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Treatment of congenital unilateral hypoplastic breast anomalies using autologous fat grafting: A study of 11 consecutive patients

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Summary During the period 2008—2013, 11 women were treated with autologous fat grafting for unilateral congenital breast hypoplasia comprising both tuberous breast and micromastia. No correction of the contralateral breast was done at evaluation. Patients were treated median one time, and they had their inter-breast volume difference reduced from median 175 to 50 ml. Patients showed overall high degree of satisfaction with the treatment, but they were less satisfied when addressing size and shape separately. The median follow-up time was 13 months, and the achieved breast volume sustained throughout the follow-up period.

Background

Both micromastia and tuberous breasts are included in the term "hypoplastic breast," and they arise from a breast-base anomaly. Hypoplastic breast anomalies become apparent during puberty as the breasts lack normal development. Among young women, breast anomalies are associated with a severe decrease in self-esteem, social anxiety, depression, and psychosexual dysfunction.[1] Overall, breast deformity has a significant personal and social consequences, and it is associated with lower quality of life.[2]

For many years, hypoplastic breasts have been reconstructed using a breast implant for a unilateral breast augmentation or a breast expander in cases of insufficient laxity in the skin. As many of the women treated for hypoplastic breasts are very young, the use of a breast implant is associated with repeated surgery because of implant exchange expected every 10—20 years.[3] Moreover, the use of a breast implant is associated with an increased risk of different surgical complications and adverse effects,

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both early (infection and wound rupture) and delayed (capsule contracture, low pathogenic infections, and silicone leak/implant decomposition). The use of autologous fat grafting for breast reconstruction diminishes or eliminates all of the mentioned complications and adverse effects associated with implant-based breast reconstruction. Repeated autologous fat grafting can be necessary depending on the requested breast volume, as too high fat-graft input can result in reduced graft survival and necrosis of breast parenchyma and skin. If the desired total fat transplantation volume is too high, the total fat transplantation volume must be fractioned into safe transplantation volumes and transferred in repetitive surgical interventions.

When conducting autologous fat grafting, an initial overcorrection of the intended end volume is needed due to an expected loss of the grafted fat on 24 ± 11% with breast augmentation and reconstruction by lipotransfer (BEAULI™) techniques.[4] Khouri et al. evaluated 81 women treated with breast reconstruction using Brava®-assisted autologous fat grafting using magnetic resonance imaging (MRI) scans and clinical examination, and they found that the grafted volume present at 3 months postoperative follow-up persisted throughout the evaluation period (follow-up with MRI at 12 months postoperatively and with clinical examination at average 3.7 years postoperatively).[5]

The aim of this study was to evaluate patient-oriented outcomes of breast reconstruction using autologous fat graft to treat unilateral breast hypoplasia.

Method

The study was a cohort follow-up study on 11 consecutive patients evaluating the outcome after breast reconstructive surgery. Moreover, we evaluated patient-reported outcomes after the breast reconstructive surgery using a cross-sectional questionnaire. The study was conducted at the Department of Plastic Surgery at Roskilde University Hospital, Denmark, during the period from 1 January 2008 to 31 August 2013.

Participants

Patients were offered treatment with autologous fat transplantation if they had unilateral hypoplastic breast anomaly with inter-breast volume difference exceeding 100 ml, if they were post puberty (fully developed breasts), and had body mass index (BMI) 20–25. They were excluded from treatment if they at pre-examination were smokers, not ASA 1 (American Society of Anesthesiologists), or had unsuitable or insufficient donor sites. Patients who could be sufficiently treated with a contralateral reduction mammaplasty or who specifically requested implant-based breast reconstruction were not offered treatment with autologous fat transplantation. Patients with bilateral hypoplastic breast anomaly were offered an implant-based breast reconstruction. All patients treated for unilateral hypoplastic breast anomaly with autologous fat transplantation during the study period were consecutively included in the study ($n = 11$). All patients consented to their participation. Data collection was conducted by the Department of Plastic Surgery at Roskilde University Hospital.

Variables

Preoperatively, all patients evaluated with measurement of height, weight, and breast volume were estimated using transparent plastic domes[6,7] by one of the three authors. Standardized photos were taken preoperatively and postoperatively (at follow-up). Each patient was graded according to Grolleaus classification of breast anomalies by the three authors.[2] Tuberous breast is characterized by a deficiency of breast tissue in the lower medial quadrant (Grolleau type 1) or in both the lower medial and lateral quadrants (Grolleau type 2). Micromastia is characterized by postpuberty deficiency of breast development (cup size A or smaller) meaning that all four quadrants of the breast are impaired (Grolleau type 3).[2] At the postoperative follow-up (minimum 6 months after surgery) all patients were evaluated by one of the three authors with measurement of height, weight, and breast volume using plastic domes. Moreover, each patient completed a questionnaire in Danish (see appendix for English translation of the questionnaire) containing items addressing outcome satisfaction and associated adverse effects (donor site and recipient site). All the included patients returned a completed questionnaire. At the time of data collection, none of the patients had received any additional corrective surgery besides autologous fat grafting.

Treatment

Preoperatively, marking of the breast tissue deficiency was done in a standing position. All surgical procedures were performed under general anesthesia. Donor site for fat harvesting was the lower abdomen in all cases. The fat was collected using either Coleman setup with 2-mm cannulas and with approximately −0.5 atm vacuum[8–10] ($n = 9/11$) or ad modum BEAULI™ using a water-jet-assisted lipografting (WAL) equipment (Body-jet®) with a 3.8-mm cannula and suction pressure at −0.5 bar[4] ($n = 2/11$). Independently of the fat-collecting technique, the fat graft was centrifuged at 3000 rpm for 3 min (ad modum Coleman)[8–10] in order to obtain a rather dense fat graft. The purified fat was transferred to 10-ml LuerLock syringes. The fat was injected in multiple sites at the inframammary fold and the periareolar region by 2-mm transfer cannulas. The fat was grafted in multiple layers until the desired volume was achieved, including approximately 20% overcorrection due to expected fat resorption. In cases of elevated inframammary fold or areas with tension, fasciotomy was performed either to lower the inframammary fold or to loosen the constrictions. Four of the 11 patients were also treated with the Brava® vacuum system. The women declared to have used the Brava® system exactly as instructed (verbally and written instructions matching the recommendations from the manufacturer[5]).