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CASE REPORT
Reconstructive

Delayed Hypersensitivity Reaction to Titanium-coated Polypropylene Mesh in Breast Reconstruction

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Summary: Breast implant reconstructions increasingly incorporate meshes like the synthetic nonresorbable titanium-coated polypropylene mesh commercialized as Tiloop (Pfm medical). We report the case of a 48-year-old woman, with a medical history of nickel allergy, who presented with an extensive erythematous eruption, a periprosthetic reaction, and an axillary node reaction, 18 months after a unilateral prophylactic mastectomy. We excluded infectious, sarcoidosis and carcinomatosis. The patient's medical history, the clinical evolution, and the particularly fast and complete healing after removal of the mesh were suggestive of an unusual allergic reaction to the titanium in the titanium-coated polypropylene mesh. Titanium allergies are very rare events, predominantly described in the dental and orthopedic fields. We also discussed the hypothesis of a tardive red breast syndrome related to a synthetic mesh, also mediated by immunological response as described recently in another case report. *(Plast Reconstr Surg Glob Open 2022;10:e4232; doi: 10.1097/GOX.0000000000004232; Published online 14 April 2022.)*

Breast reconstructions are becoming more and more frequently used in therapeutic, prophylactic, delayed, and immediate situations. The most widely implemented technique is reconstruction with implants traditionally placed under a total muscular and fascial coverage pocket. The use of meshes, in retropectoral or prepectoral positions, reduces the extent of muscle dissection required and allows the control of the inframammary fold, to preserve natural shape, decrease capsular contracture, reduce animation, and increase the rate of direct implant reconstructions.[1] Meshes can be derived from biologic sources or synthetic materials (resorbable or not). Tiloop (Pfm medical) is a widely used synthetic nonresorbable titanium-coated polypropylene mesh (TCPM). It is associated with very few complications, but follow-up periods have so far been relatively short.[2]

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CASE REPORT

Eighteen months after a prophylactic mastectomy and immediate breast reconstruction by retropectoral textured implant with a TCPM mesh, a 48-year-old woman presented with a localized reticular erythematous eruption affecting the lower external quadrant of the reconstructed breast.

The patient's medical history included a stage II Hodgkin's lymphoma treated with supra and subdiaphragmatic radiotherapy at the age of 24 years, and a left breast in situ carcinoma treated by mastectomy and IBR with a retropectoral textured implant without mesh at 44 years. At the age of 47 years, due to the previous Hodgkin's irradiation, the patient requested "prophylactic" surgery of the right breast, which was performed using a retropectoral textured implant and TCPM. The patient reported a contact allergy to nickel earrings and adhesive bandage.

The initial eruption in the lower external quadrant of the right reconstructed breast, 18 months after prophylactic surgery, was pruriginous, erythematous, and blanched on diascopy (Fig. 1). The patient was apyrectic. A cutaneous biopsy revealed a dermal inflammatory infiltrate with lymphocytes, plasma cells, and histiocytes without any evidence of infiltrating tumor cells (Fig. 2). Three months after the initial eruption, the eruption had spread (Fig. 1), and the patient remained apyretic with increasing localized discomfort. Ultrasonography and magnetic resonance imaging revealed a thickened capsule, with suspicious right-sided axillary lymph nodes. A biopsy of the periprosthetic tissue detected fibro-inflammatory changes with a granulomatous tissue reaction; the node biopsy also

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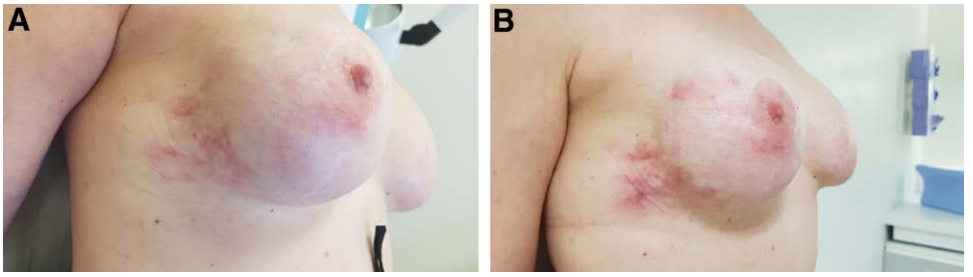

Fig. 1. Right breast reconstruction with a TCPM. A, Profile view: the first signs of erythematous eruption. B, Profile view: 3 months later.

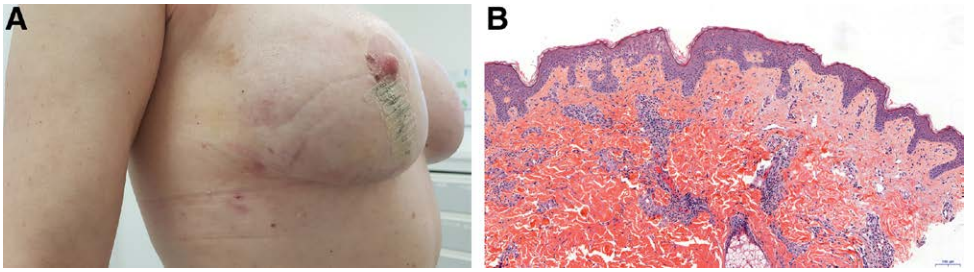

Fig. 2. Right breast reconstruction after removal of TCPM. A, Profile view: 9 days after removal. B, Cutaneous biopsy (Hemalun-eosin stain, at 10× magnification).

showed inflammatory granulomatous changes, and a complete blood count detected a mild eosinophilia.

Five months after the initial eruption, we observed extensive erythematous cutaneous lesions and the emergence of a periprosthetic reaction (Baker IV capsular contracture). Cutaneous lesions were located exactly in front of the TCPM in the lower and external quadrant of the reconstruction (Fig. 1). Only analgesic oral treatment was given, but discomfort and pain accelerated the surgical project of explantation. We did not note any changes in the left breast, which had also been reconstructed with a textured implant but without a TCPM. We removed the TCPM by complete capsulectomy and exchanged the intact anatomical textured implant with a round and smooth one.

The pathological analysis of the capsule detected a fibro-inflammatory reaction with lymphoid islets and a resorptive granulomatous reaction in the area in contact with the implant.

After removal of the mesh, the eruption regressed quickly. Twelve days after surgery, the dermatologist noted a complete disappearance (Fig. 2). Allergological exploration by epicutaneous tests with standard European baselines, metals, and plastic/glue baselines and a piece of Tiloop showed a strong contact allergy to metals: nickel (2+ at 48 and 72 hours) and palladium (1+ at 48 hours and 2+ at 72 hours) and a weak reaction to 4-tertiarybutylcatechol (± at 48 hours and 1+ at 72 hours), a component of the glue family. Epicutaneous tests were negative for titanium, titanium salts, and Tiloop.

DISCUSSION

We describe a rare event of delayed local reaction after TCMP breast reconstruction with Tiloop.

The pathological analysis was the key to exclude differential diagnoses such as cutaneous relapse of contralateral breast carcinoma, sarcoidosis, and breast implant-associated anaplastic large cell lymphoma.

We excluded an infectious disease because of the clinical presentation without fever and without any biological signs of bacterial infection.

In this particular case, patch tests were negative for titanium, titanium salts, and Tiloop, but some authors have previously noted that titanium does not easily penetrate the skin,[3,4] which would make skin prick tests for titanium more efficient than epicutaneous tests. Implanting our patient with a piece of TCPM subcutaneously for a period of 48–72 hours may have yielded more direct supportive evidence, but our multidisciplinary team did not support this invasive approach.

The hypothesis of an allergic reaction to TCPM is corroborated by the patient's medical history, the clinical evolution, and particularly by the fast and complete healing after removal of the mesh, as described by Thyssen.[4] The responsible allergen is probably titanium because polypropylene is considered to be immunologically inert.

Multiple clinical allergic reactions such as localized and systemic dermatitis have already been described in orthopedic and dental surgeries.[3,5] These specialties frequently use metallic implants.

We cannot exclude delayed red breast syndrome (RBS), which is also mediated by an immunological response. A case of RBS related to a synthetic mesh has been recently described by Mayer et al.[6] However, this study and previous works[7,8] describe an earlier timing of the presentation: a different dermatologic description with continuous erythema and spontaneous resolution.

In conclusion, we consider this case as the first described allergic reaction to TCPM. According to this hypothesis,

after elimination of infection diagnosis, corticosteroid treatment could be discussed in case of persistent local reaction before explantation. In patients with a medical history of metal allergies, surgical teams should reconsider more traditional implant techniques (with de-epithelialized inferior flaps or expanders), autologous reconstructions, or implant-based reconstructions with other types of mesh.

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