

Titanium allergy as a likely cause of post-reconstruction dermatitis of the breast

Michele Buonomo , Jenna L. Ruggiero, Sara Hylwa

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CASE REPORT

A 44-year-old non-atopic female presented with a well-demarcated, erythematous plaque over the left breast 13 months after reconstructive breast surgery with placement of a temporary tissue expander (TTE) (Figure 1). TTEs are designed to be left in place for 6 months; however, the patient delayed surgery for a definitive implant due to the ongoing COVID-19 pandemic. Her rash started as dryness/cracking of the skin, initially felt to be secondary to skin expansion, but progressed to an erythematous, weeping eruption of the distal left breast. She insisted that she applied only petroleum to the breast for treatment. Biopsy of the rash showed spongiotic dermatitis with eosinophils. Subsequently, two different topical steroids were prescribed and provided minimal improvement.





FIGURE 1

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Breast tissue expander (posterior view)

Patch testing was performed using the 2020–2021 North American Contact Dermatitis Group (NACDG) standard series and supplemental series (corticosteroids, personal care products, preservatives, emulsifiers, acrylates, plastics/glues, metals). Allergens were obtained from Chemotechnique Diagnostics AB (Malmö, Sweden) or allergEAZE SmartPractice (Calgary, Alberta, Canada). Allergens with no commercially available patch test preparation were prepared “in house” by diluting compounds purchased from MakingCosmetics Inc. (Redmond, WA, USA). The patient was patch tested to all components of her Natrelle 133S MV breast tissue expander (Allergan Inc., California, USA), including the silicone elastomer, suture tabs, and magnetic metal port applied “as is”.

Allergens/substances were occluded for 2 days and read on day (D) 2 and D4. Results on D4 demonstrated a strong reaction (++) to titanium (IV) oxalate hydrate 5% pet. (Figure 2), mild (+) reactions to nickel, methylisothiazolinone, tea tree oil, sodium benzoate, pramoxine, propylene glycol, dichlorophene, and dipropylene glycol, and doubtful (?+) reactions to bacitracin, cinnamic aldehyde, bronopol, linalool, oleamidopropyl dimethylamine, ammonium persulfate, cetrimonium chloride, and butylene glycol. Notably, she had a borderline (?+) reaction to the internal magnetic metal port of her TTE (Figure 2). According to the manufacturer, the port contained a “samarium cobalt magnet encased in grade 2 titanium”. The patient's breast dermatitis resolved after removal of the tissue expander and has not recurred.



FIGURE 2

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Day 4 patch test reading to titanium (IV) oxalate hydrate 5% pet. and the internal magnetic metal port of tissue expander, tested “as is”

DISCUSSION

Adverse cutaneous reactions after reconstructive breast surgery are relatively uncommon.¹ In a study of 21 females with a rash overlying the area of breast reconstruction (1999-2012), 48% were after TTE placement; three patients had allergies to latex, though patch testing results were not described.¹ Cantisani et al described a patient who developed papules and blisters after breast reconstruction; patch testing revealed strong reactions to multiple rubber compounds, with possible exposure during surgery or contamination of the implant itself.²

Temporary tissue expanders often contain internal metallic ports that function as a needle guard through which saline is injected for gradual expansion of the surrounding skin. Once breast tissue has adequately expanded, the TTE is replaced with a permanent implant. Our patient's reaction to titanium oxalate and the titanium-coated metallic port may explain the rash directly over the site of her TTE. Interestingly, our patient did not react to titanium (IV) oxide or titanium nitride. While titanium is considered one of the most biocompatible implant materials, titanium alloy corrosion with release into surrounding tissues has been reported.³ We suspect that titanium may have been leaking from the implant into surrounding tissues from possible corrosion, especially with our patient's implant remaining in place longer than recommended, which may have been exacerbated by repeated needle punctures during expansion.

It should be noted that our patient had other (+) and (?+) reactions that were not considered clinically relevant. Methylisothiazolinone, linalool, sodium benzoate, and propylene glycol were identified in her face cleanser and/or facial moisturizing cream; however, these products did not come into contact with the left breast and the patient had no other sites of dermatitis. Potential nickel release by corrosion of the metallic port cannot be excluded, although nickel was not officially declared as a component of the TTE by the manufacturer. Knowledge of the complete composition of the medical device would help in guiding further management.

To our knowledge, allergic contact dermatitis to titanium in patients with post-reconstruction breast dermatitis has not been previously described, though patch testing is not typically performed in these patients. Titanium contact allergy and optimal patch test concentration remains controversial; recent *in vitro* studies suggest that titanium salts act as weak irritants rather than allergens, and that localized skin reactions could also be mediated by irritant-related inflammation.⁴ However, we believe that our patient's biopsy findings support an allergic process. Our case highlights that titanium allergy may be relevant in patients with localized dermatitis due to TTEs and to consider patch testing in this setting.

CONFLICTS OF INTEREST

The authors declare no conflict of interests.

AUTHOR CONTRIBUTIONS

Michele Buonomo: Writing – original draft (lead); writing – review and editing (lead). **Jenna Leigh Ruggiero:** Writing – review and editing (supporting). **Sara Hylwa:** Supervision (lead); writing – review and editing (supporting).

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