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CASE REPORT
Cosmetic

Successful Novel Treatment of Granuloma Faciale Using CO_2 Emulated Er:YAG Laser Ablation

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Summary: Granuloma faciale is a rare, benign inflammatory skin disease that has multiple medical treatment modalities due to its frequent unresponsiveness to treatment. This skin disease presents as a single, well-demarcated red-brown to violaceous, raised lesion, most commonly on the face, in middle-aged White men. Its etiology is unknown; sun exposure is thought to have some implications in its formation. Treatment modalities for granuloma faciale include topical therapy, intralesional injections, systemic therapies, phototherapy, lasers, cryotherapy, and surgical excision. In this article, we will highlight a rare case of granuloma faciale and its novel and successful treatment with a carbon dioxide emulated Er:YAG laser.
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Granuloma faciale (GF) is a rare, benign, inflammatory skin disease that was first termed by Wigley in 1945, referring to the condition as an eosinophilic granuloma of the skin.[1] Clinically, GF presents as a red-brown to violaceous papule, or plaque, often with superficial telangiectasias, most commonly on the face.[2] The lesions may also present on the trunk, extremities, or in the nasal cavity.[3] Due to the presenting location, it is hypothesized that sun exposure contributes to the formation of these plaques. Demographics of this disease include most commonly middle-aged White men, but it has also been shown to appear in children.[1] Although the exact etiology is unknown, it is commonly classified as an eosinophilic dermatosis.[4] Diagnosis should be made with a biopsy and confirmed histopathologically. Histology of GF shows a dense mixed-cell infiltrate that extends into the papillary dermis but is separated from the epidermis by a narrow zone, referred to as the grenz zone.[5] Typically, eosinophilic infiltrates are seen throughout, but not necessary for the diagnosis. Other histologic findings for GF include neutrophilic infiltration, telangiectasias, and vascular changes.[5] Treatment of GF may be difficult with multiple medical modalities, including topical, systemic, and mechanical treatments. This article will discuss a case of GF and its successful treatment with a carbon dioxide (CO_2) emulated Er:YAG laser.

CASE

A 60-year-old White man with no significant medical or social history presented to our clinic with a forehead lesion. He was previously seen by a dermatologist who had performed an incisional biopsy of the forehead lesion that confirmed the diagnosis of GF and was subsequently treated with two intralesional steroid injections, of unknown kind or dose, with minimal improvement of the lesion. The patient presented to our clinic, and upon evaluation, there was a midline upper forehead pigmented lesion (15 mm × 20 mm × 1 mm), variegated irregular border that was red to purple in pigment and slightly raised, as shown in Figure 1. The patient's lesion was refractory to other medical therapy as detailed above, and the decision to undergo laser ablation therapy was made. The patient's treatment regimen included three total laser ablations using a CO_2 emulated Er:YAG laser: the Sciton Joule Laser (Palo Alto, Calif.) at treatment intervals of 9 months after the first ablation, and 6 months after the second ablation (Table 1). The patient also received 0.5 cm^3 of intralesional triamcinolone injection (dose 40 mg/1 ml triamcinolone) diluted in equal parts of 1–100,000 epinephrine, in between the second and third laser treatments. The patient experienced some pain and hyperpigmentation 3 months after the first laser treatment, with significant improvement of the texture and coloration of the lesion after the second treatment, as show in Figure 2. After the third laser ablation treatment, the patient is very satisfied with the results, as shown in Figure 3. The patient is now being observed every 3–6 months and continues with

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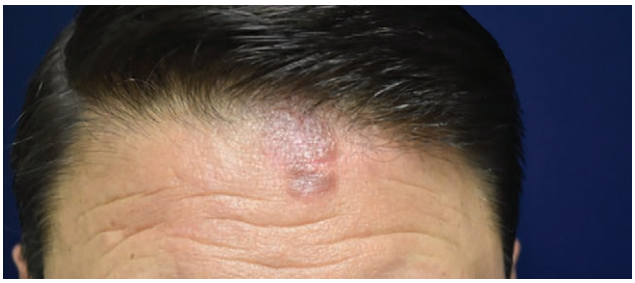

Fig. 1. Pretreatment photograph of GF forehead lesion. This photograph is upon the patient's first visit to our clinic. The lesion measures about 15 mm × 20 mm × 1 mm.

Fig. 2. Post second laser treatment photograph of granuloma faciale forehead lesion. This photograph highlights the results of posttreatment of CO_2 emulated Er:YAG laser ablative therapy after two sessions.

Table 1. CO_2 Emulated Er:YAG Laser Ablation Settings, Sciton Joule Laser (Palo Alto, Calif.)

Er:Yag	2940 nm Wavelength
Contour TRL Ablate 50 μm 12.5 J/cm^2	Coag 70 50% overlap

The patient's lesion was treated with one pass over the lesion.

conservative measures of sun protection and cleansing of the area.

DISCUSSION

We present a case of the rare benign skin disease, GF, and will focus this discussion on the treatment strategy used. Treatment of GF can be difficult due to the persistent and recurrent nature of the disease. At times, it takes single or multitude modalities for resolution of GF, with the most common being topical therapy, intralesional injections, systemic therapies, phototherapy, lasers, cryotherapy, and/or surgical excision. In this case, we used CO_2 emulated Er:YAG laser therapy with much improvement of the patient's condition.

The standard approach to treating GF typically starts with topical therapy such as topical corticosteroids, or tacrolimus, followed by systemic drugs, and in case of failure, more invasive procedures.[2] A recently published systematic review of multiple treatment modalities of GF compared topical and systemic treatment options.[2] The article noted most success with tacrolimus 0.1% ointment twice daily with a trial of local dapsone gel for further option, followed by laser therapy and cryotherapy.[2] Cryotherapy is inexpensive and widely accessible but the effect is limited.[2] Systemic therapies such as systemic dapsone are well tolerated but have a risk of severe side effects and did not prove to be more effective than other therapies.[2] In this particular systemic review, they found that the use of lasers, preferably pulse-dye lasers, was the treatment of choice for drug-resistant GF.[2] Other studies have found success in treatment with KTP 532-nm lasers, and CO_2 lasers.[2]

In our case, we found success with using a CO_2 emulated Er:YAG laser. The patient had previously failed unknown topical therapies and was suffering from the aesthetic appearance of the lesion on his forehead. CO_2

Fig. 3. Post third/final laser treatment photograph of GF forehead lesion. This photograph highlights the results of posttreatment of CO_2 emulated Er:YAG laser ablative therapy after three sessions.

emulated Er:YAG laser therapy in three treatments was used and successfully reduced the size, color, and texture of the lesion. Both CO_2 and Er:YAG lasers are classified as ablative therapy which damage and remove most superficial layers of the skin, improving the appearance of skin after subsequent re-epithelization.[6] The CO_2 laser is a versatile tool with many applications in ablative lasering.[7] CO_2 lasers emit an invisible infrared beam at 10,600 nm, targeting intracellular and extracellular water, and vaporize tissues in a nonselective manner.[2,7] CO_2 lasers generate the greatest depth of penetrance (about 5–15 times deeper than the Er:YAG laser); thus they are widely used for facial rejuvenation. Although they carry a higher risk of scarring or hypopigmentation, proper technical deployment of the CO_2 laser can help mitigate these side effects. The Er:YAG laser emits at a peak wavelength of 2940 nm, similar to the absorption peak of water at 3000 nm.[6] Like the CO_2 laser, Er:YAG lasers also target water in the epidermal and papillary dermal layers of the skin, vaporizing water in the epidermal layer, creating a skin-peeling effect, and inducing thermal injury in the dermal layer, stimulating production of collagen, as well as improving and tightening of the skin.[6] While CO_2 lasers may have a greater depth of penetrance, the wavelength of the Er:YAG is 12–18 times more efficiently absorbed by superficial water.[6] In our case, we changed the settings on the Er:YAG laser to emulate the light and heat energy of a CO_2 laser for prospective deeper penetration. Typical

settings for an Er:YAG laser for a superficial skin ablation are 2940 nm, fluence of 2.5–5 J/cm^2, ablation of 15–20 µm, coagulation of 15 µm, short pulse duration of 250–1000 microseconds. We increased the fluence, ablation, and coagulation settings (as noted in Table 1) on our Er:YAG laser to emulate the ablative effects and thermal injury of a CO_2 laser. In our case, an Er:YAG laser was used due to its availability, and safety for in-office procedure, compared with a CO_2 laser. In review of the literature, there have been minimal reports of treating GF successfully with CO_2 laser ablation and no reports of using a CO_2 emulated Er:YAG laser. Similar reports of rhinophyma-like GF have documented success with using the CO_2 laser.[8] Our case represents an innovative use and a positive outcome for treating GF with CO_2 emulated Er:YAG laser ablation therapy. When dealing with a case of GF that is resistant to multiple treatment modalities, CO_2 emulated Er:YAG laser ablative therapy should be considered due to its cosmetically pleasing outcome and low side-effect profile.

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PATIENT CONSENT

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

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