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Successful secondary augmentation mammoplasty after *Mycobacterium thermoresistibile* infection – a case report

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Summary

Mycobacterium thermoresistibile (MT) infections are extremely rare in humans. This nontuberculous mycobacterial species has been associated with lung, skin, and soft tissue infections. We present the case of a 37-year-old woman who underwent augmentation mammoplasty at another institution and developed a persistent MT infection in the right breast, requiring removal of the infected breast implant, antibiotic therapy and multiple surgical treatments. After three months of targeted antimicrobial therapy, we planned a secondary augmentation mammoplasty, starting the procedure in the non-infected breast with removal of the prepectoral implant and creation of a subpectoral pocket using a dual plane technique. Subsequently, in the affected breast we performed a placement of a subpectoral implant with the same technique and lipofilling. Finally, an inverted T-shaped resection of skin tissue was required on the left breast. After 12 months of follow-up, we obtained an acceptable aesthetic result and reported no recurrence of infection. This is the first case of MT infection in Latin America and of successful secondary augmentation mammoplasty after MT infection.

Key words

nontuberculous mycobacteria – atypical mycobacteria – breast augmentation – surgical site infections – breast deformity

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Introduction

Mycobacterium thermoresistibile (MT) is a fast-growing nontuberculous mycobacterium (NTM) described by Tsukamura in Japan in 1966 [1]. This mycobacterium was isolated from soil samples and is so named because of its exceptional ability to grow at high temperatures (37–45 °C) [1]. MT is associated with lung, skin, and soft tissue infections, and to our knowledge, 10 cases of MT have been reported in humans. On the other hand, breast augmentation is the second most common surgical procedure worldwide [2]. We present the first case of MT infection in Latin America and of successful secondary augmentation mammoplasty after MT infection.

Case presentation

A 37-year-old woman with a history of hypothyroidism, smoking, abdominal dermolipectomy, and prepectoral augmentation mammoplasty with 335 cm^3 round breast implants, Cristalline Paragel (Eurosilicone S.A.S., France), performed at another institution in Santiago del Estero, Argentina. One month later, the patient presented with purulent discharge and wound dehiscence in the right breast. She received empiric antibiotic therapy with cephalexin with little response, and the right implant was removed. Methicillin-sensitive *Staphylococcus aureus* was isolated from culture and treated with amoxicillin-sulbactam for 2 months. However, due to persistent symptoms, another surgical toilet was performed and *Mycobacterium thermoresistibile* was identified using the automated BACTEC system and MALDI-TOF mass spectrometry. The susceptibility of MT is described in Tab. 1. The patient received multiple antibiotic regimens of varying duration for 5 months. However, she continued to have poor drainage from her right breast, so she was reviewed at our plastic surgery department. Physical examination revealed significant periareolar and inframammary fold retraction without evidence of local infection (Fig. 1). MRI showed contrast enhancement in the central region of the right breast and thickening in the superomedial quadrant (Fig. 2). We performed debridement and culture, which isolated *Staphylococcus epidermidis* sensitive to trimethoprim-sulfamethoxazole and nega-

Tab. 1. Antimicrobial susceptibility of *Mycobacterium thermoresistibile*.

Organism	Agent	Susceptibility
Mycobacterium thermoresistibile	cefoxitin	sensitive
	imipenem	sensitive
	amikacin	sensitive
	gentamicin	sensitive
	clarithromycin	sensitive
	levofloxacin	sensitive
	ciprofloxacin	sensitive
	trimethoprim-sulfamethoxazole	sensitive
	linezolid	sensitive
	doxycycline	sensitive
	minocycline	sensitive

tive for NTM. Given the bacteriologic and mycobacterial history, the patient was treated with clarithromycin, levofloxacin, and trimethoprim-sulfamethoxazole for 3 months with a favorable response (Fig. 3). Three months after completion of antibiotic therapy, we planned a secondary augmentation mammoplasty.

Surgical technique

The procedure was performed under general anesthesia and we started in the left breast without infection with preoperative marking according to the Wise pattern (Fig. 4). The left breast was approached through the previous submammary scar. The prepectoral implant was removed and we created a subpectoral pocket using a dual plane technique to position a 300 cm^3 Même® MS round implant (Polytech Health & Aesthetics, Dieburg, Germany). Subsequently, the affected right breast was operated on with an implant of the same characteristics and surgical technique as the contralateral side, and the soft tissue defect in the inferior pole required lipofilling with 60 mL of abdominal adipose tissue. Finally, an inverted T-shaped resection of skin tissue was required on the left breast. After 12 months of follow-up, the patient presented with an acceptable aesthetic result without recurrence of infection (Fig. 5).

Discussion

NTMs are ubiquitous in nature and are widely distributed in water, soil and animals. They can cause chronic skin and soft tissue infections, particularly after trauma, surgery, and cosmetic procedures [3,4]. In the past 42 years, 10 human cases of MT have been reported from Europe, Oceania, and the United States (Tab. 2).

Wolfe and Moore described the first MT infection in a patient undergoing subpectoral augmentation mammoplasty [8]. The patient developed a recurrent seroma in the right breast and subsequent capsular contracture requiring implant removal. Initially, *Staphylococcus epidermidis* was isolated and treated according to susceptibility testing until symptoms resolved. One year later, she underwent secondary augmentation mammoplasty on the af-

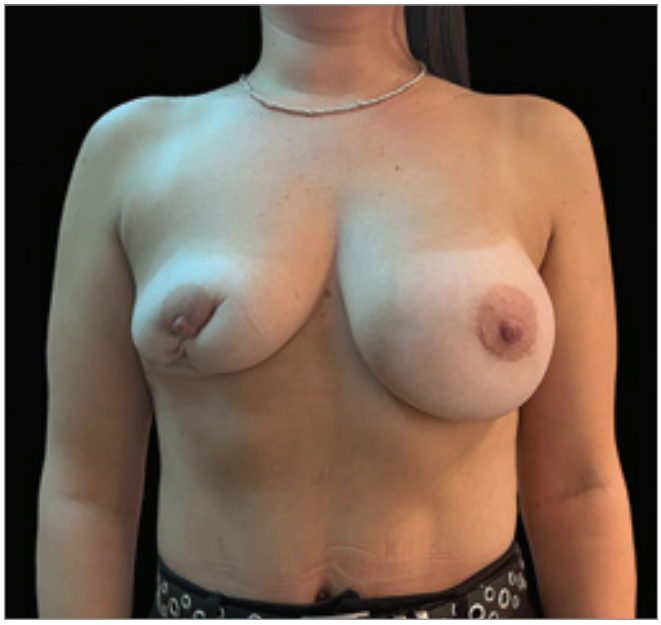

Fig. 1. Initial preoperative image.

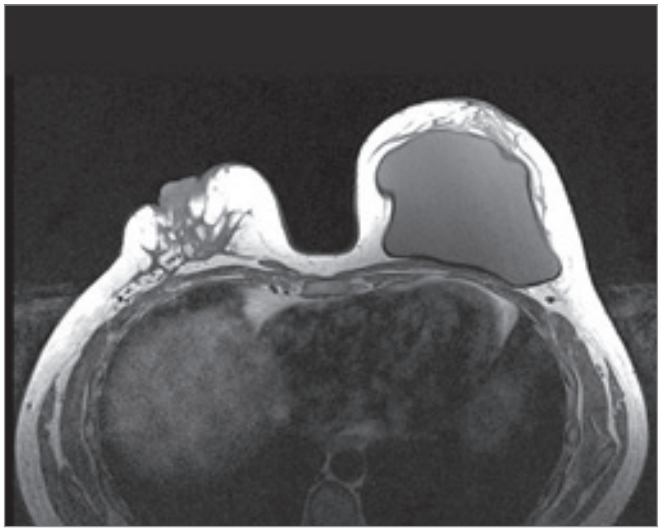

Fig. 2. Magnetic resonance imaging. In the left breast, there is evidence of a prepectoral implant without signs of rupture, and in the right breast, there is heterogeneous fibroglandular tissue and nipple retraction.

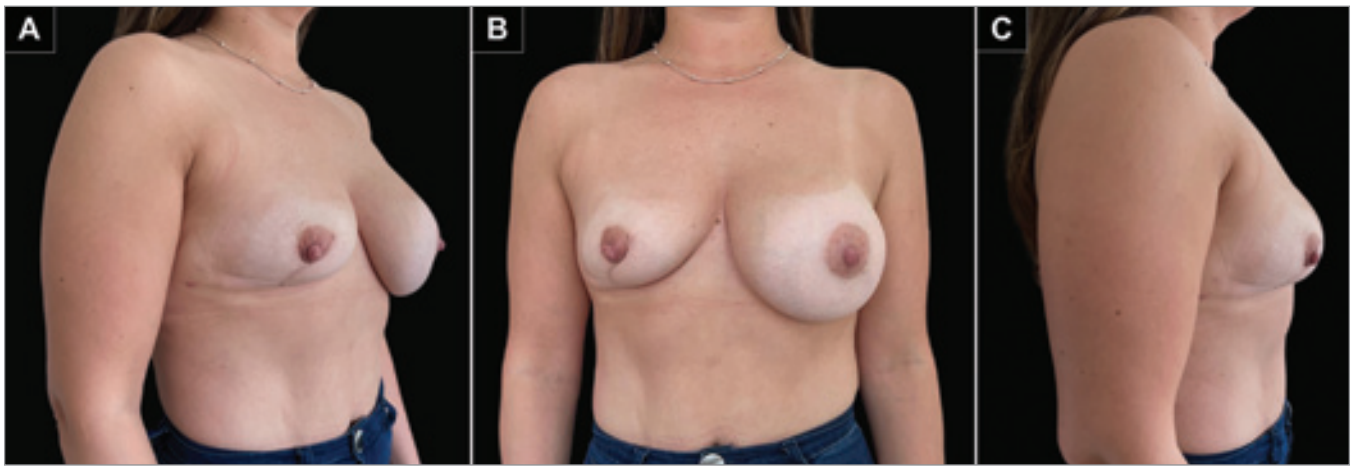

Fig. 3. Image following surgical debridement and completed targeted antibiotic treatment. A) Right oblique view; B) front view; C) right side view.

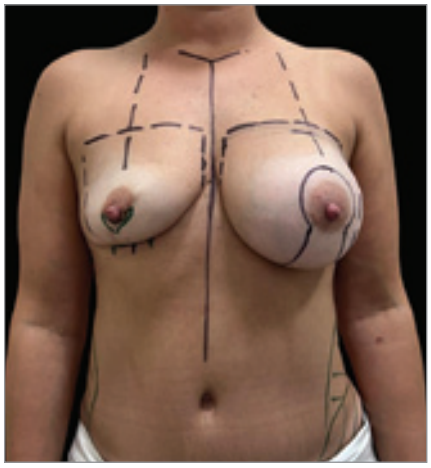

Fig. 4. Image of the marking.

fected side. However, she developed contracture again and the implant was removed. She presented with abundant serous discharge for 1 year until the MT was identified. After 16 months of antibiotic therapy, the patient recovered completely. In contrast, in our case, the infection was masked by the initial isolation of *Staphylococcus aureus* and complicated by co-infection with *Staphylococcus epidermidis*. In addition, we were able to perform bilateral secondary augmentation mammoplasty with an acceptable aesthetic result and without recurrence of infection.

Mycobacterial infections of breast implants are often complicated by late diagnosis. Treatment includes implant removal, extensive pocket lavage, and capsulotomy or capsulectomy. Prolonged targeted antimicrobial therapy should be initiated, followed by delayed reimplantation of the prosthesis once the infection has resolved. Reimplantation is recommended 3–6 months after completion of antimicrobial therapy [6]. On the other hand, our case differs from the literature because the functional or aesthetic sequelae caused by the infection and implant removal, as well as the soft tissue deformity caused by the persistent infection after late diagnosis of MT, are not described. Our surgical strategy was to first approach the breast without infection and then the breast with the soft tissue defect, performing the plane change to place the new implants. Once the projection of the affected breast was restored, we made the necessary adjustments to the skin tissue of the contralateral breast.

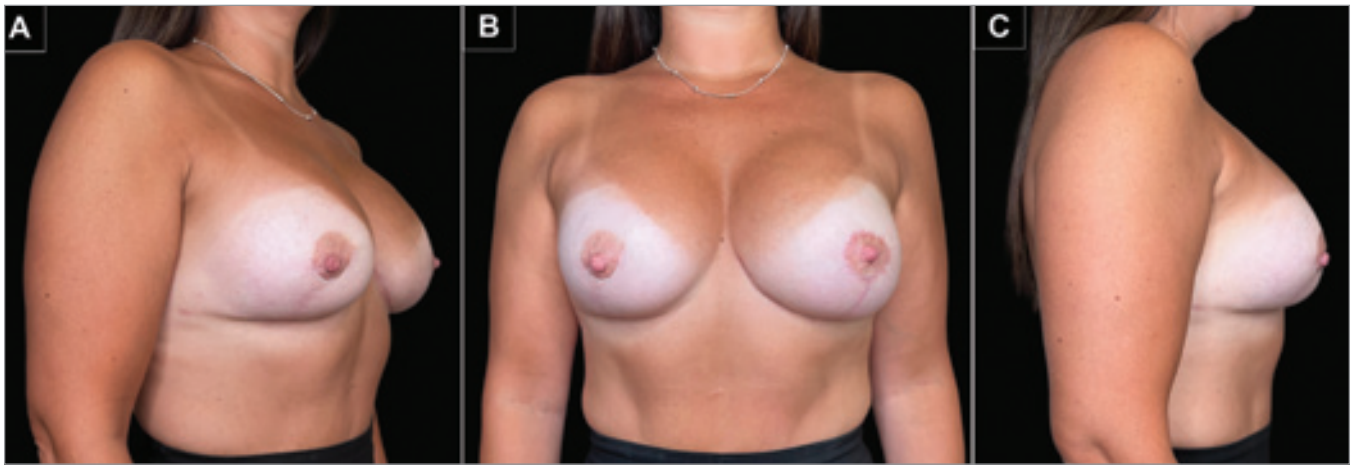

Fig. 5. Postoperative image at 12 months of follow-up. A) Right oblique view; B) front view; C) right side view.

Tab. 2. List of patients with isolation of *Mycobacterium thermoresistibile*.

Authors	Country	Sex	Age	Comorbidities	Infection site	Treatment (duration)	Surgery
Weitzman et al. 1981 [5]	USA	F	Middle-age	no	lung	RMP, ETH and STR (NR)	no
Liu et al. 1984 [6]	USA	M	64	hypogammaglobulinemia	lung	RMP, ETH and STR (1 month)	no
Neeley et al. 1989 [7]	USA	M	41	heart transplant recipient, diabetes mellitus	skin	RMP, ETH and INH (3 months)	no
Wolfe and Moore 1992 [8]	USA	F	41	no	augmentation mammaplasty-related breast abscess	RMP, ETH and INH (16 months)	yes/ prosthesis removal
Cummings et al. 2000 [9]	USA	F	NR	no	skin	levofloxacin and DOX (3 months)	no
LaBombadi et al. 2005 [10]	USA	F	73	diabetes mellitus	knee prosthesis-related osteomyelitis	MOX and linezolid (replaced by DOX, 8 months)	yes/ prosthesis removal
Neonakis et al. 2009 [11]	Greece	M	67	COPD, diabetes, purpura	lung*	ciprofloxacin (NR)	no
Hamilton et al. 2013 [12]	New Zealand	F	46	breast cancer	incisional hernia repair-related mesh infection	ciprofloxacin, DOX and RMP (3 months)	yes/ prosthesis removal
Suy et al. 2013 [13]	France	M	43	intellectual disability	tibial nailing-related osteomyelitis	CLA and levofloxacin, (5.5 months)	yes/ prosthesis removal
Yu L et al. 2023 [14]	China	M	25	HIV, Kaposi's sarcoma	lymph node	INH, ETH, RMP, azithromycin and levofloxacin (6 months)	no
Our case	Argentina	F	37	no	augmentation mammaplasty-related breast abscess	CLA, levofloxacin and SXT (3 months)	yes/ prosthesis removal

* colonization, CLA – clarithromycin, COPD – chronic obstructive pulmonary disease, DOX – doxycycline, ETH – ethambutol, F – female, INH – isoniazid, M – male, MOX – moxifloxacin, NR – explanation of the abbrevation, RMP – rifampicin, STR – streptomycin, SXT – trimethoprim–sulfomethoxazol

Currently, information on MT is limited and there are no specific guidelines for its management. Unlike other NTMs, MT has not been isolated from water samples and has been associated with postoperative infections, particularly in the presence of implants. According to these case reports, the specific environmental source could not be identified and it has been hypothesized that traumatic inoculation with MT present in soil causes local infection [9], while other authors speculate that it could be waterborne [7,8]. In our case, we did not identify the source of infection. However, isolation of NTM has been reported in contaminated methylene blue or gentian violet solutions, dyes used for tissue marking in plastic surgery [15,16]. Furthermore, this species seems to affect mainly immunocompromised patients and is relatively susceptible to antituberculosis and antibacterial agents.

Conclusions

Mycobacterium thermoresistibile infections are extremely rare in humans. In this report, we describe the first case of MT infection in Latin America and of successful secondary augmentation mammoplasty after MT infection. The management of these infections is challenging due to their difficult diagnosis. Our case demonstrates that removal of the infected breast implant with pro-

longed targeted antimicrobial therapy and subsequent aesthetic repair with implants is a feasible and safe therapeutic strategy.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The local Research Ethics Committee has confirmed that no ethical approval is required for this case report.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Roles of the authors

René M. Palacios Huatuco, Byron Pizarro Feijoo, Alejandro Coloccini, and José F. Viñas conducted the literature search, prepared the draft manuscript, and wrote the final version of the manuscript. Ignacio Piedra Buena contributed to the surgical treatment of the patient, and the manuscript review. Horacio F. Mayer contributed to the manuscript review.

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