GJR Publication
OPEN ACCESS
Global Journal of Research in Medical Sciences
Volume 02 | Issue 02 | March-April | 2022
Journal homepage: https://gjrpublication.com/journals/
Case Report

Role of Steroids in Management of Abnormal Raised Scar-Revisited

[1]Dr. P. Chakravarthy, [2]Dr. Ravi Kumar Chittoria*, [3]Dr. Jacob Antony Chakiath, [1]Dr. Adithya kevin and [1]Dr. Varun

[1]Junior Resident, Department of General Surgery, Jawaharlal Institute of Post graduate Medical Education and Research (JIPMER), Pondicherry, India-605006
[2]Prof. & Registrar (Academic) Head of IT Wing and Telemedicine, Department of Plastic Surgery & Telemedicine JIPMER Pondicherry, India-605006
[3]Senior Resident Department of Plastic Surgery & Telemedicine JIPMER Pondicherry India-605006

Submission Date: 24th March 2022 | **Published Date:** 23rd April 2022

***Corresponding author:** Dr. Ravi Kumar Chittoria
Prof. & Registrar (Academic), Head of IT Wing and Telemedicine, Department of Plastic Surgery & Telemedicine JIPMER Pondicherry, India-605006.

Abstract
Scars are a natural part of dermal healing processes and consist of networks of fibrous collagen tissue, laid down in response to injury to the dermis. In some genetically susceptible individuals, the process of scar tissue formation is excessive, and there is an over-secretion of collagen. This causes the formation of benign tumors (raised) scars known as keloid and hypertrophic scars. Scars can have many significant functional, cosmetic and psychological sequelae. Steroids are used therapeutically in the management of abnormal scars; however, this is associated with a variety of adverse effects. Despite this, our understanding of the way in which they work is poor and literature on the topic is, to date, lacking. Further work is needed to clarify the exact mechanisms that bring about abnormal scarring, to aid our understanding of the disease and facilitate the development of more evidence-based treatment strategies. In this case report, the authors present the experience of using topical steroid for management of abnormal raised scar.

Keywords: hypertrophic, keloid, abnormal scars, steroids

INTRODUCTION
Scars are a natural part of dermal healing process and they consist of networks of fibrous collagen tissue, laid down in response to injury to the dermis. In abnormal scarring excessive collagen is produced, and causes the formation of abnormal raised scars known as keloid and hypertrophic scars.

It has been estimated that every year, 100 million patients develop scars in the developed countries alone, of which 11 percent are keloid scars.[1]Scars may have many significant cosmetic, functional and psychological sequelae.[2] Steroids are used in the management of scars, a treatment which was established in 1960s.[3] Though various treatment modalities were available, steroids remain one of the standard treatment for scars in developing countries where there is economic limitation for the latest modalities of scar management. Hence in this article we revisit the role of steroids in management of abnormal raised scar.

Materials and methods
The study was carried out in a tertiary care hospital in South India, after receiving approval from institutional ethical council. The patient is a 24-year-old male with history of road traffic accident following which he sustained an open fracture of proximal tibia left leg with popliteal artery injury. He was initially managed with popliteal artery exploration and repair and external fixation of left leg. He underwent wound debridement followed by Illizarow fixation in subsequent week. Then he underwent wound debridement and skin grafting. He later developed abnormal raised scar (figure-1) for which topical steroid was applied. 0.1% betamethasone ointment was applied over the scar once daily for 1 month (figure-2). Then the response was assessed by Vancover scar scale score.

RESULTS

After using topical steroid for one month, it has been noticed that there was significant reduction in size of the scar (figure 3). Initial assessment of the scar by VSS score was 9/13 and after the scar management, the score was 6/13.

Figure-1: Abnormal raised scar before treatment at the lateral aspect of left knee

Figure-2: Application of topical steroid in abnormal raised scar

Figure-3: Scar after 1 month after topical application of steroid

DISCUSSION

Scar formation is a terminal part of wound healing, a process which involves 3 stages - inflammation, proliferation and remodelling.[5] Collagen is a major fibrous protein of the connective tissue which provides structural support in scars. Abnormality in the turnover of collagen results in fibrosis and the associated problems of abnormal scarring ensue.

In some genetically susceptible individuals, formation of scar tissue is excessive, and there is an over-production of collagen in the dermis. Keloid scarring can be familial and occurs in all races. Those who are dark-skinned are more predisposed to the condition.[6] The scar tissue is raised above the skin level and results in keloid or hypertrophic scarring.

Another group of scars termed as intermediate scars resemble both keloids and hypertrophic scars; they remain within the borders of the original wound, but do not regress and recur following surgery.[7]

There are various theories regarding the aetiology of keloids and hypertrophic scars.8 However, exact mechanism is yet to be established. Other types of abnormal scars include scar contractures, widespread scars and atrophic scars, but all of which are non-raised skin scars.[1]

Steroid hormones like the sex hormone oestrogen generally have their effect on target tissue cells by diffusing through the cell membrane and binding to intra-nuclear or intracytoplasmic receptors (as in the case of glucocorticoids).

Binding is followed by interaction of the ligand- receptor complex with the nuclear sites, and subsequent gene transcription or repression ensues.

Glucocorticoid hormones were the first steroid hormones to be discovered for medical use. They act to reduce the expression of inflammatory promoters like cytokines, adhesion molecules and inflammatory enzymes like cyclooxygenase (COX-2), and by this way combat inflammatory states.[13]

Steroid injections have been shown to induce the regression of hypertrophic scars and keloids by attenuating the inflammation, reducing synthesis of collagen and glycosaminoglycan, reducing fibroblast proliferation, as well as by promoting fibroblast degeneration and inhibition of growth.[7] A study demonstrated that steroid injections also causes ultrastructural changes in keloid scars, promoting the organization of collagen bundles and altering the characteristic collagen nodules.[14]

However, Russell and colleagues demonstrated that hydrocortisone fails to reduce the rate of synthesis of collagen, elastin , collagen mRNA and elastin mRNA in the fibroblast cells of keloid tissue.[15,16] It was postulated that this may be a reason for the resistance of keloid scars to hydrocortisone therapy.[7]

Glucocorticoid Injections are administered to combat the abnormal skin fibrosis in keloids and hypertrophic scars. However, the mechanism of action responsible for this effect is uncertain. This method was described about 40 years ago and has been the foundation for the treatment of raised scars since.[3] Other methods of scar treatment that have been successfully used in combination with steroids are surgical excision and silicone gel sheeting.

Surgical excision of keloids and hypertrophic scars is usually used in combination with steroid injections and silicone gel sheet, as surgical excision alone results in very high recurrence rates of even up to 100%[4]. Adhesive microporous hypoallergenic paper tape can also be applied for a few weeks after surgery is also advocated to minimize the risk from shearing.[17] (Despite the lack of prospective controlled studies in support of its efficacy).

Silicone gel sheeting involves covering the scar for at least 12 hours a day (depending on the patient's compliance) and has been shown to promote faster healing, although the evidence for this treatment modality has lately been questioned.[18] Silicone gel sheets are frequently used as an adjunct to surgical excision and are thought to lead to better outcomes.

Steroid injections are effective treatment modality for keloids and hypertrophic scarring, and are commonly administered intralesionally. Steroids can be in a variety of forms such as hydrocortisone acetate, dexamethasone, methylprednisolone and triamcinolone acetonide. Triamcinolone is the most commonly administered, using insulin syringe (commonly used) or possibly less painful needleless injection system (Dermojet).[7]

Triamcinolone is administered at a concentration of 10 to 40 mg/ml, depending on various factors like amount of scar tissue, area of the body involved and the individual patient.[7] Usually, 0.1 ml of 10mg Adcortyl per linear centimetre of keloid is used every four to six weeks (until successful scar reduction or patient develops side-effects). Triamcinolone acetonide injection is the therapy of choice for the treatment of keloids and second-line therapy for the treatment of hypertrophic scars (where other methods like silicone gel sheeting have failed to bring about scar resolution). However, significant pain at the site of injection is reported even with standard doses of triamcinolone acetonide[17].

Response rates are highly variable, ranging from 50% to 100%, and a recurrence rate of 9% to 50%. These rates are somewhat enhanced when steroid injections are used in combination with other treatment modalities such as surgical excision. Similarly, surgical treatment alone results in highly variable response and recurrence rates.[7]

Side effects which may occur with corticosteroid use in general are numerous and include, adrenal suppression, osteoporosis, avascular necrosis of bone, glucose intolerance, protein catabolism, raised intra-ocular pressure, cataract formation, glaucoma, gastrointestinal bleeding, altered body fat distribution (classic Cushingoid appearance),increased susceptibility to infection and aggravation of existing infection, neural effects such as itching, paraesthesia and severe pain, psychiatric disturbance, and dermal pathologies such as skin atrophy, thinning and bruising of the skin.[19] As discussed, glucocorticoid injections can be given in a variety of forms including hydrocortisone acetate, dexamethasone, methylprednisolone and triamcinolone acetonide. Serious side-effects which can occur with the administration steroids, although unlikely, are those of the systemic side effects of prolonged corticosteroid administration -Cushing's syndrome. However, in the past rare cases have been reported.[4]

Side effects of triamcinolone injection includes skin atrophy, telangiectasia and hypopigmentation or depigmentation. These side effects occur in approximately half of all patients treated with triamcinolone injection, but frequently resolve without requiring treatment.[4] These side-effects are more likely to occur when the steroids are injected into the surrounding normal skin or subcutaneous tissue.[20]

CONCLUSION

The International Advisory Panel on Scar Management has recommended the usage of intralesional steroid injections for the treatment of keloids and hypertrophic scars. Steroids remain the core treatment modality available for the management of abnormal raised skin scars especially in a low resource setting.[5] In combination with adjuvant treatment modalities like compression garments and silicone gel sheeting, steroids help in significant reduction of size of abnormal raised scar

Conflicts of interest

None

Declarations

None

Authors' contributions

All authors made contributions to the article

Financial support and sponsorship

None

BIBLIOGRAPHY

1. Bayat A, McGrouther DA, Ferguson WJ. (2003). Skin scarring.BMJ, 326, 88–92.
2. Chen, M. A., & Davidson, T. M. (2005). Scar management: prevention and treatment strategies. Current opinion in otolaryngology & head and neck surgery, 13(4), 242-247.
3. KETCHUM, L. D., SMITH, J., ROBINSON, D. W., & MASTERS, F. W. (1966). The treatment of hypertrophic scar, keloid and scar contracture by triamcinolone acetonide. Plastic and reconstructive surgery, 38(3), 209-218.
4. Al-Attar, A., Mess, S., Thomassen, J. M., Kauffman, C. L., & Davison, S. P. (2006). Keloid pathogenesis and treatment. Plastic and reconstructive surgery, 117(1), 286-300.
5. George Broughton, I. I., Janis, J. E., & Attinger, C. E. (2006). The basic science of wound healing. Plastic and reconstructive surgery, 117(7S), 12S-34S.
6. Bayat, A., Walter, J. M., Bock, O., Mrowietz, U., Ollier, W. E. R., & Ferguson, M. W. J. (2005). Genetic susceptibility to keloid disease: mutation screening of the TGFβ3 gene. British journal of plastic surgery, 58(7), 914-921.
7. Niessen, F. B., Spauwen, P. H., Schalkwijk, J., & Kon, M. (1999). On the nature of hypertrophic scars and keloids: a review. Plastic and reconstructive surgery, 104(5), 1435-1458.
8. Pellard, S. (2006). Epidemiology, aetiology and management of abnormal scarring: a review of the literature. Journal of wound care, 15(1), 44-48.
9. Beausang, E., Floyd, H., Dunn, K. W., Orton, C. I., & Ferguson, M. W. (1998). A new quantitative scale for clinical scar assessment. Plastic and reconstructive surgery, 102(6), 1954-1961.
10. Sullivan, T. A., Smith, J., Kermode, J., Mclver, E., & Courtemanche, D. J. (1990). Rating the burn scar. The Journal of burn care & rehabilitation, 11(3), 256-260.
11. Yeoung, E. K., Mann, R., Engrav, L. H., Goldberg, M., Cain, V., Costa, B., ... & Lee, J. (1997). Improved burn scar assessment with use of a new scar-rating scale. The Journal of burn care & rehabilitation, 18(4), 353-355.
12. Masters, M., McMahon, M., & Svens, B. (2005). Reliability testing of a new scar assessment tool, Matching Assessment of Scars and Photographs (MAPS). Journal of Burn Care & Rehabilitation, 26(3), 273-284.
13. Karin, M. (1998). New twists in gene regulation by glucocorticoid receptor: is DNA binding dispensable?. Cell, 93(4), 487-490.
14. Boyadjiev, C., Popchristova, E., & Mazgalova, J. (1995). Histomorphologic changes in keloids treated with Kenacort. Journal of Trauma and Acute Care Surgery, 38(2), 299-302.
15. Russell, S. B., Trupin, J. S., Myers, J. C., Broquist, A. H., Smith, J. C., Myles, M. E., & Russell, J. D. (1989). Differential glucocorticoid regulation of collagen mRNAs in human dermal fibroblasts: Keloid-derived and fetal fibroblasts are refractory to down-regulation. Journal of Biological Chemistry, 264(23), 13730-13735.
16. Russell, S. B., Trupin, J. S., Kennedy, R. Z., Russell, J. D., & Davidson, J. M. (1995). Glucocorticoid regulation of elastin synthesis in human fibroblasts: down-regulation in fibroblasts from normal dermis but not from keloids. Journal of investigative dermatology, 104(2), 241-245.
17. Mustoe, T. A., Cooter, R. D., Gold, M. H., Hobbs, F. D., Ramelet, A. A., Shakespeare, P. G., ... & Ziegler, U. E. (2002). International clinical recommendations on scar management. Plastic and reconstructive surgery, 110(2), 560-571.
18. O'Brien, L., & Jones, D. J. (2013). Silicone gel sheeting for preventing and treating hypertrophic and keloid scars. Cochrane database of systematic reviews, (9).
19. Sweetman, S. C. (2005). Martindale: the complete drug reference.
20. Murray, J. C. (1993). Scars and keloids. Dermatologic clinics, 11(4), 697-708.
21. RE, M., & JV, Q. (1962). Histogenesis of experimentally produced keloids. The Journal of Investigative Dermatology, 38, 143-181.
22. Peacock Jr, E. E. (1970). Biologic basis for the treatment of keloids and hypertrophic scars. South Med J, 63, 755-760.
23. Jalali, M., & Bayat, A. (2007). Current use of steroids in management of abnormal raised skin scars. The Surgeon, 5(3), 175-180.