

## Case report

## Reverse abdominoplasty as a salvage procedure for infected bilateral implant-based breast reconstruction

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## ABSTRACT

**Introduction:** Infection is one of the most feared complications of implant-based breast reconstruction and is difficult to manage in irradiated patients. We present the first case of bilateral breast reconstruction with infected expanders salvaged by performing a reverse abdominoplasty.

**Presentation of case:** A 64-year-old woman with a history of locally advanced bilateral breast cancer underwent modified bilateral radical mastectomy and postmastectomy radiotherapy. We performed two-stage breast reconstruction with implants. However, the patient developed a mild infection of the expanders, which was treated with targeted oral antibiotic therapy. The response to treatment was favorable, allowing us to salvage the reconstruction with a reverse abdominoplasty.

**Discussion:** Traditionally, the management of infected breast prostheses has consisted of removal of the infected implant, a complication that forces a delay in the reconstructive process. Successful reports of salvage of infected prostheses have been described in the literature. On the other hand, we were able to salvage the reconstruction by performing a reverse abdominoplasty, which allowed us to resect the irradiated tissue and provide adequate non-irradiated soft tissue coverage for the replaced implants.

**Conclusion:** Reverse abdominoplasty offers an acceptable aesthetic result with much less donor site morbidity and represents a valid alternative to other complex reconstruction techniques.

## 1. Introduction

Patients receiving postmastectomy radiotherapy may be challenging candidates for implant-based breast reconstruction due to infectious complications [1,2]. The incidence of implant infection ranges from 1 % to 2.5 % and is higher for postmastectomy reconstruction than for augmentation mammoplasty [3]. The rate of infection following radiotherapy ranges from 15 % to 37 % [4]. Although the usual approach is explantation, there are successful reports in the medical literature of salvage of infected expanders or implants [5]. On the other hand, reverse abdominoplasty has been described as a technique for aesthetic contouring of the upper abdomen, breast reduction, chest resurfacing, autologous breast augmentation, and closure of extensive post-mastectomy anterior trunk defects [6–9]. Herein, we present the first case of reverse abdominoplasty as a salvage procedure for bilateral breast reconstruction with infected expanders. This case report has been reported in line with the SCARE criteria [10].

## 2. Case report

A 64-year-old woman with a history of high blood pressure, ischemic heart disease, obesity (BMI 31.1 kg/m<sup>2</sup>), smoking, and locally advanced bilateral breast cancer underwent a modified bilateral radical mastectomy with findings of invasive lobular carcinoma, which were estrogen and progesterone receptor positive and HER2 negative, stage IIIC (T2N3M0). The patient received adjuvant systemic treatment including chemotherapy (anthracyclines for 8 cycles), followed by endocrine therapy (tamoxifen), and chest wall radiotherapy (50 Gy in 25 fractions). Twelve months after completing radiotherapy, she consulted our Plastic Surgery Department for breast reconstruction. On physical examination, she had large soft tissue defects in the anterior chest wall and radiation-induced damage to the mastectomy flaps, while the abdomen was globular with a predominance of visceral fat and insufficient adipose abdominal panniculus for autologous reconstruction of two breasts (Fig. 1). The various reconstructive alternatives were discussed with the patient. However, as she did not wish to undergo autologous

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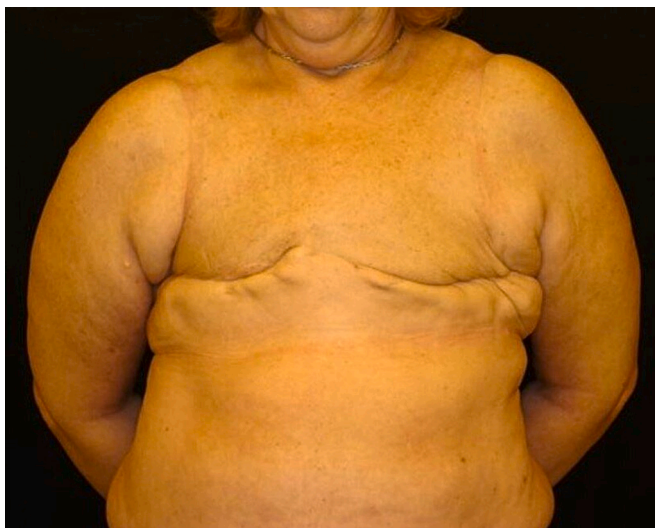
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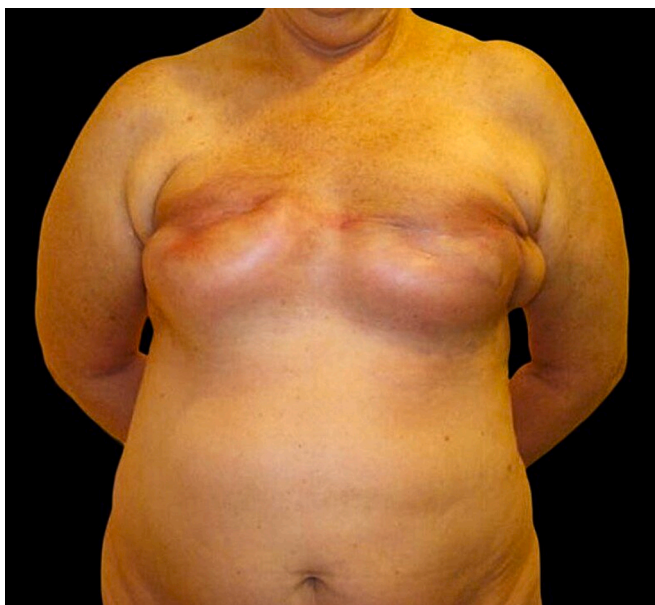
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**Fig. 1.** Preoperative frontal view. Transverse scars are seen extending from the midline to the anterior axillary line with retraction and soft tissue induration.

reconstruction techniques due to the morbidity associated with this procedure, it was decided to perform breast reconstruction with implants in two stages. First, we perform an autologous fat grafting procedure in each depressed area using 100 cc of adipose tissue harvested from her thighs. Three months later, subpectoral tissue expanders were placed. The muscle pocket was opened through the lateral free margin of the pectoralis major, and the pocket was irrigated with an antibiotic solution (1 g cefazolin and 80 mg gentamicin in 500 cc saline) [11], followed by a new irrigation with iodine-povidone solution, which was allowed to work for 10 min before rinsing. We then used new instruments, surgical fields, gowns and latex-free gloves before placing two MENTOR® CPX™4 (Mentor Worldwide LLC, California, US) 650 cc textured devices. The expanders were insufflated with saline for eight weeks until they reached their maximum capacity. However, the patient developed mild erythema in both mastectomy flaps without associated fever (Fig. 2). Ultrasound revealed minimal periprosthetic fluid. Under ultrasound guidance, a specimen was obtained and sent for culture,



**Fig. 2.** Front view posterior to tissue expansion. Erythema is observed in both breast skin flaps.

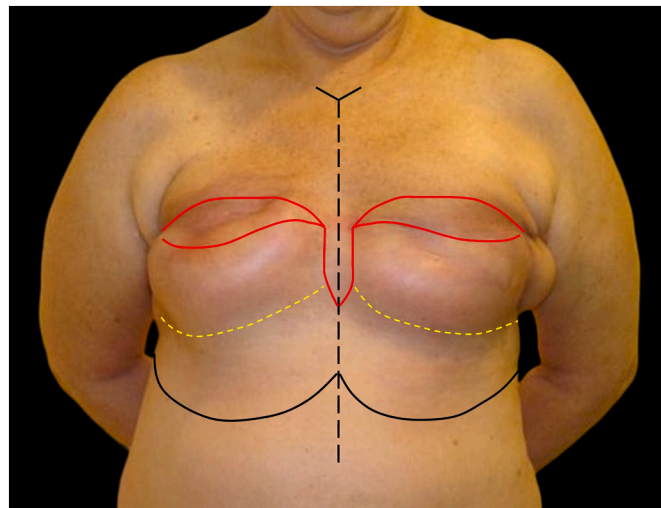
which isolated a clindamycin-susceptible *Staphylococcus aureus*. Given the patient's good clinical condition, we opted for conservative management of the infection with oral antibiotic therapy with clindamycin until the time of the subsequent surgery. According to the Clavien-Dindo classification, the infectious surgical complication was stratified as Grade IIIb. The response to treatment was favorable, allowing us to plan to salvage the reconstruction with a reverse abdominoplasty.

### 2.1. Surgical technique

Preoperative marking was based on the classical reverse abdominoplasty technique (Fig. 3). Under general anesthesia and previous iodine-povidone skin antiseptics, mastectomy scars and surrounding irradiated soft tissue were resected until adequate bleeding from the dermis was observed. Flap dissection then proceeded caudally at a suprafascial level up to the umbilicus creating in this way an upper abdominal flap with non-irradiated skin and subcutaneous tissue and complete preservation of the rectus sheath fascia. Additionally, a central cleavage area was de-epithelialized to recreate the intermammary sulcus in order to avoid symmastia (Fig. 4). The muscle pocket was then opened through the lateral free margin of the pectoralis major and both infected expanders were removed. After collecting new samples of periprosthetic fluid for culture, the implant pocket was treated with the same meticulous sterile technique as the first stage. Two MENTOR® CPG™ 322 (Mentor Worldwide LLC, California, US) 650 cc silicone anatomically-shaped implants, and drains were positioned (Fig. 5). The inframammary fold was repositioned by capsulorrhaphy with simple non-absorbable sutures (2.0 silk) and reinforced with a continuous suture anchoring the hypodermis to the periosteum of the chest wall at the level of the sixth rib, from the medial to the lateral part of the pocket [12,13]. Finally, the abdominal flaps were advanced cephalad to the upper edge of the initial incision. There were no postoperative complications and the patient received oral clindamycin for six weeks. After two years of follow-up, she presented with a good evolution and an acceptable aesthetic result (Fig. 6).

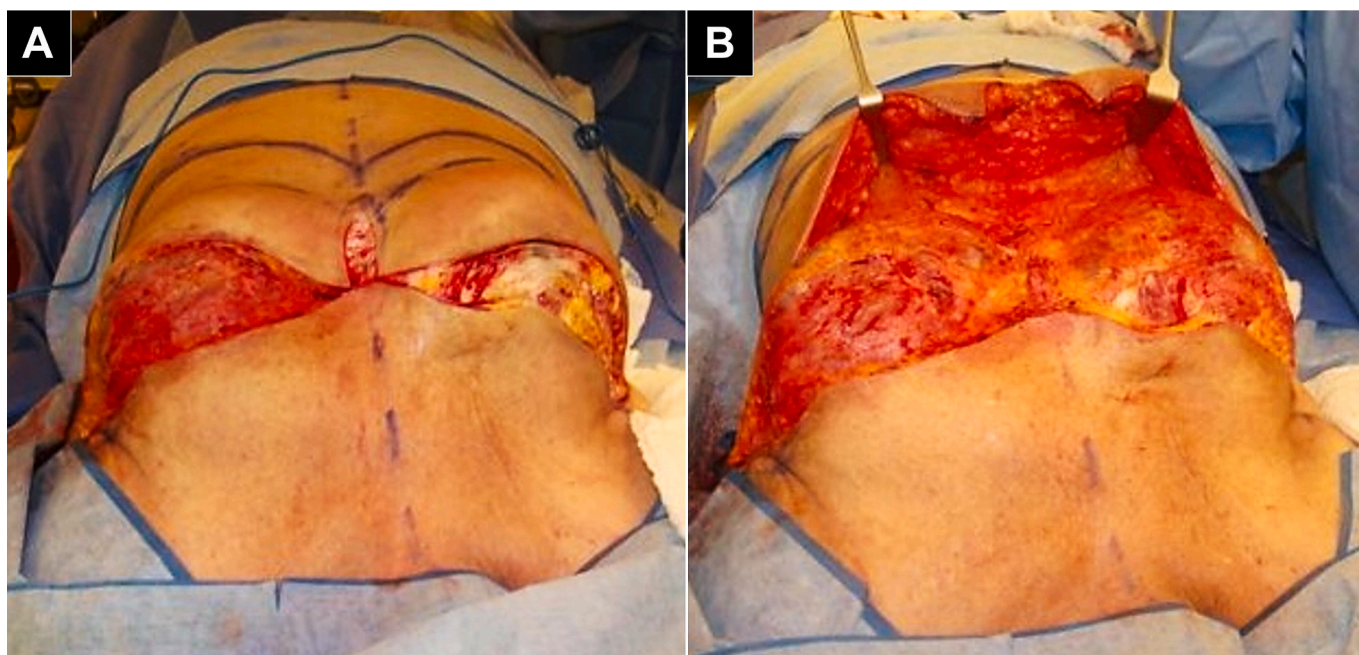
### 3. Discussion

Currently, the most commonly used techniques for breast reconstruction are implant-based reconstruction and autologous reconstruction. The main challenge is to determine the optimal timing and most

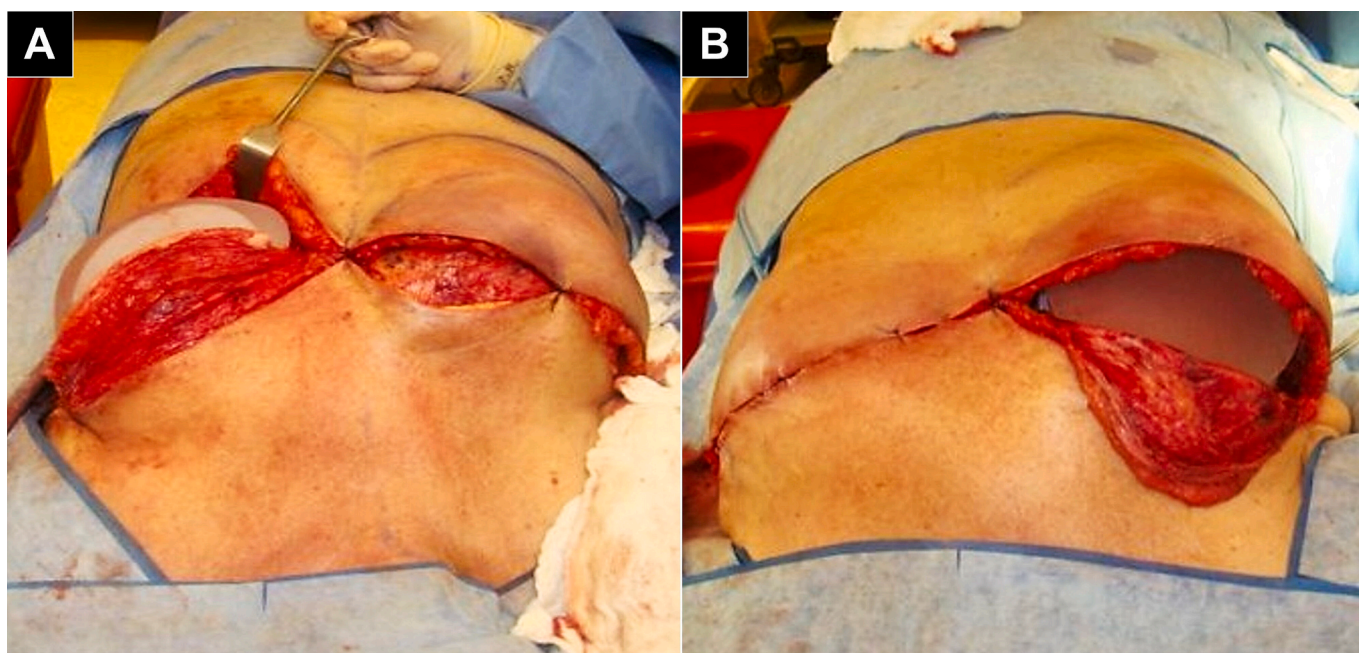


**Fig. 3.** Marking of reverse abdominoplasty. Skin flaps with radiation-induced damage and central cleavage area (solid red lines), cephalic (dashed yellow lines), and caudal (solid black lines) borders of the advancement flap. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)





**Fig. 4.** Intraoperative view. **A:** Resection of scar tissue indurated by radiotherapy. **B:** Dissection of the midline separated abdominal flaps.



**Fig. 5.** Intraoperative view. **A:** Muscle pocket opening and removal of tissue expanders. **B:** Previous pocket revision, insertion of subpectoral breast implants.

appropriate technique for reconstruction in the context of post-mastectomy radiotherapy. There are numerous options for autologous breast reconstruction, including the latissimus dorsi flap, the transverse rectus abdominis myocutaneous flap, the deep inferior epigastric perforator flap, lateral thoracic flap, the TDAP flap, the LTAP and LICAP flaps, or perforator-based propeller flaps based on the IMAP, among others [14]. However, donor site morbidity and prolonged recovery times associated with autologous reconstruction might discourage some patients to opt for these alternatives and this was the case for our patient who opted for implant reconstruction. In addition, she presented with high risk factors such as advanced age, high blood pressure, smoking, obesity, and radiotherapy. As with any procedure involving prosthetic

materials, infection remains the most common and probably the most feared complication of breast reconstruction with implants [15]. Radiation-induced skin damage has been shown to increase the risk of infection and implant exposure; it is essential to preserve adequately irrigated tissue to achieve better results after expansion [16]. Soft tissue infection, characterized by a rapid but subtle onset of inflammation and necrosis that extends from the fascia and subcutaneous fat, can lead to subsequent necrosis of the overlying skin and involvement of the deep muscular layer if not promptly treated [17]. Additionally, infection can result in delayed adjuvant therapy, compromised aesthetic outcome, and more complicated reconstruction. Most infections are caused by gram-positive pathogens such as coagulase-negative staphylococci,



Fig. 6. Postoperative control 2 years after complete breast reconstruction. A: Right oblique view B: Frontal view. C: Left oblique view.

Cutibacterium species, *Staphylococcus aureus*, and streptococci. Acute infections are usually associated with fever and chest pain, erythema, and drainage. Subacute infections may present with chronic pain, persistent drainage, failure of the incision site to heal, or migration of the implant [3]. Traditionally, management has consisted of removal of the infected implant, a complication that forces a delay in the reconstructive process. In this scenario, implant salvage has been reported as a viable alternative in patients without systemic symptoms of infection, with typical pathogen cultures, and with targeted antibiotic administration. Courtiss et al. reported salvage rates of 44.8 % and 50 % for infected implants in the context of breast augmentation and breast reconstruction, respectively [18]. Likewise, Spear and Seruya [5] reported an overall salvage rate of 64.4 % and up to 93.9 % for mild infections. This was the case of our patient whose mild infection, characterized by the absence of fever and response to targeted antibiotic therapy, was successfully treated due to early identification of the microorganism and its susceptibility. On the other hand, we were able to salvage the reconstruction by performing a reverse abdominoplasty, which allowed us to resect the irradiated tissue and provide adequate non-irradiated soft tissue coverage of the replaced implants. The reverse abdominoplasty was described by Rebello and Franco in 1972 as an advancement flap created through a submammary incision to treat laxity in the upper abdomen [19]. Zienowicz and Karacaoglu used this flap as an adjunct to aesthetic breast augmentation with or without breast implants; they named the procedure as augmentation mammoplasty by reverse abdominoplasty (AMBRA) [7]. Our case differs from existing reports in the medical literature in that it is the first to use the reverse abdominoplasty technique as a salvage procedure for implant-based breast reconstruction with infected expanders. The technique allows removal of irradiated tissue by providing optimal highly vascularized tissue for implant coverage in patients who do not want the donor site morbidity and prolonged recovery associated with other autologous breast reconstructions.

#### 4. Conclusions

Salvage implant-based breast reconstruction in patients receiving postmastectomy radiotherapy who develop infection is feasible if the infectious agent is identified and new vascularized tissue is provided. Removal of irradiated tissue and adequate coverage of implants can be achieved with the reverse abdominoplasty technique. Such a technique provides local tissue with similar texture and appearance and offers an acceptable aesthetic result with much less donor site morbidity, thus representing a valid alternative to other complex reconstruction techniques.

#### 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.

#### 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.

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None.

#### Author contribution

René M. Palacios Huatuco and Mariano F. Ramírez did the literature search, prepared the draft manuscript, and wrote the final version of the manuscript.

Horacio F. Mayer contributed to the surgical treatment of the patient, and the manuscript review.

All authors read and approved the final manuscript.

#### Guarantor

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#### Conflict of interest statement

The authors declare that they have no conflict of interest.

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