

Camouflage of Self-Inflicted Razor Blade Incision Scars with Carbon Dioxide Laser Resurfacing and Thin Skin Grafting

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Background: Self-cutting using a razor blade is a type of self-mutilating behavior that leaves permanent and socially unacceptable scars with unique patterns, particularly on the upper extremities and anterior chest wall. These scars are easily recognized in the community and become a source of lifelong guilt, shame, and regret for the self-mutilators. In the presented clinical study, we aimed to investigate the effectiveness of carbon dioxide laser resurfacing and thin skin grafting in camouflaging self-inflicted razor blade incision scars.

Methods: A total of 26 anatomical sites (11 upper arm, 11 forearm, and four anterior chest) of 16 white male patients, whose ages ranged from 20 to 41 years (mean, 23.8 years), were treated between February of 2001 and August of 2003. Detailed psychiatric evaluation preoperatively; informing the patient that the procedure is a “camouflage” operation; trimming hypertrophic scars down to intact skin level; intralesional corticosteroid injection to hypertrophic scars; carbon dioxide laser resurfacing as a single unit; thin (0.2 to 0.3 mm) skin grafting; compressive dressing for 15 days; use of tubular bandage; and protection from sunlight for at least 6 months constituted the key points of the procedure.

Results: The scars were successfully camouflaged and converted to a socially accept-

able appearance similar to a burn scar. Partial graft loss in one case and hyperpigmentation in another case were the complications. No new hypertrophic scar developed.

Conclusions: The carbon dioxide laser resurfacing and thin skin grafting method is effective in camouflaging self-inflicted razor blade incision scars. (*Plast. Reconstr. Surg.* 116: 798, 2005.)

Self-mutilation is described as the intentional harm of one's own body without conscious suicidal intent.¹⁻⁴ Some practices such as tattooing; body piercing; and healing, spiritual, and order-preserving rituals constitute the culturally sanctioned aspect of self-mutilation. The pathologic self-mutilation, which is a “non-culturally sanctioned behavior,” can be categorized into three basic types: (1) major (infrequent acts such as eye enucleation and castration, usually associated with psychoses and acute intoxications); (2) stereotypic (fixed, rhythmic behavior such as head banging and self-biting that usually accompanies Tourette's syndrome or severe mental retardations such as Lesch-Nyhan or Cornelia de Lange syndromes); and (3) superficial/moderate (acts such as self-cutting, burning, interfering with healing of wounds, excessive nail biting, pulling out one's own hair, hitting, or bruising).^{1,2,5} Self-mutilation has been not

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classified as a specific clinical entity among psychiatric disorders in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Rather, it has been regarded as a common symptom accompanying various mental disorders such as psychoses, depression, posttraumatic stress disorder, dissociative disorders, and various personality disorders such as borderline and antisocial personality disorders.⁶⁻⁹ Favazza and Rosental have proposed that a syndrome of repetitive superficial or moderate self-mutilation should be regarded as an axis I impulse disorder.²

Superficial/moderate self-mutilating behavior has been used as a coping strategy among teens and young adults to decrease emotional distress, dissociation, and posttraumatic symptoms.¹⁰ Self-mutilators typically wear long-sleeved or baggy clothing, even in hot weather, and display an unusual need for privacy. They are often hesitant to change their clothes or undress around others. It has become a major public health concern, as the incidence of self-mutilating behaviors appears to have risen since the early 1990s. It has begun to attract mainstream media attention, and many more who suffer from it are expected to seek treatment.^{5,10,11} Self-mutilation was reported by 4 percent of the general population and 21 percent of the clinical sample, and it was equally prevalent among male subjects and female subjects.¹⁰ Alcohol and substance abuse, childhood physical or sexual abuse, criminal behavior, suicidal behaviors, eating disorders, and difficulty in interpersonal relationships are common among the self-mutilators.³⁻⁹

Self-cutting of one's own skin using a razor blade is one of the most common self-mutilating behaviors and results in permanent and unique scars on the extremities and trunk that cannot be disguised. These socially unacceptable scars are easily recognized in the community. These scars become a source of lifelong shame, guilt, and regret for the self-mutilator. People with multiple scars on their bodies are stigmatized by the community. They experience serious image problems, which disrupt their social and business lives, even if they have stabilized emotionally and ceased acts of self-mutilation. Such people request that plastic surgeons eliminate the scars totally if possible, or at least to convert them to socially acceptable scars.

Self-inflicted razor blade incision scars are localized mostly on the upper extremities and

anterior chest wall and may be associated with hypertrophic scar formation. Multiple scars in diverse directions with intact skin among them are seen on a given anatomical site and constitute a unique scar pattern that points out the cause. Conventional scar revision techniques and treatment modalities used for isolated scars do not suffice to change the unique scar pattern effectively. To the best of our knowledge, there are only two reports in the English literature specifically addressing this challenging problem. Welch et al.¹² reported full-thickness excision of the involved area and application of a split-thickness skin graft in the treatment of four patients. Papanastasiou¹³ reported the harvesting of split-thickness skin graft from the scarred skin and reapplication of the graft after turning it 90 degrees.

We have successfully used the carbon dioxide laser resurfacing and thin skin grafting method in the treatment of burn scar depigmentation¹⁴ and stable and recalcitrant vitiligo¹⁵ previously. In the present study, we aimed to investigate the effectiveness of the same technique in camouflaging self-inflicted razor blade incision scars.

PATIENTS AND METHODS

Patients

A total of 26 anatomical sites (11 upper arm, 11 forearm, and four anterior chest) of 16 white male patients, whose ages ranged from 20 to 41 years (mean, 23.8 years), were treated between February of 2001 and August of 2003. Patients suffering from multiple self-inflicted razor blade incision scars on their upper extremities and anterior chest walls for more than 6 months were included in the study. All of the candidates and their psychiatric records were evaluated by a psychiatrist in the patient selection phase of the study. Those receiving medical therapy for any medical or psychiatric problem, having unrealistic expectations from the procedure, suffering from body-dysmorphic disorder, and psychotics were excluded from the study. Three of the patients had lacerated themselves once in their adolescence period as a reactive behavior and were psychologically normal before surgery. One patient was diagnosed as having paranoid personality disorder, two patients were diagnosed as having borderline personality disorder, and 10 patients were diagnosed as having antisocial personality disorder according to *Diagnostic and*

Statistical Manual of Mental Disorders, Fourth Edition axis II criteria. They had more than one self-mutilating behavior before treatment. The mean time between the treatment and last self-mutilation was 28 months (range, 6 months to 8 years). The incision scars were associated with multiple hypertrophic scars in seven anatomical sites. No patient had keloid formation. The Fitzpatrick skin types of the patients were type III in eight patients, type IV in seven patients, and type V in one patient. One anatomical site in nine patients, two anatomical sites in four patients, and three anatomical sites in four patients were treated in the same session. Informed consent was obtained from all patients after they were given a full explanation of the study.

Operative Procedure

Safety precautions were taken in the operating room for use of the carbon dioxide laser. After induction of general anesthesia and endotracheal intubation, the lacerated skin and the skin graft donor sites were shaved, prepared with povidone/iodine topical antiseptic solution, and draped in a sterile fashion. The areas were wiped with saline-soaked gauze and dried with a gauze sponge. The elevated portions of the hypertrophic scars were shaved with a no. 22 blade. Then, the whole anatomical site including multiple scars and intact skin among them were resurfaced evenly as a single unit by one pass of a flash-scanned carbon dioxide laser (Sharplan 150 XJ SilkTouch, Sharplan Lasers, Inc., Needham, Mass.) with an F 260 Handpiece, 9-mm spot size, and 34 W on SilkTouch Mode. Treated areas were wiped with saline-soaked gauze and dried with a gauze sponge. A second pass was applied to hypertrophic scar wounds to depress them more compared with neighboring intact dermis, and intralesional triamcinolone acetonide (20 mg/ml) injection was performed. Thin split-thickness skin grafts (0.2 to 0.3 mm in thickness) were harvested from the thigh region with a Padgett electrical dermatome, meshed with a no. 15 Bard-Parker blade to avoid seroma formation, and applied over the laser-resurfaced raw surfaces. Skin grafts were fixed by skin stapler or paper tapes. The grafted areas were closed with nonadherent dressing and covered with gauze sponges moistened with saline solution. Skin graft donor areas were covered with the same dressing material. The treated extremities were splinted

and elevated for 5 days. The dressings were changed every 3 days for 15 days (Fig. 1). Compressive tubular bandages (Tubigrip; Seton Health Care Group, Manchester, United Kingdom) were used for 3 months in those patients undergoing surgery of their extremities for protection from minor trauma and sunlight. The patients were advised to protect their operation sites, including graft donor areas, from the sun for at least 6 months and to use broad-spectrum sunscreens and skin moisturizers. Additional intralesional corticosteroid injections were applied at 4-month intervals as needed.

RESULTS

All of the procedures were successful, and the postoperative course was uneventful for all of the patients. The mean duration of the procedure was 45 minutes (range, 20 to 85 minutes). Partial graft loss on the anterior chest caused by inadequate immobilization was observed in one patient and the wound reepithelialized spontaneously. Skin graft donor sites healed in 5 to 7 days. The postoperative follow-up period ranged from 4 to 28 months, with an average period of 12 months. The skin grafts were reddish to pink in the first postoperative month, and then they developed a temporary hyperpigmented appearance for several months. The final color and texture became established in the following months. Significant hyperpigmentation developed in one patient who did not protect the grafted area from sunlight. Small inclusion cysts, which were treated definitely by opening the top of the cyst and removing the contents, were observed in five patients in the early postoperative period. Hair growth through the skin graft was excellent, and normal hair patterns were regained over the treatment sites. Eighty percent of the existing hypertrophic scars were totally resolved after the operation. Twenty percent of hypertrophic scars showed a tendency to recur and responded well to repetitive intralesional steroid injections and silicone gel sheeting. No new hypertrophic scar or keloid formation developed in any of the treated areas. Although there was some color and texture mismatch in the grafted areas, the usual pattern of self-inflicted razor blade incision scars was successfully converted to another form similar to a burn scar, which is socially acceptable (Figs. 2 through 4). Although not all of the outcomes were excellent for us, the patients were satisfied with the result and stated that nobody



FIG. 1. (Above, left) Preoperative view of self-inflicted razor blade incision scars. (Above, right) Bloodless and smooth raw surface after shaving of hypertrophic scars and laser resurfacing. (Below, left) Thin skin grafts were applied and fixed with a skin stapler. (Below, right) Postoperative view after 15 days.

could recognize that they were self-inflicted incision scars. The patients explained the new appearance of their scars as an “old burn” or “an operation scar” to others. We showed the final photographs of the 16 patients to eight observers (four women and four men) with different socioeconomic and educational backgrounds and asked them to make a comment about the probable cause of the scars. Seven of

the eight observers did not recognize the incision scars in any of the photographs. One observer stated that they might be razor blade incision scars in two patients who had scars on their anterior chest walls. No new act of self-mutilation was observed in 15 of 16 patients in the follow-up period. One patient with antisocial personality disorder came to 1-year follow-up with new incision scars.



FIG. 2. (Left) Self-inflicted scars in multiple directions on the upper arm and forearm. (Right) Postoperative view after 6 months.



FIG. 3. (Left) Preoperative view of the left upper arm; a tattoo accompanied the scars. (Right) Postoperative view after 12 months.

DISCUSSION

In the preoperative period, a detailed psychiatric evaluation of the candidate is of prime importance. The mental stability of the patient has to be confirmed. The expectations of the patients from the surgery and the results that can be achieved should be discussed. Some photographs of previous patients may be shown to the

candidate to give them an idea about the postoperative result. It should be emphasized that the procedure will not totally eliminate the scars but will make them less conspicuous and give them a socially acceptable appearance.

Superficial resurfacing as a unit and thin skin grafting constituted the basis of the presented method. Only the epidermis and upper-



FIG. 4. (*Left*) Multiple scars on the left deltoid and upper arm. (*Right*) Postoperative view after 18 months.

most part of the dermis were ablated with carbon dioxide laser. Bloodless, superficial, and well-controlled resurfacing was achieved in a short time with minimal residual thermal damage using a carbon dioxide laser. It is hard to achieve the same homogenous and very superficial resurfacing using other resurfacing techniques. It is well known that deep dermal abrasions and full-thickness excisions predispose to development of hypertrophic scars, particularly on deltoid and presternal areas. We deliberately avoided these two techniques by ablating only epidermis and superficial dermis using carbon dioxide laser. Only elevated portions of the hypertrophic scars were trimmed down to intact skin level; we never performed a full-thickness excision and primary suture technique, which could have increased tension in the wound. Because most of the scars extend into the deeper dermis, superficial dermabrasion does not eliminate the dermal scar. Allowing such a raw surface to spontaneously epithelialize does not change the characteristic appearance of self-inflicted incision scars. In contrast, deep dermal abrasion and spontaneous epithelialization increase the risk of complications such as hypertrophic scarring and dyspigmentation.

Immediate coverage of raw surface with thin skin grafts (1) further minimizes the inflammatory response of the wound compared with an open wound allowed to spontaneous epitheli-

alization; (2) camouflages the color difference between intact dermis and dermal scar; and (3) changes the usual pattern of self-inflicted scars that can be recognized easily. Harvesting of the skin graft with precise thickness (0.2 to 0.3 mm) using a high-quality dermatome is another key point of the method. Thinner grafts may not totally camouflage the scars. As the thickness of the graft increases, the underlying color difference is disguised better. However, a thicker skin graft applied on a shallow dermal bed results in a patchy appearance with elevated boundaries, and graft donor sites will be discernible. The worst-case scenario of the presented method is total graft loss, but it is an acceptable risk because spontaneous epithelialization is the rule. Development of no new hypertrophic scar and elimination of most of the preexisting ones are other encouraging aspects of the method. Because no new hair follicle is transplanted to scarred tissue with the presented method, scars localized on skin that is too hairy and dark may be discernible even after the color difference has been eliminated; limited excisions or hair transplantation might be the solution. The key points of the method are listed in Table I.

CONCLUSIONS

Although a perfect color and texture match could not be achieved in most of the cases, all of the patients were satisfied with the result because the treated areas were less conspicuous and gave

TABLE I

Key Points of the Carbon Dioxide Laser Resurfacing and Thin Skin Grafting Method in the Treatment of Self-Inflicted Razor Blade Incision Scars

Key Points of the Procedure
Detailed psychiatric evaluation preoperatively
Informing the patient that the procedure is a "camouflage" operation
Trimming hypertrophic scars down to intact skin level
Intralesional corticosteroid injection into hypertrophic scars
Carbon dioxide laser resurfacing as a single unit
Thin (0.2 to 0.3 mm) skin grafting
Compressive dressing for 15 days
Use of tubular bandage and protection from sunlight for at least 6 months
Repeated corticosteroid injection, pressure garment, or silicone gel sheeting as needed

them a socially acceptable appearance. We observe that camouflage of a socially unacceptable scar improves the psychology, self-confidence, and self-esteem of the patients and motivates them to take more active and productive roles in their social and business lives. The ideal candidate for treatment is a young adult with normal psychology who had an episodic act of self-mutilation in the past. We would like to remind the reader that recurrence of self-mutilating behavior is likely unless the underlying abnormality is treated and the patient becomes psychologically stable. In contrast, we believe that eliminating a constant reminder of their past lives and giving them a chance at more socially acceptable lives affects the self-mutilators in a positive way and helps them to avoid new acts of self-mutilation.

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