

The Use of Lipofilling to Treat Congenital Hypoplastic Breast Anomalies

Preliminary Experiences

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Background: Treatment options for congenital hypoplastic breast anomalies are often open, including radial scoring, parenchymal flaps, and insertion of expanders and implants. Drawbacks of open techniques involve scarring, the use of drains, and inpatient stays. The use of lipofilling to treat breast deformities is increasing, as more research is completed in this area.

Patients and Methods: We report a retrospective study of 10 patients below the age of 20 following autologous fat transfer between January 1, 2003 and January 1, 2004. (2 Poland syndrome, 3 bilateral tuberous breast, and 5 unilateral micromastia). Age, cup size, the number of sessions, time interval between each session, volumes injected, and complications were recorded. Postoperative mammography, ultrasonography, and MRI were assessed by a specialized radiologist. Patients answered a questionnaire 1 year after the procedure.

Results: Mean follow-up was 68 months (60–77 months) and mean age was 17.5 years (15–20 years). Mean number of fat injection sessions was 2 (1–4) and mean volume injected 285 mL per breast (200–500 mL). The time interval between each session was 5 months (3–6 months). Cup size remained unchanged after at least 5 years of follow-up. One case underwent a contralateral breast reduction. The cosmetic results considered satisfactory in almost all the patients after 1 year of follow-up. None of our patients complained of scars or defects at the donor site. All breasts imaging were normal except 1 patient with oil cysts.

Conclusion: Our preliminary results using lipofilling to treat young patients with breast hypoplasia with lipofilling are very encouraging. The authors believe it is an alternative of choice for the correction of the young female's breast deformities if the avoidance of scarring is preferred.

Key Words: Poland syndrome, tuberous breasts, congenital micromastia, fat grafting, lipofilling, autologous fat transfer, breast implants, breast imaging

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BACKGROUND

Congenital hypoplastic breast disorders including micromastia, tuberous breast, and Poland syndrome are characterized by breast tissue paucity and parenchymal maldistribution, with or without nipple areolar complex anomalies. Micromastia is defined as post-pubertal immaturity and abnormal smallness of the breast with a cup size smaller than A. Tuberous breast is characterized by breast hypoplasia, including a deficiency in base diameter, breast tissue herniation into the areola, deficient skin envelope, and elevation of the

inframammary fold. Poland syndrome is characterized by partial or complete absence of the pectoralis major muscle and hypoplastic or absent adjacent musculoskeletal components. These anomalies often require staged augmentation procedures.

Young women with severe breast anomalies often suffer from social anxiety, depression, peer rejection, psychosexual dysfunction, and low self-esteem. They are less likely to date or participate in school activities resulting in a significant impact on their social life, and psychosocial development can be significantly retarded.¹ A large variety of surgical correction techniques can be used such as the use of breast prostheses,² reconstruction by skin expansion, use of a pedicled latissimus dorsi flap,³ omentum flap,⁴ microsurgical transfer of a deep inferior epigastric (DIEP) flap,⁵ or lipofilling.⁶

PATIENTS AND METHODS

Patient Selection

From January 1, 2003 to January 1, 2004, the authors performed breast augmentation by fat grafting on n = 10 patients (13 breasts) with congenital hypoplastic breast anomalies (2 patients with severe Poland syndrome, 3 patients with bilateral tuberous breast deformity, and 5 patients with unilateral micromastia).

These patients were selected according to 4 criteria:

- Females younger than 20 years of age
- Negative personal and family history of breast cancer in first-degree relative
- ASA I (American Society of Anesthesiologists)
- Sufficient fat deposits in the donor sites.

Preoperative Care

Patients were informed of the advantages and drawbacks of the technique, its complications, and potential risks. After a thorough breast examination was performed, an informed consent form discussing potential complications of fat grafting into the breast was signed. They also consented for postoperative imaging. All the patients were screened for breast parenchymal anomalies with preoperative ultrasonograms. Preoperative photographs were taken. We asked our patients to maintain a stable weight during the follow-up.

Surgical Technique

Under general anesthesia, patients were marked in the standing position. Donor areas used were abdomen, trochanter area, inner thighs, inner knees, and sometimes the lumbar region depending on the distribution of adipose tissue and the patient's wishes for removal. The "superwet" infiltration with a saline solution containing epinephrine was used. Harvesting was performed by conventional lipoaspiration with 3-mm cannulas. These cannulas were attached to a vacuum pump through the intermediary of a 1200-mL suction jar. Fat was aspirated at -0.5 atm to minimize adipocyte damage. After centrifugation (at a speed of 3000 rpm for 3 min) and refinement, the purified fat was injected using 10-mL

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TABLE 1. Patient Satisfaction

	Satisfied	Dissatisfied
Size	9	1
Shape	10	0
Symmetry	9	1

LuerLock syringes with 2-mm transfer cannulas through several incisions (inframammary fold and periareolar region). The aim was to create several microtunnels from the deep to the superficial plane until the desired contour was achieved. At the end of the procedure, the patients were placed in a semisitting position to refine the breast shape. Slight overcorrection was necessary in anticipation of fat resorption (expecting a 50% resorption rate).

Postoperative Follow-Up

All patients were followed in outpatient clinic 15 days, 3 months, 6 months, and 1 year postoperatively and yearly thereafter. A questionnaire was used to document patient satisfaction 12 months after the operation, along with an ultrasound and a single oblique view mammography of each breast to reduce the harmful exposure of the radiation. Photographs were taken during each follow-up visit. Imaging aspects of reconstructed breasts were comparatively evaluated with the contralateral nonreconstructed breast for the unilateral cases. Mammograms were evaluated according to the American College of Radiology (ACR) criteria by an expert mammography radiologist. MRI study of the breast were performed in all cases at 60 months, which was the last radiological examination performed. We measured the cup sizes at 12 and 60 months.

Satisfaction With the Breast Liposculpture

The questionnaire developed for this study to inquire about the patient’s satisfaction with their reconstructed breast was based on the size, shape, and symmetry of the reconstructed breast. This was presented in the form of a simple scale ranging from 1 (extremely dissatisfied) to 4 (extremely satisfied). For each scale, responses to aesthetic satisfaction were dichotomized into “satisfied” versus “dissatisfied”.

RESULTS

Ten female patients under the age of 20 were followed from 60 to 77 months, average 68 months following liposculpture. No patient was lost to follow-up. Mean age was 17.5 years (*r*, 15 to 20 years), mean number of injection sessions was 2 (*r*, 1–4), and

mean volume injected was 285 mL (*r*, 200–500 mL). Interval between reoperation was 5 months (*r*, 3–7 months). One case underwent a reduction mammoplasty of the contralateral breast, 6 months following the initial lipofilling procedure. Postoperative clinical examinations were normal in all cases and there were no postoperative infections. The inpatient stay was 24 hours for all the patients. Simple analgesics were sufficient to control mild to moderate postoperative pain at the donor site. None of the patients complained of irregularities and depressions in the donor areas. All 10 patients (13 breasts) were followed with postoperative mammography and ultrasonography. All the patients had a postoperative MRI study of the breast 60 months after the last surgical procedure. Twelve injected breasts mammography (92.3%) were ACR1 and only 1 breast (7.7%) was ACR2. Imaging abnormalities consisted only of 1 case of oil cysts which appeared as 3 well-defined, round lucent masses, surrounded by a thin fibrous membrane. These liponecrotic cysts had characteristically benign appearances in sonography, mammography, and MRI, were asymptomatic, and were less than 1 cm in their greatest diameter. No suspicious calcification was apparent on breast imaging. No biopsy or surgical exploration was performed. Cup sizes were stable between 12 and 60 months of follow-up; 1 patient lost 1 cup size of the reduced breast after having changed contraception, and her contralateral injected breast did not change volume.

The aesthetic results were “satisfactory” by most of the patients after 1 year of follow-up: 9 patients (90%) were satisfied by the size of the breast, all the patients (100%) were satisfied by the shape, and 9 (90%) were satisfied by the symmetry (Table 1).

Summary characteristics of the 10 cases are shown in Table 2.

Illustrated Cases

Case 1

A 19-year-old woman presented with a right severe Poland syndrome. The first lipofilling episode was 300 mL and the second, 5 months later, was another 300 mL to fill the subclavicular hollow and obtain a breast almost identical to the contralateral breast. Postoperative mammograms were ACR1. The patient was very pleased with the result (Fig. 1).

Case 2

A 19-year-old woman presented with a bilateral tuberous breast deformity. A total of 320 mL was placed in the right breast and 280 mL was placed in the left breast. She has had no complications postoperatively and has a good aesthetic result 61 months after the procedure. Postoperative mammograms were ACR1 (Fig. 2).

TABLE 2. Patients’ Characteristics

Patient	Age (y)	Indications	Number of Interventions	Time Interval (mo)	Mean Volume Injected (mL)	Bilateral Cases	Symmetrization	Mammographic Finding
1	19	Poland syndrome	2	5	300	No	No	ACR1
2	15.5	Micromastia	1	0	280	No	Yes	ACR1
3	15.5	Micromastia	2	6	290	No	No	ACR1
4	18	Micromastia	1	0	300	No	No	ACR1
5	19	Tuberous breasts	1	0	300	Yes	No	ACR1
6	17	Poland syndrome	3	4	200	No	No	ACR1
7	19	Micromastia	2	5	200	No	No	ACR1
8	17	Tuberous breasts	2	6	500	Yes	No	ACR1
9	19	Tuberous breasts	1	0	300	Yes	No	ACR1
10	16.5	Micromastia	2	4	250	No	No	ACR2 (oil cysts)

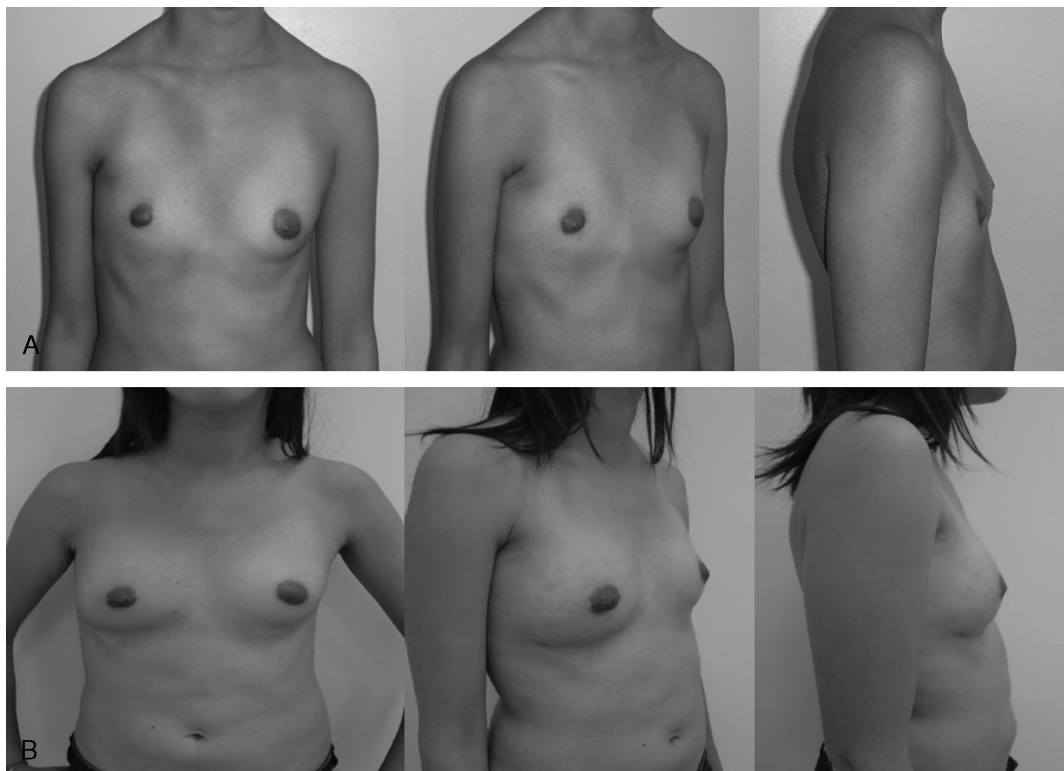


FIGURE 1. Preoperative photos (above). Photos 72 months after the second fat graft (below).

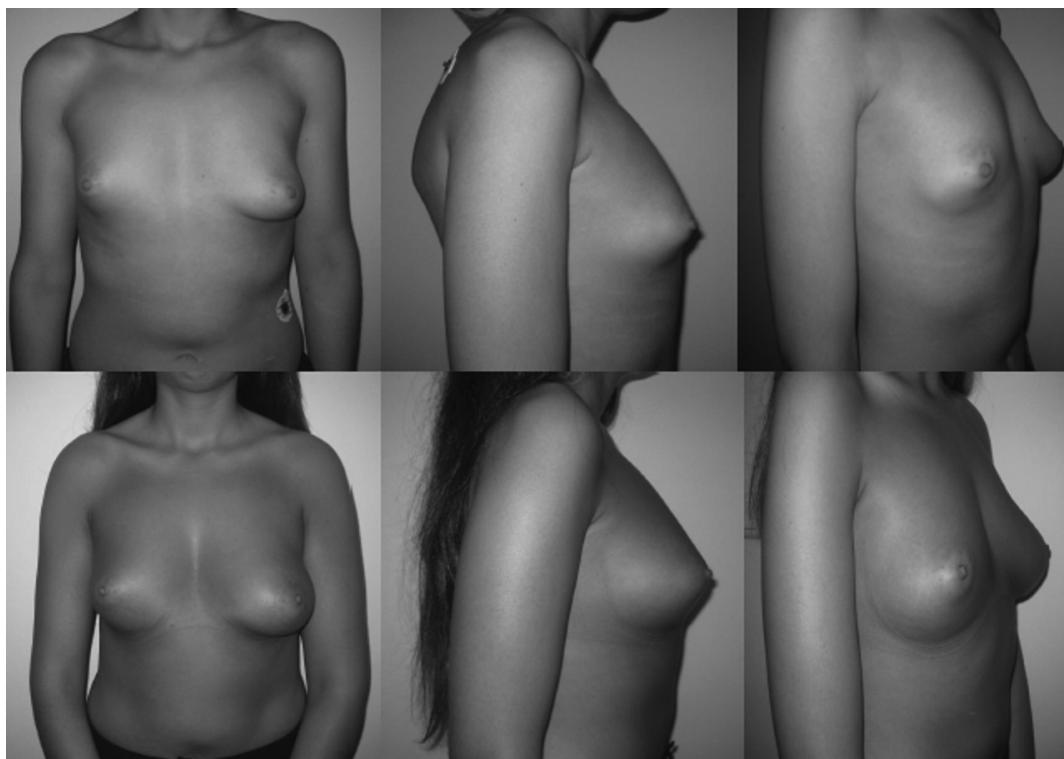


FIGURE 2. Preoperative views of a 19-year-old woman with bilateral tuberous breast deformity (above). Postoperative views 61 months after 1 fat-grafting procedure, with 320 mL grafted into the right breast and 280 mL into the left breast (below). A small asymmetry persists, but the patient was very pleased with the result and refused a second intervention.

Case 3

A 15-year-old young female patient presented with a right micromastia. A total of 400 mL was injected into the right breast; 6 months later, she underwent a second fat grafting procedure in which 180 mL of fat was placed into the right breast. She has had no complications and had an excellent aesthetic result 74 months after the last procedure. Postoperative mammograms were ACR1 (Fig. 3).

Case 4

A 15-year-old young female patient presented with a left micromastia. A total of 280 mL was injected into the left breast; 6 months later, she underwent vertical reduction mammoplasty. She had no complications and an excellent cosmetic result 68 months after the last procedure. Postoperative mammograms were ACR1 (Fig. 4).

Case 5

A 19-year-old woman presented with a bilateral tuberous breast deformity. A total of 300 mL was placed in the right breast, and the same amount was injected into the contralateral breast. She has a good aesthetic result 37 months after the procedure. Postoperative mammograms were ACR1 (Fig. 5).

DISCUSSION

Since the work of Sydney Coleman that popularized the technique,^{7,8} lipofilling has become a recognized therapeutic tool for soft tissue augmentation. This technique is widely used in volumetric facial restoration,^{9,10} hand rejuvenation,¹¹ gluteal augmentation,¹²

mature scar treatment,¹³ penile enlargement,¹⁴ and many aspects of primary breast surgery (treatment of aesthetic sequelae after breast-conserving surgery, capsular contracture after breast augmentation, and aesthetic enhancement) or in association with other procedures (correction after breast reconstruction by prosthesis and musculocutaneous flaps).^{6,15–19}

In 1987, following the publication of Bircoll,¹⁵ the ASPRS Ad-Hoc Committee on New Procedures (American Society of Plastic and Reconstructive Surgeons) deplored the use of autologous fat injection in breast augmentation. Since then, many surgeons have refrained from using fat grafting in breast procedures due to a perceived interference with the accurate detection of breast cancer.²⁰ We know fat grafting can lead to long-term complications, such as the development of cysts, scar tissue, and tissue calcification. In 2007, the ASPS and ASAPS announced that they did not recommend the use of fat grafting for breast augmentation because of the lack of safety research and concerns about potential complications.³³ In 2009, the Fat Graft Task Force made recommendations based on an evaluation of the published scientific literature. This did not exclude the use of fat transfer into the breast parenchyma, but they recommended the development of high-quality clinical studies to establish safety and efficacy of the procedure.²¹

Brown et al showed that calcifications occurred in 50% and fat necrosis in approximately 10% of all mammograms more than 2 years after reduction mammoplasty.²² Abnormalities on breast imaging occur in any surgical manipulation of the breast such as reduction,²³ biopsy,²⁴ breast liposuction,²³ breast augmentation,²⁵ and breast reconstruction.²⁶

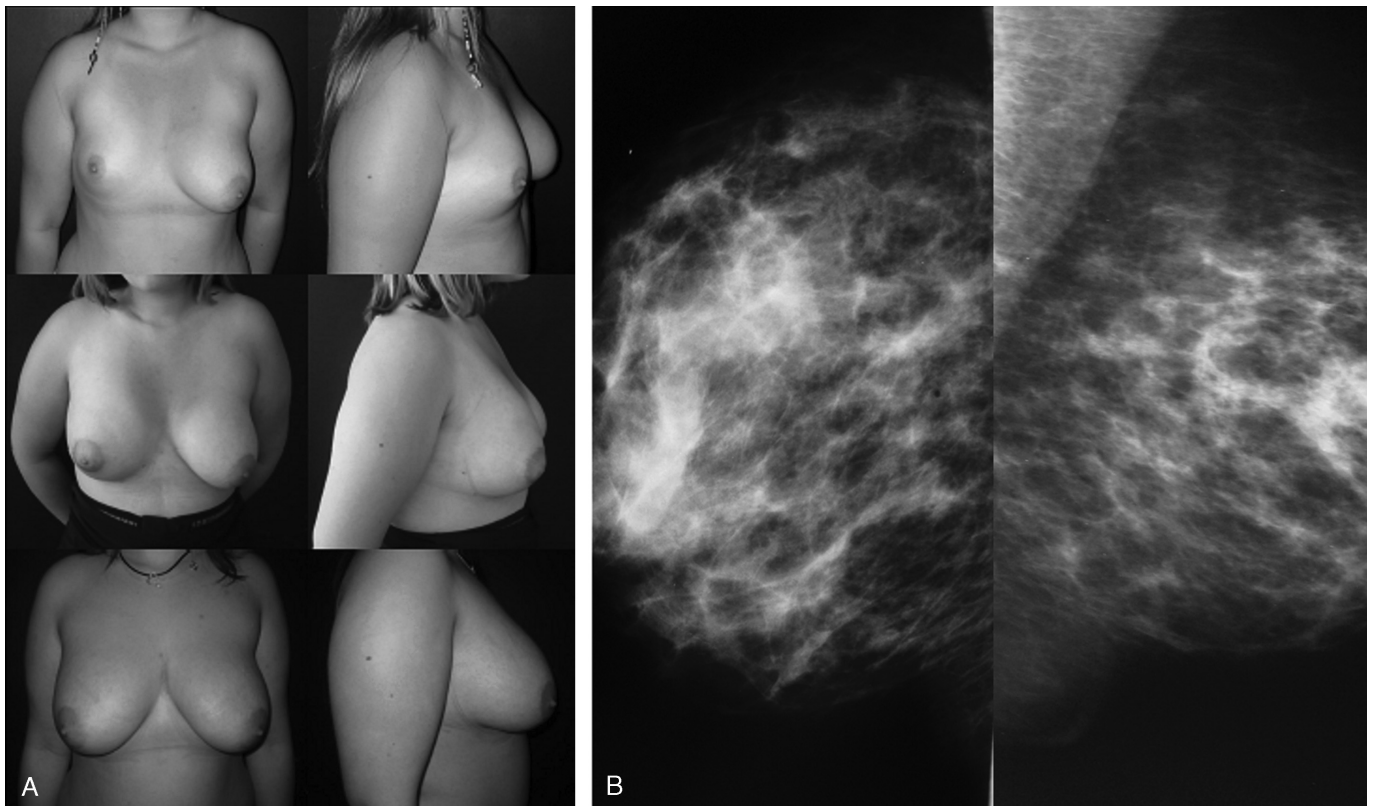


FIGURE 3. A, Preoperative views of a 15-year-old patient with a right severe micromastia (above). Views of the patient 12 months after the second procedure (center). Postoperative views of the patient 74 months after the second procedure (below). B, Mammography of the native and the reconstructed breast. Native breast mammography (right). Reconstructed breast mammography (left). Mammography was described by the radiologist as those of a "normal" breast.

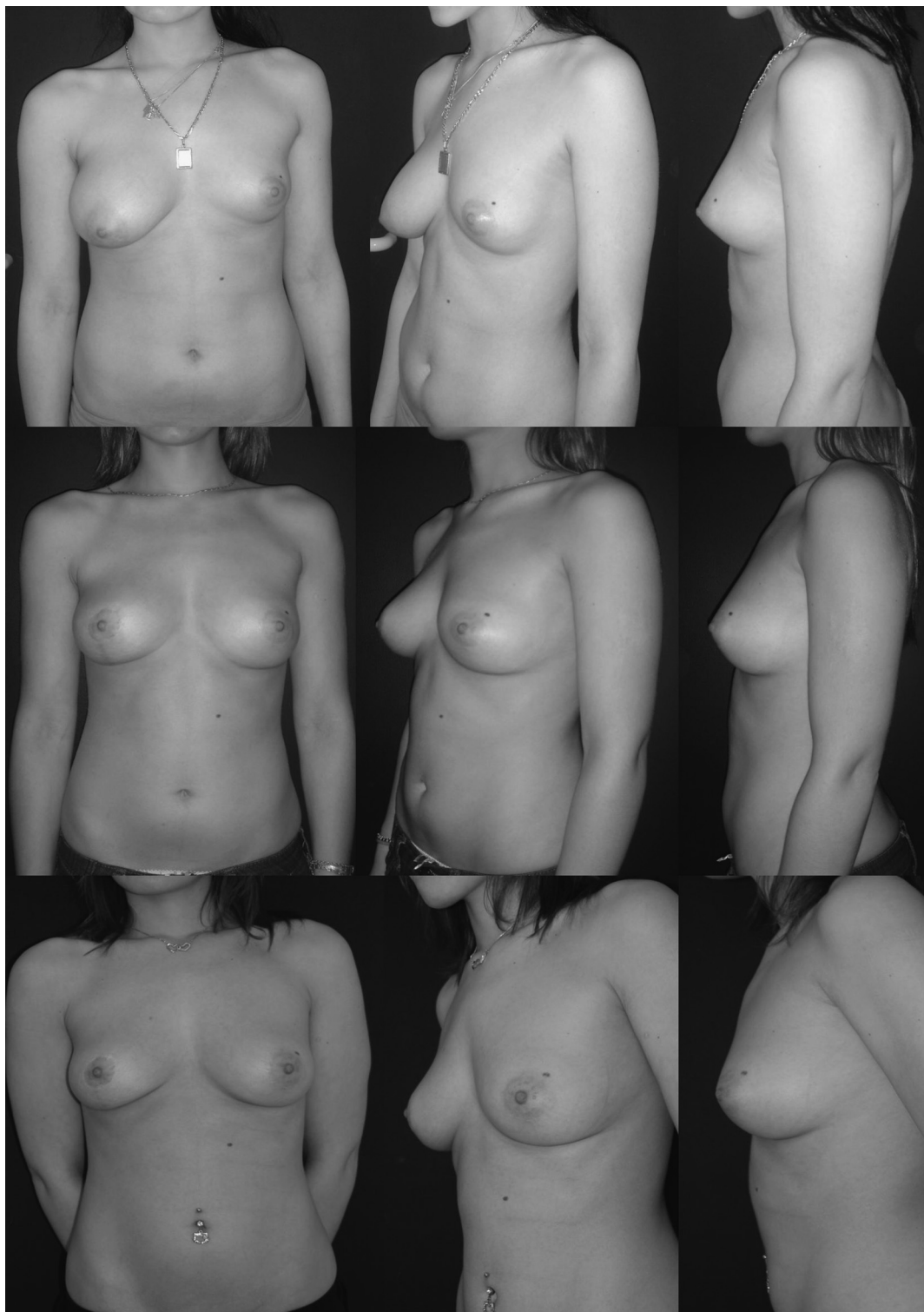


FIGURE 4. Preoperative views of a 15-year-old patient with a left micromastia (above). Views of the patient 12 months after 1 fat-grafting procedure, with 280 mL of fat injected into the left breast and 6 months after the vertical reduction mammoplasty (center). Postoperative views of the patient 68 months after the fat-grafting procedure (below).

Recently, the new generations of mammography equipment show the distinction between benign and malignant breast calcifications with greater accuracy. This is particularly true of digital

mammography, especially when examining dense breast tissue.²⁷ We believe that a combination of mammograms and ultrasounds is sufficient for the follow-up of fat-injected breasts.



FIGURE 5. Preoperative views of a 19-year-old woman with bilateral tuberous breast deformity (above). Postoperative views 37 months after 1 fat-grafting procedure, with 300 mL grafted into each breast (below). The patient was very pleased with the result.

Fat grafting is widely used alone to treat breast deformities in our department. Due to the controversial aspect of this technique, the patients were selected according to specific inclusion criteria to minimize breast cancer risk. Breast cancer is uncommon in young women, particularly for women under the age of 20 years, with the annual incidence in patients younger than 20 years estimated to be 0.1/100,000.²⁸ Women with any family history of breast cancer were excluded, as a history of breast cancer in first-degree relative (mother, sister, or daughter) doubles the risk of breast cancer. Having 2 or more cases of breast cancer among close relatives younger than 50 years or 3 cases among close relatives of any age is associated with a risk for breast cancer that is 4 times greater than that seen in the general population.²⁹

Only a handful cases of breast deformities treated by liposculpture procedures are reported in the literature: in 2007, Coleman and Saboeiro reported 1 case of Poland syndrome, 10 cases of micromastia, and 1 case of tuberous breasts with a mean age of 44 years³⁰; in 2008, Zheng et al published 24 cases of micromastia with an age between 19 and 39 years old,¹⁷ and more recently Delay et al reported the case of a 12-year-old patient with severe form of Poland syndrome treated by exclusive lipofilling with good cosmetic results.¹⁸

In recent years, the methods for harvest and injection have been refined. Most plastic surgeons agree that the execution of the technique should follow fat grafting principles as described by Coleman. This promotes fat-cell survival and minimizes the appearance of fat necrosis and radiologic calcifications. Gentle harvesting, refinement with minimal handling, and injection of the fat in small “lines” creating multiple layers are the rules to increase graft survival. Recent studies comparing harvesting with liposuction and syringe lipoaspiration have

found no significant difference in improving fat survival.³¹ In either technique, the use of low negative pressure is recommended.^{21,32} There are several alternative procedures to liposculpture for the treatment of congenital breast malformations: Breast implants following skin expansion are the most frequently used.² These invasive procedures involve the implantation of foreign materials and can lead to complications such as infection, rupture, extrusion through the skin, or breast capsule contracture. Poland syndrome with severe breast hypoplasia and concomitant thin tissue and lack of skin is difficult to treat with implants and often gives unnatural results. In severe cases of Poland syndrome, where skin is adherent to the rib cage, we have found that fat injections during the first procedure allow undermining of the fibrous tissue. The injected fat acts as a tissue expander when injected and gives pleasing results. In our experience, subclavicular hollows related to agenesis of the pectoralis and subclavicular muscles cannot be corrected by prosthesis alone.

The use of pedicled or free flaps such as latissimus dorsi flap or DIEP flap has been described in the literature^{3,5}; however, we do not commonly use this approach as it leads to significant scarring and a variable donor-site defect.

Our experience has been positive using lipofilling to correct the short nipple-to-inframammary fold distance, constricted lower pole, and poorly defined inframammary folds. In our 3 cases of tuberous breasts, we have lowered the inframammary fold by injecting fat until the skin of the lower pole became tense. A contralateral breast augmentation with fat grafting was performed to allow symmetrization. It is important to note that injection under the nipple-areola complex must be avoided in cases of nipple herniation as this may propagate the abnormality.

The fat-grafting procedure is completed once the breast is saturated and unable to absorb more fat and/or the required aesthetic result is achieved. We believe that fat grafting has definite advantages over prosthetic implants such as producing a more natural look, improving quality of skin texture, and vastly reducing scarring. In patients with Poland syndrome, it is particularly useful to fill the subclavicular hollow due to pectoralis major muscle atrophy. The limitations are that sometimes large volumes of fat must be used along with multiple sessions.

In our study, 90% of patients were satisfied with the size of the injected breasts. Only 1 patient was dissatisfied with both the size and the symmetry of the breast, who had a micromastia corrected by fat injections. This patient also had a contralateral ptotic breast. On discussion with this patient about surgical correction of her breast ptosis, she refused any further procedure because of the risk of visible scars.

The only patients who were not able to benefit from lipofilling were those very slim patients who had no suitable donor sites.³⁴

CONCLUSION

Our preliminary results using lipofilling to treat young patients with breast hypoplasia with lipofilling are very encouraging. Ninety percent of our patients were pleased with the aesthetic, no patient had suspicious breast imaging results at long-term follow-up, and we had no complications during or after the procedures. In experienced hands, lipofilling should be considered as an alternative of choice for the correction of the hypoplastic breast anomalies in selective young female patients.

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