

Review Article

Comparison of the efficacy of interlesional corticosteroid and silicone gel for keloid treatment: a review article

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Received: 23 April 2023

Accepted: 08 May 2023

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ABSTRACT

Keloid is an abnormal scar associated with various skin problems including physical and psychological distress. Keloid is often presented as skin itching, swelling, and pain with possible complications such as recurrent sequelae and stigma. Prevention and treatment of this problem include topical non-invasive and invasive options, such as silicon-based products and corticosteroids which are available in the market. Silicon is stated as a standard product, however, is used more often as a combination with corticosteroids than single use. Effectiveness of both products have been discussed separately in previous studies, making it unclear which one is more superior. Thus, a review is needed to ensure their uses in daily practice and to determine their superiority as a single or combination treatment in order to apply them efficiently. Aim of this study is to compare effectiveness of corticosteroids and silicone products to prevent or treat keloid. Keywords such as "keloid," "corticosteroid," and "silicone products" were used in PubMed, national library of medicine, ResearchGate, and dermatology textbooks. Journals found were analyzed for their validity and reliability before the compilation of this review article. Results found stated that both silicone pharmaceutical products and corticosteroids have their own benefits and risks. In addition, according to their treatment phase, they can be used as single or combination treatment. However, due to limited existing studies found, further research is necessary.

Keywords: Keloid, Corticosteroid, Silicone gel

INTRODUCTION

Keloid is a pathologic scar formed due to an imbalance between synthesis and degradation of collagen and extracellular matrix (ECM). Presentations of keloid include scar with firm and rubbery nodules that can extend beyond trauma area causing more pain and itchiness compared to other types of abnormal scars.¹ Keloid is classified as a common scar type that can be found in all countries and races with different distribution. Generally, lacks are more prone to keloid formation compared to Caucasians and Asians. However, a study in Malaysia as a more multiracial country showed that fair-skinned Chinese are more likely to form keloid compared to Indians and Malays.²

Despite its common occurrence, keloid causes frustration to both patients and attending physicians due to many psychological and anatomical complications that can arise. Anatomical consequences include multiple body parts swelling, severe pruritus, and severe pain that may need therapeutic intervention. Intervention of keloid is generally difficult due to many sequelae and few-known mechanism of its formation. Psychological consequences include change of perception that affects patients' social interactions and work, stigma (especially in keloid in conspicuous body parts), and inconvenience when keloid is stung and infected. These consequences, whether anatomical and psychological can lead to a decrease in patients' quality of life if not properly treated.³

Intralesional corticosteroid is known as one of the most widely-used treatment due to its anti-inflammatory and immunosuppressive properties that affect most organ systems.^{4,5} Corticosteroid is analogue to natural hormones produced in adrenal cortex composed by different degrees of glucocorticoids and mineralocorticoids. Glucocorticoids is a primary stress hormone that contains immune-suppressive, vasoconstrictive, anti-inflammatory properties while mineralocorticoids have function in controlling water, electrolyte balance in renal tubules.⁴

Silicone gel as a newer modality invented in the 1980s, is considered a simpler method in keloid prevention and treatment compared to intralesional corticosteroid. Silicone gel increases hydration of stratum corneum and production of fibroblasts and collagen, thus allowing a softer and flatter scar formation, protecting wound from bacterial infection, keeping balance between fibrogenesis and fibrolysis, and reducing discomfort mainly in the form of itching. In addition, silicone gel is safer and more effective because it contains self-drying technology and has a longer usage period.⁶

LITERATURE REVIEW

Review study using keywords such as “keloid”, “corticosteroid”, and “Silicone gel” was performed using PubMed, national library of medicine, ResearchGate, and dermatology textbooks to compare effectiveness of intralesional corticosteroid and silicone gel as pharmacological treatments for keloid. References were limited from 2009-2020, further analysed for their validity, reliability and compatibility to study before compiled.

DISCUSSION

Intralesional corticosteroid in the form of triamcinolone acetonide (TAC) is considered a main complementary treatment to excision. However, corticosteroid application will differ according to each keloid type which are divided into fresh nodular keloids, butterfly keloids, mature keloids, and transition keloids. Fresh nodular keloids only need TAC when sequalae is present after excision. Butterfly keloids only need TAC injection without excision. Mature keloids and transition keloids apply TAC as a supplement for excision.⁷

Comparison of intralesional corticosteroid and silicone gel done in a study with twenty patients suggested that significant size reduction of keloid (more than 50%) with single use is more often found in treatment using intralesional corticosteroid compared to silicone gel with results of 16 lesions by intralesional corticosteroid compared to 2 lesions by silicone gel by week twelve.⁸

Pathophysiology of keloid formation

Keloid forms as a result of fibroblast activity dysregulation in the fibroblastic stage that increases

collagen and ECM proliferation and decreases cell apoptosis. As a consequence, keloidal collagen in the form of bundles are formed.¹

In normal fibroblastic stage, there is an equilibrium of TGF-β1 and TGF-β2 expression as main production mediators and matrix metalloproteinases (MMP) and tissue inhibitors of metalloproteinases (TIMPs) expression as main degradation mediators. However, in keloid formation, overstimulation of TGF-β1 expression will increase collagen and ECM synthesis and decrease MMP production simultaneously. In addition, endothelial growth factor (VEGF) and platelet-derived growth factor (PDGF) will also contribute to the collagen overproduction.¹

Risk factors of keloid formation

Keloid can form spontaneously or influenced by risk factors such as genetic predisposition and other external factors. Keloid formation in parasternal and shoulder areas are mainly due to genetic predisposition. However, keloid distribution in other body parts is affected by other risk factors such as sex, cause of scar, anatomical sites involved, number of injured sites, past history of keloid formation, and family history with keloid. Table 1 will explain common causes of each external risk factor.⁹

Table 1: External risk factors of keloid formation.

External risk factor	Most common cause	Least common cause
Cause of the scar	Burns	Trauma
Anatomical sites involved	Upper limb, sternum	Genitalia, buttocks, palms, sole
Number of injured sites	Single anatomical site	Multiple anatomical sites
History of keloid formation	Present, usually in form of keloid reformation	Absent
Family history with keloid	Present, some with same site as a relative	Absent

Intralesional corticosteroid as keloid treatment

Intralesional corticosteroid in forms such as hydrocortisone acetate, methylprednisolone, dexamethasone, and TAC are often used in keloid treatment and keloid recurrence prevention to suppress inflammatory response, decrease collagen synthesis and growth of fibroblasts, and enhance collagen loss. The application of intralesional corticosteroid can alter mediators such as TGF-β1, TGF-β2, COL4A1, and COL7A1. As a result, cell proliferation and collagen formation will decrease.¹⁰

Mechanism of action of corticosteroid is completed through different pathways. In treating various immunologic and inflammatory disorders, physiologic doses of corticosteroid can serve as a replacement therapy in providing anti-inflammatory and immunosuppressive effects. However, when used with high doses to treat chronic keloid (more than sixty days), side effects can occur.⁴ For instance, skin atrophy, necrosis, ulceration, telangiectasia, hypopigmentation, hyperpigmentation as local side effects and Cushing's syndrome as a common systemic effect.¹¹

Silicone gel in keloid treatment

Silicone gel is considered an effective modality in keloid treatment due to its function in increasing stratum corneum hydration and decreasing collagen disposition by modulating signals between keratinocytes and fibroblasts.¹² In keloid treatment, scar size, pain, itching, and redness will improve due to modulation of fibroblast growth factor β (FGF β) and tumor growth factor β (TGF β) that can increase collagenases level and diminish excessive collagen.¹³ This modality is considered safe to be used with children and people with sensitive skin, easy to be applied in body areas with difficult fixation (face, scalp, and joints), and comfortable to be applied in visible body areas.^{6,13}

However, silicone gel also has its disadvantages in the form of skin irritation, especially when applied in hot climate. Prolonged drying time in visible body parts can decrease patients' compliance and increase their complaints.⁶

CONCLUSION

This review concluded that application of both intralesional corticosteroid and silicone gel have its benefits and risks. According to prior studies, intralesional corticosteroid is believed to be more effective compared to silicone gel when used as a single modality. However, no research has directly linked each keloid type treatment and their improvement when treated with both modalities. Therefore, further research is needed to confirm existing findings.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Betarbet U, Blalock TW. Keloids: A Review of Etiology, Prevention, and Treatment. *J Clin Aesthet Dermatol.* 2020;13(2):33-43.

2. Huang C, Wu Z, Du Y, Ogawa R. The Epidemiology of Keloids. In: Téot L, Mustoe TA, Middelkoop E, Gauglitz GG, eds. *Textbook on Scar Management: State of the Art Management and Emerging Technologies.* Cham (CH): Springer. 2020:29-35.
3. Olaitan PB. Keloids: assessment of effects and psychosocial-impacts on subjects in a black African population. *Indian J Dermatol Venereol Leprol.* 2009;75(4):368-72.
4. Hodgens A, Sharman T. Corticosteroids. In: *StatPearls.* Treasure Island (FL): StatPearls Publishing; 2022.
5. Das A, Panda S. Use of Topical Corticosteroids in Dermatology: An Evidence-based Approach. *Ind J Dermatol.* 2017;62(3):237-50.
6. Puri N, Talwar A. The efficacy of silicone gel for the treatment of hypertrophic scars and keloids. *J Cutan Aesthet Surg.* 2009;2(2):104-6.
7. Lemperle G, Schierle J, Kitoga KE, Kassem-Trautmann K, Sachs C, Dimmler A. Keloids: Which Types Can Be Excised without Risk of Recurrence? A New Clinical Classification. *Plast Reconstr Surg Glob Open.* 2020;8(3):e2582.
8. Tan E, Chua SH, Lim JTE. Topical silicone gel sheet versus intralesional injections of triamcinolone acetonide in the treatment of keloids-a patient-controlled comparative clinical trial. *J Dermatological Treatment.* 2009;10(4):251-4.
9. Shaheen A, Khaddam J, Kesh F. Risk factors of keloids in Syrians. *BMC Dermatol.* 2016;16(1):13.
10. Danielsen PL, Ru W, Ågren MS, Duke JM, Wood F, Zeng XX et al. Radiotherapy and corticosteroids for preventing and treating keloid scars. *Cochrane Database of Systematic Rev.* 2017;2017(4).
11. Morelli Coppola M, Salzillo R, Segreto F, Persichetti P. Triamcinolone acetonide intralesional injection for the treatment of keloid scars: patient selection and perspectives. *Clin Cosmet Investig Dermatol.* 2018;11:387-96.
12. Tripathi S, Soni K, Agrawal P, Gour V, Mondal R, Soni V. Hypertrophic scars and keloids: A review and current treatment modalities. *Biomedical Dermatology.* 2020;4(1):1-11.
13. De Oliveira GV, Gold MH. Silicone sheets and new gels to treat hypertrophic scars and keloids: A short review. *Dermatol Ther.* 2020;33(4):e13705.

Cite this article as: Limanda CF, Widhiartini IAA. Comparison of the efficacy of interlesional corticosteroid and silicone gel for keloid treatment: a review article. *Int J Res Med Sci* 2023;11:2325-7.