Donor Site Satisfaction Following Autologous Fat Transfer for Total Breast Reconstruction

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Abstract

Background: With evolving breast cancer survival and patient preferences, it is essential that reconstructive surgeons worldwide continue searching for the best reconstruction technique for patients. Autologous fat transfer (AFT) is a relatively new technique for total breast reconstruction that has already proven to be effective and safe with all advantages of autologous tissue. However, little is known about the aesthetic results and satisfaction concerning donor sites.

Objectives: The aim of this study was to measure donor site satisfaction following AFT for total breast reconstruction in breast cancer patients.

Methods: Between May and August of 2021, participants of the BREAST− trial who were at least 24 months after their final reconstruction surgery were invited to complete an additional survey concerning donor sites. The BODY-Q was utilized for data collection. Results of AFT patients were compared with a control group of implant-based reconstruction patients who did not have a donor site.

Results: A total of 51 patients (20 control, 31 intervention) completed the questionnaire. Satisfaction with body did not statistically differ between the groups. The most frequent complaint was contour irregularities (31 reports, 60.8%), with the least favorable donor site being thighs (23 reports, 53.5%) in the AFT group.

Conclusions: Satisfaction with body did not differ between breast cancer patients receiving AFT or implant-based reconstruction, meaning that large-volume liposuction does not aesthetically affect the utilized donor sites. Nevertheless, reconstructive surgeons should be aware of possible donor site complications, especially contour irregularities at the thighs, and discuss this with their patients.

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Post-mastectomy breast reconstruction due to breast cancer is an important research topic, and researchers are studying additional options for breast reconstructions while also investigating patient factors that could predict which reconstruction is the best choice for an individual patient.[1-3] Currently, the 2 most applied techniques for breast reconstruction are implant-based reconstruction (IBR) and free flap reconstruction (FFR).[4,5] IBR is standard care in most countries because of its simplicity, although FFR has become a favorable option for many women because of the autologous tissue characteristics. However, both techniques carry risks; IBR includes foreign body material that can cause capsular contracture or leakage, whereas FFR is a more invasive surgery possibly leading to a longer recovery period, excessive scarring, and, in more severe cases, flap necrosis.[6-9]

A third option for total breast reconstruction is autologous fat transfer (AFT). Although extensive research has been conducted on this topic, much remains to be assessed.[10-12] AFT has already been shown to be a low-risk procedure, which is minimally invasive, economic, and produces minimal scarring and benefits from the autologous tissue characteristics such as a natural feeling of the breast.[13-18] Further research also shows an aesthetically pleasing outcome of AFT-reconstructed breasts with long-term satisfaction during follow-up.[19]

Although the literature assessing the adverse events of AFT to the breast is promising, adequate reporting on donor site morbidity and patient satisfaction is still lacking.[13,14,20-24] The most common donor sites utilized for AFT are the abdomen, hips, inner thighs, outer thighs, and buttocks. Because the primary reconstruction goal is the breast, plastic surgeons may need to perform liposuction in a region where they usually would not harvest fat. This could lead to a lower patient satisfaction at the donor site or other possible complications rather than the known complications of aesthetic liposuction, such as ecchymosis, bruising, infection, swelling, hematoma, paresthesia, and contour abnormalities or irregularities.[25-27] Because the aesthetic result of all plastic surgery procedures is considered important, it is crucial to investigate the effect of larger liposuction volumes on the quality of life (QoL) in breast cancer patients undergoing this procedure. With this information, patients are more adequately informed before opting for a specific reconstruction method, and plastic surgeons can focus on preventing these complications.

In this study, we aimed to explore satisfaction of donor sites in women with breast cancer who underwent AFT compared with a control group (women who received IBR and did not have donor sites), measured by the BODY-Q at 24 months postoperative. It could be that due to large-volume liposuction in AFT, satisfaction with body (donor sites) is lower than satisfaction with body when no donor sites are utilized (IBR, control group).

METHODS

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for observational studies was adhered to for the composition of this article (Appendix A, available online at www.aestheticsurgeryjournal.com). As required by the Medical Research Involving Human Subjects Act, a medical ethical approval was obtained by the local medical ethical committee of Maastricht University (METC14-2059).

Study Design

Between May 2021 and August 2021, participants from all 7 participating centers of the randomized controlled BREAST− trial were approached by postal mail to complete an additional questionnaire concerning their body.[28] IBR patients were also included in this study, serving as the control group because no donor sites were utilized in this procedure. After providing informed consent, an electronic questionnaire was sent to patients via CastorEDC. A reminder was sent after 2 weeks. The primary outcome was patient satisfaction. Secondary outcomes were complaints and the occurrence and severity of paresthesia, pain, irregularities, and skin discoloration of specific donor sites.

Participants

To be eligible for invitation, post-mastectomy patients were screened to meet the inclusion and exclusion criteria of the BREAST− trial (Table 1) and needed to be at least 24 months after their final reconstructive breast surgery (Table 1).[28,29]

Data Management

BODY-Q questionnaires with at least one-half of the items completed were included in the analysis.

Data regarding patient characteristics, clinical variables and operative variables were extracted through reviewing an online case report form: MACRO and electronic medical records.[29] Potential confounders such as age, BMI, educational level, additional reconstruction, laterality of reconstruction, and follow-up time were also collected and compared between the 2 intervention groups.

Questionnaires

The BODY-Q was utilized to obtain satisfaction with body and its effect on the health-related QoL.[30,31] This questionnaire has shown to be clinically meaningful in bariatric surgery and contouring surgery.[32] Therefore, the BODY-Q could be useful in researching patient satisfaction at the donor sites following total breast reconstruction with AFT.

Table 1. Inclusion and Exclusion Criteria for the BREAST− Trial

Inclusion criteria
- Female gender
- ≥Age 18 y
- Has been in past or is candidate for mastectomy in near future
- Patients undergoing preventive mastectomy
- It is patient's choice to undergo breast reconstruction
- Patient wants to participate in study
- Patient can wear BRAVA device
Exclusion criteria
- Active smoker or history of smoking 4 wk before surgery
- Current drug abuse
- History of allergy to lidocaine
- History of silicone allergy
- ≤4 wk after chemotherapy
- History of radiation therapy in breast area
- Oncological treatment includes radiotherapy after mastectomy
- Kidney disease
- Steroid-dependent asthma (daily or weekly) or other diseases
- Immune-suppressed or immune-compromised disease
- Uncontrolled diabetes
- BMI > 30
- Large breast size (ie, > C cup), unless patient chooses to reduce contralateral side toward C cup
- Extra-capsular silicone leaking from encapsulated implant as result of previous breast reconstruction
- Plastic surgeon treating patient has serious doubts about patient's compliance

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In this study, electronically sent questionnaires comprised 8 domains of the BODY-Q questionnaire (body, back, abdomen, buttocks, hips and outer thighs, inner thighs, scars, and body image) and 4 additional questions regarding the presence and extent of common problems after liposuction (paresthesia, pain, discoloration, and contour irregularities). Please note the body domain of the BODY-Q focuses on how the patient feels about the appearance of her body (eg, how the patient feels about her body when looking from behind or when considering her weight) as well as on body image (eg, is she proud of her body).

Severity was scored utilizing a 5-point Likert scale, with a score of 1 indicating little to no burden and a score of 5 indicating a heavy burden by the complaint. At last, a comment section was computed for additional feedback from patients. Questionnaires were also sent to the IBR group as a control group for better comparison of the effect of large-volume transfer on different body parts and to find out if there is a difference in satisfaction with body compared with women who did not undergo AFT. A translated version of these questions is shown in Appendix B (available online at www.aestheticsurgeryjournal.com).

Statistical Methods

SPSS IBM version 25 was utilized to perform the statistical analyses. Categorical variables are presented as frequencies and percentages. Continuous variables are presented as mean and standard deviation (SD). Differences between groups were tested with Pearson's chi-square or Fisher's exact test for categorical variables. For continuous variables, we employed the independent samples *t* tests. Despite the BREAST− trial being a randomized study, baseline between-group differences were also tested for the present study, because we included only a subset of patients.

RESULTS

Participants

After screening for inclusion and exclusion criteria, 104 women of the BREAST− trial were considered eligible. Of these participants, 59 women filled out an informed consent form and returned a signed version. Finally, 51 women, comprising 31 AFT patients and 20 IBR patients, completed the electronic questionnaire. This led to a response rate of 49% (51 of 104 women). The recruitment process is shown in Figure 1.

Patient Demographics and Clinical Characteristics

Overall, no significant differences in baseline characteristics were found between the 2 treatment groups. Only average follow-up time after breast reconstruction varied between the groups at 36.0 months (SD ± 9.6) in the AFT group compared with 42.2 months (SD ± 9.5) in the IBR group ($P = 0.029$). Mean age in the AFT group was 56.7 years (SD ± 9.4), ranging from 32.0 to 76.0 years vs 60.2 years (SD ± 7.0) in the IBR group, ranging from 32.0 to 77.0 years. Mean BMI in the AFT group was 23.4 kg/m^3 (SD ± 2.4) vs 23.3 kg/m^3 (SD ± 2.5) in the IBR group.

Moreover, no statistically significant differences were found between the groups when considering educational level, laterality of reconstruction, and follow-up time.

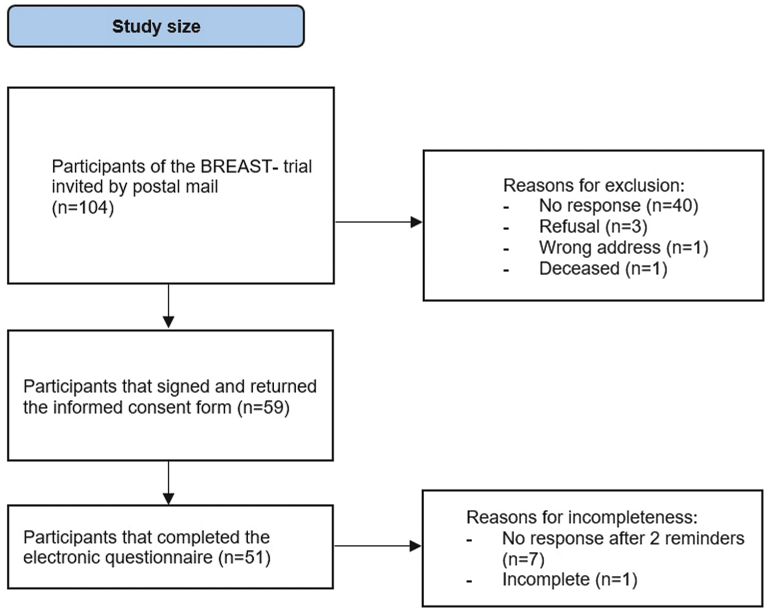

Figure 1. Flow chart shows how final study size was obtained.

No patients required additional breast reconstruction surgery. On average, an estimated 750 cc of fat was utilized for full breast reconstruction (total for all AFT sessions). Patient characteristics and clinical features are presented per reconstruction group in Table 2.

Main Results

Body-Q

Overall, no statistically significant differences were found between the groups. BODY-Q domain scores are shown per group in Table 3. AFT patients scored on average higher on the BODY-Q domains body, scars, and buttocks, whereas the IBR group scored higher on the domains body image, hips and outer thighs, inner thighs, abdomen, and back.

In the AFT group, the lowest-scoring domains were abdomen and inner thighs, whereas scars scored the highest. For the IBR group, the lowest scoring BODY-Q domains were body and abdomen, whereas the highest scores were given for back.

Location of Complaints

All possible affected donor sites as reported by patients with complaints are shown in Figure 2. A total of 55 complaints were mentioned for the back, flank, thighs, hips, buttocks, and abdomen. Per patient multiple areas could be reported, resulting in more complaints than participants included in the AFT group. IBR patients served as a control group and were expected to not report any body complaints, yet these women also reported complaints on different body sites, with the most frequently reported complaints situated at the abdomen (n = 10). For the AFT group, the most complaints were reported for the thighs (n = 23) and abdomen (n = 15) (Figure 2).

Type and Severity of Complaints

A total of 63 specified complaints were reported, of which 51 were in the AFT group and 12 in the IBR group. Most of the complaints involved contour irregularities, with 31 reports in the AFT group and 4 reports in the IBR group. All reported types of complaints are shown in Figure 3. The highest score for severity of complaints was reported in the IBR group for pain (5.0), whereas the highest score reported in the AFT group was 3.8 for skin changes/discoloration. Average scores of severities are shown in Table 4.

Comments

A total of 8 patients in the control group and 13 patients in the AFT group commented on their reconstructive surgery. In short, IBR patients expressed their gratitude towards the reconstruction team; however, they all wished to have their implants exchanged for an autologous reconstruction. In general, AFT patients stated that the overall treatment was difficult and that they still experienced complaints at the donor sites. Despite this, all the women stated they would repeat and recommend this reconstruction treatment.

DISCUSSION

This study compared satisfaction with body in patients who received a breast reconstruction with either AFT or

Table 2. Patient and Clinical Characteristics in AFT and IBR Patients

Characteristic	AFT (N = 31)	IBR (N = 20)	*P*
Age, mean ± SD, y	56.7 ± 9.4	60.2 ± 7.0	0.15
BMI, mean ± SD, kg/m^2	23.4 ± 2.4	23.3 ± 2.5	0.86
Educational level[a]			0.76
- Primary school (%)	0.0 (0.0)	0.0 (0.0)	
- Lower vocational education (%)	2.0 (6.5)	1.0 (5.0)	
- Preparatory secondary vocational education or lower general secondary education(%)	6.0 (19.4)	2.0 (10.0)	
- School of higher general secondary education or the pre-university education (%)	4.0 (12.9)	1.0 (5.0)	
- Post-secondary vocational education (%)	2.0 (6.5)	2.0 (10.0)	
- Higher professional education (%)	13.0 (41.9)	12.0 (60.0)	
- University (%)	4.0 (12.9)	2.0 (10.0)	
Additional reconstruction[b]			—
-Yes (%)	0.0 (0.0)	0.0 (0.0)	
Laterality of reconstruction			0.47
-Bilateral (%)	9.0 (29.0)	4.0 (20.0)	
Follow-up time[c]	36.0 ± 9.6	42.2 ± 9.5	0.029

[a]Educational level according to the Dutch education system. AFT, autologous fat transfer; IRB, implant-based reconstruction; SD, standard deviation. [b]Other breast reconstruction before or after the BREAST− trial reconstruction. [c]Time window after final reconstruction surgery.

Table 3. BODY-Q Scores in AFT vs IBR Patients

Body-Q domain	AFT (N = 31)	IBR (N = 20)	95% CI	*P*	Crude difference
Body	64.1 ± 19.1	56.8 ± 19.2	(−18.4 to 3.7)	0.82	+7.3
Body image	62.1 ± 26.7	63.5 ± 27.3	(−14.1 to 17.0)	0.85	−1.4
Scars	83.5 ± 20.1	75.8 ± 23.3	(−20.1 to 4.6)	0.21	+7.7
Hips and outer thighs	65.7 ± 31.0	73.9 ± 27.5	(−8.9 to 25.3)	0.34	−8.2
Inner thighs	59.3 ± 35.0	73.9 ± 31.0	(−4.7 to 33.9)	0.13	−14.6
Abdomen	56.9 ± 31.8	60.7 ± 27.5	(−13.6 to 21.3)	0.66	−3.8
Buttocks	77.7 ± 28.0	71.8 ± 26.9	(−21.7 to 9.9)	0.46	+5.9
Back	78.9 ± 28.0	84.5 ± 16.5	(−6.9 to 18.2)	0.42	−5.6

AFT, autologous fat transfer; CI, confidence interval; IBR, implant-based reconstruction.

IBR, reported 2 to 5 years after the final reconstruction surgery. Overall, no differences in satisfaction with body were found between the groups.

For well-established breast reconstruction techniques such as the deep inferior epigastric perforator flap, donor site complications and aesthetic results have been researched.[33,34] In contrast, research concerning AFT has solely focused on satisfaction with breasts and the breast-related QoL as measured by the BREAST-Q.[35] Therefore, little is known about possible donor site complications or satisfaction. Because this is an autologous reconstruction technique where fat is harvested through large-volume liposuction, possibly in areas where this is not aesthetically feasible, it is crucial to consider the donor site satisfaction for a more holistic evaluation of QoL and satisfaction with body following reconstruction. The authors found the BODY-Q to be the most adequate for measurement of the donor site–related body image and satisfaction, because it

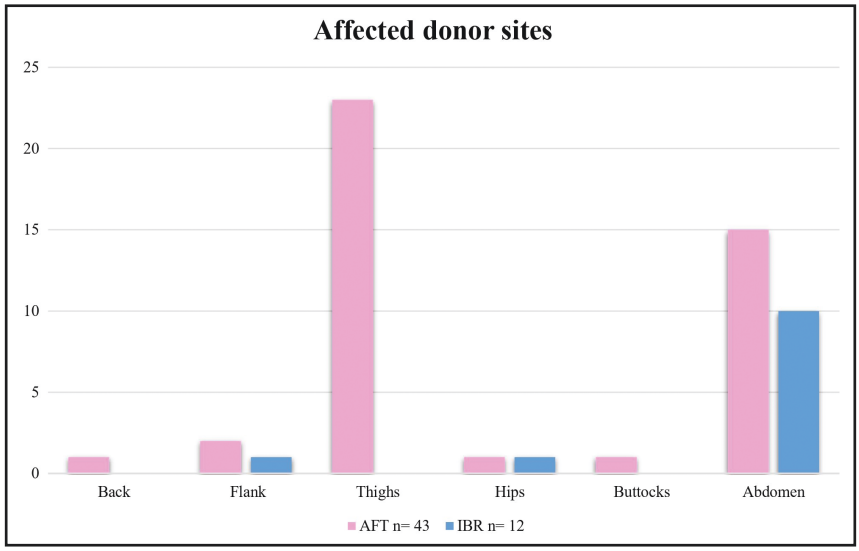

Figure 2. Chart showing number of complaints per donor site region per group, with pink indicating autologous fat transfer and blue indicating implant-based reconstruction.

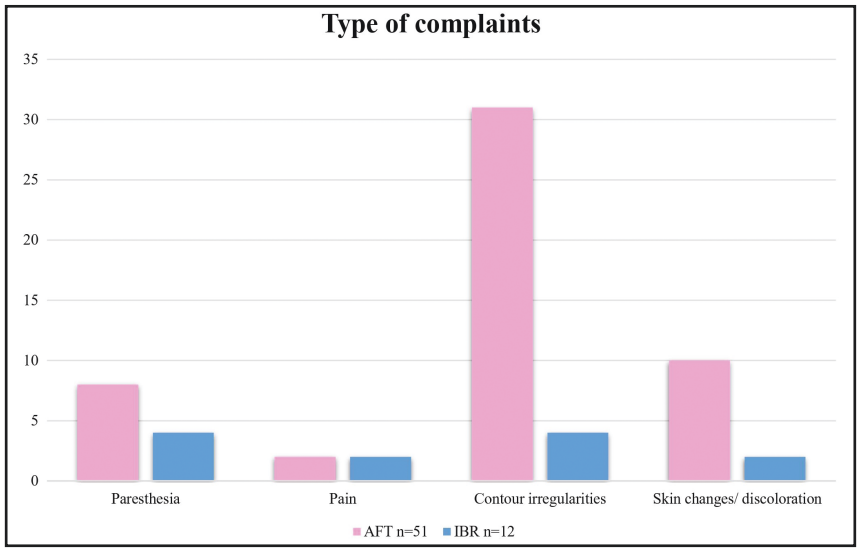

Figure 3. This chart shows different types of donor site complaints and amount of mentions per treatment group, with pink indicating autologous fat transfer and blue indicating implant-based reconstruction.

specifically questions donor sites utilized for liposuction in a standardized manner. In addition, 4 known complications after liposuction (paresthesia, pain, contour irregularities, and skin changes) were explicitly explored if patients experienced these complications, where they experienced the complications, and the severity of these complaints on a visual analog scale score.

Our results show no statistical differences in satisfaction with body between the AFT and IBR group. However, the AFT group had lower mean scores for the domains body image, hips and outer thighs, inner thighs, abdomen, and back, with the inner thighs scoring the worst compared with the IBR group. Furthermore, contour irregularities at the thighs were the most frequently reported complaints in the AFT group. It could be that due to large-volume liposuction in AFT, satisfaction with body in AFT patients is not equal to satisfaction with body in patients who received liposuction for aesthetic purposes. Indeed, aesthetic literature findings state that liposuction leads to a higher satisfaction with body in cosmetic patients.[36-39] In contrast, satisfaction with body scores were lower in AFT patients who underwent liposuction. This supports claims stating that when plastic surgeons remove larger volumes of fat (>100 cc) to perform AFT, this action could jeopardize the cosmetic outcome of the donor sites. A remarkable outcome was the higher mean scores for satisfaction with body for the domain buttocks. It might be that shape of buttocks is altered due to liposuction of the

Table 4. Average Severity Scores Per Group[a]

Complaint	AFT (SD) n = 25	IBR (SD) n = 12	Crude difference (95% CI)	*P*
Paraesthesia/numbness	3.0 (1.0)	3.5 (1.7)	−0.5 (−3.7 to 2.1)	0.63
Pain	3.0 (1.4)	5.0 (0.0)	−2.0 (−14.7 to10.7)	0.30
Contour irregularities	3.1 (1.1)	2.8 (1.0)	+0.3 (−1.1 to 1.7)	0.59
Skin changes/discoloration	3.8 (1.1)	2.0 (1.4)	+1.8 (−4.8 to 8.4)	0.29

AFT, autologous fat transfer; CI, confidence interval; IBR, implant-based reconstruction. [a]A score between 1 and 5 was reported, with a score of 1 indicating little to no burden and a score of 5 indicating a heavy burden by the complaint.

back, suggesting that this is a favorable donor site for AFT. Another rationale for higher satisfaction scores for the buttocks could be because the buttocks were not utilized as a donor site in this study.

For the BREAST-Q, minimal important differences have been described.[40] For the BODY-Q, these have not yet been described. Although we found no statistical differences in body-related QoL between the groups, some mean differences were substantial, for example, up to −14.6 for satisfaction with inner thighs. More research is necessary to help interpret these differences. For now, substantial differences in scores, such as for thighs, should be noted and be handled with caution if opted as the donor site.

A surprising finding was that IBR patients reported complications at the abdomen, an area not involved in this reconstruction procedure. Additionally, this group had lower mean scores on the BODY-Q for domains body and abdomen, suggesting that IBR patients are generally less satisfied with their body and abdomen. These findings are in line with other studies investigating differences in body-related QoL following IBR compared with FFR.[41] These studies concluded that although FFR could lead to severe complications and major scarring, patients tend to be more satisfied with their body after FFR compared with IBR. Compared with results of these FFR patients, our results show comparable results for the other domains but with better scores for the domain scars for AFT patients. This corresponds with the minimally invasive features of AFT and might also be an important aspect for women who must choose the type of reconstruction following their mastectomy.

Lower reported scores for the IBR group are also consistent with the findings of Miseré et al.[42] The authors utilized the BODY-Q to measure the body-related QoL after breast reconstruction, comparing the deep inferior epigastric perforator flap, IBR, and the lateral thigh perforator flap.[42] Their results showed that long-term body-related QoL in the autologous breast reconstruction group was superior to that of the IBR group. When comparing the results of matched domains, patients included in our study generally scored higher. Nevertheless, both our study and other studies on BODY-Q results show that autologous reconstructions can possibly lead to low BODY-Q scores and should be a point of interest for both plastic surgeons and breast cancer patients.

This study has certain strengths and limitations. To our knowledge, this was the first study to research donor site satisfaction following AFT compared with IBR, employing the BODY-Q. Results of this study identify possible flaws at the donor sites for AFT. A limitation of this study is that there was no baseline measurement available for comparison. Other limitations include the relatively small sample size per treatment group and the possibility for participation bias because an additional informed consent and survey was sent to patients of the BREAST− trial. Thus, the authors cannot rule out the possibility that only content patients responded to express their gratitude, whereas the opposite scenario involving responses from mainly disappointed patients who want to express their criticism is also possible. Furthermore, the BODY-Q has only been validated for utilization in post-bariatric patients. Nevertheless, this questionnaire provides good insight into satisfaction with donor sites in patients who underwent autologous breast reconstruction.

We believe it is important for plastic surgeons to keep these results in mind when discussing possible donor sites with their patients. Prior to the reconstruction, both advantages and disadvantages of all possible donor sites should be properly communicated. In this manner, patients can make a more well-considered choice of breast reconstruction.

CONCLUSIONS

In this study, donor site satisfaction following AFT for total breast reconstruction measured by the BODY-Q did not differ between AFT and IBR. Nevertheless, our results suggest that selection of the donor site should be performed with care. The inner thighs should only be utilized with great caution when selected as a donor site due to possible contour irregularities. More research on donor site complications in AFT is recommended to further improve and tailor AFT breast reconstruction.

Supplemental Material

This article contains supplemental material located online at www.aestheticsurgeryjournal.com.

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