# Perforator Flap Breast Reconstruction After Unsatisfactory Implant Reconstruction

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**Abstract:** In 2009, 86,424 breast reconstructions were performed in the United States, with 76% being implant-based procedures. Capsular contracture and infection are the 2 most cited indications for implant explantation, resulting in a reconstruction failure. However, several patients are dissatisfied with implant reconstruction even without the aforementioned complications. We hypothesize that microvascular autologous tissue transfer with perforator free-flap breast reconstruction provides an excellent salvage modality in the face of an unsatisfactory implant reconstruction, resulting in an improved cosmetic and functional outcome, with low risk of complications. We retrospectively reviewed the charts of patients in the senior author's practice who underwent perforator flap breast reconstruction between the years 1998 through 2008, and identified all patients who had prior implant reconstruction. Indications for implant explantation, medical history, operative procedure, and postoperative complications were reviewed. During the study period, 1846 perforator flaps were performed. We found 191 patients who underwent autologous breast reconstruction after implant reconstruction with a total of 284 flaps (15.4%). The most frequent patient complaint was unnatural appearance and feel of the implants (Baker I or Baker II), and the majority of patients had not undergone radiation. Most patients were reconstructed using abdominal flaps with 164 deep inferior epigastric perforators, 50 superior gluteal artery perforators, 30 superficial inferior epigastric arteries, 35 inferior gluteal artery perforators, and 5 transverse upper gracilis. The total complication rate was 7.4%, with most complications related to wound healing at the donor site. There were 3 flap losses (1%), all of which were later successfully reconstructed with another perforator flap. Implant failures are traditionally thought to be in patients with Baker grade III/IV capsular contractures and in patients status post radiation therapy. However, in our study, the majority of patients seeking perforator flap reconstruction after implant reconstruction complained of an unnatural feel and appearance of their breasts, and did not have a severe capsular contracture deformity (Baker III/IV), nor had they undergone radiation. This suggests that implant reconstruction can lead to patient dissatisfaction severe enough to warrant removal even with Baker I/II results, and not in the setting of postradiation changes.

**Key Words:** perforator flap, DIEP flap, implant reconstruction, implant failure

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In the United State during 2009, 86,424 procedures were completed for the purpose of breast reconstruction. The overwhelming majority (76.4%) of these procedures were implant-based.[1] It is generally accepted that implant reconstruction requires simpler operative technique and shorter operating time. These benefits are likely a large reason why well-described disadvantages of implant reconstruction, including implant displacement, capsular contracture, pain, and infections, are tolerated.[2–5]

In contrast to implant-based reconstruction, in 2009, only 16% of breast reconstructions were completed using microvascular transfer of autologous tissue, and less than half of those microvascular procedures were performed using perforator flaps.[1] Perforator flaps require microsurgical expertise and additional comfort with perforator anatomy when compared with traditional transverse rectus abdominus muscle or implant reconstruction. However, the patient is rewarded with a more natural reconstruction, free from capsular contracture, and with less donor-site morbidity than nonperforator autologous reconstruction.[6]

Numerous reports detailing the long-term complications of implant reconstruction exist within literature.[5,7] When discussing options with patients, we usually refer to statistics provided by the implant manufacturers. At 1-, 3-, and 10-year after implant placement, Baker III/IV contracture was present in 29%, 30%, and 59% of patients who received implants, respectively.[8] At 1-, 3-, and 10-year after implant placement, removal of the implants occurred in 10%, 27%, and 45% of patients who received implants, respectively.[8]

As a result of these long-term complications of implant-based reconstruction, there exists a growing portion of women with implant-based reconstruction who present requesting removal of their implants in favor of autologous reconstruction. This type of reconstruction is termed tertiary reconstruction, compared with primary reconstruction, at the time of mastectomy, and secondary reconstruction (delayed reconstruction), which is performed after the mastectomy.

While there is no shortage of literature both describing and validating autologous breast reconstruction, and specifically, perforator-based autologous breast reconstruction, there is a dearth of literature examining the motivation or the outcomes of tertiary breast reconstruction. The few studies that exist describing implant salvage, or tertiary reconstruction, demonstrate that autologous reconstruction using latissimus dorsi, abdominal tissue, and gluteal tissue is effective and meets the aesthetic expectations of the patients[9–11]; however, they have uniformly small sample sizes and do not clearly elucidate patient motivation for the tertiary reconstruction. Most recently, Visser et al published the most comprehensive outcomes study supporting the use of autologous reconstruction for implant failures.[12]

The purpose of this study is to examine tertiary breast reconstruction trends in a single surgical group practice with a high-volume of perforator-based, autologous breast reconstructions. Specifically, we sought to evaluate[1] the severity of implant complications,[2] motivations for tertiary reconstruction,[3] patient characteristics, and[4] outcomes after tertiary reconstruction using perforator-based free flaps.

## PATIENTS AND METHODS

### Patient Sample

Between January 1998 and December 2008, 1846 free flaps were performed on 1844 patients. A total of 284 flaps were com-

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pleted after unsatisfactory implant reconstruction on 191 patients (15.4% of flaps performed during that period).

## Measures

### Surgical Data

Surgical outcomes and complications were assessed using a prospectively maintained database that included patient demographics, surgical data, and complications. Metrics evaluated included patient motivation for tertiary reconstruction, Baker grade capsular contracture, radiation, diagnoses, outcomes, and complications.

## RESULTS

In total, 284 tertiary breast reconstructions were performed in 191 patients. Of these, 98 patients underwent unilateral reconstruction and 93 patients underwent bilateral reconstruction. All patients were reconstructed using perforator flaps. The majority of patients were reconstructed using deep inferior epigastric perforators (DIEP) flaps (n = 164), followed next by superior gluteal artery perforator flaps (n = 50), inferior gluteal artery perforator (n = 35), superficial inferior epigastric artery (n = 30), and then by transverse upper gracilisflaps (n = 5). Patient characteristics are listed in Table 1.

Severity of implant complications was assessed by assessing Baker grade capsular contracture, history of infection, as well as documenting subjective patient reports of pain, desire for more natural appearance, asymmetry, and general dissatisfaction with appearance of implant reconstruction (not related to a desire for a natural appearance). In all, 117 (41%) implant reconstructions were classified as Baker I or II and 97 (34%) were classified as Baker IV. A total of 22 (8%) implant reconstructions were explanted secondary to infection, whereas 14 (5%) implant reconstructions were explanted for noninfection-related reasons including pain, seroma, deflation, and symmetry. Severity and types of implant complications are listed in Table 2. Motivation for seeking tertiary reconstruction is listed in Table 3.

**TABLE 1.** Characteristics of Patients Who Underwent Tertiary Reconstruction in Our Series

| Characteristics | N = 191 Patients |
|---|---|
| Age at time of tertiary reconstruction (yr) | |
| Median | 49 |
| Range | 21–66 |
| Medical comorbidities | |
| Hypertension | 60 (30.1%) |
| Diabetes | 3 (1.6%) |
| History of DVT or PE | 6 (3%) |
| Total flaps | N = 284 flaps |
| Unilateral | 98 (34.5%) |
| Bilateral | 93 (65.5%) |
| Breast pathology | |
| Invasive ductal carcinoma | 152 (53.5%) |
| Prophylactic | 92 (32%) |
| Ductal carcinoma in situ | 18 (6%) |
| Cosmetic | 6 (2%) |
| Invasive lobular carcinoma | 5 (1.7%) |
| Lobular carcinoma in situ | 5 (1.7%) |
| Poland's syndrome | 3 (1%) |
| Cystosarcoma | 1 (<1%) |
| Fibroadenoma | 1 (<1%) |
| Congenital amastia | 1 (<1%) |

DVT indicates deep venous thrombosis; PE, pulmonary embolism.

**TABLE 2.** Severity and Types of Implant Complications

| Type of Implant Complication | Value |
|---|---|
| Baker I or baker II capsular contraction | 117 (41%) |
| Baker III capsular contraction | 34 (12%) |
| Baker IV capsular contraction | 97 (34%) |
| Explanation from infection | 28 (8%) |
| Explanation (noninfection-related) | 14 (5%) |

**TABLE 3.** Motivations for Tertiary Reconstruction by Baker Grade Classification

| | Baker I/II (N = 117) | Baker III (N = 34) | Baker IV (N = 97) |
|---|---|---|---|
| Desire natural | 74 (63%) | — | — |
| Pain | — | — | 65 (67%) |
| Appearance | 18 (16%) | 9 (26%) | 9 (9%) |
| Asymmetry | 3 (2%) | 15 (44%) | 14 (15%) |
| Other | | | |
| Feels implant | 5 (4%) | — | — |
| Itching | 4 (3%) | 1 (3%) | — |
| Difficulty sleeping | 2 (2%) | — | 2 (2%) |
| Cold intolerance | 2 (2%) | — | — |
| Size | 1 (1%) | — | — |
| Malposition | — | 7 (21%) | 2 (2%) |
| Synmastia | — | 2 (6%) | — |
| Concern for rupture | — | — | 3 (3%) |
| Rupture | — | — | 2 (2%) |

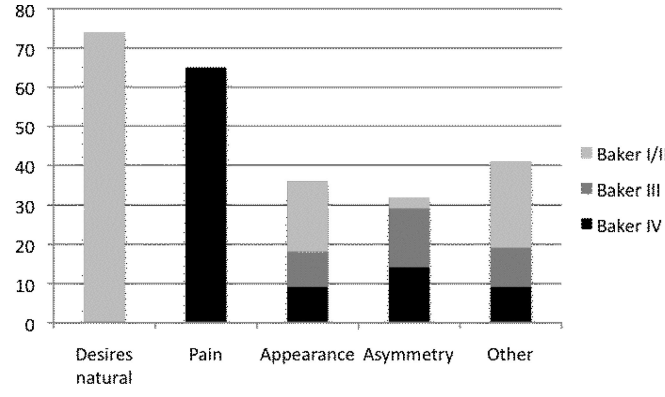


**FIGURE 1.** Motivations for tertiary reconstruction by Baker Grade classification.

To determine the effect of Baker grade on patients' motivations for autologous reconstruction, we sorted patient cited motivation into Baker grading of capsular contracture. These results are summarized in Figure 1. Further details of specific patient motivators for autologous reconstruction after implant reconstruction are listed in Table 3.

Effect of radiation treatment on patients desire for tertiary reconstruction was also tracked. Only 57 (20%) implant-based reconstructions received radiation and 224 (80%) implant-based reconstructions did not receive radiation.

### Surgical Results

Complications requiring a reoperation occurred in 21 (7.4%) of 284 flaps (Table 4). There were 3 (1%) flap losses (2 superior gluteal artery perforators, 1 DIEP) that were subsequently reconstructed with perforator flaps. Nine (3%) flaps returned to the operating room for venous congestions and required revision of the venous anastomosis for successful salvage. Two (0.7%) flaps returned to the operating room for inflow problems and were treated with revision of the arterial anastomosis for successful salvage. Seven (2.5%) patients required reoperation for evacuation of hematomas. Seven (2.5%) patients required seroma drainage in the office.

**TABLE 4.** Complications of Tertiary Reconstruction

| **Complications** | |
|---|---|
| Flap loss | 3 (1%) |
| Revision of venous anastomosis | 9 (3%) |
| Revision of arterial anastomosis | 2 (0.7%) |

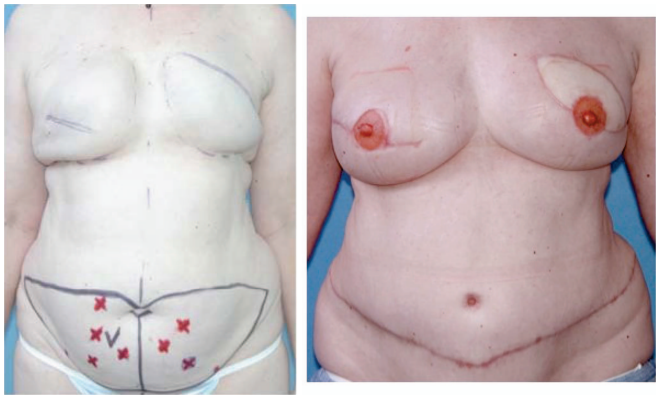

**FIGURE 2.** Clinical example of tertiary perforator-based breast reconstruction. A 53-year-old woman with history of breast cancer status post bilateral mastectomies with implant reconstruction (left). Status post removal of implant reconstruction and tertiary reconstruction with DIEP flap (right).

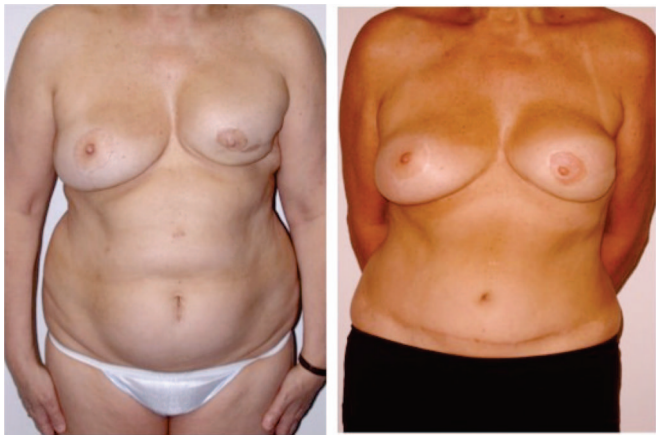

**FIGURE 3.** Clinical example of tertiary perforator-based breast reconstruction. A 44-year-old woman with history of breast cancer status post bilateral mastectomies with implant reconstruction (left). Status post removal of implant reconstruction and tertiary reconstruction with DIEP flap (right).

Twenty (7%) patients developed donor site wounds that were treated with local wound care. To improve aesthetic outcomes, 9 (3%) patients underwent reoperation for fat necrosis and 4 flaps required additional volume. All flaps requiring additional volume were treated by the recruitment of local tissue in the form of 2 thoracodorsal artery perforator flaps, 1 intercostal artery perforator flap, and 1 lateral thoracic artery flap. Figures 2 and 3 demonstrate clinical examples of our tertiary breast reconstruction.

## DISCUSSION

The aim of this study was to review our experience with tertiary perforator flap breast reconstruction. Specifically, we sought to describe the patient population that seeks autologous reconstruction after implant-based reconstruction. In addition, we aimed to elucidate the severity of the implant-based complications that lead to autologous reconstruction, as well as the motivation for these tertiary reconstructions. Finally, we described the outcomes of our tertiary perforator flap breast reconstruction series.

We believe this to be the largest series of tertiary breast reconstructions reported in the literature, perforator-based or otherwise. Previous studies have demonstrated the reliability of perforator flaps for primary and secondary reconstructions,[6,13] and now this series adds further utility to the perforator flap as a salvage procedure for dissatisfaction with implant-based breast reconstruction. The choice of perforator-based autologous breast reconstruction in the setting of implant explantation carries with it the same benefits it has in primary and secondary reconstruction.[6]

The volume of patients in this study is representative of the increasing trend toward tertiary breast reconstructions. This trend highlights the known drawbacks to implant-based breast reconstruction; however, we should not be surprised. US Food and Drug Administration-mandated clinical trials have revealed failure rates of implant-based breast reconstruction in the range of 50% at 7 years,[8,14] and these data are widely available to all reconstructive surgeons (and reconstructive patients). When breast implants fail to meet patients' expectations, many women seek alternative forms of reconstruction. Perforator flaps have gained popularity in this regard, as many women fear the loss of function associated with the sacrifice of muscle in several muscle-based rotational and free flaps.[15–18] Further, patients express concerns regarding abdominal wall bulging, as well as frank hernias, that are well known to be associated with the transverse rectus abdominus muscle flap experience.[19–23] Further, some patients are not comfortable with the use of prosthetic meshes and/or biologic matrices in the abdominal donor site in the attempt to avoid abdominal wall bulging and/or hernia. Perforator flaps offer a functional solution to those concerns because they are performed independent of muscle and nerve sacrifice. As a result, perforator flaps avoid the associated loss of function of muscle flaps, and they typically do not require the incorporation of prosthetic materials or biologic matrices in the repair of the donor site.

The senior author's practice has noted an increase in the number of tertiary breast reconstruction consultations, and we hypothesize that statistic will continue to increase in the following years. One reason is the growing availability of microsurgeons to the general community. In the past several years, a number of formerly tertiary-care center-based microsurgeons have found new homes in community hospitals that are increasingly capable of supporting thriving microsurgery programs. The larger number of microsurgeons translates into more reconstructive options being available to breast cancer patients who are being treated in the community. This has a both direct and indirect effect on the increase in tertiary reconstructions. Patients with severe implant problems, such as infections, capsular contracture, pain, and malposition, may have

access to microsurgeons, whereas they did not have so in the past. Further, the presence of these new microsurgeons translates into greater numbers of primary and secondary autologous reconstructions. Satisfied breast reconstruction patients have numerous outlets to share their enthusiasm (or lack thereof) with other cancer patients needing reconstruction. The senior author notes many of his tertiary reconstruction patients reporting envy of friends, relatives, or acquaintances with autologous reconstructions as motivators in seeking revision reconstruction.

Most patients who presented with implant dissatisfaction who wanted a more natural appearance reported desiring a breast with ptosis, softness, and an organ that will change with them as they age and have weight gains and losses. Those patients who wanted a better-appearing breast regularly complained about the upper pole shelf and roundness of their breast. Other common specific reasons given for desiring implant removal were not being able to find a bra that fit, fear of inevitable implant exchange operations, fear of rupture, not feeling comfortable hugging friends and family because of the firmness of the implants, and implant-related discomfort when sleeping prone. Rare reasons cited for wanting removal of implants were that the implants felt cold in the winter and caused severe itching (that did go away after removal).

Ultimately, many of the factors that influence patients to inquire about tertiary reconstruction have a root cause related to patient education at the time of the initial reconstruction consult. This is not to say that a well-informed patient might not choose implant-based reconstruction, it just underscores the importance of informed consent. Even if a surgeon does not offer every type of breast reconstruction option in their practice, the patient should be well educated regarding all of their options, even if that includes going outside of the practice. We believe a thorough conversation includes primary implant-based reconstruction, tissue expander/implant-based reconstruction, autologous tissue plus implant-based reconstruction, and autologous only reconstruction (including pedicled flaps, free muscle-sparing flaps, and perforator flaps). Each of these options has a unique profile of short- and long-term complications. Even in ultra-specialized practices where there is some assumption that patient had sought out a particular surgeon for a specialized surgery; we believe that all options should be reviewed.

In our study, 41% (117 implants) of patients desiring removal of their implant-based reconstruction had only Baker I or Baker II grade capsular contracture. Of those 117 implants, 73 implants (63%) were removed with the chief reported motivation that the patient desired a "more natural" appearance. We believe this is further evidence of lack of patient understanding when choosing implant-based reconstruction. With only Baker I or Baker II contracture, no complaints of asymmetry, malposition, or evidence of infection, most would agree that these patients had acceptable results for implant-based reconstruction. However, the chief complaint of desiring a "more natural" appearance speaks to a preoperative misperception regarding the aesthetic result of implant reconstruction. These patients have the results that were theoretically promised, but are now exhibiting a certain "buyer's remorse."

The patients in our study with Baker III and IV contracture had more predictable motivations for desiring removal of their implants. Of patients with Baker III contractures, 70% (24 implants) sighted either pain or asymmetry as chief motivators for pursuing tertiary reconstruction. Also in line with expectations is that, 67% (65 implants) of our patients with Baker grade IV contractures sighted pain as the chief motivator for removing their implants.

We examined the hypothesis that women with low-grade capsular contracture after implant-based reconstruction may not have not been offered autologous reconstruction because of a paucity of abdominal tissue necessary for appropriate size match in reconstruction. Although we do not have BMI data on our patient series, this hypothesis seems unlikely given the majority of tertiary reconstructions in our series were ultimately reconstructed with DIEP flaps, unless they had large body habitus changes during the interval between the original reconstructions and their tertiary reconstructions.

Another hypothetical risk factor for tertiary reconstruction we examined is radiation therapy. However, only 20% of the tertiary reconstruction patients in our series underwent radiation therapy, making this possibility unlikely as well.

Limitations of our study include no formally standardized assessment of patient satisfaction with either the original or new reconstructions. We also recognize that the senior authors practice is highly specialized and likely disproportionately attracts patients desiring tertiary reconstructions. Further, secondary to the nature of the senior author's practice, many patients travel long distances for their tertiary reconstructions and for this reason receive follow-up care in local practices close to their homes. It is possible that we are not aware of and therefore did not report revision procedures to the perforator flap reconstructions that were performed my surgeons outside of this practice.

## CONCLUSIONS

This study demonstrates that breast reconstruction using perforator-based flaps is a technically feasible as well as a reliable option for women who have previously undergone implant-based breast reconstruction. Tertiary breast reconstruction with autologous tissue is an a viable option for women who have known complications of implant-based reconstructions.

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