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The Polyphasic Protocol for the Keloid

Corradino B*, Di Lorenzo S and Maltese M

Department of Surgical Oncology, University of Palermo, Italy

Abstract

The occurrence of keloids is a common clinical problem that can cause functional impairment and cosmetic deformities. They are pathological cutaneous scars that occur due to surgery, burns or other traumatic wounds. Keloids are manifestations of a loss of the control mechanism that regulates wound repair (inflammation, neoangiogenesis and synthesis of extracellular matrix).

The authors present their polyphasic protocol for the treatment of keloids: it consists of a combination of intralesional excision, steroid injections and dye-laser treatment over a period of four months. In our research, we have selected patients who have been clinically diagnosed to have keloid scars, which have been diagnosed for at least one year (50 patients, from January 2005 to December 2014).

Our polyphasic protocol works on the different phases of the scarring process, altered in keloids; the uncontrolled process in keloid scars is kept in check by the combination of surgical and non-surgical approaches, and is based on the knowledge on wound healing.

In all cases the results obtained are satisfactory, with a keloid scar size decrease of at least 75% from the original dimensions and an improvement of the adaptation of the keloid to surrounding skin.

Introduction

The occurrence of keloids is a common clinical problem that can cause functional impairment and cosmetic deformities. Keloids are pathological cutaneous scars that occur due to surgery, burns or other traumatic wounds. In 1970, Peacock [1] defined hypertrophic scarring as a raised scar, above skin level, which stays within the confines of the original lesion and the keloid as a scar above skin level that proliferates beyond the confines of the original lesion. Keloids are not limited to the site of the original wound, but can go beyond these boundaries. They can manifest months or migration and proliferation, synthesis and release of cytokines and extracellular matrix proteins and matrix remodeling one year. The diagnosis was confirmed by histological examination in all cases patients with keloid scars diagnosed for at least one year were treated in our department from January 2005 to December thin rim of keloid. After hemostasis, the wound is closed with Ethilon 3/0 or 4/0 stitches, taking care of suturing carefully injection was made in the residual borders of the keloid with a 29G needle as described previously. These specific suppress the inflammation by inhibition of leukocyte and monocyte migration; extent of the keloid years after injury and show no tendency to regress. Keloids mainly affect people aged between 10 and 30 years old and are less common in very young or elderly people. They can occur anywhere on the skin and familial and genetic features play a role in the genesis of the disease; they are 15 times more common in patients with dark skin, because of a genetic predisposition to autosomal dominant features [2-6]. Keloids are manifestations of wound repair control mechanism loss, which includes: clot formation, inflammation, cell in keloids this process is uncontrolled, resulting in a disordered formation and excessive deposition of matrix proteins, relatively acellular in the core and fibroblastic in the enlarging borders. Histologically keloids present an excessive deposition of collagen in the matrix; a hyper-functioning and altered response of the fibroblasts may be the cause [7-11].

In our research, we have selected patients who have been clinically diagnosed to have had keloid scars for a minimum of in accordance with to current knowledge of scarring process; we have developed multiple phases of treatment.

Methods and Materials

The first phase consists of the keloid's core excision (intralesional excision) under local anesthesia leaving a 2014; there were 27 males and 23 females, aged from 22 to 65 (mean 54.5 ± 12.4). Criteria for inclusion were: Presence of histologically confirmed keloid scar for at least 12 months, no other dermatologic diseases, no allergies, and no other pharmacological treatments (either topical or systemic) during the study, no previous treatments for keloids reduction. All patients were informed

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Correspondence:
Corradino B, Department of Surgical Oncology, Plastic Surgery Unit, University of Palermo, Italy, E-mail: bartolo.corradino@unipa.it

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about the capability of the treatment and its limits. Within the margins of the previous keloid scar, not above pathological tissue. The healthy skin is not incised, avoiding the risk of inducing an intense inflammatory response and the formation of a new keloid scar. With the excision of the central part of the keloid, the scar is reduced by more than 60% to 80% of its original size. Immediately after surgery, the first intralesional injection of metylprednisolone acetate (40 mg/ml) was done. The steroid is diluted 1:2 with soaking solution and lidocaine (to reduce the pain associated with the injection) at concentration of 0.1 ml/cm^2. The details reduce the inflammatory phase and the cytokine-induced chemotaxis which characterized the first part of the scarring process that is abnormal in the pathologic scar tissue. In the second phase, metylprednisolone acetate is injected a month after surgery (day 30), 15 days after the removal of stitches and another session was held on day 45 after surgery [12-19].

The repeated injections of steroids on day 30 and day 45 after surgery, during the remodeling phase, are done in order to:

- Induce vasoconstriction that reduces the concentration of cytokines;
- Inhibit the proliferation of fibroblasts and deposition of collagen fibers.

On day 60 the third phase took place with the first dye-laser sessions and that was repeated on day 90 and day 120 [20-26]. The laser used is a dye-laser Dermobeam 2000 Deka. The pulsed dye-laser is set at 585 nm to the power of 10 J/cm^2, spot 7 mm and duration 2 msec. The duration of the laser treatment varies from 5 min to 15 min according to the treatment finished on day 120 after surgery with the last session of dye-laser. The sessions of pulsed dye-laser reduce the proliferation of vessels; the selective photothermolysis effect of the dye-laser on the neoangiogenesis produces ischemia, reducing the number of fibroblasts and increasing the activity level of collagenases. During follow-up, scar dimensions were measured in squared centimeters and skin color was evaluated using the "Manchester score classification", that is a categorical scale composed of 4 degrees (PM: Perfect Match, SM: Slight Mismatch; OM: Obvious Mismatch; GM: Gross Mismatch) already validated as a color measurement test for skin [27,28]. Pre-operative scar dimension of the patients with keloid scars ranged from 3 cm^2 to 48 cm^2, mean (11.27 ± 10.04); at one year's 15.

Results

Follow-up, the scar dimension ranged from 0.49 cm^2 to 16.43 cm^2, mean (2.77 ± 3.09). At the end of the second and third phases, 40% of patients achieved a reduction in the size of the keloid equal to 80%, and in the first phase with surgery the keloid is reduced by more than 60% to 80% of original size. 98% of the subjects in question had achieved a reduction of 60%. No patient achieved perfect match and 17% had achieved 66% the slight mismatch. In all cases the results obtained were considered satisfactory from the point of view of both physician and patients, with the slight mismatch. In the fourth and fifth phases no patient achieved 80% reduction in the size of the keloid, while 32% achieved the perfect match and 66% the slight mismatch. In the later phases, no patient achieved 80% reduction in the size of the keloid, while 32% achieved the perfect match and keloid scar size decrease of at least 75% from the original dimensions and an improvement of the adaptation of the keloid to surrounding skin. There have been only 4 recurrences (8%). The side effects of the steroid injection are subcutaneous fat atrophy (2 patients) and telangiectasia (4 patients). The side effects of laser treatment are limited to mild purpura (in 10 patients but it persisted for up to only 7 to 10 days) and hyperpigmentation (1 patient). The statistical analysis of the size of keloids between pre-surgery and the last follow-up at one year after surgery showed a patients with histologically confirmed diagnosis of keloids were treated in our department from 2005 to 2014; the treatment protocol consisted of three consecutive phases: First phase: Keloid core excision and first steroid injection immediately after surgery. Second phase: Second steroid injection on day 30 after surgery followed by another steroid injection on day 45 after surgery. Third phase: First dye-laser session on day 60 after surgery followed by another two laser sessions on day 90 and 120 high significant difference. Statistical analysis of color changes during processing steps showed high significance as well. Differences between pre-operative scar dimensions and follow-up showed a high significance ($p<0.00$) overall. High statistical significance was found even between pair comparisons ($p<0.00$).

Discussion

From 2000 to 2005 in our department we treated 37 patients with keloids; the treatment consisted in core excision of the 47. Although many protocols have been proposed in medical literature, there is no consensus about the treatment of keloids. Multiple treatments have been advocated, such as intralesional steroid injections [29], cryosurgery [30,31], radiotherapy [32-35], pressure therapy [36,37], excisional surgery [38] and laser treatment [39,40]. After these therapies however, keloids often recur and may become even worse; recurrence is very frequent.

Keloid and in three injections of methylprednisolone acetate immediately after the surgery and again on day 30 and day 45 after surgery. In these patients, 1 year after surgery there was a reduction in size by 80% but there were 7 recurrences and there were no substantial colorimetric changes in the scar with poor adaptation to the surrounding skin. The authors have developed a new protocol to get over poor results obtained using previous therapies. Excision, steroid injections and dye-laser treatment over a period of 4 months. The authors present their new polyphasic protocol for the treatment of keloids that consists of a combination of intralesional laser), to maximize the therapeutic effect, trying to take the best from each individual therapeutic step.

In all cases the results obtained were considered to be satisfactory, with a keloid scar size decrease of at least 75% from the original dimensions and an improvement of the adaptation of the keloid to surrounding skin. There have been only 4 recurrences (8%). The authors propose their personal treatment protocol after a careful analysis of the evidence in the literature and by trying to effectively combine both the surgery, the use of a validated drug such as methylprednisolone and a laser source (Dye- dye-laser sessions are fundamental for skin remodeling, control of residual disease and to prevent recurrence. Our protocol According to the authors, surgery is today still a key step for the treatment of keloids, but it is not enough to get the desired results. Use of corticosteroid injections with precise and accurate timing allows a decrease of the inflammatory phase, reducing the risk of relapse and limiting the progression of the scar. Finally, the use of the dye-laser acting on the vascular component and reducing the therapeutic angiogenesis assists the previous steps and moreover acts by changing the color of the scar over time. The proposed protocol is effective, safe and easy to perform and follow for both patients and surgeons.

Conclusion

The polyphasic protocol proposed for keloid scars has been successful in almost all cases treated and the patients are satisfied with the results. We have had only 4 recurrences. Surgery still represents the most important step to reduce the size of the lesion, then the cortisone injections and the pulsed seems able to ensure a significant lesion size reduction and an improvement of color matching between scars and surrounding skin. The reduction in size appears to be stable during follow-up and reproducible with a prediction of at least 60% reduction compared with the initial size in almost all cases treated. The phases of the protocol require only local or topical anesthetic and are executed in ambulatory.

Our polyphasic protocol works on the different phases of the scarring process, that is altered in keloids, through the. The disadvantages are: The duration of the protocol (at least 4 months) and the cost of the dye-laser. Combination of surgical and non-surgical approaches, and is based on the knowledge on wound healing.

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