

Reconstruction of Severe Breast Deformities following Conservative Cancer Surgery and Radiation Therapy with a Latissimus Dorsi Myocutaneous Flap

JEAN-YVES BOBIN, M.D., PROFESSOR OF SURGICAL ONCOLOGY
EMMANUEL DELAY, M.D., AND MICHEL RIVOIRE, M.D.
DEPARTMENT OF SURGICAL ONCOLOGY AND PLASTIC AND RECONSTRUCTIVE SURGERY
CLAUDE BERNARD UNIVERSITY
LYON, FRANCE

Conservative surgery of selected breast-cancer tumors up to 4 cm in size gives rise to equivalent overall survival rates in both retrospective and randomized clinical trials.¹⁻⁴ Although 90 percent of patients display satisfactory functional and cosmetic results when surgery is performed by highly competent teams, the remaining 10 percent end up with severe breast deformities due to factors^{5,6} such as inappropriate selection of patients, poor surgical techniques, post-radiation fibrosis and scar contractures. These patients also suffer from painful, hard, edematous breasts. Severe breast deformities are always associated with malpositioning and distortion of the nipple-areola complex. Significant contour abnormalities, characterized by retraction and depression, may hinder reconstruction by the plastic surgeon if the patient wishes to retain the residual breast.

When local relapse or suspicious lesions occur after conservative surgery in a heavily irradiated field, mastectomy is generally advocated,^{7,8} but not always accepted by the patient. A few teams^{2,8,9} have performed fur-

ther conservative surgery involving limited excision of a local lesion, but the risks of a second recurrence and of poor cosmetic results are high. Information is scarce on plastic surgery to repair severe deformities after radi-

ation therapy, and on second-line conservative surgery.^{9,10}

The present study is an analysis of 37 patients (10 with local recurrence) presenting poor cosmetic results after conservative surgery for invasive breast carcinoma. All underwent breast reconstruction with a latissimus dorsi myocutaneous flap (LDMF) without the use of a prosthesis.

PATIENTS AND METHODS

Between 1986 and 1992, 37 women (mean age: 46 years), all of whom had severe deformities of the breast following conservative surgery and radiation therapy for breast cancer, were referred to our surgical department for treat-

ment. Ten of them (27 percent) had a local recurrence but refused a mastectomy. The mean delay between the end of primary tumor treatment and local recurrence was 2.8 years. The chosen treatment option was reconstruction of the breast with a LDMF without the use of an implant.

All patients underwent a complete work-up to rule out metastases (CA 15/3 assay, chest X-ray, liver US, bone scan) and an evaluation to determine their suitability for plastic surgery on the basis of surgical, psychological and oncological criteria. The patients had to have reasonable expectations with regard to the outcome of the procedure and to be aware of the inconveniences (scar on the back, "patchwork" appear-

ance after reconstruction of the upper inner and outer quadrants of the breast).

Of the 37 patients, 9 had strictly major breast deformities, the remaining 28 deformities had severe fibrosis and edema. Fourteen patients complained of a very painful and tender breast. Telangiectasia of the retracted skin was observed in 13 patients. Malpositioning and deformation of the nipple-areola complex was due principally to severe glandular deficiency within the lower quadrants of the breast (Table I).

Deformities were due to inadequate surgical technique in 30 patients (81 percent), 13 of whom had undergone radiation therapy, and 7 patients had radiation only with an 192Ir implant after surgery (Table II).

Two patients treated with an 192Ir implant for recurrent cancer presented a second local recurrence after 2 and 10 years. The mammograms of the heavily irradiated breasts of 15 patients revealed suspicious abnormalities, which proved to be limited in situ ductal carcinoma (n=2), T1 N0 invasive carcinoma (n=8), and non-malignant fibrosis with fat necrosis and induration (n=5). Intra-operative biopsies are essential, but identification of cancer cells in frozen sections can be extremely difficult after radiation therapy. All patients were, therefore, informed prior to surgery that, if frozen or paraffin sections of the resected area margins contained suspicious cells, a mastectomy would be performed with or without immediate breast reconstruction with an implant placed behind the LDMF.

The median follow-up was 36 months (6 months to 6.4 years). The first mammographic evaluation was performed 6 months after reconstruction and thereafter yearly.

SURGICAL TECHNIQUE

To raise the LDMF, a transverse-oriented cutaneous island was designed so that the scar would be hidden by the brassiere. Its size was a function of the area of resected retracted skin overlying the defect, which depended in turn upon the extent of radiation damage (induration, sclerosis, telangiectasia). The orientation of the breast skin resection depended upon the locations of the defect, of the previous scar, of radiation damage, and of the nipple-areola com-

Sites of Mammary Defects

Quadrant	N	Nipple-areola complex distortion
Upper outer	13	7 (54%)
Lower outer	8	6 (75%)
Upper inner	2	0
Lower inner	2	2 (100%)
Combination	12	11 (92%)
TOTAL	37	26 (73%)

Table 1.

Factors Contributing to Lack of Cosmesis

Quadrant	Surgery	Surgery + Radiotherapy	Radiotherapy	Total
Upper outer	5	4	4	13
Lower inner	6	2	0	8
Upper inner	0	0	2	2
Lower inner	2	0	0	2
Combination	4	7	1	12
TOTAL	17 (46%)	13 (35%)	7 (18%)	37

Table 2.

Aesthetic Results (N = 37)

	Patient's rating	Surgeon's rating
Very good	28	26
Good	7	9
SUBTOTAL	35 (94%)	35 (94%)
Moderate or poor	2	2

Table 3.

plex. The margins of the defects were removed down to the level of the pectoralis fascia and, if a suspicious lesion was visible, sent for histological examination. The decision to perform a partial or total mastectomy with reconstruction was based upon histological results (see previous page).

The entire latissimus dorsi muscle was elevated in order to dispose of a maximum amount of tissue to fill the major glandular deficit. Slight overcorrection of the contour compensated for any atrophy of the transposed muscle. The attachment of the latissimus dorsi to the humerus was divided and the thoracodorsal nerve was preserved. The elevated flap was placed under the skin of the axilla and the donor sites were closed in a double-layered manner over a suction drain. For upper quadrant defects, the latissimus dorsi muscle was folded and sutured to adjacent breast parenchyma. For lower quadrant defects, the muscle was fitted as a hammock to create a new infra-mammary fold and natural ptosis. A section drain was placed under the flap. Excess areas of skin were de-epithelialized and partly buried under the repositioned areola.

Postoperatively, the patients received cephalosporine for 5 days until fluid output was minimal. Dressings maintained the contour of the reconstructed breast.

RESULTS

Aesthetic results (Table III, Figures 1-3) were rated by patient and surgeon. At the outcome of the operation, both considered results very good or good in 94 percent of cases (35 out of 37 patients). In the two patients with a moderate or poor result, a fair to satisfactory final result was obtained by plastic surgery for flap ptosis (lower outer quadrant) in one patient and for distortion of the nipple-areola complex in the other. Overall, nipple-areola displacement was rectified in eight patients (22 percent) and breast symmetry was improved by contralateral mammoplasty in seven patients (19 percent).

Functional results were considered good by both patient and surgeon in all cases. The transposed muscle gave a soft and supple breast by improving lymphatic and venous drainage of the remnant irradiated parenchyma. Breast edema disappeared and fibrosis decreased. Breast pain vanished in 14 patients.

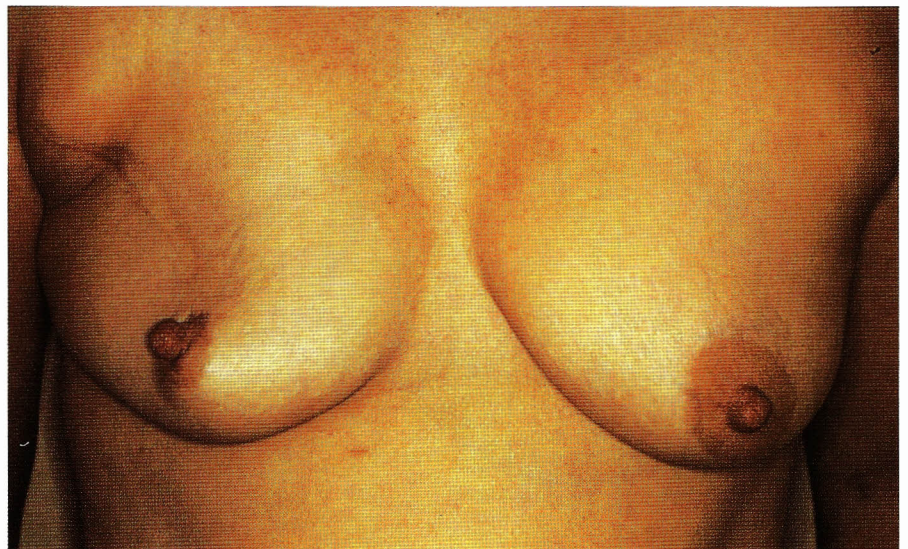


Figure 1a. Preoperative view.

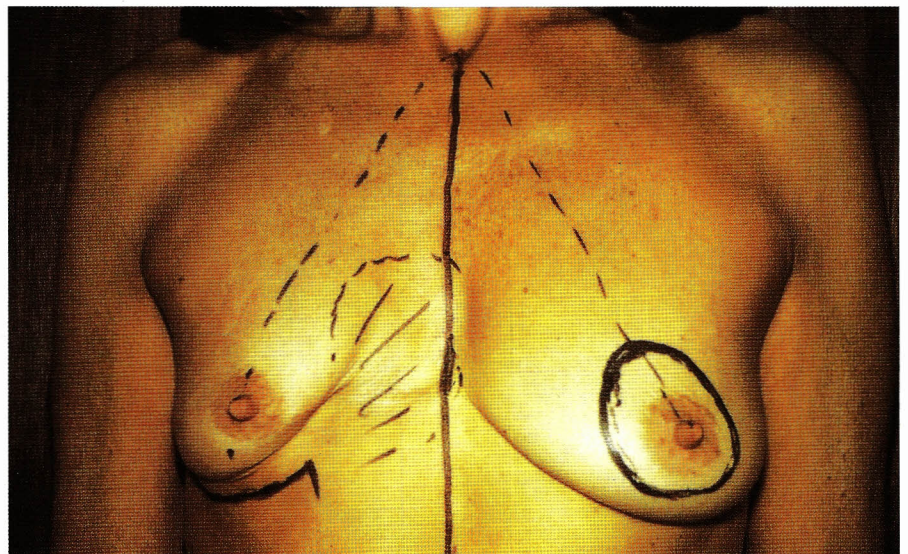


Figure 1b. Preoperative view.

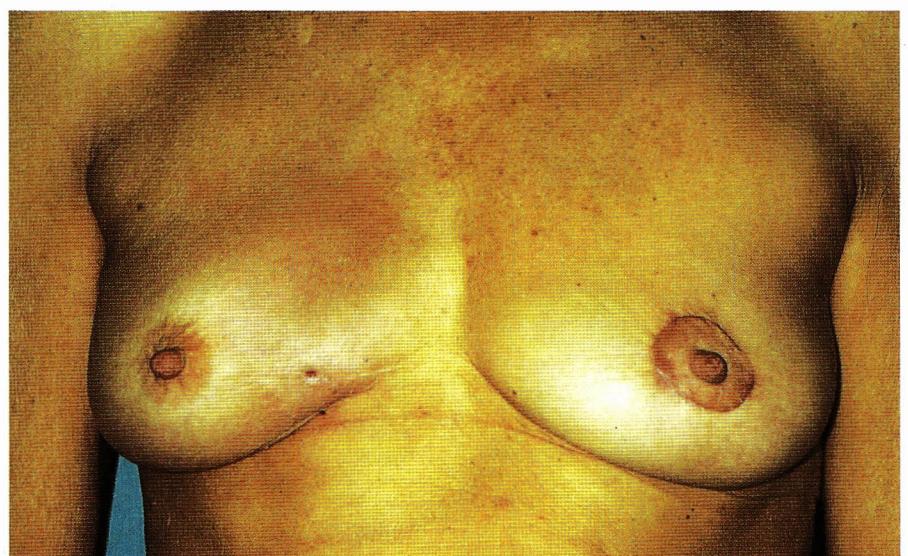


Figure 1c. Postoperative view.

Figure 1. Deformity of the inner quadrants of the right breast. Partial reconstruction with a de-epithelialized and buried musculocutaneous flap.

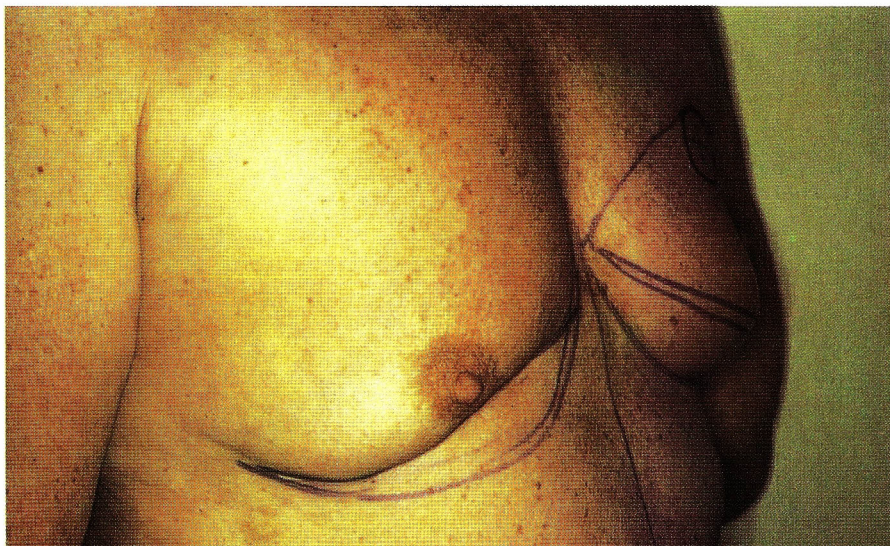


Figure 2a. Pre-operative view.

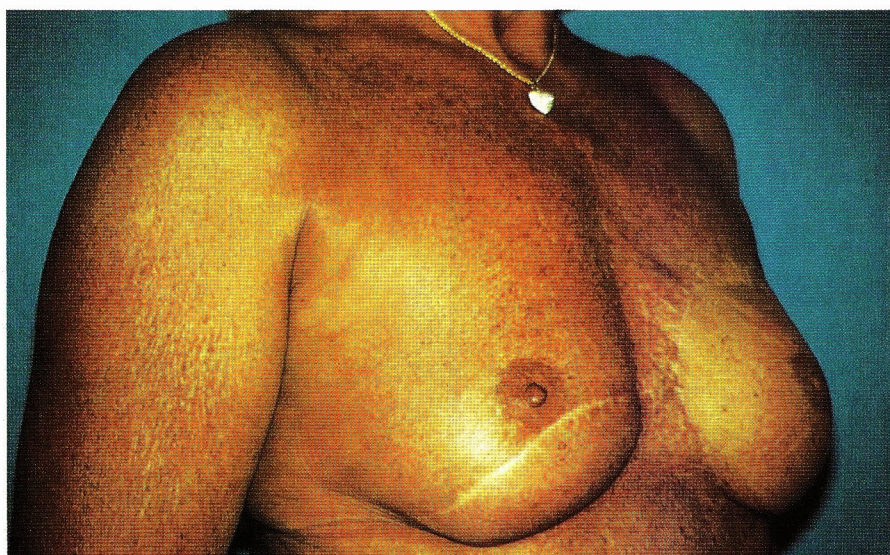


Figure 2b. Postoperative view.



Figure 2c. Postoperative view.

Figure 2. Deformity of the lower outer quadrant of the right breast. Secondary reconstruction of the left breast with a TRAM flap.

Immediate complications were infrequent and minor, and consisted mainly of dorsal seromas (7/37) necessitating percutaneous aspiration but not reoperation. Eleven patients developed pain under the back scar, which disappeared after 6 months of physiotherapy.

A definitive evaluation of oncological results requires further follow-up. In all patients the remaining breast parenchyma is being routinely evaluated by mammography. Partial reconstruction with an LDMF does not interfere with the quality and accurate analysis of a mammogram. The 29 patients without recurrent cancer have not shown any signs of such recurrence or of metastases. Five of the eight patients who had relapsed (2 DCIS and 3 invasive ductal carcinomas) remain disease-free, whereas the three others have developed metastases within one year. Two of these have been treated by brachytherapy with an ^{192}Ir implant placed under the LDMF. The patient (38-years-old), who had refused mastectomy in spite of three nodules detected in the lower outer quadrant of the right breast, was found to have three foci of invasive cancer in this quadrant upon removal. The postoperative period was uneventful; cosmetic and functional results of the second operation were excellent, but the patient died of distant metastases 10 months later in spite of chemotherapy. The second patient (55-years-old) with a local recurrence in the upper inner quadrant of the left breast attached to the pectoral fascia remains disease-free 24 months after surgery.

DISCUSSION

Only 10 percent to 15 percent of patients end up with severe breast deformities after conservative surgery and radiation therapy for breast cancer.¹¹⁻¹³ The proposed classifications of such deformities are confusing^{14,15} and, in agreement with Grisotti et. al.,¹⁶ we consider that no classification should be attempted but that each deformity should be described simply and precisely. The 37 patients included in the present study suffered from very severe deformities which were, for the most part (81 percent), due to surgical inexperience usually after resection of the lower quadrants of the breast.

When breast parenchyma is not approximated, the glandular defect fills

up with seroma, which is subsequently replaced by fibrotic tissue. Irradiation of the primary tumor bed enhances fibrosis leading to retraction of the remaining gland, to accentuated deformities in breast shape, and to dislocation of the nipple-areola complex.¹⁷⁻¹⁹ Ir implants further enhance distortion, producing telangiectasia, and fat necrosis responsible for induration and skin retraction. After brachytherapy, clinical and X-ray examination of the breast are very difficult and mammograms reveal disturbing abnormalities.²⁰ Wide excision of suspicious nodules or of local relapses in an irradiated breast often yields poor cosmesis and generates complications such as infection and necrosis. For these reasons, most surgeons advocate simple mastectomy with or without immediate reconstruction.^{7,8,21,22} In general, the patients themselves, in spite of their breast deformities, do not seek plastic surgery either because they are scared of further surgery and mastectomy, or because no rectification of their defects has been proposed to them by their physician or surgeon who fears major

complications might arise from the poorly vascularized swollen breast.²³ Many of these attitudes are governed by a lack of information on the indications, relevance, and results of partial breast reconstruction by LDMF after radiation therapy.²⁴

Partial aesthetic reconstruction serves several purposes. It avoids the psychological stress of mastectomy; it restores normal breast shape without the use of an implant; it improves functional disorders such as edema, fat necrosis, tissue fibrosis; it enables suspicious nodules in a heavily irradiated breast to be checked; and finally, it yields an aesthetic result and is an effective anticancer treatment, in cases of wide resection after a local recurrence.

Partial breast reconstruction by LDMF is indicated for deformities limited to one or two quadrants of the breast. The deficit has to be compatible with the autologous LDMF transfer. The entire latissimus dorsi muscle is required and was adequate in all of our 37 patients. In anticipation of any subse-

quent minor amyotrophy, we slightly overcorrected the deficit. Unlike Grisotte et. al.,¹⁶ we found that the technique was suitable without resorting to a prosthesis for both large and small breasts because women with larger breasts have more fatty tissue in their backs. The best timing for surgical correction by LDMF is at least one year after radiation therapy.⁹ Our patients underwent surgery after more than two years and had good, stable, long-term cosmetic results.

Because the deformities were wide and composite, we considered local flap operations or mammoplasty unsuitable. Submuscular implants with or without expansion for correction of volume deficiency are hazardous in irradiated breasts because implant extrusion, chronic infection or necrosis may occur, and because implant location may hide part of the residual gland and thus impede subsequent follow-up by clinical examination or mammography. Berrino et. al.²⁴ found expandable implants to be effective because they gradually stretched over



Figure 3a. Preoperative view.



Figure 3b. Preoperative view.

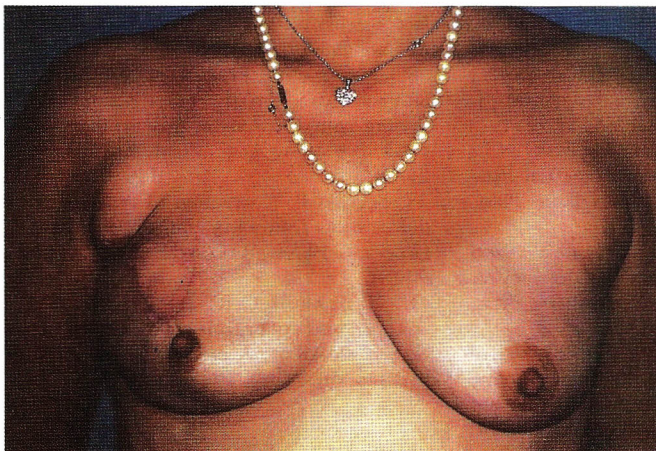


Figure 3c. Postoperative view.



Figure 3d. Postoperative view.

Figure 3. Deformity of the upper outer quadrant of the right breast. Reconstruction with a TRAM flap.

the fibrotic tissue. They obtained satisfactory results in nine difficult cases by multiple overinflation and deflation of the implant.²⁵ The transverse rectus abdominis musculocutaneous (TRAM) flap,²⁶ which we use widely for mastectomy defects, seems too major a surgical procedure to correct a partial defect requiring a more limited amount of tissue.

The LDMF technique is very reliable and quick, leaves behind a horizontal back scar that is hidden by the brassiere, and results in no functional morbidity. The only postoperative complication may be seroma formation which can be managed by percutaneous aspiration. The best cosmetic results were obtained for lower quadrant deformities. The lower mammary fold can be rebuilt into its proper position and the contour of the breast can be easily shaped. The LDMF does not, however, solve all the problems relating to the deformities, and secondary plastic procedures were needed to improve aesthetic results. The nipple-areola complex was repositioned in 22 percent of cases and symmetry was adjusted by contralateral mammoplasty in 19 percent of cases. From an aesthetic viewpoint, 93 percent of our patients judged their final result to be excellent or good. This very high rating can be explained by the patient's satisfaction in retaining her own breast. The drawbacks are a back scar, a patchwork appearance of the upper quadrants, and the elimination of LDMF among future options.

After transposition of the latissimus dorsi muscle, the breast returned to a near normal consistency and breast pain was greatly alleviated or completely disappeared. Good functional results occur because the resection of fibrotic tissue and the application of a well-vascularized muscle to the relatively hypovascular tissue increases the local tissue blood supply and its lymphatic and venous drainage.⁹

So far, after a median follow-up of 36 months, no local recurrences have occurred after partial mastectomy and LDMF reconstruction. Wide resections leaving margins with no suspicious findings have to be performed. Further follow-up is required, and this follow-up is facilitated, in the case of LDMF, by the removal of fibrotic reactions and abnormalities and reduction of edema and thickness, which lead to improvements in the

quality of mammograms and X-rays.⁹ On the basis of the results obtained to date in ten patients with breast defects and local recurrence of cancer, we advocate this technique of second-line conservative surgery involving wide resection of an irradiated mammary gland as a possible safe alternative to salvage mastectomy. **STI**

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