

Dermabrasion

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INTRODUCTION

"Dermabrasion is dead. CO₂ laser resurfacing is the best method for removing acne scars and wrinkles. Microdermabrasion is a new technique with no downtime and can clear up acne scars and improve wrinkles. Dermabrasion has too many complications and is operator or technique dependent. CO₂ laser resurfacing is much easier to learn than dermabrasion. There is too much bleeding and risk of scarring with dermabrasion." The lists of claims and counterclaims about a time-honored technique as dermabrasion go on. The truth is that dermabrasion still remains a vital technique in the hands of a properly trained and experienced dermatologic and plastic surgeons. The complications from dermabrasion are no different or more frequent than any other resurfacing technique.

Jacob reviewed the different types of acne scarring and attempted to fit the treatment to the type of scar. They recommend punch excision, subcision, and laser resurfacing. Dermabrasion is not even considered but in the discussion they say "dermabrasion was once the main treatment modality for skin resurfacing but complications, technique dependent with steep leaning curves make it less attractive than laser resurfacing." They quote uncontrolled laser studies on acne scars. Controlled studies of wrinkles treating one side with dermabrasion and the other with CO₂ laser show equal clinical results with slower healing time with CO₂ laser resurfacing. Whang have combined chemical peel, excision, punch grafting, CO₂ laser and dermabrasion with excellent results. What a clever idea for a dermatologic surgeon to use many different techniques.

HISTORY

Kromayer described his cylindrical knives for punching scars, tattoos, pigmentation, abscesses, hair, nevi, and other defects in 1905. Later he described rasps or burrs with either clockwise or counterclockwise rotation for scar removal to which he attached motor-driven instruments from the dental clinic. He adapted his punches and rasps to perform "scarless operations," which were described in his book *Cosmetic Treatment of Skin Complaints*. Kromayer showed that healing of wounds occurs beneath a scab without obvious cicatrization if the injury does not penetrate the reticular dermis. Freezing the skin with carbon dioxide snow and ether spray provided rigidity as well as anesthesia suitable for dermabrading.

Kurten, who was a dermatologist, reawakened interest in wire brush motor-driven dermabraders using refrigeration for anesthesia in 1953. He reported improvement in acne scars, seborrheic and actinic keratosis, tattoos, wrinkles,

keloids, traumatic scars, adenoma sebaceum, nevi, and lichenoid plaques. Orentreich who worked with Kurten, popularized dermabrasion and refined much of today's equipment. Burke's textbook *Wire Brush Surgery in the Treatment of Certain Cosmetic Defects and Diseases of the Skin*, published in 1956 and revised in 1979 gave creditability to dermabrasion as an accepted procedure. There have been minor modifications in techniques since then. The author and others have used dermabrasion to treat nonacne-related lesions such as trichoepithelioma, epithelioma adenoids cysticum, and others.

Dermabrasion reached its peak in popularity in the 1950s. There was criticism of the procedure in the 1960s and early 1970s but with the renewed interest in dermatologic surgery in the 1970s and 1980s, dermabrasion became more popular. Dermabrasion has lost some popularity since the technique is old and not taught much in residency or fellowship.

INDICATIONS

Dermabrasion was developed as a method of treating acne scars. It has been used to treat a variety of problems including hypertrophic scars, traumatic scars, actinically damaged and wrinkled skin, and correction of pigmentary abnormalities. Among the cosmetic indications for dermabrasion are acne scars, fine wrinkling, scar revision, melasma, perioral rhytides, and tattoo removals (laser is probably treatment of choice for tattoos).

There are many other therapeutic reasons for selecting dermabrasion: epidermal nevus, epithelioma adenoids cysticum, rhinophyma, nevus angiomasus, syringoma, adenoma sebaceum, keloids, scar of discoid lupus erythematosus, actinic keratosis and solar elastosis, seborrheic keratosis, basal cell carcinoma, and Darier's disease. Hanke provided a list of 50 conditions that have been treated with dermabrasion (Table 1).

The correction of old and new scars by dermabrasion is very effective. Superficial sharply demarcated scars can often be completely removed while soft saucer like depressions can be improved but not eliminated. Emphasize to the patient that improvement is expected, but do not promise to eliminate all scars. Dermabrasion will soften sharp edges and improve the crater-like appearance of these scars caused by shadows in the depression. Deep ice-pick-type scars will require scar revision by punch excision and suturing, punch elevation or punch grafting at the same time as dermabrasion is done. Dermabrasion can also be used for cysts or to marsupialize epithelialized sinuses when chronically infected. In another chapter, Yarborough shows that

Table 1 Various Entities Treated with Dermabrasion

Postacne scars	Adenoma sebaceum
Traumatic scars	Neurotic excoriations
Smallpox or chickenpox scars	Multiple trichoepitheliomas
Rhinophyma	Darier's disease
Professionally applied tattoos	Fox-Fordyce disease
Amateur-type tattoos (India ink)	Lichenified dermatoses
Blast tattoos (gunpowder)	Porokeratosis of Mibelli
Multiple pigmented nevi	Lichen amyloidosis
Actinically damaged akin	Verrucous nevus
Age- and sun-related wrinkle lines	Molluscum contagiosum
Active acne	Keratoacanthoma
Freckles	Xanthlasma
Pseudofolliculitis barbae	Hemangioma
Telangiectasia	Leg ulcer
Acne rosacea	Scleromyxedema
Chloasma	Striae distensae
Vitiligo	Early operative scars
Congenital pigmented nevi	Hair transplantation
Syringocystadenoma papilliferum	(elevated recipient sites)
Nevus flammeus	Linear epidermal nevus
Keloids	Syringoma
Dermatitis papularis capilliti	Angiofibromas of tuberous sclerosis
Lupus erythematosus	Chronic radiation dermatitis
Basal cell carcinoma (superficial type)	Xeroderma pigmentosum
	Lentiginos

scars from excisional surgery or trauma can be dermabraded six to eight weeks after sutures are removed to camouflage these wounds by forming a more natural epidermal surface. Older wound do not respond as well unless they are re-excised, followed by dermabrasion. Dermabrasion has become a tool for treatment of photoaging skin, although most prefer lasers because of the tissue contraction that helps wrinkles.

Rhinophyma can be greatly improved with dermabrasion when combined with electrofulguration or CO₂ laser resurfacing for the contraction of tissue. Actinically damaged skin and aging skin is a growing indication for dermabrasion. Today, CO₂ laser, erbium laser, and noninvasive lasers may be better. In a study of half-face dermabrasion of actinically damaged skin, Burke showed that precancerous lesions were substantially reduced and their future development was retarded over a 5-year period. This work has been corroborated by Coleman et al., more recently. Aside from the benefit of the prophylactic effect on the development of new keratosis and the resolution of old ones, improvement in facial wrinkling is seen in dermabrasion patients.

EQUIPMENT

Proper outpatient operating room facilities must be available to perform dermabrasion. Most dermatologists perform dermabrasion in an office surgical unit separate from general offices or an ambulatory surgical center. Hospitalization with general anesthesia is not necessary and adds to the expense and risk of the procedure but should be offered to the patients. There should be a versatile operating table capable of placing the patient in several different positions. Adequate lighting and proper emergency equipment should be available. The patient's past medical history and current medications should be noted. The operator and assistant should wear surgical gowns and gloves. A plastic face

**Figure 1** Osada XL 20 dermabrasion with foot pedal control.

shield and mask is worn for protection from blood and tissue particles that spray.

Hand engines are the most popular dermabraders because they are small, hand-held engines that are quiet and easy to maneuver. The Bell Hand Engine and Osada models (Fig. 1) can reach rotational speeds of 18,000 to 35,000 rpm in both directions, depending on the model. A rheostat adjusts the speed, which can also be controlled with a foot pedal. The combination of rotational speed of the machine, abrading attachment, and pressure applied by the operator allows rapid planning, which is not as convenient as hand engines.

Nitrogen-driven machines, such as the Stryker unit, are well built, provide excellent torque, and reach 50,000 rpm easily. The handpiece is larger than the hand engine. It is necessary, however, to store and replace large tanks of nitrogen.

The abrading end pieces for dermabrasion are diamond fraise, wire brush (Fig. 2), or serrated wheel. Diamond fraises are stainless-steel wheels on which diamond chips of different grades of coarseness (regular, coarse, or extra coarse) are bonded. Most experienced surgeons use the coarse or extra coarse fraises. The cylinder type comes in various widths and diameters, while other shapes such as pear, are helpful in specific locations.

The wire brush is a stainless-steel wheel with wires arranged at an angle. The wires of the brush cut deep and

**Figure 2** Dermabrasion operative site. Gentian violet to mark areas for dermabrasion, towels, and wire fraise on dermabrader. (See color insert.)

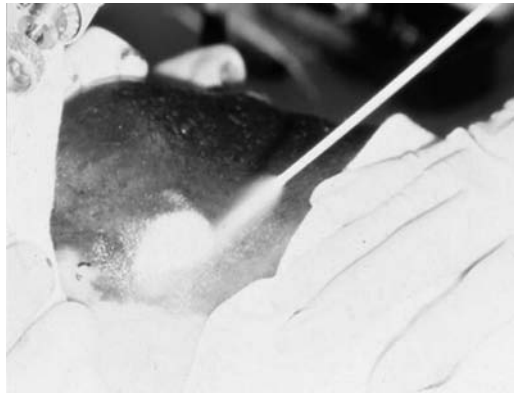


Figure 3 Cryoanesthesia to skin with Frigiderm spray.



Figure 4 Immediately postoperative after full-face dermabrasion. (See color insert.)



Figure 5 Immediately postoperative with the Vigilon dressing applied to areas of dermabrasion.

rapidly in frozen skin. Most experienced surgeons prefer the wire brush, but for the novice these are much harder to control and can gouge easily. The wire brush should be used for the deep scars and the diamond fraise to feather the edges

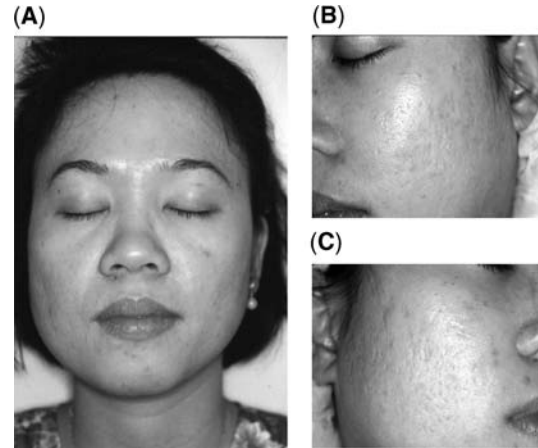


Figure 6 (A-C) Preoperative pitted scars of moderate severity on entire face. (See color insert.)

or plane more smoothly than an area treated with the wire brush. The CO₂ laser may be used after epidermis is removed to get more contraction of collagen of scars.

PATIENT SELECTION AND PREOPERATIVE ASSESSMENT

The preoperative consultation is extremely important. You must tell the patient clearly what to expect from the procedure, as well as get a feel for what he or she really understands. List alternative procedures such as chemical peel, collagen, collagen implants, microdermabrasion, and CO₂ laser. The use of photographs, video, or PowerPoint® presentation to demonstrate the procedure, as well as before and after pictures including that of complications, are helpful in the consultation. This discussion should be documented in the chart. Pamphlets and handout brochures are good.

Patients who seek cosmetic surgery to improve their appearance for a variety of personal reasons have particular personalities. The surgeon must have a basic understanding of psychology and specifically the psychopathology of the



Figure 7 Ten days postdermabrasion with edema and erythema. (See color insert.)

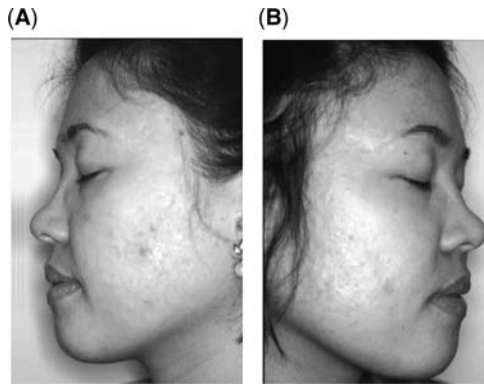


Figure 8 (A-B) Six weeks after dermabrasion with return of normal colored skin and marked improvement in scars. (See color insert.)

cosmetic surgery patient. Therapeutic dermabrasion may relieve some of the pressure to achieve perfect results. Avoid promoting dermabrasion and list the other options available and the complications that can occur. There are adjunctive procedures that are often combined with dermabrasion and these should be carefully covered in the consultation. The physician must decide who is a good candidate and if a reasonable improvement can be expected. Avoid the patient who has a minimal scar and cannot tolerate what seems like a slight blemish. Also, avoid patients critical of care given by previous physicians. The patient's criticism may be valid, but you too may be unable to live up to the patient's expectations.

Preoperative work-up includes a medical history, specifically other medication (especially aspirin) and diseases such as hepatitis, HIV infection, and recurrent herpes simplex. Evaluate atypical scars or keloids from previous surgery that may be predictive of poor results. Laboratory evaluation includes complete blood cell count, serum chemistry values, and bleeding time, although frequently these tests are not necessary. Other tests include evaluation of hepatitis B antigen and antibody and HIV antibody titers. These are done to protect the surgeon and staff.



Figure 9 Dark-skinned patient with facial epidermal nevus. Test spot dermabrasion in right temple, then entire cheek treated. There is good repigmentation. (See color insert.)

Outstanding reviews by Roenigk, Yarborough, and Alt of techniques using the wire brush and diamond fraise require little elaboration. It must be emphasized that dermabrasion is a hands-on technique that requires adequate preceptorship training under the auspices of someone experienced in this art. Most authors agree that a wire brush requires considerably more skill and runs higher potential risk for injury as it is able to cut much deeper and more quickly than is the diamond fraise. Wire brushes do produce superior results in deeper scars.

Many patients requesting dermabrasion have been previously treated with 13 isotretinoin (Accutane[®]) systematically. This potent acne therapy causes sebaceous gland atrophy, a cause for concern in the healing process. Initial reports suggested that dermabrasion patients were unaffected by previous treatment with isotretinoin then later reports suggested that patients who were dermabraded after isotretinoin exhibited atypical scarring. Subsequently, other surgeons have compiled patients that have been treated with isotretinoin and dermabraded without difficulty. This controversy has not been settled but has significant medical and legal implications. There is still no definite answer to the question of isotretinoin treatment and postdermabrasion scarring but it can occur unpredictably after use of isotretinoin. It is prudent for physicians to suggest that isotretinoin patients be fully informed of the potential risks and wait a period of at least six months to a year before undergoing dermabrasion.

Another preoperative consideration is the HIV. Dermabrasion results in the aerosolization of blood and tissue products and potentially, live infective viral particles. Wentzell indicated that aerosolized particles produced during dermabrasion were of sufficient size to allow access to, and retention by, mucosal and pulmonary surfaces. The studies suggested that commonly used personal protection devices, such as operating masks, goggles, and scatter shields, do not prevent the inhalation of these particles. Risks clearly exist to the physician, his assistants, and other personnel, as well as to the HIV-infected patient. A thorough history, HIV titers and all protective equipment must be used when doing dermabrasions and there must be the realization that with all of these measures, there still remains a degree of risk. Therefore, doing dermabrasion in HIV

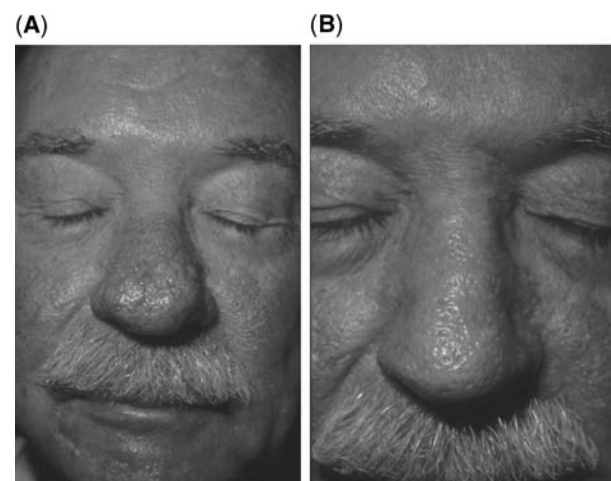


Figure 10 Rhinophyma before and after dermabrasion combined with CO₂ laser. (See color insert.)

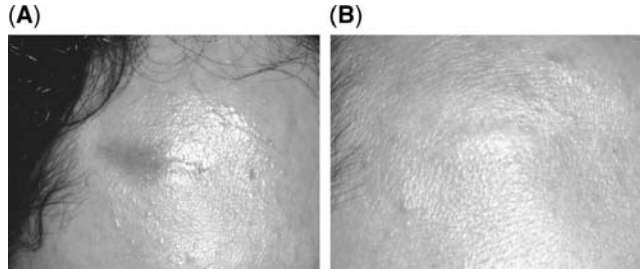


Figure 11 Surgical excision with dermabrasion six weeks after the wound healed. Nice cosmetic improvement of scar.

patients is not recommended. Other alternative procedures can be used. Similar precautions regarding hepatitis are recommended.

Surgical scars respond so well to dermabrasion that patients who are receiving excisional surgery are told preoperatively that dermabrasion in six weeks may be a viable option as a “touch-up.” Dermabrasion can also be done at the time of the surgical scar if its location can be improved cosmetically by dermabrasion. The results of waiting six weeks of doing simultaneously with the surgery show equal results.

ANESTHESIA

Preoperative medication should relax the patient and reduce pain since most dermabrasion is done with local anesthesia. Intramuscularly meperidine hydrochloride (50–100 mg) and intravenous diazepam (10–20 mg) provide sedation, although other agents may be used. These can also be given during the procedure by keeping an intravenous line open. The blood pressure, pulse, and heart rate should be monitored continuously. A pulse oximeter is necessary for all patients under heavy sedation. Ibuprofen or corticosteroids may help reduce edema and bleeding. Preoperative topical retinoic acid may reduce the incidence of milia postoperatively and enhance wound healing.

For small areas, it is preferable to use a local anesthesia field block. Nerve blocks with lidocaine may be used on the central face, based on the distribution of facial sensory nerves. Approximately, 3 ml of lidocaine is injected bilaterally at the supraorbital notch, supratrochlear region, infraorbital foramen, and mental foramen.

Tumescent anesthesia may be useful in dermabrasion and can eliminate nerve blocks and cryoanesthesia. This takes more time to deliver to the entire face. It also distorts the scars that are to be dermabraded.

Prechilling of the skin with ice packs enhances the anesthetic effect of hydrocarbon sprays used for topical

cryoanesthesia. The skin is sprayed by the assistant in a circular motion for 10 to 20 seconds until it becomes frigid and developed a white frost (Fig. 3). Freezing too aggressively will result in deep cryonecrosis in the dermis, especially over the mandibular bone. The area to be sprayed is usually not greater than 2 to 3 cm. Towels not gauze should be used to protect the adjacent skin.

The choice of spray anesthesia is important. Ethyl chloride is the oldest agent and is not used much because it is explosive and inflammable, has general anesthetic properties and requires a blower for rapid evaporation. Frigiderm (Freon) and Fluro-Ethyl are Freon 114 and Freon 114 plus ethyl chloride, respectively. They generally freeze the skin surface to -42°C in 25 seconds. Freon and Fluro-Ethyl are the preferred agents for cryoanesthesia.

General anesthesia is used more frequently by non-dermatologic surgeons. Except for special circumstances, this only adds to the risk, cost and time to do this procedure. The vast majority of dermabrasions are done in office surgical suites.

TECHNIQUES

Dermabrasion requires at least one assistant to help with freezing and to hold the skin taut. Both the operator and assistant should wear gowns, rubber gloves, and plastic face shields. The assistant should wear cotton gloves over rubber gloves to protect the fingers. Cotton towels are preferred over gauze, which easily gets caught in the wire brush. The area should be painted with Gention violet to serve as a guide (Figs. 2 and 3). Gention violet deep in the scars also indicates whether the abrasion has gone to the sufficient depth to obliterate them. Disposable eye patches are the best cover for the eyes. The patient lies supine on the table.

Dermabrasion of the face is usually done in sections: four on each cheek, two on the chin, two on the nose, two on the upper lip, and three on the forehead. Spraying and abrading one area at a time, the surgeon starts at the outermost and dependent areas and moves toward the central and upper areas of the face (Fig. 4). The operator moves the brush or fraise over the frozen skin with firm, steady, back-and-forth strokes, and even pressure. In areas with deeper scars, more pressure may be applied. Dermabrasion is done in anatomic units, so it is usually done to the natural folds of the face (nasolabial fold, hairline, or submandibular). This is done to avoid obvious lines of demarcation that can occur with spot dermabrasion. CO_2 laser resurfacing of the lower eyelids and lip, if necessary, is preferred over dermabrasion. Localized dermabrasion of a small area of scarring is also risky because texture and pigment changes may be readily apparent. Although the trunk is usually not dermabraded, lesions on arms and legs may respond well.

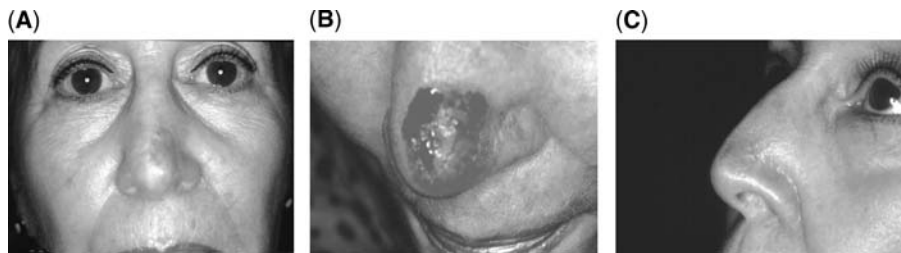


Figure 12 Skin graft on nose following Mohs surgery for basal cell carcinoma. Immediately after and six weeks after dermabrasion of graft and edges.

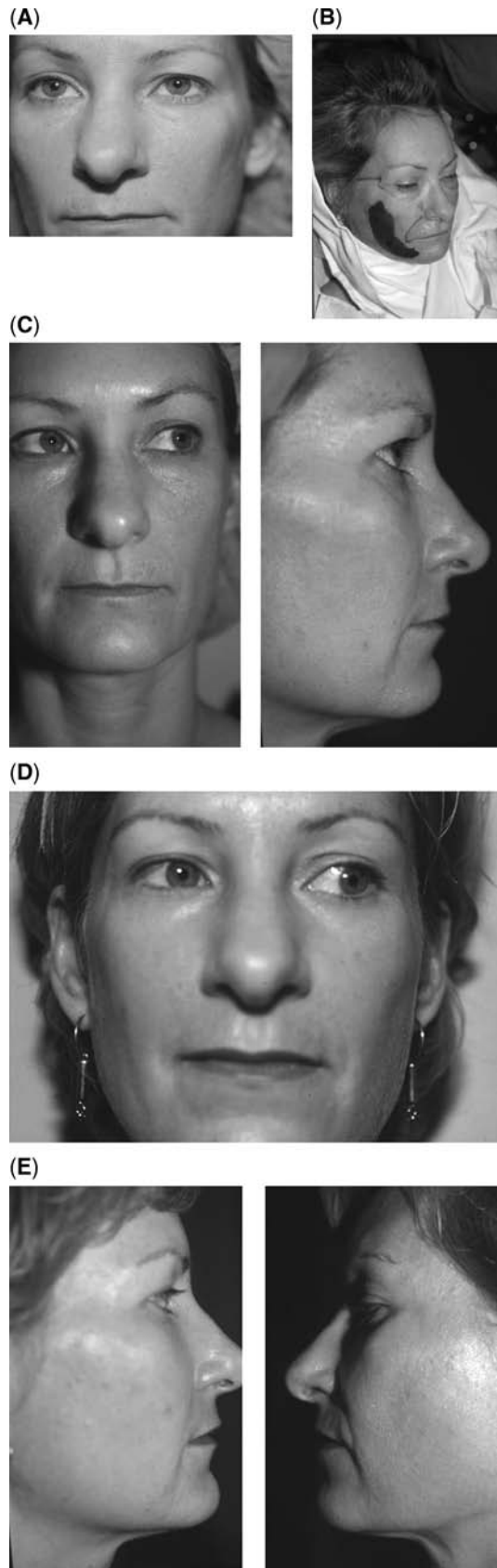


Figure 13 Mild acne scar on cheek and wrinkle under eyes and upper lip (A–B). CO₂ laser under eyes and upper lip. Dermabrasion of cheek six weeks postoperative (C–E).

POSTOPERATIVE CARE AND DRESSING

The author has tried many types of dressings in more than 30 years of performing dermabrasion. For the past 15 years, the dressing choice has been Vigilon or second skin (Spenco).

Vigilon appears to fulfill more criteria for the ideal wound dressing than any of the other wound dressings. It is composed of 4% polyethylene oxide and 96% water in a colloidal suspension on a polyethylene mesh support. Prior to application, a polyethylene film is removed from the side of the dressing that will cover the wound. Vigilon, unlike other occlusive dressings permits a moist environment while allowing for absorption of wound exudates (Fig. 5). It is also nonadherent. The Vigilon is changed daily for about five days and then the wound is left open with lubrication applied.

Biological dressings, in patients undergoing full-face dermabrasion, act by preventing dehydration to allow rapid epithelial migration. Healing time or re-epithelialization is reduced by as much as 50%. Vigilon (second skin) may be the best dressing to use the following dermabrasion. Re-epithelialization will occur in five to seven days without crusting compared to 10 to 12 days when crusts are allowed to form.

Op-site was the first in a series of thin, transparent, semipermeable, synthetic polyurethane membranes to be used as a wound dressing. Several others have been introduced, including Bioclusive (Johnson & Johnson), Tegaderm (3M), and Ensure (Deserat). Each is a thin, elastic film, transparent and permeable to air and water vapor without being porous. They do not adhere to the wound, but stick to intact skin and conform to the curves of the face. The membrane protects nerve endings like a second skin, giving immediate pain relief. They keep the wound moist and prevent eschar formation thus providing optimal conditional for re-epithelialization.

The patient is given written instruction for postoperative care. Pain medication such as acetaminophen with codeine is helpful. Systemic antibiotics (dicloxacillin or Keflex 500 mg two times a day) and a short course of prednisone starting at 40 mg/day and tapering in one week are useful in reducing infection and postoperative edema. Antiviral drugs such as acyclovir or valacyclovir are essential prior to and 10 days after postoperative.

The patient is seen in 24 hours for dressing change. The Vigilon dressing is then changed on a daily basis at home or in the office depending on the patient's choice. Office dressing changes are better and you can detect any problems early. The patient should be evaluated regularly at 7, 14, and 30 days—more often if necessary.

Avoidance of sun is important after dermabrasion. Sun exposure may easily burn the new skin and will predispose to postinflammatory hyperpigmentation.

CLINICAL RESULTS FROM DERMABRASION

Dermabrasion is most frequently done for acne scars (Figs. 4–6). You can expect improvement but frequently touch up dermabrasion is needed. Even patients with oriental skin color or darker skin colors (Figs. 7A and B) will respond and heal with normal repigmentation.

Other therapeutics indications are rhinophyma (Figs. 8A and B), surgical scars (Fig. 9A and B), and skin grafts (Fig. 10C). Photoaging skin and wrinkles are more often treated by CO₂ laser because of the collagen contraction but dermabrasion in the past has been effective (Fig. 11C). Deep acne scar may



Figure 14 Deep acne scars requiring both dermabrasion (A) before, (B) after 1st Dermabrasion and follow-up touch up with CO₂ laser. (C) 2 weeks after CO₂ laser, (D) 3 months after Dermabrasion and CO₂ laser.

require repeat dermabrasion (touch up) and/or CO₂ laser to get tissue contraction of edges of scar (Figs. 12 and 13D).

COMPLICATIONS AND CONTRAINDICATIONS

Among the most common complications are keloids (Fig. 14)-hyperpigmentation, hypopigmentation (Fig. 15), hypertrophic scars, gouging of skin, herpes simplex, milia, persistent erythema, and telangiectasia (Fig. 16).

Erythema is expected in the postoperative period, but it may persist for weeks or months with some telangiectasia. Milia formation is very common and can easily be

corrected by abrasive soaps or simple extraction. Pinpoint electrodesiccation can also be used. The use of topical retinoic acid prior to and after dermabrasion may be reduced with the incidence of milia.

Hypertrophic scars or keloids may occur in a small number of patients (Fig. 14). A personal or family history of keloid formation is a relative contraindication. African-American patients tend to form keloids more frequently. The use of refrigerants, especially on the mandible may be partially responsible. Atypical keloids develop in atypical locations such as the buccal skin after dermabrasion of patients still on or having recently taken isotretinoin.



Figure 15 Deep acne scars which need deep dermabrasion, punch excision, and CO₂ laser. (A-B) pre-operative, (C) after dermabrasion and punch excision, (D-E) 2 month postoperative, (F) after CO₂ laser.

Patients now wait six months to one year after stopping isotretinoin before the procedure. Treatment of these scars with intralesional triamcinolone is helpful. Early treatment with flashed pumped dye vascular laser may stop the development of keloids if used early.

Patients with a history of recurrent herpes simplex should be approached with caution. The surgeon should avoid

Figure 15 (Continued)

dermabrasion in the trigger areas of previous herpes simplex. All patients regardless of history of herpes simplex are treated with an anti-viral agent. Oral acyclovir 400 mg three times a day or valacyclovir 1.0 mg two times a day for three days before and until the skin has re-epithelialized, should be given prophylactically. If disseminated herpes simplex develops, hospitalization and intravenous acyclovir are indicated.

Hypopigmentation and hyperpigmentation are common but usually temporary. Pigmentary problems are more common in dark-skinned patients (skin types IV-VI). It is most noticeable at the edges of the dermabrasion or in spot dermabrasion. Postinflammatory hyperpigmentation usually fades in several months and topical hydroquinone 4% may be helpful.

Acne will occasionally recur after dermabrasion, although most patients with minimally active disease will



Figure 16 Complication—keloids on chin. (See color insert.)



Figure 18 Complication—persistent erythema and telangiectasia. (See color insert.)

actually improve. Infection with *Staphylococcus* and *Pseudomonas* occurs occasionally and needs prompt topical and systemic therapy. *Candida albican* infection can occur and culture prompt treatment with Diflucan[®] is essential.

Dermabrasion is usually contraindicated in patients with chronic radiodermatitis, pyoderma, herpes simplex, psychosis, severe psychoneurosis, alcoholism, xeroderma pigmentosum, verrucae planae, or burn scars.

ADJUNCTIVE PROCEDURES WITH DERMABRASION

Subcision of depressed scars using a Nokar[™] (B-D) needle will release fibrous bonds. Larger deeper scars that do not respond well to dermabrasion alone may be treated in other ways. Punch excision with a circular punch can be sutured closed. Occasionally, the depressed scar can be removed with 4 to -5 mm punch and elevated flush to the surface

of the surrounding skin and held in place with steristrips. In addition, punch excision of the scar with a full-thickness punch graft replacement taken from the postauricular area will fill these defects. Dermabrasion is usually done six weeks after these procedures have corrected the deeper



Figure 17 Complication—hypopigmentation. (See color insert.)



Figure 19 Severe rhinophyma treated with dermabrasion and CO₂ laser at the same time. (A) Preoperative; (B) immediately postoperative; (C) 2 months postoperative.

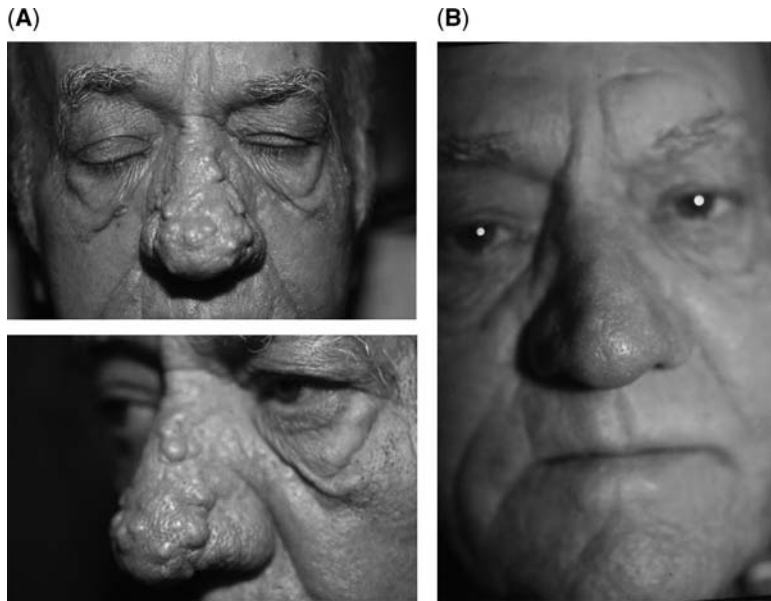


Figure 20 Severe rhinophyma and multiple cysts of nose treated by combination dermabrasion and CO₂ laser at the same time. (A) preoperative; (B) postoperative.

scars to smooth the skin surface. We now do both procedures at the same time with similar results.

Bovine collagen (Zyderm I or II or Zyplast™) or hyaluronic acid (Restylane™) used to augment soft depressions remaining after dermabrasion. Dermabrasion should probably be done just to eliminate as many scars as possible. Collagen implant or autologous fat implants can be used to fill out the remaining scars. Zyderm will last only four to six months. Restylane last longer than Zyplast—up to six months. Fat implants may be more permanent. Fat implants have been used in recent years to correct the soft shallow larger scars not corrected by dermabrasion. Dermabrasion can safely be done on patients who have previously received collagen or silicone injections.

COMBINING RESURFACING

Resurfacing of the face to remove acne scars, wrinkles, actinic keratosis, and photodamaged skin is not a new technique. The recent boom in resurfacing lasers leads one to believe that lasers invented the technique of resurfacing and rejuvenation the face. Many techniques have been available for almost 100 years, but certainly, in the past decade the whole field has shown new promise. Sometimes the technique or device (i.e., laser) is brought to the public's attention with publicity on television, in newspapers, women's magazines before adequate clinical trials can be completed, and long-term results and potential complications can be evaluated.

The Er:YAG laser was developed in an attempt to reduce healing time and minimize erythema while still trying to achieve the results of CO₂ laser resurfacing. There are also lasers which combine the CO₂ laser with the Er:YAG laser, as well as lasers with two different Er:YAG delivery systems. There have been some comparative studies with clinical and histologic evaluation to try to evaluate the benefit:risk ratio of all lasers.

We can incorporate new technology where it has an advantage over previous techniques (i.e., CO₂ laser for contraction of collagen), but we should retain chemical peels, dermabrasion, and soft-tissue augmentation in combination where indicated. The next several cases will

illustrate the points of combination resurfacing with emphasis on dermabrasion.

COMBINATION RESURFACING CASES

Dermabrasion plus CO₂ laser combined with dermabrasion is usually performed first followed by CO₂ laser for touch up and contraction (Figs. 12 and 13). Dermabrasion can be combined with CO₂ laser in different locations to achieve different goals (Fig. 11). Dermabrasion and CO₂ laser can be used at the same time for severe cases of rhinophyma (Figs. 17 and 18C). Severe photoaging skin may require full-face CO₂ laser plus dermabrasion (Figs. 19B and C, 20, and 21).

COMPARISON WITH OTHER MODALITIES

All resurfacing techniques result in upper to mid-dermal wound. Dermabrasion relies on mechanical "cold steel" injury, acid peels result in a "caustic" injury, and lasers result in a thermal injury. Studies in the porcine model comparing carbon dioxide laser, trichloroacetic acid, and dermabrasion by Fitzpatrick and Campbell have shown that histological and ultrastructural changes seen following these procedures are comparable. A study by Giese revealed that when dermabrasion was compared with chemosurgical peels, significant alterations were seen in the elastic fibers in histological and mechanical properties. Holmkvist reported that half-face perioral dermabrasion contrasted with half-face CO₂ laser resurfacing yielded identical clinical results but that dermabrasion healed in approximately half the time with significantly less postoperative erythema and morbidity. Most surgeons practicing resurfacing agree that extended postoperative erythema and delayed hypopigmentation are more common with phenol or CO₂ laser than dermabrasion. A review by Baker points out that dermabrasion equipment is inexpensive, portable, and widely available, requires no specialized accessory equipment, and poses no fire hazard in the operating room. Dermabrasion should not become a lost art. It has many advantages over other resurfacing techniques.



Figure 21 (A) Severe photoaging (Glogau Type IV) with very deep rhytides. (B–C) Immediately after treatment with full-face CO₂ laser resurfacing and spot dermabrasion to deeper wrinkles. All done at the same original surgical time. Good postoperative results (D–H) before and after 6 months.

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