The past decade has seen a dramatic rise in the number of minimally invasive cosmetic procedures performed. In 2009, 12.5 million cosmetic procedures were performed by American Board of Medical Specialties board-certified physicians, an increase of almost 70% from 2000. These minimally invasive procedures have provided the public an alternative to surgery that can improve aesthetic appearances and combat the effects of aging. The popularity of these procedures can be attributed to lower costs as well as less time for recovery and healing.

Dermabrasion is a skin-resurfacing technique that has been around since the 1930s. Kromeyer first treated skin complaints with a rotating burr or rasp after freezing the skin with carbon dioxide snow or ether spray. Its use was expanded to traumatic tattoo removal when Iverson successfully used sandpaper to remove debris from the face in 1947. Over the past 50 years, dermabrasion has also been used for many other problems, including wrinkling, scar revision, and the treatment of precancerous lesions. A 50% increase in the number of dermabrasion procedures was seen in the past 10 years. However, the popularity of this technique has recently declined with the advent of other resurfacing treatments. Chemical peels and laser therapies have become increasingly popular to address similar problems that are treated by dermabrasion. However, dermabrasion can still be a more effective tool to treat severe or deeper problems of the skin.

ANATOMY OF THE SKIN

Comprising 16% of the total body weight, the skin is the largest organ system and plays a key role as an immunologic barrier and in the maintenance of homeostasis. Considering how insults to the...
integumentary system serve as a nidus for many serious systemic infections, a thorough understanding of skin anatomy is necessary in order for the physician to safely treat disorders of the skin.

The skin is functionally divided into 2 layers: the epidermis and the dermis. The epidermis is composed of epithelium and can be further subdivided into 5 layers: the stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum, and the stratum basale (germinativum). As the most superficial layer, the stratum corneum is composed of multiple layers of keratinocytes that are continually lost and regenerated. This layer is targeted during mechanical or chemical exfoliation. The stratum lucidum, found mainly in the palms of the hand and soles of the feet, contains a dense layer of keratin filaments that provides additional structural support. The stratum granulosum contains membrane-coating granules whose lipid-rich contents create a waterproof barrier for the skin. The stratum spinosum is the thickest layer of the epidermis and is characterized by the presence of multiple spiny cells rich in cyto keratin. The stratum basale contains the mitotically active cuboidal cells that generate the cells composing all other layers of the epidermis.

The connective tissue dermis forms 2 layers: the papillary layer and the reticular layer. The loose papillary layer is located directly beneath the stratum basale of the epidermis and houses the capillary network supplying the integument as well as the nerve endings critical to touch sensation. The markedly thicker reticular layer contains densely packed collagen that accounts for the skin’s great tensile strength. It also serves as the foundation for hair follicles as well as sweat and sebaceous glands.

**DERMABRADERS**

Many dermabrasers are available for skin resurfacing (Fig. 1). Most are handheld devices that are attached to a control unit that regulates the speed of the endpiece (Fig. 2). These handpieces may be driven by pneumatic or electric motors. The operator is able to control the dermabrader with a foot pedal. Typically, the speed ranges from 10,000 to 85,000 revolutions per minute (RPM); however, most operators control the dermabrader at 12,000 to 15,000 RPM.

The burrs come in many different sizes, shapes, and levels of coarseness. The most common endpieces used include diamond fraises, serrated wheels, or wire brushes. The operator chooses the tip based on the area needing dermabrasion and the desired depth of penetration. During the procedure, the dermabrader must be kept in constant motion across the skin with a gentle application of pressure. The amount of pressure applied and the selected speed are the 2 most important factors in determining the end results.

**INDICATIONS**

Dermabrasion has many applications as a skin-resurfacing technique and is commonly used for the treatment of fine perioral rhytids and fine wrinkles found in other regions of the face. Rhinophyma is another disease of the face often treated with dermabrasion. It is characterized by granulomatous infiltration of the nose, making it appear large and bulbous. With dermabrasion, the nose is debulked and rapid reepithelialization follows. Dermabrasion may also be used to revise scars from trauma, skin grafts, acne, and surgical incisions.

Premalignant and superficial malignant lesions of the skin can sometimes be treated with dermabrasion. Actinic keratoses, basal cell carcinomas, and squamous cell carcinomas have all been treated with success using skin-resurfacing techniques. However, treatment of malignant lesions using dermabrasion should be used cautiously because of the inability to accurately stage the tumor and determine clear margins.

**PREOPERATIVE WORKUP**

A thorough history and physical is performed at the initial consultation. Any pertinent medical history must be noted, including any bleeding disorders and history of rashes or cold sores. Patients who have had prior outbreaks of herpes simplex virus may require prophylactic antiviral medications, such as acyclovir.
Physicians should obtain medication lists to ensure that patients are not taking drugs that may lead to complications or compromise wound healing. If medically feasible, blood thinners and any medications that cause hyperpigmentation should be discontinued preoperatively. Isotretinoin (Accutane), a drug used to treat severe acne, may delay wound healing and cause hypertrophic scarring or keloid formation and, therefore, should be stopped at least 6 months to 1 year before undergoing the procedure. However, dermabrasion treatment during active acne may increase the risk of infection postoperatively and is a relative contraindication.

Dermabrasion can be performed on patients of varying ages. It is important to recognize the skin types of the patients and determine their Fitzpatrick skin type (Table 1). Those with dark complexions may experience permanent pigment changes following dermabrasion and, therefore, are not ideal candidates for the procedure. In addition, during the physical examination the skin on the entire body is surveyed for any evidence of keloids or hypertrophic scars that would discourage the use of dermabrasion.

The area that is to be treated by dermabrasion is closely examined. Patients must be informed of the limitations of the procedure and must have realistic expectations. Dermabrasion is more suitable for fine wrinkles and may not completely eradicate all imperfections, especially the deeper, coarse ones.

A few weeks before the performance of dermabrasion, patients can be pretreated with tretinoin (Retin-A). This medication promotes wound healing by increasing collagen formation. For patients at risk of hyperpigmentation postoperatively, hydroquinone, a bleaching agent, may be prescribed before the procedure.

**PROCEDURE**

Dermabrasion is commonly performed in office-based procedure rooms, surgery centers, and occasionally in the hospital. It is done under local anesthesia with the option of sedation or general anesthesia. Regional blocks are effective and additional topical anesthetics may be used to freeze the skin. If sedation or general anesthesia is used, patients must be monitored appropriately. The surgical team must wear appropriate sterile attire, including a mask with a facial shield. Protection from blood exposure and aerosolized particles during the procedure is important, especially when treating patients with a history of HIV or hepatitis.

The area to be dermabraded is marked and may be divided into sections when dealing with large surface areas to ensure uniformity. The appropriate diamond fraise tip or wire brush is chosen and attached to the handpiece. The skin is held taut with one hand or held by an assistant, and the dermabrader is moved across the skin with constant, gentle pressure. A back-and-forth motion is used for the diamond fraise tip, but the wire brush is moved in one direction (Fig. 3).

The borders of the treated area are feathered to prevent any noticeable transitions. The depth of skin that is dermabraded is one of the most important factors that will determine the outcome. No bleeding is seen while treating the epidermis because of the lack of vasculature. Punctate bleeding is visualized when entering the papillary dermis. The papillary-reticular junction is the ideal endpoint of dermabrasion and is identified by increased, confluent bleeding. Dermabrasion beyond the reticular dermis can lead to significant scarring.

**POSTOPERATIVE CARE**

Immediately following the procedure, saline-soaked gauze moistened with dilute epinephrine may be temporarily placed on the open wounds to achieve hemostasis. A moist environment is necessary to promote wound healing. Multiple petroleum-based products are available to maintain a moist environment and prevent desiccation, such as Aquaphor (Beiersdorf Inc, Hamburg, Germany) and Xeroform gauze (Kendall Inc, Mansfield, MA, USA). The wound is cleansed daily and ointment is reapplied as necessary. Reepithelialization is completed 7 to 14 days following the procedure.

Patients should minimize sun exposure or wear appropriate sunblock for 6 to 12 months following the procedure to avoid hyperpigmentation. Hydroquinone may be used to treat any hyperpigmentation seen after dermabrasion. Residual erythema and edema should be expected to last 1 to 2 months and nonallergenic makeup is worn during that time. Recovery from dermabrasion usually lasts 2 to 4 weeks. Patients are able to return to work within 2

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**Table 1**

| Type | Reaction to Sun       |
|------|-----------------------|
| I    | Always burns, never tans |
| II   | Usually burns, tans with difficulty |
| III  | Sometimes burns, average tan |
| IV   | Rarely burns, tans easily |
| V    | Very rarely burns, tans very easily |
| VI   | Never burns, tans very easily |
weeks; however, they are advised to avoid strenuous activities and exercise for 4 to 6 weeks.

**COMPLICATIONS**

Although dermabrasion is an effective skin-resurfacing tool, there are associated complications that physicians and patients need to be made aware of. Abnormal scarring, including the formation of hypertrophic scars and keloids, can potentially occur if dermabrasion is performed beyond the reticular dermal layer. It is also seen in patients with genetic predisposition, such as collagen disorders, and those taking certain medications.

Hyperpigmentation and hypopigmentation can be avoided with proper patient selection and perioperative care. Patients with Fitzpatrick skin types I and II are less likely to experience pigment changes. Patients are instructed to avoid excessive sun exposure; however, hydroquinone can be prescribed to treat unwanted hyperpigmentation.

Infectious complications can be treated with antibiotic and antiviral therapy. Patients with a history of a herpes outbreak are treated prophylactically with antivirals. Dermabrasion should be used with caution in patients with active acne and may require antibiotic treatment before undergoing the procedure. The formation of milia, small white keratin-filled cysts, may be seen following dermabrasion and usually resolve spontaneously, but they can be treated with incision and drainage when necessary.

**MICRODERMABRASION**

Microdermabrasion is a cosmetic technique that has gained considerable popularity as a less invasive, painful, and costly method of skin

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**Fig. 3.** (A) The wire brush is moved in a single direction during dermabrasion. (B) The diamond-fraise tip is used in a back-and-forth motion. (*From* AlKhawam BA. Dermabrasion and microdermabrasion. *Facial Plast Surg* 2009;25(5):307; with permission.)

**Fig. 4.** Microdermabrasion. A fine stream of crystals are used to disrupt the stratum corneum and the dislodged cells are removed by vacuum suction. (*From* AlKhawam BA. Dermabrasion and microdermabrasion. *Facial Plast Surg* 2009;25(5):307; with permission.)
rejuvenation. The procedure does not need to be performed by a physician, and is, therefore, offered at day spas, aesthetic clinics, and medical offices. Although its effects are not as dramatic as dermabrasion, it offers a more conservative choice in the management of photoaged skin.

The procedure consists of the operator using a device that mobilizes a fine stream of ablative aluminum oxide crystals at the skin with the intent of disrupting the stratum corneum. The cells at the most superficial layer are dislodged and simultaneously removed by vacuum suction (Fig. 4). The level of exfoliation achieved is dependent on many factors, including the skin contact time of the microdermabrader as well as the suction strength of the vacuum. Side effects are usually mild and include erythema and tenderness at the procedure site. These complications are treated with nonsteroidal anti-inflammatory drugs.

Microdermabrasion has uses in the treatment of acne scarring and photoaged, damaged skin. However, its noninvasive nature makes it of limited use in the treatment of skin beyond the most superficial layer of the epidermis. Multiple procedures are usually required to achieve a noticeable effect.

**SUMMARY**

Dermabrasion is an effective skin-resurfacing tool whose results have withstood the test of time. When performed properly, it can achieve dramatic results with a low risk of complications. Although its use has decreased because of the introduction of laser therapy and chemical peels, dermabrasion still retains some benefits over the other modalities in certain circumstances. Dermabrasion can be more effective than chemical peels in dealing with deeper wrinkles and may also be more advantageous in patients with darker complexions. Nonetheless, all 3 techniques may be used alone or in combination to achieve the desired effect.

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