

BRIEF ARTICLES

Resolution of Post-Surgical Hypergranulation Tissue with Topical Aluminum Chloride

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ABSTRACT

Hypergranulation is the extension of granulation tissue beyond the required amount to close a tissue defect. We report our experience using aluminum chloride to treat a series of two patients with hypergranulation tissue. Both patients had lengthy treatment courses after Mohs surgery with growth of hypergranulation tissue that resolved once aluminum chloride was placed on the wound. Aluminum chloride is a useful hemostatic agent frequently employed in dermatology. It is a readily available and low-cost option for management of hypergranulation after dermatologic procedures. Chronic wounds are a common treatment challenge for clinicians. Due to its affordability and availability, clinicians may consider topical aluminum chloride when managing post-surgical hypergranulation tissue.

INTRODUCTION

Hypergranulation, also commonly referred to as overgranulation or proud flesh, is the extension of granulation tissue beyond the amount required to close a tissue defect.¹ This is an infrequent, albeit not entirely rare, occurrence in wound healing.

Hypergranulation tissue presents as a moist, vascular, red tissue with a granular surface that extends above the level of the surrounding skin. Newly formed epithelial tissue at the edges of the granulation tissue may be seen proliferating towards the center. Histologically, this tissue is comprised of a dense network of capillaries, many fibroblasts and macrophages, and newly created collagen fibers.¹

There are three phases in wound healing: inflammation, proliferation, and maturation. Hypergranulation can occur during the proliferative phase of wound healing. Normally, granulation tissue fills in wounds by growing from the base of the wound until becoming level with the surface of the skin.¹ In hypergranulation, the granulation tissue continues to proliferate beyond the height of the wound surface. This impairs re-epithelialization from the wound edge because the epithelial cells must now migrate vertically to achieve closure.

Many treatment options for hypergranulation have been reported in the literature including: silver nitrate, both topical and intralesional corticosteroids, laser ablation, hydrocolloid dressings, trichloroacetic acid, polyurethane

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foam, surgical excision, both sugar and salt application, and enzymes such as papain. Traditionally, chemical cautery with silver nitrate has been used as the last resort treatment option after milder methods have failed.

The use of aluminum chloride to treat hypergranulation tissue has not been explored extensively in the literature. At the present time, no cases describing the management and long-term clinical outcomes of the use of aluminum chloride to treat hypergranulation could be found. We report our experience using aluminum chloride to treat a series of two patients with hypergranulation tissue.

CASE REPORT

Patient 1:

A 76-year-old man presented to clinic for treatment of a squamous cell carcinoma measuring 2.1 x 2.3 cm on the medial parietal scalp. Mohs micrographic surgery was done in one stage and the defect was repaired with a primary closure. The sutures were removed 12 days after surgery, and the wound had normal post-operative appearance. Three weeks after Mohs, the patient presented with pain at the surgical site. On review, the wound had dehisced and was covered with a yellow crust. Bacterial culture revealed heavy growth of methicillin-susceptible *Staphylococcus aureus* (MSSA). The wound was gently debrided and covered with a hydrocolloid dressing and oil emulsion. The patient was instructed to clean the wound daily with soap and water and continue covering the wound with a hydrocolloid dressing.

One month after the surgical procedure, the wound was noted to have developed exuberant granulation tissue. (Figure 1A) The traditional method of treatment with pressure

dressings was attempted. At this point, the patient was seen every 4 days for dressing changes and cleaning. The wound was also gently debrided with a curette three more times during the next month. Approximately two months after Mohs, during debridement the wound began to bleed. Aluminum chloride was placed on the wound to achieve hemostasis. Flurandrenolide 0.05% cream was applied, and then the wound was covered with a hydrocolloid dressing. On follow up, it was noted that the granulation tissue had improved significantly. (Figure 1B) Aluminum chloride was then applied weekly for a period of 4 weeks and until resolution. Six weeks after its appearance, the granulation tissue had fully resolved. (Figure 1C)

Patient 2:

An 87-year-old man presented to clinic for removal of a squamous cell carcinoma measuring 2.0 x 2.0 cm on the medial parietal scalp. Mohs micrographic surgery was performed, and the lesion was cleared in one stage. The defect was repaired with a primary closure. The sutures were removed 13 days after Mohs, and the wound had a normal post-operative appearance.

Eleven days after suture removal, the patient presented to clinic with a surgical site infection that was draining purulent material. The wound was incised and drained. A bacterial culture revealed heavy growth of MSSA. Over the course of the eight weeks, the patient completed two courses of antibiotics, first minocycline 100 mg twice a day for five days and then dicloxacillin 500 mg twice a day for seven days. Additionally, he was seen in clinic approximately every 4 days for wound checks and gentle debridement. Wound care consisted of cleansing with soap and water, application of an oil emulsion dressing, and then hydrocolloid dressing.

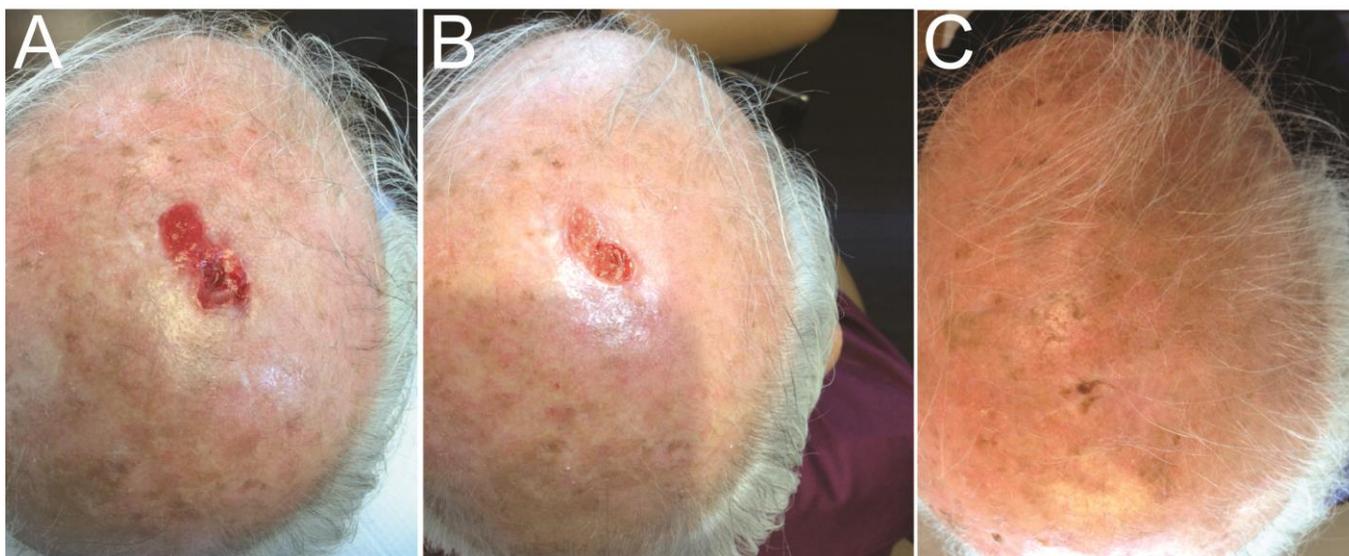


Figure 1. A) A 76-year-old man with evidence of hypergranulation tissue on the scalp after Mohs micrographic surgery for squamous cell carcinoma. B) The patient's hypergranulation tissue is resolving after an application of aluminum chloride. C) The patient's scalp defect resolved entirely 10 weeks after the original Mohs procedure.

More than two months after Mohs, the wound had not fully healed and hypergranulation tissue was noted. Topical aluminum chloride was applied to the wound once, the wound was left open without a bandage, and then three weeks later the wound was closed.

Aluminum chloride is an effective hemostatic agent commonly used in dermatology. It is a readily available and low-cost option for use after dermatologic procedures such as biopsies.²

Aluminum chloride is a caustic agent that is hydrolyzed by water to produce hydrated aluminum hydroxide and hydrochloric acid.³ This is thought to lead to vasoconstriction, tissue coagulation, and activation of the coagulation pathway.³ This protein coagulating effect induces tissue necrosis, eschar formation, and finally hemostasis.⁴ It also acts as an astringent to contract and retract the tissues it contacts.⁵ Hypergranulation tissue is a highly vascular and friable tissue that responds to hemostatic agents by necrosing and involuting.

Aluminum chloride has an advantage over other hemostatic agents such as silver nitrate and ferric subsulfate because it is less likely to leave behind pigment particles that may stain the skin.⁴ As evidenced by the two cases reported, topical aluminum chloride is an effective treatment option for hypergranulation tissue. No adverse events were seen in our two patients, but given the lack of previous reports, further studies are needed to examine the side effect profile of this regimen.

Chronic wounds are a common treatment challenge for clinicians. They are expensive to treat, as they frequently do not respond to standard of care treatment modalities. Due to its low cost and widespread availability, clinicians may consider topical aluminum chloride when managing post-surgical hypergranulation tissue.

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