

Multimodal Management of Facial Keloid with Tissue Expansion, Excision, and Injection of 5-FU and Triamcinolone

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Summary: Keloids are benign, fibroproliferative dermal growths that occur in response to injury of the skin. These hypertrophic scars can cause pain and discomfort and have been associated with negative effects on social well-being, prompting physicians to seek effective treatment modalities with minimal risk of recurrence. Although surgical excision of the keloid initially removes the scar tissue, surgery alone triggers a fibroproliferative response similar to the initial insult, resulting in a high recurrence rate. Thus, a multimodal approach may be most appropriate when surgery is indicated to limit recurrence. We present the successful treatment of recalcitrant keloid formation of the face that was treated with tissue expansion, excision, and intralesional triamcinolone and 5-fluorouracil injections. (*Plast Reconstr Surg Glob Open* 2023; 11:e4796; doi: [10.1097/GOX.0000000000004796](https://doi.org/10.1097/GOX.0000000000004796); Published online 25 January 2023.)

INTRODUCTION

Keloids are benign, fibroproliferative dermal growths that occur in response to injury of the skin. They occur when hyperactive fibroblasts deposit irregular, disorganized type I and III collagen, creating a hypertrophic scar that extends beyond the borders of the injury.¹ These scars can cause pain and discomfort and have been associated with negative effects on social well-being, prompting physicians to seek effective treatment modalities with minimal risk of recurrence.² Although limited, current knowledge of keloid pathophysiology has guided first-line treatments and aided in elucidating novel therapies.

Several treatment options have been well documented, including a combination of surgical and medical management.^{3–7} Although surgical excision of the keloid initially removes the scar tissue, surgery alone triggers

a fibroproliferative response similar to the initial insult, resulting in a 50%–100% recurrence rate.⁶ Thus, if surgery is warranted due to extensive disfigurement, a multimodal approach may be most appropriate to limit recurrence. We present here a case of recalcitrant keloid formation of the face that was treated successfully with tissue expansion, excision, and serial intralesional triamcinolone (TAC) and 5-fluorouracil (5-FU) injections.

CASE

A 48-year-old man presented to clinic with a blast injury that led to the formation of disfiguring keloids and multiple draining sinuses on his bilateral cheeks that extended onto the posterior neck (Fig. 1). (See figure 1, Supplemental Digital Content 1, which displays the lateral view of a 48-year old man with disfiguring keloids and multiple draining sinuses on bilateral cheeks extending to the posterior neck. <http://links.lww.com/PRSGO/C373>.)

This extensive disfigurement significantly impacted his quality of life, as he isolated himself. Previous treatment attempts, including several excisions and advanced flaps with different providers, were complicated by chronic infection and keloid recurrence. Given the patient history of recurrence, it was clear that none of the singular modalities would be sufficient. Therefore, a two-stage approach with the goal of tension-free incision

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Fig. 1. Anterior view of a 48-year-old man with disfiguring keloids and multiple draining sinuses on bilateral cheeks and neck.

closure along with prolonged postoperative intralesional injections was planned.

Given the history of draining sinuses, the lesions were biopsied to rule out malignant degeneration. The patient was treated with preoperative antibiotics for 1 month prior to placement of the tissue expanders to reduce the risk of infection. Incisions were made at the boundary of the normal skin and keloid and two 8 cm × 3 cm expanders were implanted subcutaneously in the cheek and two 15 cm × 3 cm were placed in the chin (Fig. 2). (See figure 2, Supplemental Digital Content 2, which displays the lateral view demonstrating tissue expander placement. <http://links.lww.com/PRSGO/C374>.) Crescent-shaped expanders were chosen to accommodate surrounding anatomical contours and the largest size expander that could be accommodated was chosen to maximize expanded skin. The patient did not experience postoperative complications. Typically, the use of high-visibility tissue expansion is limited in adults due to the impact on their lives. However, in this case, the patient was willing to commit to a longer period of time to achieve resolution of symptoms. After allowing the insertion incision to heal for 3 weeks, weekly expansion was done for a period of 3 months. Once satisfactory expansion was achieved, the keloids were excised, and the resulting wounds were



Fig. 2. Anterior view demonstrating tissue expander placement. The patient demonstrated near resolution of draining sinuses after a 1-month course of prophylactic antibiotics before tissue expander placement.

resurfaced with the expanded facial flaps. Injections at the level of the healing incisions of 5-FU (10 mg/mL-10 mL dose) and TAC (40 mg/mL-1 mL dose) were given every 2 weeks for a total of five treatment cycles, then tapered to approximately monthly injections for 9 months. As significant recurrence was not noted, the time interval between injections gradually increased with treatment completion at 2 years from excision. Five years postoperatively, the patients' scars remained soft, with minimal thickening and minimal recurrence (Figs. 3 and 4). He reported that he was very satisfied with the results.

DISCUSSION

The treatment of pathological scars remains a challenge despite a multitude of treatment modalities available. As keloid formation is only documented in humans, the lack of animal model available for experimentation limits our ability to study the efficacy of various treatments.⁸ Thus, care is largely driven by individual clinical experience.

Although intralesional injections of TAC remain the first-line treatment, they have a reported 33%–50% recurrence rate.³ Although less regularly employed as a monotherapy, 5-FU alone has been reported to have a 45%–78% recurrence rate.^{3,4} Acceptable outcomes have been reported when combining intralesional TAC and



Fig. 3. Anterior view after closure and serial treatments of 5-FU and TAC demonstrating minimal keloid recurrence.



Fig. 4. Lateral view after closure and serial treatments of 5-FU and TAC demonstrating minimal keloid recurrence.

5-FU, with one study citing up to 96% of patients achieving satisfactory results.⁵ Excision alone has a reported 50%–100% recurrence rate, likely attributed to additional trauma to the skin triggering a fibroproliferative response.⁶ A recently published systematic review evaluating excision and adjuvant treatments in the prevention of keloid recurrence found that radiotherapy, intralesional TAC, verapamil, and 5-FU were successful adjuvants to keloid excision.⁹ Although brachytherapy was considered in this particular case, it did not yield satisfactory results in previous cases at our institution. For this reason, serial injections were chosen.

Anderson et al additionally reported success of multimodal treatment in a cohort of 26 keloids treated with excision and concurrent 5-FU injections, followed by serial injections of 5-FU weekly with the addition of TAC at the final injection at 9 weeks. Four keloids demonstrated hypertrophic scarring and, with a mean follow-up time of 22 weeks, none demonstrated recurrence.¹⁰ These results, along with similar successes reported in the literature, suggest that combination therapy should be prioritized in recalcitrant keloids that are resistant to first-line treatment modalities.

Although facial tissue expansion may be perceived as an initially burdensome method, the benefits of tension-free closure in the setting of inadequate skin for primary closure are enhanced by the prospect that minimizing tension may thus minimize subsequent pathological scar formation. Sparse data exist on whether specific

wound-closure techniques reduce the likelihood of keloid recurrence; however, tensionless closure after excision has been found to be important in reducing scar hypertrophy and widening.⁷ When considering a two-stage surgical approach involving tissue expansion, patient selection requires careful consideration.

A wide variation in first-line treatments among independent practitioners points to the lack of consensus as to the most effective keloid treatments. Although many more clinical trials assessing the efficacy of singular and combination therapies are underway, limiting recurrence should remain a focus. This case represents the successful treatment of extensive facial keloids using tissue expansion, excision, and serial injections of a combination of triamcinolone and 5-fluorouracil.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was obtained from all patients for being included in the study. Additional informed consent was obtained from all patients for which identifying information is included in this article.

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PATIENT CONSENT

The patient provided written consent for the use of his image.

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