Multidisciplinary treatment of a massive head and neck keloid scar: A case report

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Abstract
Keloid scars can lead to significant patient morbidity and disfigurement, especially when located on the head and neck. Massive keloid scars are particularly difficult to manage due to ulceration, infection, pain, and high recurrence rates following excision. We report the successful treatment of a massive head and neck keloid scar with excision and grafting, postexcisional radiotherapy, and ablative fractional laser-assisted topical corticosteroid delivery.

Keywords
Keloid, scar, laser, radiation, graft

Date received: 4 March 2020; accepted: 30 April 2020

Introduction
Keloid scars result from a complex aberrant response during the tissue remodeling phase, which can result in disfiguration, restriction of movement, pain, pruritus, ulceration, and infection. Herein, we report successful multimodal treatment of a large multiply recurrent keloid scar, including excision and grafting, radiation, and ablative fractional laser-assisted topical corticosteroid delivery.

Case presentation
A 33-year-old otherwise healthy teacher presented to our dermatology clinic with a 15 × 13 × 6 cm ulcerated and necrotic keloid scar overlying his left posterolateral scalp, neck, and retroauricular area with associated dermatopathic regional lymphadenopathy. He had fallen off a water tank 22 years earlier, suffering a laceration which healed as a large keloid scar. This recurred despite three previous attempts at excision and grafting, including excision and grafting, radiation, and ablative fractional laser-assisted topical corticosteroid delivery.

We referred the patient to a plastic surgeon who excised this large keloid and closed the site with a split-thickness skin graft (STSG) from the left anterolateral thigh at 16/1000th thickness. Starting the day of his excision, the patient then underwent 3 days of consecutive radiation treatment with 600 cGy using 6-MV photons over 3 days. We then followed the patient for ongoing scar management and keloid prevention over the next 12 months, consisting of eight intrallesional triamcinolone acetonide (TAC) injections at 5–40 mg/ml and three sessions of UltraPulse ablative fractionated CO₂ laser using Synergistic Coagulation and Ablation for Advanced Resurfacing (SCAAR FX) mode with settings of 110–150 mJ at 3%–5% density (Lumenis Ltd., Yokneum, Israel). The patient suffered from skin ulceration, likely from the combination of intrallesional corticosteroid and radiation, necessitating two courses of antibiotics. This ulceration led to irregular hypopigmentation. The patient found the TAC injections are quite painful, despite local anesthetic. He also had restriction in lateral movement of his neck, and his wound was firm to palpation (Figure 2).

We then introduced ablative fractional laser-assisted topical application of TAC 10 mg/ml, with the goal of improving the pliability and size of the scar. Over the next 12 months, the patient underwent six additional treatments of SCAAR FX at settings of 130–150 mJ at 3%–10% density to the peripheral hypertrophic portions of the scar and SCAAR FX at 80–100 mJ at 5%–10% density to the central portion followed by two more treatments of TAC 10 mg/ml.

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immediately by topical application of TAC 10 mg/ml. This resulted in improved irregularity, size, range of motion, pain, and pliability to the patient’s scar. The patient suffered from no further ulceration of the skin during this fractional laser-assisted drug delivery. The patient remains pleased with the functional and cosmetic appearance of his scar 22 months from his last such treatment and has not had recurrence of the keloid 47 months from his excision (Figure 3).

Discussion

Keloid scars result from various patient-related, site-related, and external factors. Common triggers include trauma, inflammation, burns, surgery, and tension. Genetics and ethnicity play a role, as darker skinned individuals are up to 15 times more likely to develop keloids.1 Almost half of the patients in a health-related quality of life survey reported severe emotional symptoms related to their keloid scar and roughly one-quarter reported severe problems related to symptoms and function.2

The pathogenesis is hypothesized to involve an excessive number of and response to growth factors, such as platelet-derived growth factor and transforming growth factor β (TGF-B), leading to an increase in fibroblast proliferation and collagen/extracellular matrix synthesis. Moreover, keloids display increased neovascularization and decreased metalloproteinase activity.2,3

Various conventional and off-label treatments have been reported, such as occlusive dressings, topical and intraleisional corticosteroids, excision and cryotherapy. Newer treatments include radiation therapy, 5-flurouracil, imiquimod, ingenol mebutate, retinoids, calcineurin inhibitors, such as tacrolimus, bleomycin, verapamil, TGF-B, hyaluronidase, botulinum toxin A, pulsed dye laser, fractional laser resurfacing, and laser-assisted drug delivery (LADD).3 Like much of medicine, the number of treatments for a given condition is often an inverse to each individual one’s success.

Reported recurrence rates with surgical excision alone range from 45%–100%.3 Excision followed by grafting is challenging due to scar contracture, graft failure, and keloid recurrence. When treated with excision and radiation, keloids can have much lower recurrence rates of 0%–8.6%,3 as radiation is felt to inhibit the angiogenesis and fibroplasia seen in keloid formation. Ablative fractional CO2 lasers have well-documented efficacy in treating recalcitrant scars such as extensive burn scars.4 Ablative fractional laser devices are now more frequently being used to improve to topical drug delivery, allowing the use of lower dosing with fewer adverse
effects. Fractional lasers created microscopic treatment zones (MTZs) which facilitate uniform drug penetration over a desired area according to the depth and density selected by the user. In our case, this modality resulted in greater improvement to the pigmentation, range of motion, pliability, size and pain versus the combination of fractional laser ablation and intralesional TAC.

In summary, keloids are challenging to treat and often require multidisciplinary efforts for success. To our knowledge, we report the first successful case of a large recurrent keloid treated with excision and STSG, postoperative radiation, and ablative fractional laser-assisted topical corticosteroid delivery and provide suggested laser parameters for LADD of TAC.

Acknowledgements
The authors thank Dr Andrew Lin of Plastic Surgery for performing the excision and grafting of this keloid scar. They also thank Dr Robyn Banerjee for performing the radiotherapy following the excision.

Declaration of conflicting interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Informed consent
Written informed consent was provided for the use of original photographs by the patient.

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