

CASE REPORTS

Breast Reconstruction Particularities after Radiotherapy - Case Report

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Abstract

Background: Patients undergoing postmastectomy breast reconstruction, with a history of prior radiation therapy, present a particular clinical scenario. This is because of their well-documented higher complication rates, secondary to deleterious effects of irradiation on the soft tissue envelope of the remaining breast. **Case presentation:** This article presents the case of a breast reconstruction in a 53-year old woman with two subsequent breast reconstruction procedures after being treated with chemotherapy and radiotherapy. The first procedure was placing an expander under the mastectomy skin flaps, but it was followed by complications requiring the removal of the expander. One year later the second procedure was performed with latissimus dorsi flap and implant with satisfactory results. But after two years from the latest procedure, the patient turned to our clinic for improvement of the cosmetic outcome. Taking into account the medical and surgical history of the patient and after a complete clinical evaluation, the decision was to perform the right breast reconstruction with contralateral unipedicle musculocutaneous TRAM flap. **Conclusions:** The aesthetic results of standard delayed breast reconstruction after radiation therapy in patients with locally advanced breast cancer are satisfactory at best, even in the hands of experienced surgeons. The result quality that can be obtained in a patient with previous radiotherapy is therefore less optimal than the one achieved in a nonirradiated patient.

Keywords: breast reconstruction, postmastectomy, radiotherapy

Abstract

Introducere: Pacienții care urmează o procedură de reconstrucție mamară postmastectomie și care au efectuat anterior radioterapie, prezintă o particularitate clinică. Aceasta se datorează efectelor adverse negative, prea bine cunoscute ale iradierii asupra țesuturilor restante de la nivelul toracelui. **Prezentare de caz:** Acest articol prezintă cazul unei reconstrucții mamare la o pacientă în vârstă de 53 de ani, care a efectuat anterior două proceduri de reconstrucție mamară după ce a urmat tratament cu chimio și radioterapie. Prima procedură a constat în plasarea unui expander sub lambourile tegumentare restante, dar a fost urmată de complicații locale ce au necesitat îndepărtarea expanderului. Un an mai târziu, a fost efectuată a doua procedură cu lambou musculocutan latissimus dorsi și implant, aceasta având rezultate satisfăcătoare. După doi ani de la ultima intervenție, pacienta revine în clinica noastră pentru îmbunătățirea aspectului estetic al sânelui reconstruit. Luând în considerare antecedentele medicale și chirurgicale ale pacientei și după o evaluare clinică completă, este luată decizia de a efectua reconstrucția mamară cu lambou musculocutan TRAM contralateral unipediculat. **Concluzii:** Rezultatul estetic al procedurii standard de reconstrucție mamară după radioterapie la pacienții diagnosticați cu cancer mamar local avansat

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este mulțumitor în cele mai bune cazuri, chiar și atunci când procedura este efectuată de chirurghi cu experiență. Prin urmare, calitatea rezultatului ce poate fi obținută la pacienții care au făcut radioterapie anterior reconstrucției mamare este mai puțin satisfăcătoare comparativ cu pacienții neiradiați.

Cuvinte cheie: reconstrucție mamară, postmastectomie, radioterapie

BACKGROUND

Postmastectomy radiation therapy decreases the incidence of locoregional disease recurrence in patients with invasive breast cancer and has been proven to reflect a survival advantage for patients with node positive disease^{1,2}. The optimal timing and technique of breast reconstruction procedures in patients requiring postmastectomy radiation therapy are controversial¹. Patients undergoing postmastectomy breast reconstruction, with a history of prior radiation therapy, present a particular clinical scenario. This is because of their well-documented higher complication rates, secondary to deleterious effects of irradiation on the soft tissue envelope of the remaining breast.

The increased need for skin and volume replacement after radiotherapy makes delayed breast reconstruction extremely challenging because of the tendency for wound healing problems to occur between the irradiated chest wall and the autologous tissue flaps, which are often used to reconstruct the breast³.

This article presents the case of a breast reconstruction in a 53-year old woman with two subsequent breast reconstruction procedures after being treated with chemotherapy and radiotherapy.

CASE PRESENTATION

The patient, a 53-year old female, diagnosed 4 years ago with invasive ductal carcinoma after radical mastectomy procedure of the right breast and ipsilateral axillary lymph node dissection, was admitted to the "Prof. Dr. Agrippa Ionescu" Plastic Surgery Clinic of the Emergency Hospital for improvement of the cosmetic outcome of the reconstructed right breast after two previous surgical procedures.

From her medical history, of note is the histopathological result which presented the diagnose of Stage III A invasive ductal carcinoma G3 p T3N1 with 8 positive axillary lymph nodes from 15 dissected, completed by the immunohistochemical findings ER (+) PGR (-) Cer B2 (+) and Ki67 positive in 15% tumour cells. The patient was referred to an oncologist and radiation therapy specialist. The adjuvant oncologic treatment

was composed of 8 cycles of polichemotherapy (FEC) followed by 4 sessions of Tamoxifen and continued with 25 cycles of adjuvant external beam radiation therapy.

Ten months later after completion of the chemotherapy and radiotherapy, the patient asked for medical advice for breast reconstruction procedure. All the possible reconstruction procedures were presented to the patient and after her approval, it was decided for two-stage breast reconstruction with placement of a tissue expander (anatomic Backer prosthesis 255 /90 cc cohesive gel). The expander was placed under the mastectomy skin flaps (the upper medial part) and the pectoralis minor (the upper lateral part) and beneath the anterior insertions of the serratus anterior muscle. Due to the wound dehiscence with seroma and superficial skin cellulitis not responding to antibiotics treatment, the expander is removed and the remaining pocket closed in anatomically-layered with surgical suture.

One year later, the surgical team together with the patient decided breast reconstruction with silicone prosthesis (Siltex Round Moderate Profile gel breast implant cohesive 100 cc) covered with autologous tissue flap (pedicle latissimus dorsi musculocutaneous flap). There weren't any notable postoperatively complications except for a small patch of skin necrosis in the central area that, after debridement and excision, was covered with a full thickness skin graft. The overall cosmetic result was acceptable and the patient discharged 10 days later.

After two years from the latest procedure, current clinical examination of the right breast showed a skin scar retraction in the upper medial pole, with the skin graft well incorporated above the latissimus dorsi musculocutaneous flap and a minimal volume loss in the autologous flap. The patient requested for the improvement of the overall cosmetic result of the right breast (Figure 1).

Taking into account the medical and surgical history of the patient and after a complete clinical evaluation, it was decided to perform the right breast reconstruction with contralateral unipedicle musculocutaneous TRAM flap.



Figure 1. Preoperative view.

TECHNIQUE

The surgical procedure began with the removal of the implant together with the latissimus dorsi flap. A standard muscle-splitting technique was performed with a contralateral musculocutaneous TRAM flap that was passed through a subcutaneous tunnel and into the mastectomy defect where it was trimmed and contoured to match the opposite breast mound and sutured to the edges of the surrounding defect. The abdominal wall was closed with particular attention to incorporate the internal and external oblique fascia within the anterior rectus closure followed by the reconstruction of the navel. Both the abdomen and the TRAM flap reconstruction sites were drained with suction drains that

were left in place for at least 7 days and the wounds dressing was changed every two days. The patient was discharged after ten days (Figure 2, Figure 3).

DISCUSSION

The *American Society of Clinical Oncology*⁴ recommends postmastectomy radiation therapy for patients with four or less positive lymph nodes to achieve better loco-regional control and possibly improve survival. Radiation is also recommended for patients with advanced primary cancers as these patients remain at risk for locoregional recurrence after mastectomy despite the use of adjuvant chemotherapy and hormone therapy.

When the breast undergoes irradiation, one can reasonably expect changes as a result of the radiation exposure. These effects can include atrophy of subcutane-



Figure 2. Intraoperative view.



Figure 3. Final result 14 days postoperative.

ous fat, pigmentation changes, fibrosis and contracture of skin and muscle, and delayed wound healing^{5,6}. Such consequences are not limited to the local tissues, however, as autologous tissue transfers are altered by similar types of fibrosis and contracture when irradiated. Even prosthetic materials are indirectly modified, with resultant capsular contracture around irradiated prosthetic implants^{7,8}.

In women who desire breast reconstruction after mastectomy, the sequencing and timing of reconstruction and postmastectomy irradiation and the technique used for breast reconstruction can influence complication rates and aesthetic results.

What would be the optimal time at which to begin delayed reconstruction after postmastectomy irradiati-

on and can it be done safely within one year after postmastectomy radiation therapy?

In the past, the reconstruction procedure was delayed for several years after postmastectomy radiation therapy because of concerns that the reconstructed breast would interfere with surveillance for recurrence in the higher risk breast cancer patients who require to receive postmastectomy radiation therapy. However, subsequent studies⁹ found that a reconstructed breast does not impair the detection of recurrence and that overall survival after a locoregional recurrence of breast cancer is not adversely influenced by the presence of a reconstructed breast. Recently, there has been a trend toward performing reconstruction sooner after postmastectomy irradiation to reduce the time patients must wait to have a reconstructed breast¹⁰.

Momoh and colleagues¹¹ retrospectively evaluated the outcomes in one hundred patients who underwent delayed autologous tissue – based breast reconstruction after postmastectomy irradiation – 17 who underwent reconstruction within six months after postmastectomy radiation therapy and 83 who underwent reconstruction more than six months after postmastectomy radiation therapy. No significant differences in complication rates were observed between the two groups.

An alternate analysis¹¹ examined 50 patients who underwent reconstruction within 12 months after postmastectomy radiation therapy and 48 patients who underwent reconstruction more than 12 months after postmastectomy radiation therapy; again, no important differences in complication rates were observed. The authors concluded that as overall complication rates were similar in the two groups, it may be possible to perform autologous breast reconstruction less than one year after postmastectomy radiation therapy instead of the currently accepted practice of many reconstructive surgeons, which is to wait at least one year after postmastectomy radiation therapy.

With an increasing number of patients receiving postmastectomy radiation therapy, the decision of whether to offer implant-based or autologous tissue breast reconstruction has never been so demanded.

A study conducted by Gregory and Evans and colleagues¹², evaluated the role of implants on the irradiated breast. There appeared to be a significant capsular contracture and complication rates for breast implants in patients who received adjuvant radiotherapy either before or after prosthetic placement. These complications appeared unrelated to the implant type (although polyurethane implants might be more resistant to radiotherapy) or the interval between breast implant placement and radiotherapy. Placement of implants before

and after irradiation had no effect on the overall result. Their conclusion on using the autologous tissue was that this technique didn't offer a favourable environment for the implant, but the TRAM flap reconstruction may have a more protective role than latissimus dorsi flap reconstruction. They advocated autologous reconstruction whenever possible and considered it mandatory to avoid the potential for poor outcomes in patients with irradiated breast tissue.

Does using an autogenous tissue flap in association with an implant for breast reconstruction decrease the incidence of implant-related complications in previously irradiated breasts?

Spear and colleagues¹⁶ conducted a retrospective review of the role of the latissimus dorsi flap with an implant in the reconstruction of previously irradiated breasts. The authors concluded that in patients with unsatisfactory results after two-stage implant-based reconstruction as a result of the deleterious effects of postmastectomy irradiation, the breast contour can be improved by inserting a latissimus dorsi flap, generally to the inferior pole of the breast.

In a study conducted by Evans and colleagues¹² that examined the outcomes of patients who underwent breast reconstruction after irradiation therapy with an implant and an autologous tissue flap, the authors found that the addition of the tissue flap – either a musculocutaneous TRAM flap or a latissimus dorsi flap – didn't seem to offer protection against capsular contracture, a common complication of postmastectomy radiation therapy. The authors supported breast reconstruction with autologous tissue alone in patients who underwent or were about to undergo postmastectomy radiation therapy.

In a study of partial breast irradiation published by Chen et al.¹⁹, 199 patients received postmastectomy radiation therapy using interstitial brachytherapy. The mean follow up was 6.4 years. The study concluded that radiation sequelae are not limited to the perioperative period and can evolve and possibly delay reconstructive success with time. The toxicity of radiotherapy is most often defined by late effects on the residual tissue. These late effects may take years to develop and are related to technique^{17,18}.

Although the consensus in the literature is that autologous tissue is preferable to breast implants within an irradiated operative field, even autologous tissue reconstructions can be negatively influenced by postmastectomy radiation therapy. Some studies^{12,14} the majority conducted by radiation oncologists, have found acceptable outcomes with TRAM flap reconstruction and postmastectomy radiation therapy even when the

flap is put in place before radiation delivery. However, until less deleterious methods of radiation delivery can be implemented and proven effective, delayed reconstruction may be the optimal choice in patients known at the time of mastectomy to require postmastectomy irradiation.

In 2001, researchers at M. D. Anderson²⁰ conducted a retrospective study comparing complication rates in patients who underwent immediate TRAM flap reconstruction before postmastectomy radiation therapy and patients who underwent postmastectomy irradiation before TRAM flap reconstruction. The mean follow-up times after the end of treatment for the immediate and delayed reconstruction groups were three and five years, respectively. The incidence of early flap complications (partial or total flap loss and vascular thrombosis) did not differ significantly between the two groups. However, the incidence of late complications (flap volume loss, flap contracture and fat necrosis) was significantly higher in the immediate reconstruction group. Furthermore, 28% of the patients with immediate reconstruction required an additional flap to improve a distorted contour resulting from flap shrinkage and severe flap contracture after postmastectomy irradiation.

Autologous tissue not only gives a more natural aspect and offers durable reconstruction compared with implant-based techniques, but also seems better suited to handle postmastectomy irradiation.

CONCLUSIONS

The aesthetic results of standard delayed breast reconstruction after radiation therapy in patients with locally advanced breast cancer are satisfactory at best, even in the hands of experienced surgeons.

The previously irradiated breast presents the surgeon with particular difficulties, some of which cannot be corrected. Radiation causes cellular damage that the body does not completely repair, so chronic radiation damage does not improve with time, but aggravates instead. Furthermore, the irradiated tissues surrounding an autologous breast reconstruction will usually not blend into the tissues of the reconstructed breast as well as they would without irradiation. Frequently, irradiated skin will have to be sacrificed during the reconstruction, increasing the amount of skin required from the donor site. The result quality that can be obtained in a patient with previous radiotherapy is therefore less optimal than the one achieved in a nonirradiated patient.

As the incidence of breast cancer continues to grow, an increasing number of patients will be seeking plastic

surgery counselling for breast reconstruction. Given its long history of success and reputation as the workhorse in autologous breast reconstruction, the pedicle TRAM flap will continue to be a viable option and a

time tested choice for the reconstruction of a natural and symmetric breast mound, with limited morbidity and good patient satisfaction.

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