

Destructive Facial Granuloma Following Self-Treatment With Vitamin E Oil and an At-Home Microneedling Device

Chelsea Huang, MD; Bruce R. Smoller, MD; Justin C. Kerstetter, MD; Anwar S. Raza, MD; Michael R. Greas, MD

PRACTICE POINTS

- Severe complications can potentially arise from at-home microneedling procedures when combined with cosmeceuticals such as vitamin E oil.
- Clinicopathologic correlation with cosmetic procedures is imperative to prompt diagnosis and treatment of these skin reactions.
- Microneedling procedures should be performed under the supervision of a board-certified dermatologist to avoid complications, and clinicians should inquire specifically about skin care routines and cosmetic procedures when patients present with unusual lesions on the face.

Use of cosmeceuticals such as vitamin E oil with at-home microneedling (MN) devices can lead to local and systemic complications. We report the case of a 44-year-old woman who developed a necrotic ulcer on the chin following self-treatment with vitamin E oil and an at-home MN device. Our case highlights a severe complication associated with an increasingly popular cosmetic practice for facial rejuvenation. It is important for dermatologists to be vigilant in correlating clinical history and recent cosmetic procedures with the histologic findings for timely diagnosis and treatment of unusual lesions on the face.

Topical application or injection of cosmeceuticals in conjunction with procedures such as facial microneedling (MN) has been associated with local and systemic complications.¹ Microneedling is an increasingly popular minimally invasive therapeutic procedure that is used for a wide range of dermatologic purposes, including facial rejuvenation.² Other indications for MN include minimizing the appearance of acne scars, surgical scars, stretch marks,

wrinkles, and other cosmetic skin concerns. This procedure can be performed both at home and in a clinical setting, but at-home devices differ from procedures performed in a dermatology office. Clinicians use medical-grade devices for deeper penetration of the skin, yielding more effective results. In contrast, at-home MN devices are designed to be safer and less powerful with milder outcomes.

Although at-home options may be more accessible and affordable for patients, they also increase the risk for improper use and subsequent infection. Additionally, the use of cosmeceuticals such as vitamin E oil in conjunction with MN to enhance the effects of the procedure can lead to further complications. We report the case of a 44-year-old woman who developed a necrotic ulcer on the chin following self-treatment with vitamin E oil and an at-home MN device. While MN has been reported to be relatively safe when performed by board-certified dermatologists, clinicians should be vigilant in correlating clinical history and recent cosmetic procedures with the histologic findings for timely diagnosis and treatment of unusual lesions on the face.

Case Report

A 44-year-old woman presented to the emergency department with a progressively enlarging, necrotic, ulcerative lesion on the midline chin of 4 months' duration. The patient reported that the lesion started as redness that developed into a painful oozing ulcer following application of vitamin E oil in conjunction with an at-home MN device (Figure 1). She purchased the vitamin E oil and MN device online and performed the procedure herself, applying the vitamin E oil to her whole face before, during, and after using the MN device, which contained 0.25-mm titanium needles. She denied undergoing any other recent cosmetic procedures.

Drs. Huang, Kerstetter, Raza, and Greas are from the Department of Pathology, Loma Linda University Medical Center, California. Dr. Smoller is from the Departments of Pathology and Laboratory Medicine and Dermatology, University of Rochester School of Medicine and Dentistry, New York. The authors have no relevant financial disclosures to report.

Correspondence: Chelsea Huang, MD, Loma Linda University Medical Center, 11234 Anderson St, Loma Linda, CA 92354 (chuang@llu.edu).
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The lesion initially was treated by the patient's primary care physician with oral doxycycline for 6 weeks, followed by oral cephalexin and clindamycin for 2 weeks. Although the redness stabilized, the lesion continued to enlarge, which prompted her initial visit to our hospital 1 month after seeing her primary care physician. During this visit, the patient was given penicillin, and the ulcer was debrided and biopsied; however, no clinical improvement was seen.

A biopsy during her initial emergency department visit and a repeat biopsy after 1 month showed similar findings of diffuse lymphohistiocytic and eosinophilic inflammation in the dermis (Figure 2) with poorly defined granulomas and multinucleated giant cells containing nonpolarizable exogenous material (Figure 3). Similar detached exogenous materials also were identified adjacent to the tissue. Diffuse re-epithelialization was seen, featuring pseudoepitheliomatous hyperplasia in association with the inflammatory process and granulation tissue (Figures 3 and 4). A higher-power view of the dermis showed foci of sclerosing lipogranuloma (Figure 4). Periodic acid-Schiff, Grocott methenamine silver, acid-fast bacilli, Fite, and Wright-Giemsa stains all were negative for microorganisms, and pancytokeratin staining was negative for carcinoma. These findings supported the diagnosis of a foreign body granulomatous reaction to an exogenous material—in this case, the vitamin E oil. Subsequent treatment with

intralesional triamcinolone 10 mg/mL injection over 18 months resulted in progressive and drastic improvement of the lesion (Figure 5). A scar excision was performed, which further improved the lesion's cosmetic appearance.

Comment

Application of various topical cosmeceuticals before, during, or after MN to enhance the effects of the procedure can introduce particles into the dermis, resulting in local or systemic hypersensitivity reactions. The associated adverse events can be divided into 2 main categories: adverse reactions related to the topical product or to the materials of the MN device itself.

A study showed that topical application of vitamin E oil to wounds on the skin does not improve the cosmetic appearance of scars.³ Instead, it is associated with a high incidence of contact dermatitis. A similar case of vitamin E injection, although without the concurrent use of an MN device, complicated by a facial lipogranuloma has been described.⁴ Sclerodermoid reaction, subcutaneous nodules, persistent edema, and ulceration at the site of vitamin E injection also have been described following the injection.^{5,6} Because vitamin E is a lipid-soluble vitamin, its absorption in the human body is dependent on the presence of lipid or oil-like substances. The reactions mentioned above are associated with the vitamin E oil, which acts as a helper vehicle for lipid-soluble vitamins to be absorbed.⁷ Other ingredients in topical vitamin E oil



FIGURE 1. Multiple confluent, erythematous, ulcerated nodules on the chin following application of vitamin E oil in conjunction with an at-home microneedling device after debridement and failed treatment with antibiotics.

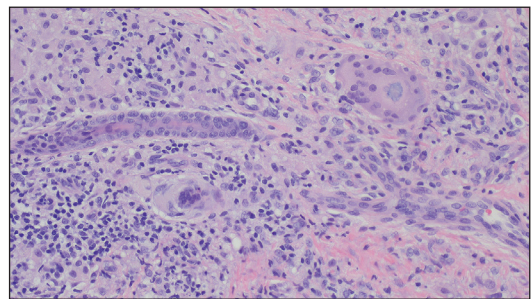


FIGURE 3. Foreign body granulomatous inflammation with multinucleated giant cells containing nonpolarizable exogenous material (H&E, original magnification ×400).

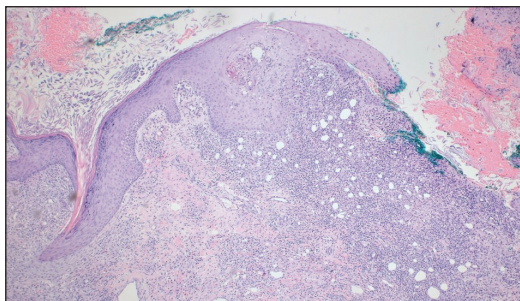


FIGURE 2. Ulceration with adjacent pseudoepitheliomatous hyperplasia and mixed dermal lymphohistiocytic inflammation (H&E, original magnification ×20).

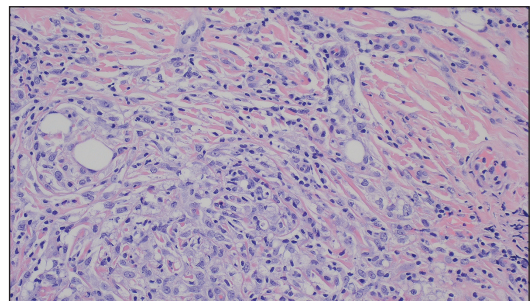


FIGURE 4. Close-up of cystic fat degeneration with mixed granulomatous inflammation consistent with a sclerosing lipogranuloma (H&E, original magnification ×400).



FIGURE 5. Healing ulcerated nodules on the chin 6 months after treatment with periodic intralesional steroid injections.

include a combination of D-alpha-tocopherol, D-alpha-tocopheryl acetate, D-alpha-tocopheryl succinate, or mixed tocopherols.⁸ These ester conjugate forms of vitamin E also may play a role in its immunogenic properties and possibly contribute to adverse effects such as dermatitis and erythema. Further research is needed to investigate the impact of ester conjugate forms on skin reactions and individual responses.⁷

Hyaluronic acid is a relatively safe and commonly used topical treatment that acts as a lubricant during MN procedures to help the needles glide across the skin and prevent dragging. It also can be applied after the procedure for hydration purposes. Other common alternatives include peptides, ceramides, and epidermal growth factors. Topical products to avoid before, during, and 48 hours after undergoing MN include retinoids, vitamin C, vitamin E, exfoliants, serums that contain acids (eg, alpha hydroxy acids, beta hydroxy acids, glycolic acid, and lactic acid), serums that contain fragrance, and oil-based serums because they are associated with similar adverse effects.⁸⁻¹⁰ A granulomatous reaction after an MN procedure also has been reported with the use of vitamin C serum.¹¹

The US Food and Drug Administration has approved the use of MN devices, including for at-home use, to improve the appearance of facial acne scars and wrinkles as well as abdominal scars in patients aged 22 years or older; however, MN devices are not approved for delivery of cosmeceuticals or other topical products into the skin. Therefore, there is no universal list of approved topicals to be used in conjunction with MN.¹²

Most MN devices are made of nickel and various other metals. Cases of contact dermatitis and delayed-type hypersensitivity granulomatous reaction with systemic symptoms have been reported after MN procedures due to the material of the MN device.^{1,13,14}

Conclusion

Microneedling is a minimally invasive procedure that causes nominal damage to the epidermis and superficial papillary dermis, stimulating a wound-healing cascade for collagen production.^{15,16} Although not approved by the US Food and Drug Administration, MN performed at

dermatology offices sometimes can be used in conjunction with topical products to enhance their absorption; however, while vitamin E is known for its antioxidant properties and potential skin benefits, the lipid substance acting as the vehicle is not absorbable by the skin and may cause a granulomatous reaction as the body attempts to encapsulate and digest the foreign substance.^{10,17} Although rarely reported, the use of topical vitamins with MN—through intradermal injection or combined with MN—can be associated with severe complications, including local, sometimes systemic, and life-threatening complications. Clinicians should be vigilant in order to correlate clinical background and history of recent cosmetic procedures with the histologic findings for prompt diagnosis and timely treatment.

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