De-Mythifying Breast Reconstruction: A Review of Common Misconceptions about Breast Reconstruction

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Currently, only 40% of women in the United States who undergo mastectomy for cancer treatment also undergo immediate breast reconstruction, with considerable geographic and socioeconomic variability in the rates of these procedures.[1] Although this overall percentage has been increasing steadily during the past 20 years, and is projected to grow in the future, it is likely that many more patients are candidates for reconstruction at the time of mastectomy, but are instead relegated to delayed reconstruction or, in some cases, never undergo these procedures. This is important because previous studies have shown that reconstruction is associated with substantial improvements in quality of life.[2,3] In addition, options are available for virtually all women who undergo mastectomy.

Although it is likely that numerous factors contribute to the relatively low rates and geographic variability in immediate breast reconstruction, one potential issue might be misconceptions or outdated ideas about potential complications or issues that can arise in patients who undergo these procedures. For example, in one survey of breast cancer specialists, nearly one-third of surgeons believed that breast reconstruction can adversely delay detection of local recurrence, and 17% thought that it was associated with high morbidity.[4] However, recent large-scale studies from multiple high-volume institutions have shown that these numbers are exaggerated considerably. The purpose of this review was to consider the common misconceptions in the literature about immediate breast reconstruction and summarize the best evidence available for and against these procedures in various patient populations.

METHODS

A review of different aspects of breast reconstruction was performed using a search strategy that included the key terms: *breast reconstruction*, *chemotherapy*, *radiation*, *adjuvant therapy*, *autologous reconstruction*, *implant-based reconstruction*, *free-flap breast reconstruction*, *pedicled flap breast reconstruction*, *TRAM reconstruction*, *latissimus flap reconstruction*, *patient satisfaction*, *cancer recurrence*, and *cancer recurrence diagnosis*. The search terms were applied to electronic bibliographic databases (PubMed and Google Scholar) to find all relevant studies. No limits were applied to year of study; however, we did exclude publications that were not in the English language. Only studies describing breast reconstruction were included. Additional review of relevant articles not found in the electronic bibliographic search was performed using a hand search of references, tables, and abstracts from each article. The articles were sorted by level of evidence, and only articles with a level of evidence of III or higher were used. The articles were also analyzed by number of patients, with greater weight given to studies with larger sample sizes, and relevance to the hypothesis being examined.

Myth 1: Women do not care whether they undergo breast reconstruction

In 1998, the federal government passed the Women's Health and Cancer Rights Act, which guaranteed universal coverage for women undergoing breast reconstruction for postmastectomy or postlumpectomy defects.[5] Many state laws go farther and include coverage of symmetrizing procedures on the contralateral breast.[6] But women will not be able to avail themselves of the opportunity for reconstruction if they are not aware that it exists. A recent analysis of the nationwide data demonstrated that only 37.8% of nearly 16,000 women in the United States undergoing mastectomy had breast reconstruction.[1]

Why are so many women not having breast reconstruction? There are many different contributing factors. Increasing age, non-white ethnicity, and lack of private insurance—characteristics that practitioners will be unable to change—have all been shown to decrease reconstruction rates.[7,8] However, it is more likely that these factors contribute to a lack of access or information about reconstruction than actual informed decisions not to undergo reconstruction. In a level III study of women undergoing postmastectomy breast reconstruction, the single

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greatest predictor of whether a woman underwent breast reconstruction was the mention of reconstruction by the breast surgeon in the initial consultation—greater than age, ethnicity, socioeconomic background, or postmastectomy radiation.[9] Increasingly, legislators have attempted to correct this problem on a state level. In 2012, New York State mandated that hospitals and physicians inform women of the option of breast reconstruction after mastectomy.[5]

It is likely that these laws will contribute to increasing the numbers of women undergoing breast reconstruction. But are patients more satisfied if they have reconstruction? There are no level I randomized studies that examine this question. Part of the difficulty is that patients who elect to have reconstruction are often different from those who do not, not only in terms of age, socioeconomic status, and race, but also in terms of the emphasis during treatment of eradication of the cancer vs restoration of body image.[10] The benefit of reconstruction depends to a great extent on individual circumstance and patient preference.[10]

What do we know? The best available evidence we have is level II prospective studies. The largest prospective cohort study (n = 250) examined psychosocial outcomes in women who underwent either immediate or delayed reconstruction with both implant-based and autologous techniques.[3] Outcomes assessed included emotional well-being, vitality, general mental health, social functioning, functional well-being, social well-being, and body image. Substantial improvements from preoperative level in every category were seen at 1-year postoperative evaluations.

How does this compare with women who had mastectomy alone without reconstruction? Multiple studies show a substantial benefit to body image with breast reconstruction. A level II multicenter prospective study (n = 103) examined the psychological implications of women's decisions for or against breast reconstruction. The following groups were compared: mastectomy alone, immediate reconstruction, or delayed reconstruction. All 3 had reduced psychological distress postoperatively, but were still conscious of an altered body image, regardless of breast reconstruction.[11] A larger retrospective level III study compared wide local excision, mastectomy alone, and breast reconstruction (total n = 577). Patients who underwent mastectomy without reconstruction demonstrated substantially worse body image and self-esteem, higher anxiety and depression, and negative changes in perceptions of sexuality than did women who either retained their breast after lumpectomy or had breast reconstruction.[2]

In a recent retrospective cohort study from Australia, a validated questionnaire (the BREAST-Q) was used to compare 79 patients who underwent reconstruction with 64 who did not undergo reconstruction.[12] The reconstruction group showed statistically significantly higher BREAST-Q scores with regard to satisfaction with the breast ($p < 0.0001$), psychological well-being ($p = 0.0068$), and sexual well-being ($p = 0.0001$). For the reconstruction group, the main reasons for undergoing reconstruction included improved self-image, more clothing choices, and the feeling of overcoming the cancer. One third of nonreconstructed patients still feared that reconstruction would mask cancer recurrence.[12] This last point shows the importance of the evidence in myths 3 and 4 in dispelling any patient concerns about rate or diagnosis of recurrence.

A patient's decision to undergo reconstruction is a complex interaction of preference, psychosocial stability, and body image. It is difficult to untangle preoperative perceptions with assessment of outcomes. In several studies, women who had higher levels of depression and lower preoperative body image were less satisfied with the postoperative result.[11,13,14] In this vulnerable population, extensive preoperative discussion is particularly important. In a level III study of patients who had undergone both implant-based and autologous reconstruction (n = 123), less satisfaction with preoperative information directly correlated with higher moderate to severe regret with their decision.[14]

Takeaway

Breast reconstruction might not be the right choice for every patient, but every patient deserves to have a complete discussion before cancer treatment to make a fully informed decision. The more involved they are in the decision process, the more likely they are to be satisfied with postoperative outcomes. Special care must be taken with patients who have a history of depression or negative body image because these patients are more likely to be unhappy with the result regardless of their choice for or against reconstruction.

Myth 2: Breast reconstruction increases the risk of postoperative complications

It might be easy to assume that reconstruction increases the overall risk of postoperative complications. Reconstruction adds another level of complexity to the mastectomy, in addition to potentially stressing the mastectomy flaps with tissue expansion or adding another surgical site with autologous reconstruction. However, the evidence is not as straightforward. O'Brien and colleagues[15] performed a level III study comparing postoperative wound complications in 298 patients with mastectomy alone vs 113 patients who also underwent immediate breast

reconstruction (IBR). The hospital stay was longer in patients without reconstruction (4.4 days) than in those with IBR (3.8 days; $p < 0.05$), possibly because these patients were older and had more advanced disease. Overall incidence of complications, including wound complications, was similar between the two groups, 28% for patients without reconstruction and 31% for patients with IBR. This is a relatively high rate of complications, but the authors included relatively minor complications, like seroma, that can be treated easily in an office setting.

In a more recent study, Zhong and colleagues[16] prospectively studied a similarly large group of consecutive patients that included both implant-based and autologous reconstruction. Two hundred forty-three women who underwent mastectomy alone were compared with 148 women who underwent mastectomy and IBR. Both major complications—including reoperation for any reason, prolonged hospital stay, or readmission to hospital or a major medical complication (such as pulmonary embolus)—and minor complications were examined. The most common major complication in the IBR group was hematoma evacuation. After adjusting for laterality, BMI, smoking, previous breast irradiation, and sentinel lymph node dissection, no significant difference in the incidence of overall and major postoperative complications between the two groups was found on multivariate analysis. In addition, the IBR group had a significantly higher incidence of preoperative radiation (34% vs 2%), which is an independent risk factor for wound complications.[16]

In a much larger study published in 2014, Fischer and colleagues[17] compared 30-day perioperative outcomes in 30,440 women who underwent mastectomy alone vs 12,383 who also underwent IBR with tissue-expander placement. The patients were identified using CPT code in the American College of Surgeons NSQIP database from 2005 to 2010. Immediate breast reconstruction using tissue expander was not found to be associated with greater risk of wound (3.3% vs 3.2%; $p = 0.855$), medical (1.7% vs 1.6%; $p = 0.751$), or overall (9.6% vs 10.0%; $p = 0.430$) complications. However, it is important to note that because these outcomes are limited to 30 days, they likely represent an underestimation of actual complications, particularly those related to infection.

The same group from the University of Pennsylvania also compared autologous and implant-based breast reconstruction using the same large database.[18] This study evaluated 3 categories of complications in patients undergoing breast reconstruction and did not directly compare them with those undergoing mastectomy alone. Patients included in the study were 16,063 women who underwent breast reconstruction, including both autologous (20.7%) and implanted-based (79.3%) reconstruction.

The rate of complications was found to be remarkably low: 8.4% for major surgical complication, defined as deep wound infection, flap or prosthetic loss, or an unplanned return to the operating room within 30 days; and 3.5% for wound complications, which included both superficial surgical site infections or wound dehiscence. There was only a 1.6% incidence of medical complications, defined as pneumonia, pulmonary embolism, postoperative renal insufficiency, urinary tract infection, stroke, MI, symptomatic deep venous thrombosis, sepsis, or septic shock. Independent risk factors for major surgical complications included immediate and autologous reconstruction, obesity, smoking, previous percutaneous cardiac surgery, recent weight loss, bleeding disorder, recent surgery, American Society of Anesthesiologists classification ≥ 3, intraoperative transfusion, and prolonged operative times.[18] Prolonged operative times have also been found to be a significant risk factor for complications in several other studies evaluating patients after breast reconstruction,[19,20] most likely as both an indicator and a cause of a difficult intra- and postoperative course.

There is an excellent concordance with this low rate of major complications in a retrospective review of 1,195 patients during an 11-year period.[21] Mehrara and colleagues[21] found that 7.7% of patients had a major complication, the majority of which were related directly to the flap itself (including partial or complete flap loss or hematoma). Only 1.2% of patients suffered a major medical complication.

Takeaway

There are similar complication rates in patients who undergo mastectomy with and without reconstruction. Patients who are at high risk for complications from any surgery (eg, patients who are obese, smokers, American Society of Anesthesiologists >3, etc) would be at greatest risk for complications from breast reconstruction. The rates of major complications are very low.

Myth 3: Breast reconstruction delays adjuvant therapy

Although NIH guidelines recommend initiation of adjuvant chemotherapy as soon as possible (within 31 days post mastectomy), there has been no clear definition of the interval between mastectomy and adjuvant therapy that affects outcomes.[22] Based on the best clinical evidence, including a retrospective review by Lohrisch and colleagues[23] showing a significantly inferior survival rate in patients with stage I to II carcinoma for whom chemotherapy was delayed >12 weeks post mastectomy, current guidelines recommended the initiation of adjuvant chemotherapy 4 to 12 weeks post mastectomy.[22,23]

Does breast reconstruction delay the initiation of this therapy and, if so, is it clinically significant? The literature does not provide a clear and definitive answer. Several studies show no difference in time to initiation of chemotherapy or in the rate of complications during chemotherapy. Mortensen and colleagues[24] compared 39 patients who underwent mastectomy alone vs 42 patients who underwent IBR, including both implant-based and autologous reconstruction. The time to initiation of chemotherapy was not significantly different between the two groups (1.54 months for mastectomy alone vs 1.70 months for reconstruction), with no difference in the rate of delay for initiation of chemotherapy (2 patients in each group). In both groups, 3% of patients had surgical site complications during chemotherapy.[24]

Although there are some studies that do show a delay in initiation of adjuvant chemotherapy after immediate breast reconstruction, the relative delay is small and is of unclear clinical significance. In a small retrospective case-control analysis, 35 patients with stage I or II breast carcinoma who elected to undergo breast-conservation therapy were matched to women who elected to have mastectomy with immediate reconstruction. For breast-conservation therapy and mastectomy with immediate reconstruction, the median time to chemotherapy initiation was 38 days (range 25 to 103 days) and 55 days (range 30 to 165 days), respectively. Patients undergoing mastectomy with immediate reconstruction were more likely to experience a significant delay in the initiation of chemotherapy (>90 days; 7 patients [20.0%] vs 1 patient [2.9%]; $p < 0.001$).[25] It is not clear that this is in fact a clinically significant "delay" because it falls within the large window of acceptable timing for treatment. In addition, the matching in this case might also be imperfect for numerous reasons. First, the matching was not between mastectomy with reconstruction vs mastectomy alone but rather with breast-conservation therapy, which is a much smaller and less invasive procedure than a mastectomy. Second, the sample size is small and the study is retrospective, meaning that there might be more actual differences between the two groups of patients despite the best effort to match them.

In a retrospective review of 6,662 patients with stage I to III cancer requiring adjuvant chemotherapy within National Comprehensive Cancer Network institutions, postmastectomy reconstruction led to a treatment delay of 2.7 weeks with a mean of 12 weeks for all patients ($p < 0.001$).[26] In the article, Vandegrift and colleagues[26] emphasized the importance of the initiation of chemotherapy within 120 days of diagnosis as recommended by American Society of Clinical Oncology/National Comprehensive Cancer Network quality measures. These measures recommend chemotherapy for stage II and stage III patients with hormone receptor−negative cancer be initiated within 120 days of diagnosis. One hundred twenty days was considered a "reasonable estimate of the time required to deliver the preceding components of therapy that would not jeopardize outcome."[27] With a mean of 12 weeks, even a delay of 2.7 weeks puts these patients well within the 120-day window and demonstrates, in fact, that the delay is not clinically significant.

In a larger prospective study of consecutive patients that included both implant-based and autologous reconstruction, 243 women who underwent mastectomy alone were compared with 148 women who underwent mastectomy and IBR.[16] One hundred six patients received adjuvant chemotherapy; median time from mastectomy to chemotherapy was 6.8 weeks (range 0.71 to 15 weeks) in the mastectomy alone group ($n = 96$) compared with 8.5 weeks (range 6.3 to 11 weeks) in the IBR group ($n = 10$) ($p = 0.01$). This is a very small (<12 days difference) between the two groups, which is most likely not a clinically significant delay based on current recommendations.

Free flap reconstruction can potentially lead to the greatest delay in adjuvant therapy because of the complexity and length of the initial surgery, as well as the addition of a second surgical site, usually the abdomen. Chemotherapy cannot be initiated until all postoperative wounds are sufficiently healed, and a greater incidence of wound complications has been demonstrated in the autologous group when compared with the implant-based reconstruction group.[24]

One study from Europe looked specifically at patients who underwent autologous free flap breast reconstruction.[28] Twenty-seven patients who underwent autologous free flap reconstruction were compared with a control group of 139 patients who did not undergo reconstruction.[28] The free flap patients had considerably more advanced cancer than the control group, a potentially confounding factor, as these patients might be more fragile and at greater risk for complications. The mean time to initiation of chemotherapy was 15 days longer in the flap group than in the control group (55 days vs 40 days). The initiation of chemotherapy was delayed past 6 weeks in 28.8% of the control group vs 67% of the flap group, and past 12 weeks in 3.6% of the control group vs 7% of the flap group. The most common reasons for delay were flap and donor site complications, the greatest reason being flap failure.[28]

Takeaway

In the vast majority of patients, breast reconstruction with implants is well tolerated and rarely results in a delay of chemotherapy. Autologous reconstruction does tend to

delay adjuvant therapy in general due to the more complex nature of these procedures. However, these delays often fall within the accepted window for the initiation of chemotherapy and are not clinically significant in the vast majority of cases.

Myth 4: Autologous reconstruction is morbid

Autologous reconstruction is a broad category that encompasses any technique where the breast is reconstructed from the patient's own tissue. This includes both pedicled techniques, where the artery and vein remain attached to the flap, and more technically demanding microvascular free flap techniques, which involve cutting the artery and vein to the flap and re-attaching the blood vessels in the region of the breast to be reconstructed. The length of the procedure varies both by the procedure—immediate vs delayed, unilateral vs bilateral reconstruction—and by the expertise and number of surgeons. The length of stay—averaging between 3 and 7 days—is typically longer after an autologous reconstruction than it is after an implant-based reconstruction, after which the patient remains hospitalized as she would be for a mastectomy alone, approximately 1 day per mastectomy.[29,30]

Major systemic complications

There are multiple studies in large numbers of patients demonstrating the safety of autologous reconstruction. In a level III study of 225 consecutive patients undergoing microvascular breast reconstruction with perioperative thromboprophylaxis according to guidelines by American College of Chest Physicians, there was a 5% rate of bleeding complications. No patients were diagnosed with pulmonary embolus; 3.4% of these patients, who were screened for deep vein thrombosis by ultrasound, were found to have clinically silent deep vein thromboses.[31] In another retrospective review of 500 consecutive patients, there were no episodes of MI, congestive heart failure, pneumonia, deep vein thrombosis, or pulmonary embolism.[32] In a retrospective review of 1,195 patients, there was only a 1% risk of serious complications, including congestive heart failure and sepsis.[21]

Flap and donor site complications

This does not mean that these procedures are without local complications, especially in specific high-risk patient populations. Active smokers have consistently elevated levels of flap complications, like marginal necrosis, and donor site complications. In a prospective study of 624 free flaps, smokers had a 9% risk of flap complications and a 12% risk of donor site complications, and often problems with wound healing.[33] In Chang and colleagues,[34] the largest multicenter level III study (n = 718), smokers had a significantly higher incidence of mastectomy flap necrosis than nonsmokers (18.9% vs 9.0%; p = 0.005).[34] Smokers also had an increased risk of donor-site complications, including abdominal flap necrosis, than former smokers (25.6% vs 10.0%; p = 0.001) or nonsmokers (14.2%; p = 0.007). However, these studies also show no evidence for increased risk of flap failure.[33,34]

Obese patients (BMI >30 kg/m^2) are another high-risk group. In the Seidenstuecker and colleagues[33] prospective study, obese patients had a 15% rate of flap complications, including a 3.4% rate of partial or complete flap loss—the highest of any subgroup examined—in addition to a 6% rate of donor site complications. Mehrara and colleagues[21] demonstrated that obesity was an independent predictor of complications, especially at the donor site. This was also found to be true for patients undergoing pedicled flaps, both at the flap and donor sites.[35]

The safety of reconstruction in elderly patients (aged older than 65 years) is addressed elsewhere.

Free vs pedicled flaps

There are two pedicled flaps commonly used for breast reconstruction: transverse rectus abdominis myocutaneous (TRAM) and latissimus dorsi flaps. Pedicled TRAM flaps have been compared with both free TRAM flaps and implant-based reconstruction. A level II multicenter study by Alderman and colleagues[36] (n = 183) demonstrated that peak torque for trunk flexion at year 2 was significantly decreased in patients with TRAM compared with those who underwent expander and implant reconstructions ($p < 0.05$), with a 6% to 19% decrease in flexion peak torque. No significant difference in flexion peak torque was found between patients with free and pedicled TRAM reconstructions. However, the effects of these deficits on patients' day-to-day quality of life remain unclear.[36] An equivalence was also found in a retrospective study by Serletti and Moran[29] comparing 125 patients who underwent pedicled and free TRAM flaps. Length of hospital stay was similar (7 days for free vs 8 days for pedicled). No significant differences were seen in hematoma, wound infection, partial/total flap loss, deep vein thrombosis, or long-term in abdominal bulge or hernia.

However, other studies have shown an increased risk of ischemic flap complications in pedicled TRAMs, especially in obese patients. In a retrospective level III study of 301 consecutive patients, Andrades and colleagues[37] found a lower rate of ischemic complications (ie, wound healing problems, skin flap necrosis, fat necrosis, and partial and total flap loss) in patients who underwent free vs pedicled TRAM flaps. In another large retrospective review of 221 patients, Moran and Serletti[38] found a significantly higher rate of flap loss with pedicled vs free TRAM in obese patients

(BMI >25.8 kg/m^2), especially if the patient was also smoking.

There is a physiologic explanation for this observed difference. Although they harvest the same abdominal tissue, the vascular pedicles to pedicled and free TRAM flaps are different. Pedicled TRAM flaps, first described by Hartrampf and colleagues[39] in 1982, are supplied by the superior epigastric artery, the final branch of the internal mammary artery. Free TRAM flaps, on the other hand, are supplied by the deep inferior epigastric artery. This system can offer a more robust blood supply to the flap than does the superior epigastric artery, often a smaller-caliber "choke" vessel.[40] The flaps of obese patients, who often have larger breasts to reconstruct requiring larger flaps harvested from the abdomen, may have more complications if the blood supply is inadequate.

The latissimus dorsi flap is another alternative reconstructive technique. This flap, based on its thoracodorsal pedicle, is rotated through a subcutaneous tunnel underneath the axilla to recreate a new breast with or without an implant. In a prospective study of 58 patients who underwent latissimus dorsi breast reconstruction, evaluations were performed preoperatively and at 8 time points in the first 3 years postoperatively using the self-administered Disabilities of the Arm, Shoulder and Hand outcomes measure.[41] Scores at the first clinic visit, 6 weeks and 3 months postoperatively, were clinically and statistically significantly elevated from the preoperative mean. Long-term scores were consistent with normal function, although elevated from preoperative values. However, long-term shoulder dysfunction did develop in a subset of patients. Higher preoperative Disabilities of the Arm, Shoulder and Hand score (worse shoulder function) correlated with poor postoperative outcomes.[42] These results agree with the majority of the published literature, although there is a wide range in method of strength testing and follow-up.[43,44]

Long-term complications

Flaps that are harvested from abdominal tissue often require harvest of rectus abdominis fascia and some or all of the rectus abdominis muscle, in addition to a transversely oriented paddle of skin and soft tissue. These TRAM flaps can be harvested as either pedicled or free flaps. If some rectus muscle remains after harvest, it is called a muscle-sparing TRAM flap. Alternatively, the flap can be based on the deep inferior epigastric vessels perforating through the rectus muscle or the superficial inferior epigastric artery coursing above the fascia from the external iliac vessels below, giving rise to the deep inferior epigastric perforators (DIEP) or superficial inferior epigastric artery flaps. This category of flaps is known as "perforator flaps" because no muscle is intentionally harvested as part of the procedure.[40] Because TRAM, muscle-sparing TRAM, and DIEP flaps all involve incisions through the rectus abdominis fascia and dissection or harvest of the muscle, abdominal bugle and hernia are known long-term complications of all 3 procedures. There is a debate within the plastic surgery literature about the relative morbidity of these different procedures.

In a blinded prospective cohort study conducted by Selber and colleagues,[45] 157 patients had preoperative and 1-year postoperative objective strength testing of their abdominal wall. Patients who had bilateral TRAM flaps had a considerable decline in upper and lower abdominal strength compared with those who had bilateral DIEP or superficial inferior epigastric artery flaps. There was no significant difference in patient assessment of abdominal wall function postoperatively between the patients who underwent TRAM flaps with those who did not.[45] These authors point out that there is great inter-surgeon variability in the method of harvest, for example, the amount of muscle taken in a muscle-sparing TRAM, which makes accurate comparison between any 2 or 3 techniques difficult.

In a systematic review of 20 studies on abdominal wall function after autogenous tissue breast reconstruction, Atisha and Alderman[46] found that women who underwent bilateral pedicled or free TRAM flaps had a measurable decrease in muscle function postoperative, for example, ability to perform situps, and that this translated into a substantial decrease in activities of daily living, recreational, and laborious activities. However, all other categories of patients, including those with bilateral muscle-sparing TRAMs or DIEP flaps and those with unilateral pedicled or free TRAMs, had no impairment in their activities of daily living. There was no difference in postoperative function of patients with pedicled vs free TRAM flaps.[46]

Takeaway

Autogenous reconstruction is associated with an overall very low level of morbidity. The risk of major complications is very low, and the majority of patient complications are minor and associated with wound healing. Even patients who are ordinarily at high risk for surgical complications—including obese, elderly, and previous radiated patients—have relatively low rates of minor complications. Even though free flaps are more complex, when performed by experienced surgeons, the rate of morbidity and flap loss is very low and, in some series, even lower than in pedicled flaps. Perforator flaps are associated with less abdominal wall weakness, but it is unclear if this has a significant impact on activities of daily living.

Myth 5: Breast reconstruction increases risk of or delays diagnosis of recurrence

This concern arises from the fact that a breast implant or flap might obscure a small recurrent cancer below,

especially if on the chest wall. However, there are large trials from major cancer centers demonstrating that breast reconstruction, whether implant-based or autologous, does not increase the risk or delay diagnosis of cancer recurrence. In addition, when a recurrence is identified, the presence of reconstruction does not alter treatment options or outcomes.

There have been multiple large studies during a 20-year period that demonstrate no increased rate of recurrence with breast reconstruction. In 1985, Noone and colleagues[47] published a 6-year retrospective review of 185 patients who underwent IBR with a mean follow-up of 26 months. Techniques of IBR included both implant-based and autologous reconstruction. Recurrent disease was found in 0% of stage I patients, 5% of stage II patients, and 13% of stage III patients.

In 1994, a follow-up study of 306 patients was published that included the patients from the earlier cohort and extended the retrospective review to 13 years.[48] During a minimum follow-up period of 3 years, with a mean of 6.4 years, recurrent disease developed in 60 patients (19.6%), at a mean interval to recurrence of 31 months. The first locations of recurrences were local,[16] regional,[11] and systemic.[33] Recurrence included stage I in 7 patients (5.2%); stage II in 45 patients (32.1%); and stage III in 8 patients (40%). The recurrence rates in both studies by Noone and colleagues fall within expected rates for patients undergoing mastectomy alone.[47,48]

A retrospective 15-year review from Memorial Sloan Kettering examined only patients who underwent autologous reconstruction.[49] Four hundred nineteen TRAM flap breast reconstructions were performed in 395 patients, with a mean time to follow-up of 4.9 years (range 1 to 14.7 years). Sixteen of 395 patients (3.8%) experienced local breast cancer recurrence, with a mean time to local recurrence of 1.6 years (range 0.2 to 7.0 years). Three of the 16 patients (19%) required removal of the entire TRAM flap to manage local breast cancer recurrence. Recurrence included ductal carcinoma in situ in 1 patient (1%); stage I in 3 patients (2.9%); stage IIa in 6 patients (9.5%); stage IIb in 3 patients (10.3%); and stage IIIa in 2 patients (10.5%). These recurrence rates are also in line with accepted national standards for patients undergoing mastectomy alone.

A smaller, more recent level III study also had similar results, showing no increase in risk with breast reconstruction. Liang and colleagues[50] performed a retrospective review of 249 patients who underwent skin-sparing mastectomy and immediate TRAM flap reconstruction, two-thirds of whom (67.1%) were diagnosed with stage II or stage III disease.[50] During a median follow-up period of 53 months, patients presented with 3 (1.2%) local, 13 (5.2%) regional, 34 (13.7%) distant, and 5 (2.0%) concurrent locoregional and distant recurrences. Median time to recurrences was 26 months (range 2 to 70 months) for all recurrences, 23 months (range 2 to 64 months) for locoregional recurrences, and 26 months (range 8 to 70 months) for distant recurrences. All local recurrent lesions were detectable by careful physical examination. Importantly, detection of local recurrence suggested the presence of distant metastasis (60.0%).

In a level III evidence study from MD Anderson Cancer Center, all cases of immediate breast reconstruction during a 10-year period were examined.[51] Types of reconstruction included both implant-based and autologous, including pedicled and free flaps. Local recurrence was found in 2.3% of patients (39 of 1,694). Twenty-eight patients had disease in the skin or subcutaneous tissue, and the remaining 11 had disease in the chest wall. In both groups, the time to detection of recurrence was similar (27.5 vs 29.5 months for skin/subcutaneous vs chest wall). In addition, patients with chest wall recurrence were more likely to have metastatic disease develop (91% vs 57%), have a poorer prognosis for remaining disease free (91% vs 57%; $p = 0.044$), and have shorter disease-free survival after treatment (2-year/5-year survival: 24%/24% vs 52%/42%; $p = 0.04$). This led to the conclusion that these patients would likely have had metastatic disease develop regardless of when their recurrence was diagnosed.

A matched-cohort study from Memorial Sloan Kettering had similar results.[52] Three hundred nine patients who underwent implanted-based reconstruction were matched to 309 patients who had not undergone reconstruction. The matching included both stage (I, II, or III) and age (within 5 years). Median time to detection of a locoregional recurrence was 2.3 years (range 0.1 to 7.2 years) in the reconstructed cohort and 1.9 years (range 0.1 to 8.8 years) in the nonreconstructed cohort ($p = 0.733$). They also found that management of recurrence in these patients did not necessitate implant removal. Twelve patients had a locoregional recurrence confined to the skin/subcutaneous tissue ($n = 9$) or musculature of the chest wall ($n = 3$), and 9 patients had a regional lymph node recurrence. Ninety-five percent (20 of 21) of locoregional recurrences in the reconstructed cohort were initially detected by physical examination.[52]

A more recent study confirms these findings. Yoo and colleagues[53] performed a retrospective review of 964 patients who underwent TRAM flap reconstruction after mastectomy. Sixteen (1.7%) had local cancer recurrence. Mean follow-up period until the detection was 31.1 months (range 7 to 84 months). Fourteen (87.5%)

patients had recurrence on the skin or in subcutaneous fat. Of the 16 patients, recurrence was detected by breast self-examination in 13 (81.3%) patients. Eight (50%) lesions mimicked benign lesions. In a case report, a recurrence was found 5 years after initial resection in the subpectoral pocket used for the tissue expander and implant.[54] These findings emphasize the importance of continued breast examinations and imaging to find rare yet possible recurrences.

Takeaway

Breast reconstruction, either with autologous tissues or implants, does not increase risk of, or delay diagnosis of, recurrence. Recurrences usually occur either in the skin or chest wall and are diagnosed with physical examination or radiologic evaluation. Patients should be encouraged to continue to perform self-examinations and have regular visits with their breast oncologist surgeon to increase the risk of detection of rare recurrence.

CONCLUSIONS

Through analysis of the literature for each breast reconstruction "myth," it is clear that the best evidence shows that there is a psychological benefit to understanding the options about breast reconstruction. In addition, breast reconstruction does not substantially delay chemotherapy or interfere with monitoring a patient's possible cancer recurrence. Both implant-based and autologous reconstruction can be performed safely with a low risk of local or systemic complications in appropriate patients.

Author Contributions

Study conception and design: Schneider, Mehrara
Acquisition of data: Schneider
Analysis and interpretation of data: Schneider, Mehrara
Drafting of manuscript: Schneider, Mehrara
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