Radiographic Findings after Breast Augmentation by Autologous Fat Transfer

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Background: Fat transfer to healthy breasts, that is, in women with no history of breast disease, particularly breast cancer, is becoming increasingly popular. The main issue remains whether the transfer of fat cells to the native breast hampers breast imaging. This pilot study aimed to assess the effectiveness of radiographic evaluation after breast lipomodeling and to propose objective elements for the detection of mammographic signs, and for postoperative evaluation of breast density and Breast Imaging Reporting and Data System (American College of Radiology) classification.

Methods: The authors retrospectively reviewed the radiographic findings of patients undergoing breast lipomodeling between 2000 and 2008. A descriptive semiologic analysis was conducted. Then, the authors compared breast tissue density and Breast Imaging Reporting and Data System categorization in 20 patients with preoperative and postoperative images available for review.

Results: The descriptive analysis identified 16 percent of mammograms with microcalcifications, 9 percent with macrocalcifications, 25 percent with clear well-focused images of cystic lesions, and 12 percent with tissue remodeling. The comparative study showed no statistically significant difference between breast density findings before and after fat injection, whether using the American College of Radiology classification or a personalized rating system. Similarly, no significant difference was observed using the American College of Radiology Breast Imaging Reporting and Data System categorization before and after fat grafting.

Conclusions: Radiographic follow-up of breasts treated with fat grafting is not problematic and should not be a hindrance to the procedure. However, the authors' preliminary results should be confirmed in larger series, and the radiographic follow-up of women undergoing breast lipomodeling should be standardized to ensure reproducibility and improve patient safety. (*Plast. Reconstr. Surg.* 127: 1289, 2011.)

Lipofilling or fat tissue transfer to the breast has been a taboo[1–3] ever since the American Society of Plastic and Reconstructive Surgeons banned the technique in 1987, in response to the controversy started by the publication of Bircoll's results.[4,5] In 1998, our group decided to develop a research program aimed at assessing the technique in breast. We adapted lipomodeling first to breast reconstruction and then to several other indications of aesthetic breast surgery.[2] We chose to name the technique "lipomodeling," from the Greek root *lipo*, meaning "fat," and the Latin word *modello*, meaning "give shape." We consider this naming closer to what we do during this specific procedure.

Based on the encouraging results obtained in breast reconstruction,[6–8] we started using lipomodeling in healthy breasts, which is in women with no history of breast disease. The main concerns with the technique remained the alleged complexity of radiographic follow-up of the treated breasts.

This study describes the radiographic changes in breasts after lipomodeling. The description is

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based on the American College of Radiology Breast Imaging Reporting and Data System classification used before and after the procedures.[1,2] The aim of our study is to determine whether the transfer of fat tissue to the native breast hampered breast imaging and follow-up.

PATIENTS AND METHODS

The study was conducted at the cancer institute of Lyon, France, with the approval of the institutional review board. All patients had received information on the surgical procedure[3] and had signed a consent form before undergoing fat grafting. A retrospective study of 76 women undergoing breast lipomodeling in native breast was conducted between 2000 and 2008. Selected patients were informed of the study, and accepted to participate, by telephone or at follow-up visits. Mean age at inclusion in the study was 38.16 ± 17.3 years, with a mean body mass index of 22.49 ± 3.06. Four major indications were chosen: breast augmentation without implant (two cases), Poland syndrome (15 cases), tuberous breast (17 cases), and combination with mastopexy (42 cases). All patients were operated on by the senior author (E.D.).

The inclusion criteria were patients undergoing lipomodeling to the breast for the previously cited indications with postoperative mammograms and at least 1-year follow-up. Exclusion criteria were patients with less than 1-year follow-up or those for whom postoperative mammograms were missing, either because they had not yet been taken or because the patient had been followed outside the hospital and images were not available (Table 1).

Fat tissue was collected and prepared using the standard procedure described by Coleman, with only minor variations.[9] Then, fat tissue was injected in multiple layers and multiple directions, from deep to superficial areas and from retropectoral to subcutaneous tissues, following a tridimensional grid pattern. When lipomodeling was combined with mastopexy, injections were made to the upper inner quadrant of the breast to achieve fullness in the cleavage area. A total of 113 procedures were performed in 76 patients, with an average of 1.37 ± 0.63 procedures per patient.

Table 1. Inclusion Criteria for Descriptive Radiographic Study

	No. of Patients
Patients included	31
Patients followed outside the hospital	25
Mammograms <1 yr	13
Postoperative mammogram not yet available	7
Total	76

Descriptive Analysis

Thirty-one postoperative mammograms were reviewed for identification of areas of fat necrosis and microcalcifications or macrocalcifications. The 31 mammograms were divided into one patient undergoing cosmetic breast augmentation, four for correction of Poland syndrome, five for correction of tuberous breasts, and 21 in combination with mastopexy (Table 2). A detailed description of specific semiologic patterns associated with breast lipomodeling has already been published.[10]

Comparative Study

We compared breast density and American College of Radiology Breast Imaging Reporting and Data System II classification in 20 patients before and after breast lipomodeling (a total of 40 mammograms). All mammograms were reviewed in pretreatment/posttreatment pairs by an experienced breast radiologist blinded to which images had been taken before or after treatment. The date of the mammogram and the type of associated procedure were scratched out to avoid biases. Of these 20 patients, one had undergone cosmetic breast augmentation, one had undergone correction of Poland syndrome, and 18 had undergone a combination of lipomodeling and mastopexy (Table 3).

Mammograms were assessed using the American College of Radiology Breast Imaging Reporting and Data System II classification.[11] Standard mammographic reports classified the lesions into four categories, American College of Radiology categories 1, 2, 3, and 4, following the recommendations of the American College of Radiology. Breast density was measured using the international American College of Radiology index. However, given the subjective and vague nature of this criterion, we applied a more complex personalized scale in which each American College of Radiology category was divided into three sublevels to account for variations within each category. For instance, American College of Radiology category 2 tissue masses (density, 25 to 50 percent) could be noted 2.25 (corresponding to 25 to 33 percent density), 2.5 (between 34 and 42 percent), or 2.75

Table 2. Clinical Characteristics of the 31 Patients Included in the Descriptive Radiographic Study

Breast No.	Age (yr)	BMI	Volume Injected (cm³)	Type of Surgery	No. of Courses
21	17	26.7	100 + 340	ST III R	2
25	22	21.3	265 + 320 + 270	POL III R	3
28	29	20.3	260 + 350 + 157	POL II R	3
29	20	21.7	227 + 200	POL I L	2
30	24	21.5	276 + 245	POL I R	2
37	51	20.6	150	PEXY + LIPO L	1
38	62	20.7	150	PEXY + LIPO R	1
39	62	20.7	60	PEXY + LIPO L	1
42	57	21.7	32	PEXY + LIPO L	1
48	52		60	PEXY + LIPO L	1
51	51	26	65	PEXY + LIPO L	1
52	63	23.6	90	PEXY + LIPO R	1
54	27	20.4	144 + 317	ST II R	2
58	59		48	PEXY + LIPO L	1
59	60		25	PEXY + LIPO L	1
61	51	23	22	PEXY + LIPO R	1
63	55	22.6	40	PEXY + LIPO L	1
64	46	20.7	158	PEXY + LIPO R	1
66	20	20.4	100	ST III R	1
67	20	20.4	100	ST III L	1
68	64	23.8	120	PEXY + LIPO L	1
69	50	18.9	54	PEXY + LIPO L	1
70	20	25.3	300 + 140	ST II R	2
72	64	27.7	50	PEXY + LIPO L	1
73	28	18	113	PEXY + LIPO R	1
74	55	29.3	80	PEXY + LIPO L	1
75	48	26.5	70	PEXY + LIPO L	1
78	44	22.3	71	AA L	1
79	50	26.2	30	PEXY + LIPO R	1
80	51	22.5	100	PEXY + LIPO L	1
81	48	20.2	130	PEXY + LIPO L	1
82	53	20.1	210	PEXY + LIPO L	1
86	48	18.9	126	PEXY + LIPO R	1

BMI, body mass index; ST, tuberous breast; POL, Poland syndrome; LIPO, lipomodeling; AA, aesthetic breast augmentation; PEXY, mastopexy; R, right; L, left.

Table 3. Clinical Series of 20 Patients Included in Comparative Radiographic Study

Breast No.	Age (yr)	BMI	Volume Injected (cm³)	Type of Surgery	No. of Courses
28	19	20.3	260 + 350 + 157	POL II R	3
37	51	22.5	150	PEXY + LIPO L	1
38	62	20.7	150	PEXY + LIPO R	1
39	62	20.7	60	PEXY + LIPO L	1
42	57	21.8	32	PEXY + LIPO L	1
58	59	—	48	PEXY + LIPO L	1
59	60	—	25	PEXY + LIPO L	1
61	51	23	22	PEXY + LIPO R	1
62	53	23	110	PEXY + LIPO L	1
64	46	20.7	158	PEXY + LIPO R	1
68	64	23.8	120	PEXY + LIPO L	1
69	50	18.9	54	PEXY + LIPO L	1
72	50	27.7	50	PEXY + LIPO L	1
75	48	26.5	70	PEXY + LIPO L	1
78	44	22.2	71	AA L	1
79	50	26.2	30	PEXY + LIPO R	1
81	48	20.3	130	PEXY + LIPO L	1
82	53	20.2	210	PEXY + LIPO L	1
83	54	22.4	20	PEXY + LIPO L	1
84	57	32.7	20	PEXY + LIPO R	1

BMI, body mass index; POL, Poland syndrome; LIPO, lipomodeling; AA, aesthetic breast augmentation; PEXY, mastopexy; R, right; L, left.

(between 43 and 50 percent) by the radiologist, thus allowing more accurate assessment of the breasts. Two hypotheses were tested in this study: the existence of a significant difference between prelipomodeling and postlipomodeling breast density, and the existence of a significant difference in American College of Radiology ratings before and after breast lipomodeling.

Statistical Analysis

The median S1 and S2 populations (S1, prelipomodeling data; S2, postlipomodeling data) were compared using Wilcoxon's test and a Wilcoxon's signed rank test, a nonparametric test for comparing continuous variables in small paired samples ($n < 30$), and a significance level of 0.05 (or $p < 0.05$).

RESULTS

Descriptive Analysis

Thirty-one postlipomodeling mammograms were available for analysis, with a median radiographic follow-up period of 16.2 ± 13.5 months. An average of 200.8 ± 64.8 cc of fat was injected into each breast. Most patients had one injection per breast; only three had two injections for the correction of tuberous breasts, and four had two or even three injections for correction of Poland syndrome.

In 17 cases (54 percent), we found no radiographic abnormality. Microcalcifications were visible on five mammograms (16 percent). These small (<2 mm), round deposits were either isolated or associated with small, pale fat nodules, and were presumably calcified remnants of necrotic fat cells. They were classified as benign (Breast Imaging Reporting and Data System II) in conformity with the criteria of Le Gal et al.[10] Macrocalcifications were found in three of the 31 cases (9 percent), and eight mammograms showed clear, well-focused images of cystic lesions. These small, homogeneous fatty lesions were surrounded by a thin, dense cell layer and sometimes were associated with wall calcifications. They likely indicated fatty cysts, a feature typical of areas of fat necrosis on ultrasound images. These lesions were also classified as benign (Breast Imaging Reporting and Data System II) (Fig. 1).

Finally, four mammograms (12 percent) showed radiographic signs of architectural distortion characterized by well-circumscribed nonconfluent areas of variable tissue density, with thick parenchymatous zones of scar tissue (Fig. 2). All were seen in patients undergoing fat injection combined with mastopexy and occurred in the area of the mastopexy scar, as seen on the front-view mammogram in Figure 2, *left*.

Comparative Study

Forty breast mammograms, 20 images taken before and 20 taken after lipomodeling, were collected for the study. An average of 90 ± 65.2 cc of fat was injected into each breast. Nearly all patients had only one injection per breast; only one had three injections for treatment of Poland syndrome. Pairs were compared using the Wilcoxon test. Regarding breast tissue density, the analysis revealed no significant difference before and after lipomodeling, whether using the international American College of Radiology classification (*Wilcoxon,* $W = 200$ and $p = 1$; thus, $p > 0.05$) or a revised personalized rating system (*Wilcoxon* $W = 195.5$ and $p = 0.911$; thus, $p > 0.05$; signed rank test, $p = 0.8438$) (Table 4). The same method was used to compare American College of Radiology classifications (Breast Imaging Reporting and Data System II) before and after the procedure (Table 5).

Based on mammographic images taken before lipomodeling, 35 percent of the patients were classified as American College of Radiology category 1, 60 percent were classified as American College of Radiology category 2, and 5 percent were classified as American College of Radiology category 3. After the procedure, 35 percent were classified as American College of Radiology category 1 and 65 percent were classified as American College of Radiology category 2. The comparison showed no statistically significant difference between prelipomodeling and postlipomodeling results (*Wilcoxon* $W = 200$, $p = 1$; thus, $p > 0.05$; signed rank test, $p = 1$).

DISCUSSION

Very few studies have systematically and comprehensively addressed the radiographic outcome of fat grafting to the breast, as previously performed in women undergoing complete breast reconstruction or partial surgical reconstruction after breast cancer conservative surgery.[6–12] Published studies reporting signs of fat necrosis are mainly case reports and give little information on the procedure. In particular, we know that the experience of the surgeon with the technique is essential.[2] In that regard, the series published by Carvajal and Patino[13] seems to be the only methodologically sound study in the literature.

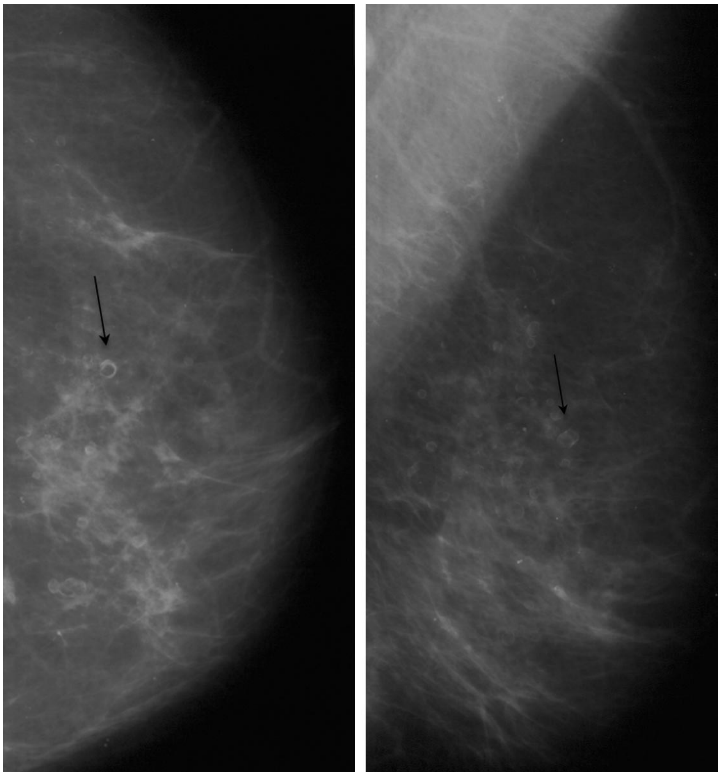

Fig. 1. (*Left*) Mammogram obtained at 1 year after lipomodeling (front view), showing well-defined "soap bubble–like" calcified lesions characteristic of fat necrosis. (*Right*) Mammogram obtained at 1 year after lipomodeling (oblique view), with the same soap bubble–like calcified lesions.

Our study is based on strict mammographic analysis and provides valuable information. First, some new post–fat grafting radiographic signs were visible in slightly less than 50 percent of the mammograms studied. Second, overall breast density remained stable over time, with some limited areas of lower density. Third and most importantly, radiographic follow-up was not more difficult after lipomodeling while respecting the procedure, and should no longer be a hindrance to the procedure when using a stable international American College of Radiology classification (Breast Imaging Reporting and Data System II) for breast cancer imaging.

The development of microcalcifications remains poorly understood.[14–18] Results of the descriptive radiographic study show the presence of microcalcifications in 16 percent of the 31 postoperative mammograms analyzed, in agreement with the average 17 percent reported in the literature.[13,14,19–21] Carvajal and Patino[13] found that 45 percent of the 20 mammograms included in their series contained microcalcifications. All were considered benign and stable over time, with 85 percent of the images classified as American College of Radiology category 2; the other 15 percent were initially classified as American College of Radiology category 3 but were rated American College of Radiology category 2 after 1 year. Even if the risk of missing a diagnosis of breast cancer has never been associated with breast surgery in general, the use of fat grafting has been controversial for many years, ever since the debate around the publication of Bircoll's results in 1987.[4,5] However, with the use of modern radiographic techniques, particularly magnetic resonance imaging–guided vacuum-assisted core biopsies if there is any doubt, radiologists can now easily distinguish between calcifications resulting from fat necrosis and those associated with cancer.[22]

Large areas of fat necrosis can be prevented by injecting small aliquots of fat in multiple layers and multiple directions, and by avoiding saturation of the recipient tissues with injected fat.[2,23] When this complication occurs, it is considered a sign of technical weakness,[24] probably caused by

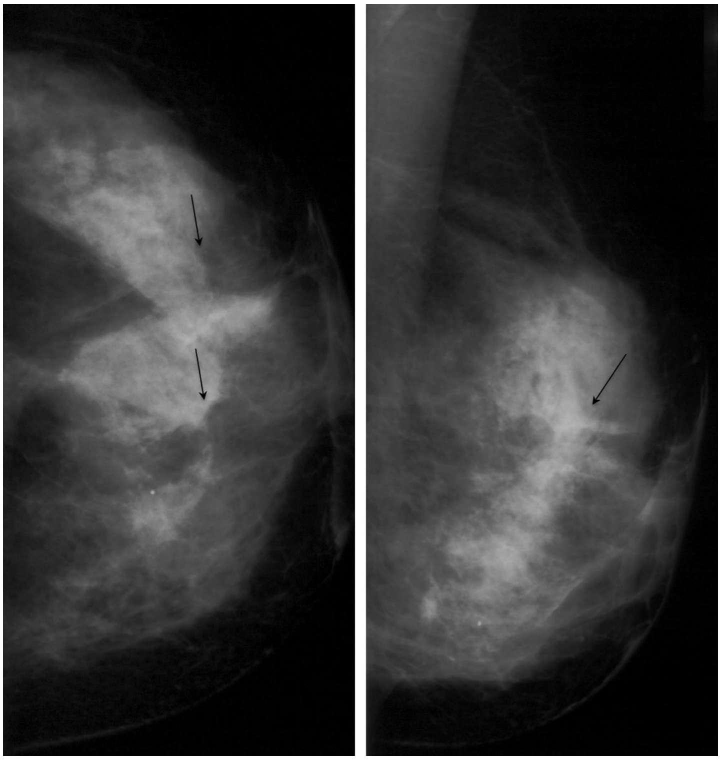

Fig. 2. (*Left*) Mammogram obtained at 1 year after lipomodeling and mastopexy (front view), showing structural abnormality classified as American College of Radiology category 0 in the area of the mastopexy scar. (*Right*) Mammogram obtained at 1 year after lipomodeling and mastopexy (oblique view), with the same structural abnormality in the area of the mastopexy scar.

Table 4. Comparative Study of Breast Density before and after Lipomodeling*

Breast No.	BMI	Volume Injected (cm^3)	Type of Surgery	Preoperative Density	Postoperative Density
28	20.3	260 + 350 + 157	POL II R	2.25	2.25
37	22.5	150	PEXY + LIPO L	3.5	3.5
38	20.7	150	PEXY + LIPO R	4.5	4.5
39	20.7	60	PEXY + LIPO L	4.5	4.5
42	21.8	32	PEXY + LIPO L	2.75	2.25
58	—	48	PEXY + LIPO L	2.5	2.5
59	—	25	PEXY + LIPO L	3.75	3.25
61	23	22	PEXY + LIPO R	2.25	2.75
62	23	110	PEXY + LIPO L	2.5	2.5
64	20.7	158	PEXY + LIPO R	3.5	3.5
68	23.8	120	PEXY + LIPO L	2.5	2.5
69	18.9	54	PEXY + LIPO L	2.25	2.75
72	27.7	50	PEXY + LIPO L	2.5	2.5
75	26.5	70	PEXY + LIPO L	2.5	2.5
78	22.2	71	AA L	3.25	3.25
79	26.2	30	PEXY + LIPO R	2.5	2.5
81	20.3	130	PEXY + LIPO L	3.25	3.75
82	20.2	210	PEXY + LIPO L	3.5	3.5
83	22.4	20	PEXY + LIPO L	2.5	2.25
84	32.7	20	PEXY + LIPO R	2.5	2.5

BMI, body mass index; POL, Poland syndrome; LIPO, lipomodeling; AA, aesthetic breast augmentation; PEXY, mastopexy; R, right; L, left.
*According to a revised personalized rating system.

Table 5. Comparative Study of Breast American College of Radiology Classifications (Breast Imaging Reporting and Data System II) before and after Lipomodeling

Breast No.	BMI	Volume Injected (cm^3)	Type of Surgery	Preoperative ACR Category	Postoperative ACR Category
28	20.3	260 + 350 + 157	POL II R	1	1
37	22.5	150	PEXY + LIPO L	3	2
38	20.7	150	PEXY + LIPO R	2	2
39	20.7	60	PEXY + LIPO L	2	2
42	21.8	32	PEXY + LIPO L	2	2
58	—	48	PEXY + LIPO L	2	2
59	—	25	PEXY + LIPO L	1	1
61	23	22	PEXY + LIPO R	1	1
62	23	110	PEXY + LIPO L	2	2
64	20.7	158	PEXY + LIPO R	2	2
68	23.8	120	PEXY + LIPO L	2	2
69	18.9	54	PEXY + LIPO L	1	1
72	27.7	50	PEXY + LIPO L	1	1
75	26.5	70	PEXY + LIPO L	1	1
78	22.2	71	AA L	2	2
79	26.2	30	PEXY + LIPO R	2	2
81	20.3	130	PEXY + LIPO L	2	2
82	20.2	210	PEXY + LIPO L	2	2
83	22.4	20	PEXY + LIPO L	1	1
84	32.7	20	PEXY + LIPO R	2	2

BMI, body mass index; ACR, American College of Radiology; POL, Poland syndrome; LIPO, lipomodeling; AA, aesthetic breast augmentation; PEXY, mastopexy; R, right; L, left.

nonobservance of the prescribed procedures.[8,25,26] In our series, radiographic modifications indicative of fat necrosis (microcalcifications and macrocalcifications) were observed in 25 percent of the mammograms. In the series published by Carvajal and Patino,[13] 20 percent of the patients had uncalcified and 20 percent had calcified liponecrotic cysts.

The radiographic presentation of liponecrotic "oil cysts" varies with time. First, they appear as solid nodes detectable by ultrasound examination but not by mammography. A few months later, oil cysts become visible, particularly on mammograms. Imaging may also reveal multiple, mainly infracentimetric nodes. Then, the thin cystic envelope may progressively thicken and calcify. Lumps of necrotic fat turn into calcifications: either round, well-defined microcalcifications developing in the vicinity of cysts, or lucent-centered macrocalcifications rated American College of Radiology category 2 when they develop from infracentimetric nodes.[22] Analysis of postlipomodeling mammograms requires a thorough knowledge of these variations with time. Furthermore, the occurrence of new fatty lumps may not be directly attributable to lipomodeling, even in treated patients. Fat-grafted breasts, just as any "normal" breasts, consist of ever-changing living tissues and may spontaneously develop calcifications or any other type of lesion. Fat necrosis, like microcalcifications, may be diagnosed after any type of breast surgery.[15–27] However, the only specific characteristic of postlipomodeling tissues is thus the occurrence of multiple small scattered areas of fat necrosis, namely, soap bubble–like, well-defined calcified lesions with thin contour lines (Fig. 1). All of the calcifications observed were categorized by radiologists as American College of Radiology category 2: either full, round, solid masses or round, well-circumscribed, bubble-like lesions.

Interpretation of radiographic findings was found to be easy in all the mammograms studied. The cases of architectural distortion observed in patients undergoing fat injection combined with mastopexy did not complicate radiographic examination, except in one case described in Figure 3. In this patient, discrimination between simple architectural distortion and an evolving malignant lesion was difficult on the basis of the front-view mammogram, but a simple complementary test (centered and focused mammogram and ultrasound) easily confirmed the American College of Radiology category 2 classification. We thus observed that, in a few cases, combined mastopexy and lipomodeling could render the interpretation of radiographic findings more difficult.

No image of a mass histologically consistent with an inflammatory granuloma or giant cytosteatonecrosis was visible on our patients' mammograms. All calcifications were typically benign, and suspicious images were recorded. However, in case of suspicion, as described in Figure 3, complementary radiographic imaging should be performed to obtain a more precise classification of

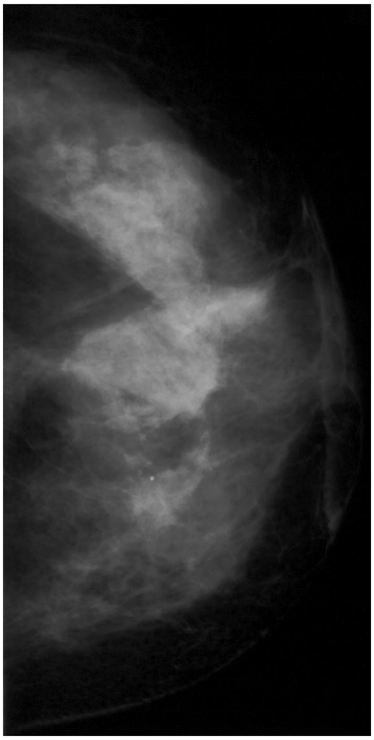

Fig. 3. Radiographic signs of "architectural distortion" in a breast with lipomodeling following mastopexy rated American College of Radiology category 2 after simple complementary radiographic imaging (centered and focused mammogram and ultrasound).

the lesion either as American College of Radiology category 2 or, on the contrary, as a suspicious abnormality (American College of Radiology category 4), in which case a microbiopsy or macrobiopsy should be considered.

Results of the comparative radiographic study show that breast density remains stable over time, with some limited areas of lower density. Breast density is calculated as the ratio of the mammary gland to the surrounding fat tissues. The scientific literature has clearly demonstrated that increased breast density is associated with a lower sensitivity[28–34] and a lower specificity[35–37] of mammographic screening. In addition, high breast density is a major risk factor for breast cancer, especially for interval cancers, as confirmed by a meta-analysis of 42 studies.[38] Our results obtained in women before or after lipomodeling have shown no statistically significant difference in breast density. However, fat transfer to the breast is sometimes associated with the presence of brighter areas on postoperative mammograms (Fig. 4).

These low-density areas are not necessarily homogeneous and do not impact American College of Radiology breast density rating. In contrast, small breast density variations within a given American College of Radiology category (e.g., from 30 percent to 48 percent) provide valuable information about the risk of cancer. To better assess these changes, we have divided each American College of Radiology group into three subcategories according to variations of breast density in each category. We observed six partial variations of breast density within the same American College of Radiology category, but this did not significantly impact the final results. Interestingly, the average volume of fat tissue grafted to the 20 patients included in the comparative series was 90 $\pm$ 65.8 cm^3, which is relatively low when compared with the total volume of fat in the breast. As this difference might significantly influence outcome in women undergoing major breast lipomodeling, more precise data should be obtained and compared in subsequent studies.

A major contribution of this work is the absence of difference between American College of Radiology Breast Imaging Reporting and Data System II evaluation before and after lipomodeling. We observed that the interpretation of mammograms obtained after the procedure is easy and effective, without ambiguity. Our findings are in agreement with results reported by Carvajal and Patino,[13] with 85 percent of postoperative mammograms classified American College of Radiology category 2, whereas the other 15 percent initially classified as American College of Radiology category 3 were categorized as stable and rated American College of Radiology category 2 after 1 year. A major finding of our comparative radiographic study is that the American College of Radiology rating is stable over the period of observation, whether before or after lipomodeling.

We acknowledge some weaknesses in the present study. First, because of the difficulty of obtaining preoperative images, the study sample was relatively small, as also reported by Carvajal and Patino.[13] Second, one cannot rule out a bias in the interpretation of mammograms because they were taken by different mammography systems with different image quality. Third, most patients in our series also underwent mastopexy, which represents two procedures on each breast. This could render the interpretation of radiographic findings in a few cases more difficult. However, fat grafting was principally performed in the cleavage area, and all mammograms were reviewed by a radiologist blinded to the type of surgery associated with the procedure.

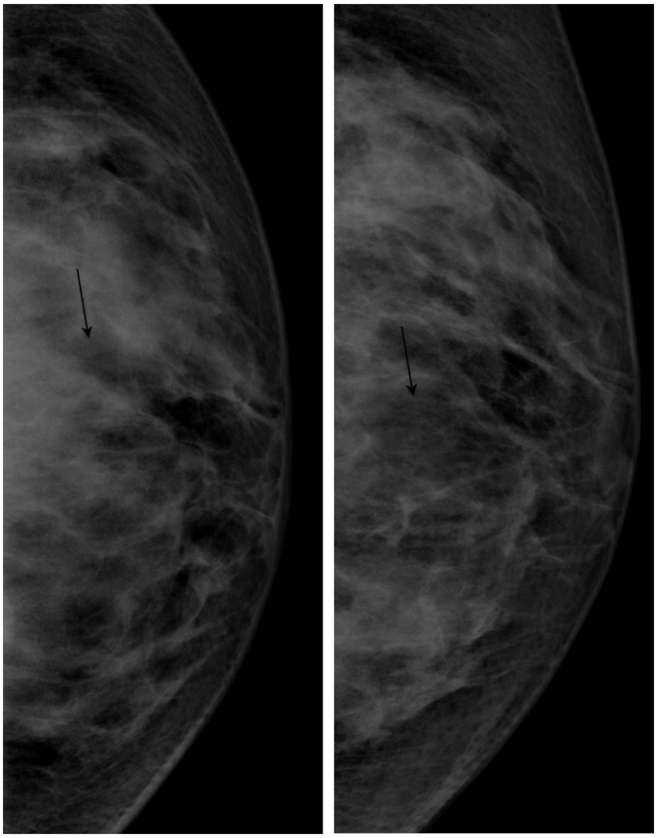

Fig. 4. (*Left*) Mammogram of the left breast, density American College of Radiology category 3 corrected to 3.75, with compact mammary gland areas. (*Right*) Mammogram, density American College of Radiology category 3, with numerous compact mammary gland areas at 1 year after lipomodeling, possibly corresponding to decreased density, from American College of Radiology category 3 to category 2.5 or 2.

Consequently, it appears crucial for radiologists to acquire specific knowledge of lipomodeling. A trained breast radiologist is a radiologist with extensive expertise in breast imaging and knowledge of tissue changes following the injection of fat cells. He or she must be able to identify areas of fat necrosis on mammograms and to monitor the evolution of these images over time. He or she must be able to identify tissue abnormalities and to confirm the examination results with complementary radiographic tests or a biopsy. To acquire and develop this competence, breast radiologists must maintain continuing medical education requirements through exchanges with peers and experts. For instance, a specific meeting on postlipomodeling breast imaging (Breast Imaging and Plastic Surgery) is held every year in Lyon, France. A strong collaboration of breast radiologists and surgeons is the only way to avoid alarmist falsehoods regarding postoperative radiographic aspects of lipomodeling, as documented in a previous article.[39]

A complete preoperative workup including ultrasound and mammographic imaging should be proposed to all patients older than 17 years. Then, between 6 and 12 months after surgery, a baseline workup should be performed by the same radiologist, using the same procedure. If the results of the preoperative workup are negative, any abnormality observed during this immediate postoperative period would be related to the surgery and not to underlying malignant disease. Long-term follow-up should remain tailored to the age and the risk factors of the patients.

CONCLUSIONS

Our work demonstrates that lipomodeling does not seem to affect the radiographic follow-up of the patients. Although some new radiographic images were visible in slightly less than 50 percent of the mammograms studied, we confirm that postoperative evaluation is effective and accurate when performed by a skilled breast radiologist. Overall breast density remains stable over time, with some limited areas of lower density. Radiographic follow-up of breasts treated with fat grafting is not problematic and should not be a hindrance to the procedure. However, these preliminary results should be confirmed in larger series, and the radiographic follow-up of women undergoing breast lipomodeling should be standardized to ensure reproducibility and improve patient safety.

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