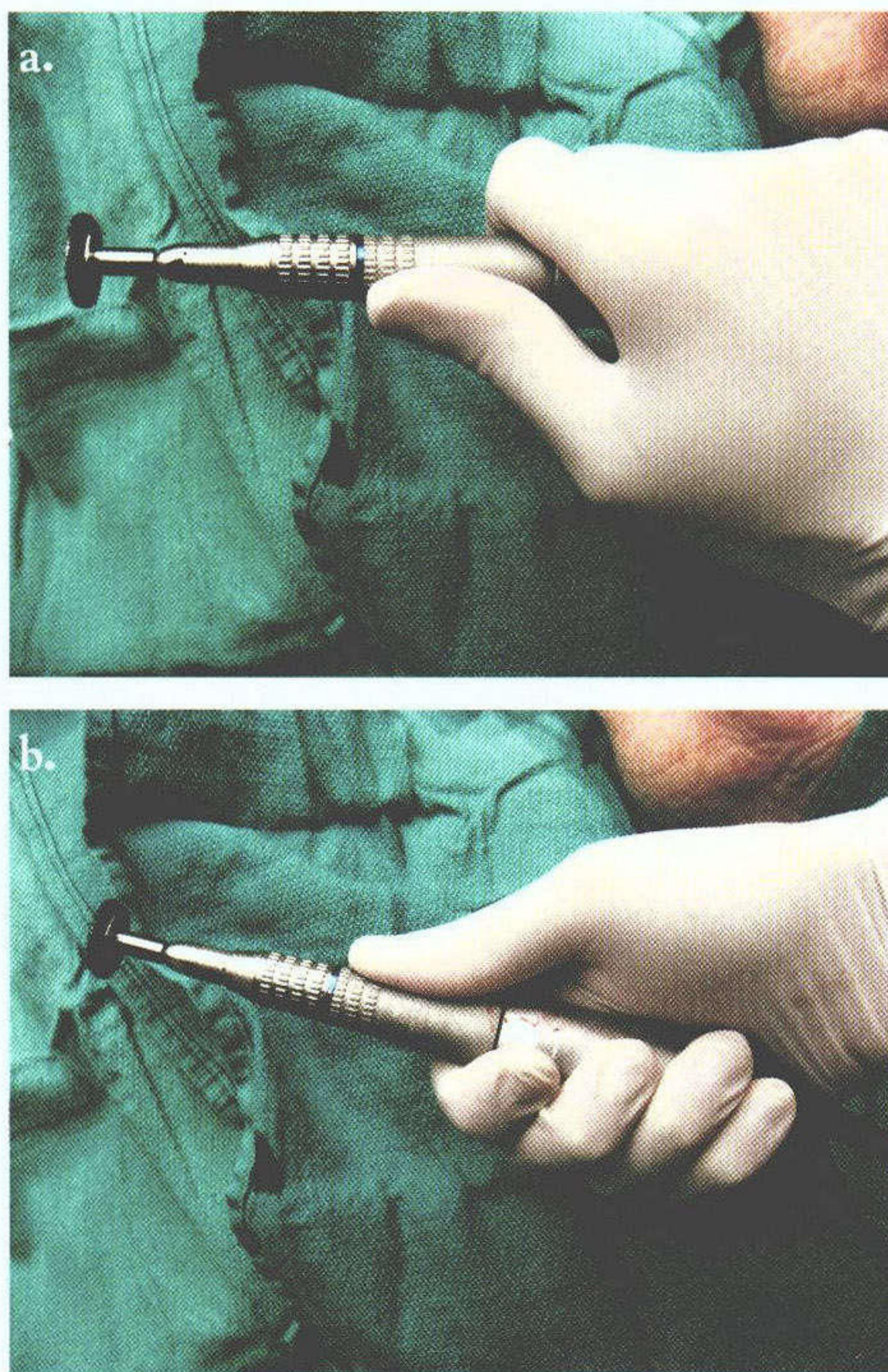
Smooth, controlled movements enable the operator to create even contours using dermabrasion. Attention must be given to the direction of rotation of the end piece. Using an arciform motion, the end piece is passed over the skin in a direction perpendicular to the direction of the rotating wire brush or diamond fraise. The large nodules of rhinophyma or deep acne scars in the midcheek may require the direction of the end piece rotation to be against the angle of the bristles of the wire brush, and thereby pulling the skin towards the device (clockwise, if viewed from the butt of the engine). This direction of rotation allows the dermabrader to go deeper into the skin. Caution must be used when using the dermabrader in this direction to prevent unwanted gouging particularly near the free edge of the lip or nose. Using the dermabrader set to rotate in the direction of the bristle angles pushed the skin away from the device (counterclockwise rotation, if viewed from the butt of the hand engine), and allows the surgeon to brush over the free edges of the face without the risk of grabbing loose skin. This direction of rotation is also less likely to gouge or produce unwanted grooves in the skin (Figure 2).

Counterclockwise rotation also makes it easier to dermabrade certain areas of the face, such as the nasal tip, without the use of cryoanesthesia because in this direction of rotation there is less grabbing and pulling of the skin. Lastly, counterclockwise rotation of the wire brush drives the neck of the dermabrading hand engine toward the surgeon's thumb which allows for stabilization and control. In the clockwise direction of rotation, the neck of the hand engine is pulled away from the thumb and must be stabilized with the forefingers gripping the body of the hand engine. Dermabrading with a wire brush in the clockwise direction is indeed more technically difficult to master; however, because the direction of rotation is against the angle of the bristles radiating from the center of the endpiece, it is the most aggressive and efficient method of dermabrasion. Consequently it is the preferred technique of dermabrasion in conditions requiring the greatest amount of recontouring as with rhinophyma or very deep acne scars in the mid cheek.

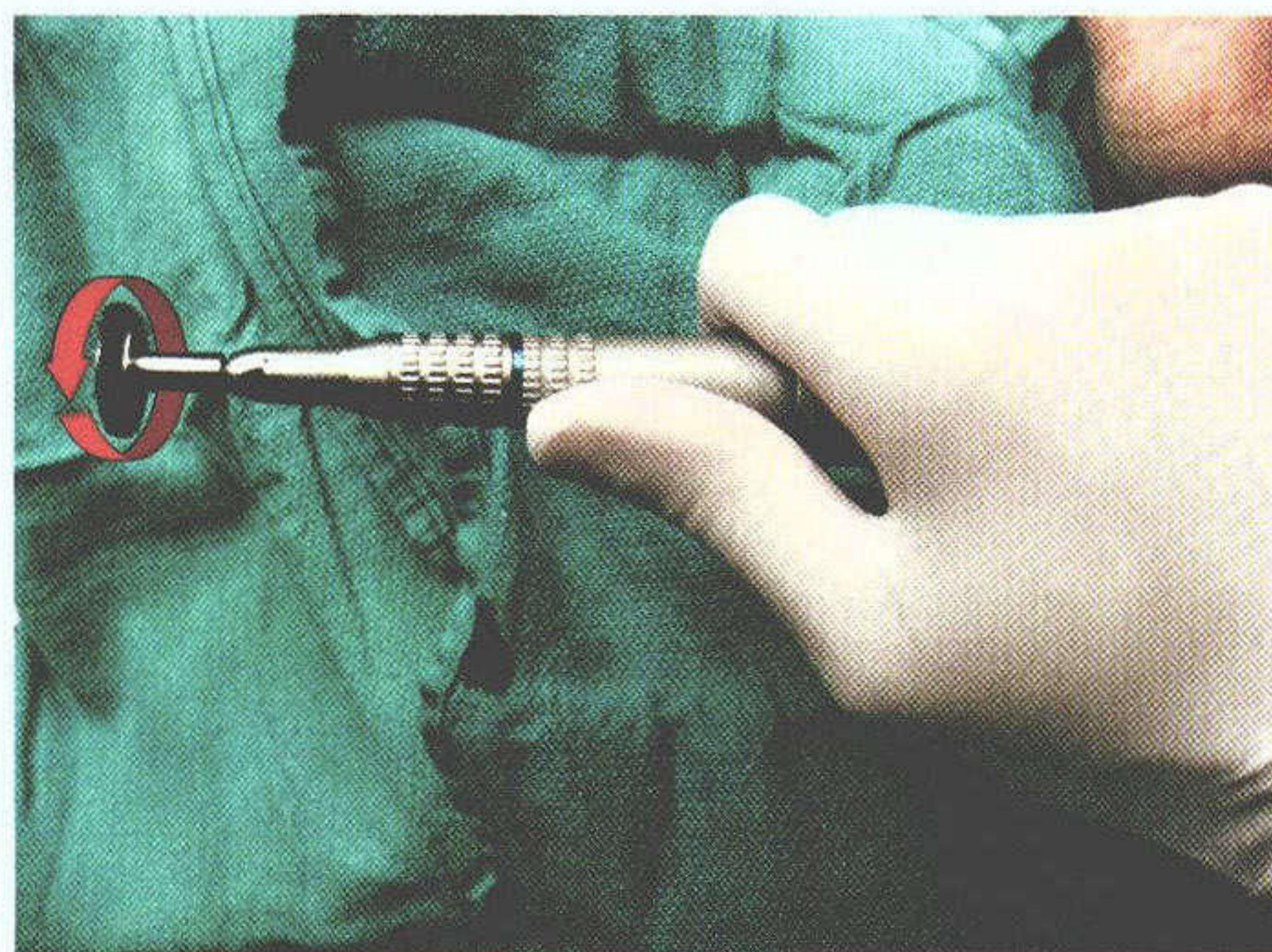
The depth of injury is visible during the procedure and is used to direct the degree of treatment. Papillary dots of bleeding indicate an entry into the papillary dermis. These bleeding foci will become larger and coalesce the deeper one goes into the dermis. Entry into the reticular dermis is indicated by the presence of frayed collagen bundles.

Treatment areas should be approached with an awareness of cosmetic units since treating an entire unit camouflages the treated area and often leads to the best final result. When dermabrading the full face, the treatment areas should extend 1 to 2 cm below the mandible. The boundaries of any treatment area should be feathered to avoid drastic pigmentation changes. It is helpful to treat the dependent areas first while

**Figure 1.** The correct hand position of the operator on the dermabrasion hand piece.



**Figure 2.** The counterclockwise rotation of dermabrasion device tip.





they are still a bloodless field. Using cotton towels for shielding the nontreatment areas and blotting are preferred since gauze can be easily entangled in the dermabrader tip.

### Postoperative Care

After completing dermabrasion, application of gauze soaked in 1% lidocaine with epinephrine (1:100 000) is applied to the treatment area and followed by an ice pack placement. This helps both with hemostasis and pain. For full-face dermabrasion, the application of a semipermeable dressing (Vigilon®, C-R Bard, Inc., Covington, GA; 2<sup>nd</sup> Skin®, Spenco Medical Corporation, Waco, TX) followed by nonadherent pads (Telfa®), gauze, paper tape, and finally Surgilast® netting (Western Medical Limited, Tenaflly, NJ) are applied to the treatment area. The use of these semipermeable dressings has been demonstrated to decrease healing time from 14 days to 5 to 7 days.<sup>7,8</sup> Full-face dressings will require daily changes as well as gentle debridement with normal saline for the first 2 to 5 postoperative days. Medications and sedatives are often helpful to manage the patient's symptoms and fears of claustrophobia due to the dressing masks. Triamcinolone acetonide 40 mg given intramuscularly will help reduce periocular edema in full-face dermabrasion patients. Spot dermabrasion postoperative care may simply consist of saline or 0.25% vinegar compresses applied 4 to 5 times daily followed by application of an occlusive ointment (Vaseline® or Aquaphor®) until re-epithelialization is complete.

### Complications

Complications following dermabrasion are relatively rare but recognizing early signs will lead to treatment resulting in less morbidity. Both bacterial and viral infections often present as painful nonhealing erosions. Secondary bacterial infections will present on postoperative day 4, whereas viral infection occurs after re-epithelialization is complete on postoperative days 7 to 9. For any painful erosions, cultures should be obtained, and empiric treatment should be initiated with oral antibiotics and antiviral medications. Identification of the causative agent and therapeutic sensitivities will guide further therapy. Because herpetic outbreaks are the most common secondary infection, patients with any history of perioral herpetic infection and all patients undergoing full-face dermabrasion should receive antiviral prophylaxis. A typical prophylactic regimen is valacyclovir 500 mg twice a day for 10 to 14 days. Breakthrough viral infections can occur despite prophylaxis and should be treated with herpes zoster doses of antiviral medication.

Pigmentary changes are the most common complication following dermabrasion. Postoperative hyperpigmentation is transient and occurs 4 to 6 weeks following surgery. This is particularly problematic in Fitzpatrick type 2 and type 3 skin. Patients should be instructed to have strict sun avoidance and treatment with hydroquinone at the early stages of hyperpigmentation is helpful.<sup>9</sup> Thirty percent of patients with Fitzpatrick types 1 to 4 are at risk for hypopigmentation, which does not appear until 12 to 18 months following surgery.<sup>10,11</sup> Because this loss of color is difficult to treat, the use of camouflaging makeup can be very helpful for these

patients. Studies have demonstrated that treatment with the 311-nm excimer laser improves postoperative hypopigmentation in some patients.<sup>12</sup>

Scarring is another feared complication of dermabrasion. The most common factors associated with scarring are hereditary predisposition, wound depth, postoperative infection, and isotretinoin use. Early recognition of the propensity to scar is important for management. The early warning signs of scar formation are persistent erythema and prolonged healing. Wounds that take longer than 3 weeks to heal have a 78% risk of scarring.<sup>10</sup> Topical steroids are effective in the initial phases of hyperemia, but after scar thickening and induration has occurred intralesional steroids are preferred. Intralesional steroids may be injected every 2 to 3 weeks, and the use of silicone or steroid impregnated tape 4 to 5 nights a week is helpful. Telangiectasias can become more prominent with steroid injection, and can be treated with the 532 nm potassium titanyl phosphate (KTP) or 585/595-nm pulsed dye lasers. The pulsed dye laser is also helpful for treating the induration of the scar itself.<sup>13</sup>

Milia are small epidermal cysts that are often a part of the normal healing process but can also occur secondary to excessive occlusion. When present, it is advised to change to a less occlusive topical regimen consisting of cream rather than an occlusive ointment. Acne surgery and extractions may be performed to extrude the milia. Acne flares are also common in the healing process and may be due to excessive occlusion. Acne flares can be treated in the same manner as milia by changing to a less occlusive topical regimen. Acne flares respond well to normal acne treatment regimens.

### Surgical Defects and Scar Revision

Dermabrasion is used daily in surgical practice for treatment of partial thickness, Mohs surgical defects, and scar revisions. Small defects on the nasal tip, ala, or vermillion of the lip are ideal candidates for dermabrasion. Dermabrasion can produce results better than those observed if the defects were to have been converted to a full thickness wound and repaired with a linear closure, flap, or graft. The choice of dermabrading tip is dependent on the area to be treated. Pear-shaped cones are useful for the angles of the oral commissure, and wire brush tips are preferred for the nose, cheeks, or forehead.

A less abrasive technique is preferred for treating partial thickness defects and scar revision in order to blend the treatment areas with the surrounding skin. Refrigerant spray may be used, but often the skin tension obtained by the 3-point retraction is sufficient for treatment. The dermabrader is used with the tip rotating in a counterclockwise direction (with the angle of the radiating bristles or pushing the skin away from the device). The skin is locally infiltrated with tumescent anesthetic that decreases the risk of gouging the unfrozen skin. Attention must be given to the entire cosmetic unit and the feathering of the transition areas.

Revision of surgical scars is optimally performed 6 to 8 weeks following surgery or traumatic injury. Yarbrough demonstrated that 89% of facial scars treated with dermabrasion at



4 to 8 weeks after injury healed without any visible evidence of residual scarring.<sup>14</sup> When dermabrading scars, the texture of the scar is distinct from the surrounding tissue allowing the surgeon to clearly visualize the treatment target. The scars frequently "crumble" with dermabrasion providing a visible endpoint for resurfacing. It is important to contour the scar borders to prevent a "step off" appearance.

### Acne Scars

Patients who have had prolonged periods of inflammatory acne have a propensity to form acne scars. Dermabrasion is particularly helpful for the box car scars that are small in diameter and shallow.<sup>15</sup> The ice pick scars also have a small diameter but are deeper than box car scars. These often respond best to punch excision or punch grafting followed by dermabrasion to smooth the contours. Rolling scars are large in diameter, atrophic, distensible, and bound down. These scars respond best with subcision to release the tethering scar tissue and followed by skin-tightening treatments such as CO<sub>2</sub> laser resurfacing.<sup>16</sup> In contrast, dermabrasion is more ideally suited for acne scars such as boxcar scars that have defined shoulders and require sculpting recontouring. In patients with severe scarring, a combination of a full-face CO<sub>2</sub> resurfacing for the rolling scars and dermabrasion of the more sharp-shouldered scars is very helpful. Two CO<sub>2</sub> passes are performed first, then wire brush dermabrasion of any persisting boxcar or ice pick scars is performed until the scars are seen to crumble or break up. Figure 3 demonstrates that after CO<sub>2</sub> resurfacing, most of the acne scars are still present and visible and are accentuated by the differences in the pigment. Dermabrasion was used immediately after the CO<sub>2</sub> resurfacing to smooth the contours of the scars as is evidenced by the more even pigmentation obtained after dermabrasion versus CO<sub>2</sub> alone (Figure 4).

### Rhinophyma

Rhinophyma responds very well to treatment with dermabrasion and provides significant cosmetic improvement. Infraorbital regional blocks may be used in conjunction with direct local injection of 1% lidocaine with epinephrine (1:100 000) for anesthesia and swelling. Using a wire brush tip rotating in clockwise rotation (against the angle of the radiating brushes and pulling the skin towards the device) the fibrous nodules may be evenly contoured, reducing the overall size of the nose. Care must be taken not to gouge the skin, particularly at the alar rim, which can be caught by the wire brush and inadvertently wounded. Application of lidocaine and epinephrine soaked gauze applied immediately postoperatively provides additional anesthesia and hemostasis.

### Tattoos

The depth of placement of the tattoo pigment is the determining factor for deciding which modality of treatment will best remove tattoos. Lasers, excision, and dermabrasion are all treatment options for tattoo removal and each is optimal in certain cases. When the pigment lies in the superficial epidermis and dermis, the alexandrite and YAG lasers can allow complete removal of the pigment without scarring. Unfor-

tunately, tattoo pigment is often placed at variable levels in the skin and often the depth of laser penetration does not reach the deeper pigment. Excision of the remaining portions of tattoo is often the best option. Sometimes the persisting tattoo pigment can be dermabraded, exchanging the pigment for white, hypopigmented scar. The use of gentian violet and Adaptec<sup>®</sup> gauze placed on the abraded surface immediately following dermabrasion is a useful technique that promotes phagocytic removal of deep pigment by macrophages in the acute phase of wound healing.<sup>17</sup>

### Summary

Dermabrasion is a reliable skin resurfacing modality. It is often the ideal treatment for contouring post-Mohs surgical defects, scar revisions, acne scars, rhinophyma, and tattoo removal. In the hands of a skilled operator, it may be combined with other skin resurfacing techniques to obtain optimal results.

**Figure 3.** An African-American patient after CO<sub>2</sub> resurfacing for acne scars. Notice the persisting pigment in the deep aspects of the acne scars.



**Figure 4.** An African-American patient after CO<sub>2</sub> resurfacing followed by dermabrasion of the cheeks, nose, chin, and upper lip for acne scars. Notice the improvement in persisting pigment in the deep aspects of the acne scars compared to CO<sub>2</sub> alone.





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