

Oncological safety of breast cancer patients undergoing free-flap reconstruction and lipofilling



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Abstract

Background: Autologous fat grafting is a widely accepted approach for breast reconstruction after mastectomy but its oncological safety has not been established. This study aimed to compare recurrence in patients who underwent fat-grafting procedures after autologous breast reconstruction and those who did not.

Patients and methods: We retrospectively reviewed 207 consecutive patients, who underwent mastectomy and reconstruction using free flap surgery. We divide them in two groups: a study group of patients who underwent fat grafting procedure and a control group of patients who did not. Outcome regarding local and regional recurrence was compared between the two groups. Particularly, we studied recurrences from primary surgery to baseline (first lipofilling) and from baseline to most recent follow-up.

Results: Median follow-up was 60 months from surgery to baseline and 29 months from baseline to most recent follow-up. The overall observational period after mastectomy in the control group was 120 months. Local recurrence was observed in 6 patients from the study group, respectively 3 in the first observational period and 3 after the fat grafting procedure. The control group, as the study one, presented a total of 6 recurrences ($p = 0.555$; Hazard Ratio free flap and lipo vs only free flap: = 0.66; 95% CI 0.16–2.66).

Conclusions: We found no significant differences in recurrence between patients who underwent fat grafting and those who did not. These encouraging findings support previous results but larger series of patients are required to confirm long-term oncological safety in these procedures.

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Keywords: Fat grafting; Free-flap; Recurrences

Introduction

The use of autologous tissue in breast reconstruction after mastectomy is motivated by superior long-term outcomes compared with implant-based reconstruction. Additional procedures, such as fat-grafting, may be necessary to optimize the aesthetic results and to manage complications (volume deficit, asymmetries, surface deformities and scar retraction)^{1–3} in order to increase patient quality of life.^{4,5} Although fat grafting is widely integrated in breast reconstruction, there is still no clear consensus on its oncological safety. The biological

mechanism of growth factor secreted by adipose tissue, such as adiponectin and leptin, and their interaction with breast tissue and “dormant” tumor cells remains controversial.^{6–13} This issue is currently under debate among oncologist and surgeons. In 2007, the French Society of Plastic Reconstructive and Aesthetic recommended French plastic surgeons to “postpone lipofilling in the breast with or without breast cancer history unless it is performed under a prospective controlled protocol”.¹⁴ In 2009, the American Society of Plastic Surgeons Fat Graft Task Force stated that no reliable studies can definitely confirm the oncologic safety of lipofilling in breast cancer patients.¹⁵ No studies have been performed to date to analyse the local recurrence in breast cancer patients who underwent free flap based reconstruction and

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subsequent reshaping using fat grafting. Aim of this study is to evaluate if the recurrence rate increased in this homogenous group of patients.

Patients and methods

Study cohort and data sources

We retrospectively analysed all patients who underwent mastectomy for breast cancer between 1989 and 2011 at two institutions in Barcelona, Hospital de Santa Creu i Sant Pau and Clinica Planas. Data were taken from computerized patients records at each centre. A total of 207 consecutive patients were recruited, 150 at Hospital de Santa Creu i Sant Pau and 57 at Clinica Planas. The inclusion criteria were patients who had a mastectomy for invasive or in situ carcinomas and subsequent reconstruction with free flaps. Different kinds of free flaps were used as DIEP, SIEA, SGAP, IGAP and Tap.

The deep inferior epigastric artery perforator flap (DIEP) flap is currently the gold standard for breast reconstruction with autologous tissue. It consists of a free fascio-cutaneous perforator flap transferred from the lower abdomen based on deep inferior epigastric vessels.

The SIEA flap (superficial inferior epigastric artery flap) allows the transfer of the same skin and fat paddle of the diep flap but with a different artery. Unlike TRAM, both DIEP and SIEA spare rectus muscles.

The SGAP is the superior gluteal artery perforator flap. The IGAP is the inferior gluteal artery perforator flap: gluteal skin and fatty tissues are transferred based on different perforators skeletonized through gluteus maximum muscle.

The Tap is the toraco dorsal artery perforator flap; it is a fascio-cutaneous flap based on musculo-cutaneous perforators from the toraco -dorsal vessels.

Patients undergoing bilateral surgery because of bilateral disease, were counted as 2 cases. Exclusion criteria were patients with distant metastases at diagnosis, recurrent tumor, patients who underwent conservative treatment and patients who did not present a minimum follow up of 12 months after fat grafting procedure. We divided patients into a study group of 107 cases (100 patients of which 7 bilateral cases) who underwent fat grafting after free flap reconstruction, and a control group of 107 cases treated only with free flap reconstruction. All the fat graftings were performed using the same technique, and the first of these treatments was used as the baseline for the oncological follow-up. We separated the follow-up into 2 observational periods: the first one from primary surgery to baseline and the second one from baseline to the most recent follow-up.

Tables 1–3 show data regarding clinical history, cancer histology, stage of pathology (T,N,M), receptor status, chemotherapy, radiotherapy, hormonal treatment, BRCA mutation status, and type of autologous reconstruction.

Table 1
General characteristics.

	Study group n (%)	Control group n (%)	P
Age years (SD)	49.19 (7.847)	48.98 (7.512)	0.845
BMI (SD)	25.69 (4.63)	25.35 (3.71)	0.717
Alcohol	11 (10.2%)	4 (3.7%)	0.106
Tobacco	34 (31.8%)	43 (40.2%)	0.132
DM	0	1 (0.9%)	1.000
COPD	0	1 (0.9%)	1.000
Obesity	8 (7.5%)	11 (10.3%)	0.632
Overweight	15 (14%)	35 (32.7%)	0.020
Hypertension	12 (11.2%)	16 (15%)	0.544
Coronary artery disease	2 (1.9%)	0	0.498
Peripheral vascular disease	2 (1.9%)	0	0.498
Dyslipidemia	14 (13.1%)	14 (13.1%)	1.000
Cesarian section	15 (14%)	18 (16.8%)	0.705

The BRCA test was introduced 8 years ago in our hospital for patients with positive family history and for this reason not all the patients were tested for this gene mutation.

Being overweight was defined as following in the BMI range—kg/m² between 25 and 30.

The study focused primarily on local recurrences. The term local recurrence (LR) was used to identify all local (mastectomy flaps, nipple areola complex, thoracic skin, and scar tissue) and all regional recurrences (axillary, internal mammary and infraclavicular nodes).

The follow-up consisted of annual mammograms evaluated by our breast radiologists and of clinical examinations performed by the surgeons.

Fat grafting technique

Recipient sites for fat grafting were marked on the reconstructed breast before surgery. Preoperative antibiotic prophylaxys was administered. Fat was harvested, without previous local anaesthetic infiltration, from fat deposits (knee, upper abdomen, thighs and flanks) using cannulas (2–3 mm diameter, 1–2 blunt opening and 10–15 cm length) attached to a 10 cc Luer-Lok Syringe. The harvested tissue was centrifuged in a Coleman machine (1 min at 2000 rpm) to separate the fat tissue from the oily layer and the residual blood cells, and transferred in 3-cc syringes for injection in the required areas, particularly in correspondence of mastectomy flaps. Two fat grafting

Table 2
Performed reconstruction.

	Study group n (%)	Control group n (%)
Type of FLAP		
DIEP	83 (77.5%)	93 (86.9%)
SIEA	10 (9.3%)	8 (7.5%)
SGAP	8 (7.5%)	4 (3.7%)
IGAP	2 (1.9%)	1 (0.9%)
DIEP + SIEA	3 (2.8%)	1 (0.9%)
FREE TAP	1 (0.9%)	0

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