Augmentation of Atrophic Depressed Scars Utilizing the Deepithelialized Scar Tissue Itself

WAEL SAADELDEEN, M.D. and AHMED KAMAL, M.D.
The Department of Plastic Surgery, Faculty of Medicine, Assiut University, Egypt

Abstract

Background: Various surgical techniques and modalities have been used to treat scars, but non showed definite efficacy controlling that abnormally-placed fibrous tissue. Contractile forces of healing in addition to the nature of primary injury greatly influence the final scar appearance. Atrophic depressed scars are a major challenge that a Plastic Surgeon may ever face. Lack of dermal skin layer should be replaced for a perfect reconstructive surgery result.

Objective: To augment the atrophic depressed scars with autologous tissue that is already present in-place reaching aesthetically pleasant reconstructive results; the de-epithelized scar tissue itself.

Methods: Thirty-seven (37) patients with atrophic and depressed scars (caused by trauma) were surgically treated with scar revision surgery where the authors employed the scar tissue itself after being de-epithelized for augmentation of the absent or abundant atrophic scars' dermal layer. The assessment of the results was conducted by comparison of the before and after surgery photographic documentation 6 months following segmentation surgery as well as patients' satisfaction.

Results: Dramatic improvement of the scar morphology with good patients' satisfaction has been obtained.

Key Words: Atrophic depressed scars – Deepithelialized scar tissue.

Introduction

The effect of some scars is more deep than skin. It is often very difficult to evaluate the emotional impact of such injuries. This is especially true with children who are unable to verbalize their feelings about the scars or in males who are taught to minimize their concern about their appearance [1].

Scar formation is a process consequent to the healing of soft tissues after a trauma. However, abnormal or disturbed collagen production can cause anomalies of the cutaneous surface and textural irregularities. A cosmetically acceptable scar is often at the level with the surrounding skin, a good color match, soft, and narrow. Favorable lines of closure are usually within or parallel to relaxed skin tension lines: Lines due to dynamic action of the underlying musculature [2].

Scars affect approximately 4.5-16% of the general population and arise from either excessive or insufficient new collagen generation during the wound healing process [3]. Hypertrophic scars appear as hypo-pigmented or erythematous raised nodules or plaques containing excessive amounts of collagen, fibrin and proteoglycans [4,5]. In contrast, atrophic scars are dermal depressions with overlying thinned epidermis which results from a loss of dermal collagen following some types of inflammation or traumatic injury such as acne, varicella, post-traumatic wounds or post-operative scars [6]. A cosmetically acceptable scar is often at the level with the surrounding skin, a good color match, soft, and narrow. Favorable lines of closure are usually within or parallel to relaxed skin tension lines: Lines due to dynamic action of the underlying musculature [7].

The treatment of scars can be the most gratifying thing that a Plastic Surgeon does. On the other hand, it would be unfair if we did not point out that it is also one of the most difficult and challenging aspects of this type of practice. Because scars cannot be removed completely, but they can often be improved considerably [8].

Unlike most cosmetic procedures, incisions usually cannot be hidden. The area of incision has already been predetermined by the injury often it is in the worst possible place such as on the face or the hand [9].
Various treatments have been developed to improve the appearance of scars [10]. Many different non-surgical as well as surgical techniques have been employed to solve the problem of atrophic scars including silicone gel sheets, pressure garments, corticosteroid therapy, dermabrasion, surgical excision, chemical peels and more recently, laser treatments [11].

Plastic Surgeon can employ a variety of approaches to achieve more esthetically pleasant scars. Classification of a scar abnormality will guide the choice of treatment technique. The surgical strategy selected should be based on a correct evaluation of the scar’s characteristics. In addition, while any scar with a suboptimal appearance can be revised, greatest patient satisfaction is achieved with realistic expectations [12].

By the time scar revision patients present to a physician, they have exhausted every means at their disposal to disguise the scar. These attempts at concealing the scar typically involve the use of cosmetics, clothing, and hairstyle modifications [13].

The surgical strategy selected should be based on a correct evaluation of the scar’s characteristics. In addition, while any scar with a suboptimal appearance can be revised; greatest patient satisfaction is achieved with realistic expectations [14]. Dermal augmentation in patients with atrophic scar has been approached surgically with autologous dermal graft, dermofat graft, autologous fascial graft, autologous fat injections, and an artificial dermal matrix graft most popularly; the alloderm and the integra [15].

In this study, the authors used the de-epithelialized scared fibrous tissue for autologous augmentation of the scanty or absent dermal element after release of its tethered central element.

**Patients and Methods**

The authors performed their surgical technique for augmentation of the atrophic depressed scars in 37 patients presented to the department of Plastic Surgery, Assiut University Hospital between February 2006 to September 2011.

Patients presented with atrophic scars after recent repeated local corticosteroids injections for hypertrophic scar control were excluded from the primary selection for the study.

25 were females and 12 were males, their ages range from 16-35 year old. In all cases, the etiology was old sutured trauma. From the history taking, the type of the primary wound type was blunt lacerated or highly lacerated complicated in 17 patients of the study group by localized infection which was managed by topical wound care and dressing, one of the needed surgical debridement. There was no lack of subcutaneous or deeper underlying tissues secondary to trauma in any patient.

**Surgical technique:**

The procedure performed under local infiltration anaesthesia using a solution of Lidocaine 1% and Epinephrine 1:200,000 in 36 patients and under general anaesthesia in only one patient.

Pre-operative blood examination done to all patients included: Random blood sugar, coagulation profile, and CBC as well as pre-operative cardiac examination. Pre operative photographic documents taken the morning before surgery after a signed written consent obtained.

**First step:** The surgical incision, the authors did 2 types of incisions; linear elliptical incision in 14 patients with scars parallel Langerhan’s lines and zigzag incision in 23 patients with scars against the Langerhan’s body lines.

**Second step:** The surgeons did complete careful sharp de-epithelization of the island scar tissue following the incision using blade number 11. Then the raw scar was examined by magnification loop to exclude the presence of any minute remnants of epithelial cells that may induce inclusion dermoid cyst formation latter on.

**Third step:** The surgeon released the tethered central zone of the scar tissue; a small sharp tip double bladed dissecting scissor introduced at one pole of the fibrous tissue, going deep in a subcision incision to cut the adhesions between the scarred tissue island and the underlying bone, muscles, or deep subcutaneous tissue.

**Fourth step:** Dissection of the released edges deep to one fat-cell depth and to a distance varied from 3-10mm according to the scar width.

**Fifth step:** Suturing the subcutaneous layer of the wound edges together with central line of the underlying scar tissue using 5/0, 4/0, or 3/0 vicryl sutures.

**Sixth step:** Skin closure with running intraldermal 5/0 or 6/0 momocril or proline sutures if elliptical incision done. If zigzag incision, the surgeon close the skin also with simple 6/0 momocril or proline sutures. In all cases, adhesive surgical strips applied to alleviate the wound edge edema and at the same time, to insure perfect edge-to-edge wound closure all along the suture line.
Fig. (1): Case No. (1): 1- Elliptical excision and de-epithelization, 2- Scar tissue in place still attached to the underlying bed, and 3- Closure of the wound by simple 5/0 vicryl sutures.

Fig. (2): Case No. (2): 1- Zigzag excision and de-epithelization, Scar tissue in place still attached to the underlying bed, and 2- Closure of the wound by simple 5/0 proline sutures.

Follow-up:
Time to stitch removal varied, in the face area; stitches removed after 5 days in the face, after 7 days in hands and forearm, and 10 days for the rest of the body. After stitch removal, scar control topical agents prescribed to all patients. Patient come in P.O. visits at an interval of one month scheduled for follow-up.

Results
Thirty-seven (37) patients were included in this study, the authors did not include any patient presented with atrophic scars after recent repeated local corticosteroids injections for hypertrophic scar control.

Post-operative photography taken after 3 and 6 months following scar augmentation surgery and patient satisfaction estimated. The atrophic and depressed scars become even, color matching the normal surrounding skin, and with no more surface contour irregularities. Good patient’s satisfaction clearly obtained in all cases with noticed positive psychological and psycho-social effects as well. Figs. (3-8).

Fig. (3): Case No. (1): Atrophic scar in the left cheek of a 29 year-old male patient 8 months following sharp trauma, before surgery to the left, and after surgery to the right.
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Fig. (4): Case No. (2): Atrophic scar in the forehead of an 18 year-old female patient 2 years following blunt trauma, before surgery to the left, and after surgery to the right.

Fig. (5): Case No. (3): Atrophic scar in the left mandibular area of a 22 year-old female patient 6 months following surgical drainage of an abscess, before surgery to the left, and after surgery to the right.

Fig. (6): Case No. (4): Atrophic scar in the left perioral area of a 37 year-old female patient 5 years following sharp trauma, before surgery to the left, and after surgery to the right.

Fig. (7): Case No. (5): Pre-operative view of an atrophic depressed scar in the left forearm of a 24 year-old female patient 18 months following healing from a dog bite.

Fig. (8): Case No. (5): Post-operative view of an atrophic depressed scar in the left forearm of a 24 year-old female patient 18 months following healing from a dog bite.
Discussion

Augmentation of the atrophic scars is the key-stone in replacing the absent dermal layer that gives the skin its normal texture, color, surface plan, and integrity. Subcision incision is a very effective simple surgical technique for releasing the tethering effect of the contracted mature fibrous bands freeing the scar tissue itself from the deeper underlying structures.

Many techniques and a variety of materials have been used for augmentation of the atrophic and depressed scars. At the present time they include the use of injectable temporary implants which well known as dermal and subcutaneous fillers, and permanent injectable implants, autologous fat injection, autologous dermal graft, and autologous dermo-fat graf. Other options in soft tissue augmentation are processed acellular dermal matrix materials. These are widely available. They are treated to remove cells aiming to carry a very low risk of prion-related disease transmission. The processed acellular dermal matrix materials last longer than collagen or fat injections, but the dermal matrix must be implanted.

All of these are temporizing measures and do not provide long-term correction of the depressed scar. Permanent implants consisting of Gore-Tex, Soft-form, or Silastic (polytetrafluoroethylene) are long-lasting options. Some atrophic Hyperemic scars can be treated with nonablated lasers (pulse light).

Surgeons always consider surgical intervention as a long-term and better option. Surgical treatments include fusiform (elliptical) scar excision of the whole fibrous tissue present, shave excision, partial or serial excisions, local flap coverage, skin grafting, and pedicled or free flaps. The scar will be level with the surrounding skin.

The resulting surgical scar would be thinner and then needs more underlying strong support to avoid recurrence of any depression or atrophy. In this manner, the scar can be brought to on a bed of a dense fibrous tissue layer that will act to augment the poor dermal layer as well as to support the weak newly created revised scar line. Such support will direct the contractile and traction forces away for the scar’s axis. In this way, it serves to shorten healing time, narrow the scar, and yield a more aesthetic final result.

The authors therefore believe that this technique can be utilized as a simple, safe, cheaper technique that brings significant improvement to the treatment of an atrophic depressed scar anywhere in the body.

References