



Review Article

Insights into the Management of Keloid Scars: A Survey-Based Protocol

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Abstract

In the broad array of literature as it relates to keloid treatment, there is a global absence of definitive protocols in the management of keloid scars.

The goal of this project was to find some common ground in treatment regimens among plastic surgeons and to determine how our treatment protocol compares with those of other plastic surgeons. To this end, a web-based survey was designed and over 700 random emails were sent to plastic surgeons worldwide, with 54 completing the survey, representing several hundred years of cumulative experience from the plastic surgeons who responded. These results were then tabulated and the more common regimens identified.

The results of the survey, while useful in identifying common regimens and helping to substantiate the validity of our protocol, underscore the need for randomized, controlled trials to bring about more consistency in regimens used.

Introduction

Background

Keloids arise as an aberrant tissue response to cutaneous insult characterized by the production of excessive fibrous tissue. Keloids extend beyond the original boundaries of tissue injury and may appear months to years after injury. They occur with equal frequency in males and females and occur most commonly in younger people.

Keloids have a predilection for the earlobes, chest, back, neck, and shoulders. Keloids tend to afflict those people that are more pigmented, with blacks being the most susceptible. Keloids may be symptomatic; commonly causing itching, tenderness, and pain. The etiology of keloids is unknown. Some have demonstrated that

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increased extracellular matrix production is characteristic [1-4]. Keloids remain difficult to treat under even the most optimal of conditions, and they frequently recur.

Treatments

An array of adjunctive therapies including silicone gel sheeting, pressure garments, intralesional steroids, and radiotherapy have been employed with variable success. Intralesional cryotherapy, a newer technique, though showing some promise with improvement of symptomatic keloids, remains controversial for use in a wider range of Fitzpatrick types [5].

Silicone sheeting

Several randomized, controlled trials have confirmed the validity and effectiveness of silicone sheeting [6-13]. Though effective, the silicone material be worn continuously for months at a time to prevent rebound hypertrophy [14].

Pressure therapy

Pressure therapy involves the exertion of at least 24 mmHg to exceed the inherent capillary pressure [15,16]. Much like silicone materials, pressure garments should be worn 18 to 24 hours a day for several months [17-20]. Surgery in conjunction with pressure therapy has produced success rates of up to 90 percent [21-25].

Corticosteroid injections

Steroids have been demonstrated to soften the contours and reduce the bulk of keloids [26-30]. Response rates vary from 50 to 100 percent, with recurrence rates of up to 50 to 80 percent [26-30]. Steroids purportedly decrease collagen synthesis by increasing metalloproteinase activity [31-36]. The optimal number of injections to be performed and the amounts injected to produce an optimal response are largely up for speculation.

Radiotherapy

Radiotherapy has been employed as both adjunctive and primary treatment. Radiation therapy is presumed to destroy the proliferating fibroblasts, resulting in diminished collagen production [37]. Radiation treatments are typically administered over five to six sessions in the early postoperative period [38,39]. The combination of surgery and perioperative radiation therapy reduces recurrence to 10 percent according to some authors [37]. Historically, radiation therapy has been reserved for abnormal scars resistant to other treatments due to the presumed risks posed by radiation.

Excision and intralesional steroids

Though all of the modalities presented thus far have roles to play in keloid management, local excision in combination with intralesional kenalog has long been the definitive treatment for keloids. However, there is lack of a standardized protocol (including specific steroid, strength, number, and frequency of doses to be administered) in the published literature [40].

Intralesional cryotherapy

Intralesional cryotherapy is an emerging technique where the scar is frozen from inside. A recent comprehensive review demonstrated decreased clinical symptomatology and scar volume, however, complete eradication was not achieved and some patients experienced hypopigmentation and/or recurrences [5]. While showing some promise with improvement of symptomatic keloids, intralesional cryotherapy remains controversial for use in a wider range of Fitzpatrick types.

Methods

To undertake this task of searching for a treatment protocol, a random compilation of board certified plastic surgeons was made comprising over 700 names. Next all of these selectees were emailed a letter asking for participation in filling out a web-based survey. Ultimately, 54 respondents filled out the survey. Lesions treated ranged in size from 0.5 cm to 15+ cm. Limitations of this study would include sample size and self-selection bias.

Participants were queried on steroid preference, concentration and volume injected, number of treatments, frequencies, and the temporal relationship of those injections to excision. Finally, those surveyed were asked to provide additional therapies they found useful in treating keloids.

Results

The results were then tabulated and expressed as percentages. Only the most common responses have been tabulated.

Discussion

Table 1 illustrates that triamcinolone (kenalog®) appears to be the overwhelming favorite for steroid injection. Triamcinolone (kenalog®) has long been used to treat keloid scars and is manufactured in standard concentrations from 10 to 40 mg/ml. Although the majority of the respondents used 40 mg/ml concentrations, many of these were diluted 2 to 1. After accounting for dilution, relatively equal numbers used each of the concentrations of kenalog. The concentration of the triamcinolone is easily ascertained, but the volume of injection for a certain surface area or a volume of scar tissue is not easily enumerated upon inspection alone. Thus, blanching of the involved scar area is recommended at the titration end point.

| Steroid choice | | Kenalog concentrations | |
|----------------|-----|------------------------|-----|
| Kenalog | 96% | 10 mg/ml | 35% |
| Celestone | 4% | 20 mg/ml | 31% |
| | | 40 mg/ml | 35% |

Table 1: Surveyed surgeons' steroid preferences and the dosage of their preferred agent.

Table 2 reveals that all of the plastic surgeons surveyed practice excision, which is what one expects when referred to a surgeon for treatment of a keloid. One also notices that the majority of surgeons injected 1 ml and that the majority administer perioperative steroids. As far as dosing intervals go, q month dosing for a total of 3 treatments was the most common preoperative and postoperative regimen, with q6 week dosing for 3 doses being the second most common.

While excision and intralesional kenalog® constitute the most common treatment algorithm, it was interesting to note that (see table 3) 22% used radiation as a primary form of treatment following excision, and that almost ½ used radiation at some point in their

| | | |
|----------------------------|-----------------|-------------------|
| Preoperative Steroids 26% | q month x 3 50% | Q 6 weeks x 3 25% |
| Postoperative Steroids 70% | q month x 3 39% | Q 6 weeks x 3 32% |
| Perioperative Steroids 63% | | |

Table 2: Preoperative versus postoperative steroid treatment strategies and dosage regimens.

treatment algorithm. Silicone gel sheeting (26%), compression garments (22%), and cordran tape (17%) constituted the majority of the other adjunctive therapies.

| Postoperative Adjunctive Management | Radiation | Silicone Gel Sheetting | Compression Garments | Cordran tape |
|-------------------------------------|---|------------------------|----------------------|--------------|
| | 22% as primary form of treatment after excision 46% for refractory keloids | 26% | 22% | 17% |

Table 3: Survey results for adjunctive strategies (see discussion below).

| Injection #1 | Excision after 2 weeks | Injection #2 at 1 week post op | Injection # 3 at 4 weeks, Injection #4 at 8 weeks |
|--------------|------------------------|--------------------------------|--|
| | | | |

Table 4: Authors' preferred treatment regimen.

Conclusion

Therefore, if one were trying to define the most common algorithm, it would consist of the following:

- 1) Excise the keloid, injecting 1 ml of 10, 20, or 40 mg/dl kenalog at the time of surgery,
- 2) Inject 1 ml of 10, 20, or 40 mg/dl kenalog into the keloid postoperatively every month for a total of 3 doses.

These findings are largely supportive of and consistent with the protocol presented by the authors: 1 cc of triamcinolone 10mg/ml (kenalog 10®) is injected in the lesion (in smaller lesions fluid is injected until blanching is obtained). After a waiting period of 2-3 weeks, a full excision of the lesion is performed, while achieving good hemostasis and utilizing non-absorbable suture material for closure. At postoperative day 7, the suture material is removed and 1 cc of kenalog® 10 injected into the surgical scar. This is followed by 2 more injections of the steroid every 4 weeks.

Hopefully, the findings articulated in this paper will be useful to plastic surgeons managing keloid scars, particularly those physicians just beginning a practice and physicians in training. The paper also highlights the overwhelming need for prospective randomized trials to examine such protocols and their validity in the management of keloids. However, the results obtained within this paper do shed light upon the current thinking and management tactics of practicing plastic surgeons worldwide.

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