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Oncological outcomes of lipofilling breast reconstruction: 195 consecutive cases and literature review

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Summary *Introduction:* Lipofilling has become a widely used procedure in breast reconstruction after mastectomy or breast-conserving treatment. The possibility that this technique may increase stimulation of cancer development between the potential tumor bed and the lipoaspirates grafts has been raised regarding its safety. The aim of this study was to identify the oncological risks associated with this procedure in our institution.
Methods: Between years 2007 and 2014 we record 195 consecutive patients with fat grafting technique for reconstructive purpose after breast cancer treatment. The loco-regional recurrence (LRR) as first event of relapse was the primary end point of this study.
Results: We performed 319 lipofilling procedures in 132 mastectomy and 63 breast-conserving surgery patients. Invasive carcinoma represents 81.6% of the series. The median follow-up from primary cancer surgery and fat grafting was 74 and 31 months respectively. Median time between oncologic surgery and lipofilling was 36 months. The authors observed a complication rate of 8.2%, most of them liponecrosis and oil cysts (7.2%). Four local, 2 regional and 4 distant recurrences were observed as first event of relapse in 10 patients with invasive ductal carcinoma. The loco-regional recurrence rate was 3.1% (1.08% per year).
Conclusions: Although larger prospective trials are needed, these results support the fact that lipofilling following breast cancer treatment leads to a very low rate of complications and similar to other authors, it does not seem to interfere in patient's oncological prognosis when compared with prior publications.

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Introduction

The autologous fat graft or lipofilling technique is widely used in plastic surgery for breast remodeling. However, concerns have been raised regarding the potential oncologic risks of these procedures. Cells could express protumorigenic factors, stem cells transform within the graft or even this new tissue compromise our ability to detect breast disease.[1] A number of new techniques of fat preparation have been described with the ultimate goal of improving adipocyte purification and stem cell selection.[2–4] The intentional placement of regenerating tissue at the site of a previous tumor bed, inevitably, raises questions regarding the possibility of promoting a cancer recurrence. In experimental *in-vitro* and animal studies, adipocytes and white adipose tissue progenitors are able to produce different growth factors involved in tumorigenesis.[5–7] They could act on cancer cell cycle through autocrine, paracrine, and exocrine/endocrine secretions promoting tumor progression and in some particular stages may even have inhibitory effect.[8–12]

In 2007, the French Society of Plastic Surgery sent a recommendation to postpone lipofilling in the breast with or without breast cancer history unless it is carried out under prospective controlled protocol.[13] Also the American Society of Plastic Surgeons had set up a task force in 2009 to assess indications, safety and efficacy of autologous fat grafting. They could not give definitive recommendations concerning the cancer risk based on a the limited number of studies available.[14] The Italian Society of Plastic Surgery in 2010 advised surgeons to perform lipofilling with caution and with a precise consent form but did not impose any restrictions regarding lipotransfer indications.[15]

A recent systematic review by Krastev et al.[16] concluded that only 9 articles out of 269 mentioned an oncologic follow-up but only one had a match-controlled group, with no significant differences in loco-regional recurrence (LRR) incidence rates between both groups.[17] However, lipofilling group resulted at higher risk of recurrence when the analysis was limited to intraepithelial neoplasia.[18] Following this pathway, the aim of our study was to analyze the oncologic outcome of lipofilling procedures in terms of LRR in patients with breast cancer at our institution.

Patients and methods

From January 2007 to December 2014, all patients who underwent autologous fat grafting for reconstructive purposes after surgical removal of breast cancer at Barcelona Clinic Hospital were included. Both carcinoma in situ and invasive carcinoma were included. Phylloid cancer and other sarcomas were excluded. Clinical history, tumor histopathology, staging (TNM classification), chemotherapy, radiation, hormonal treatment, oncological surgery, type of reconstruction, volume of fat transfer, number of procedures and complications were registered. The oncologic screening was performed by clinical evaluation, mammogram every year after primary surgery associated with breast ultrasound or magnetic resonance imaging when needed. Recurrences were classified into local, regional and distant. Recurrence in breast tissue and breast skin was categorized as local recurrence (LR). Axillary, infraclavicular, and internal mammary nodal recurrences were categorized as regional recurrence (RR). Loco-regional recurrence (LRR) refers to the cumulative number of them. The analyses of data were considering the last date of oncologic surgery performed (mastectomy or breast conservative treatment) to achieve disease-free margins before reconstruction.

Lipofilling technique

The procedure was performed under local or general anesthesia, depending on quantities of fat required and patient's clinical conditions. Donor sites (abdomen, flanks, inner knee, and external side of the thigh) were examined to identify the fat deposits and marked. Tumescence included 1 L of 0.9% normal saline with adrenaline (1:1,000,000). Harvesting was performed by conventional lipoaspiration with 3 mm cannulas. Fat was aspirated at 40 kPa to minimize adipocyte damage with a vacuum pump through an intermediary 400 ml modified drainage bottle as fat storage.[19] Then fat was washed with saline solution and centrifuged at 2000 rpm (400 G) for 2 min to obtain purified fat. The cellular component with no additional cell enhancement was transferred to 10 ml syringes and injected with 1.9 mm blunt cannulas through several punctures around the breast area where filling was required.

Statistical analysis

The primary outcome was the LRR of breast cancer. The location of the first relapse was used for analysis purposes (any distant recurrence detected simultaneously with a LRR was counted as a LRR). The Kaplan–Meier and Log–Rank test was used for estimated progression-free survival curves. Differences were considered statistically significant if the p value was <0.05. All analyses were carried out with SPSS 20 (IBM SPSS Statistics for Mac, Version 20.0. Armonk, NY: IBM Corp.). In case of no events, the observation was censored at the last follow-up visit.

Results

We reviewed 319 lipofilling procedures from 195 patients. The median age and BMI at the time of the first lipofilling