Case Series: Evaluation of a Liquid Silicone Gel on Scar Appearance Following Excisional Surgery—A Pilot Study

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ABSTRACT

Efforts to improve the size and appearance of scars have included therapies as varied as laser treatments and onion extract gels. Silicone gel sheeting is well known to improve the appearance of hypertrophic scars and may have a role in the management of routine surgical and traumatic scars. By varying the degree of cross-linking, silicone elastomer can be a solid sheet or a liquid gel. In this pilot series, seven patients applied a liquid silicone gel twice a day to one half of a new surgical scar for three months. At the end of this time, the treated side was noticeably better in appearance in five of seven patients while two of seven had no difference. In no patient was the silicone treated side worse in appearance.

INTRODUCTION

A full-thickness wound, regardless of the cause, will always heal with a scar. Excisional surgery, whether for cosmetic purposes or cutaneous oncology, therefore will always produce a scar. A dream of cutaneous surgeons has been to develop a method of scarless surgery. A tantalizing observation is that in utero surgery performed on fetuses results in healing with no visible scar, but this observation has not resulted in any method that can be applied to adults.

The current state of the art is to minimize scar formation rather than prevent it. Careful surgical technique, along with pre-operative planning, the general medical status of the patient, meticulous surgical technique and wound care with occlusive and semi-occlusive dressings—all affect the speed of healing and ultimate cosmetic appearance of a scar. Again, incision of the skin will always result in a scar, but the appearance of that scar can be minimized.

Wound healing proceeds through overlapping but distinct phases. The last of these is remodeling and can last up to 12 months. In the past, conventional wisdom was to allow the remodeling phase to finish before considering interventions (such as dermabrasion) to improve scar appearance. However, more recently it has become apparent that intervention during the remodeling phase can improve the ultimate outcome of the scar. An example is the use of silicone gel sheeting, which can prevent the development of hypertrophic scars and keloids.1

Silicone dressings are polymers of siloxane, which can be cross-linked to give elastomer occlusive sheets and gels, known to both treat and prevent abnormal scarring such as keloids and hypertrophic scars.1 Over 60 silicone elastomer products have been on the market since 19902 for this purpose. An unanswered question is: what effect these products would have on an otherwise normal wound healing process? Would use of silicone elastomer sheeting or gels effect final scar formation and thus improve function and appearance?

When originally introduced, silicone products were highly cross-linked polysiloxanes that produce a rubbery solid elastomer. These need to be worn up to 24 hours a day and require a secondary system, such as tape, to hold them in place. Needless to say, this is a bit inconvenient for patients. Subsequently, it was appreciated that a lesser degree of cross-linking would result in a gel that can be applied topically from a tube. One of these products (Kelo-cote®, Advanced Bio-Technologies, Inc., Suwanee, GA) has the potential benefit of rapidly drying to produce an adherent occlusive film that should allow longer duration of effect after topical application. In this pilot study, the author tested topical application of a liquid silicone gel on otherwise normal excisional scars to evaluate any potential beneficial effect.

METHODS

Ten patients who had excisional surgery for skin cancer were recruited for this pilot study. Patients with a history of abnormal scarring, such as keloids or hypertrophic scars, were excluded. Following Mohs surgery for skin cancers, wounds were repaired primarily in two layers. Routine wound care, including a topical antibiotic ointment and a semi-occlusive bandage, was used daily until suture removal at seven to nine days.

Beginning five days after suture removal, each scar was divided into two equal halves, left and right or up and down. The study nurse randomized patients to apply the liquid silicone gel (Kelo-cote) to one half of the scar twice-daily for three months. The other half received no further treatment. Patients were evaluated for safety and tolerability at one month, received a follow-
up phone call at two months and then were seen for clinical evaluation and digital photography at three months.

A blinded physician evaluated the resultant scars on two scales: the Vancouver Scar Scale and a global physician’s evaluation of noticeable difference. Specifically, the physician’s global evaluation is as follows: 0=no noticeable difference between the two halves; 1=slight but noticeable difference; 2=moderate difference and 3=dramatic difference. A colorimeter (Mexameter, KOKO Kosmetikvertrieb GmbH, Germany) was used to objectively measure scar pigmentation and erythema.

Three patients dropped quickly out of the study as they were unable to return for the first follow up visit. They reported no adverse events for the few applications they performed. Seven patients completed the full three-month course of therapy and are available for analysis.

RESULTS
Seven patients completed the three-month course of therapy and were available for evaluation. The three who withdrew did so because of an inability to comply with the protocol and return for evaluation. No adverse events of any type were reported by any patient.

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On the global physician evaluation, five out of seven patients had a noticeable difference in the two halves, with the treated side better (Table 1). In two of seven patients no noticeable difference between the two halves was reported. In no patient was the control half noted to be better in appearance.

The Vancouver Scar Scale is a validated scar assessment incorporating several features of scar appearance and function. In four of seven patients, the silicone gel treated half received a lower VSS rating, and indication of enhanced appearance and function (Table 2). In three of seven patients, the score was the same. In no patient was the control side better than the silicone gel side.

A Mexameter was used to measure scar color at the beginning of therapy with the silicone gel and after three months. This device is a colorimeter and objectively quantifies both red and brown. After three months of therapy, there was no difference in either erythema or brown pigmentation between the two halves.

The mechanism of the improvement in scar appearance is not known. A decrease in erythema and/or hyperpigmentation is not the explanation, as the Mexameter showed no color difference between the two halves. Therefore, improvement comes from height and size of the scar (Figures 1 and 2). In these clinical examples, the treated half is obviously smaller, flatter and less noticeable.

Silicone gel sheeting and liquid silicone gels are well known to improve the appearance of abnormal scars, such as hypertrophic and keloidal scars. They are also useful in preventing abnormal scarring. This pilot study suggests these products may have a role in enhancing the appearance of normal scars produced by routine surgery.

There are numerous papers regarding the mechanism of action for silicones to minimize scar formation. Most notably, the suggestion that silicones can correct both deficiencies or over-proliferation of the growth factors present in the cellular cascade that orchestrates the overall tissue repair process. In addition to the biological mechanism, silicones are also known to produce hydration of the scar by occlusion, which in turn may positively affect the alignment of collagen deposition during the remodeling phase.
DISCLOSURES
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REFERENCES

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