



Narrative review of patient-reported outcomes of breast reconstruction

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Background and Objective: The treatment of breast cancer encompasses both the elimination of malignancy as well as reconstruction after tumor extirpation. Although the patient may have had successful treatment of her breast cancer, the resulting disfigurement and deformity can have a substantial impact on her physical and mental well-being. Breast reconstruction affords these patients the opportunity to correct these deformities and potentially to improve their quality of life. The current literature review evaluates patient-reported outcomes for the various options of breast reconstruction that are most commonly performed.

Methods: A literature review on PubMed with the key words “patient-reported outcomes”, “breast reconstruction”, and “breast cancer” yielded 738 results, which were screened. Articles that specifically focused on patient-reported outcomes after various types of breast reconstruction were evaluated and included in this literature review.

Key Content and Findings: The main options of alloplastic reconstruction, autologous tissue reconstruction, and oncoplastic reconstruction were reviewed and found to demonstrate high levels of patient satisfaction. Although there is no clear superior option, patient-reported outcomes demonstrate improved well-being compared to no reconstruction.

Conclusions: Breast reconstruction provides the opportunity to correct the deformities after breast cancer treatment making it a crucial component of comprehensive cancer care. A variety of reconstructive options are available which can be tailored to each individual patient to achieve the optimal results for that particular patient. Therefore patient-reported outcomes are paramount to gauge the true success of not only breast cancer treatment but also reconstructive aspects after treatment.

Keywords: Breast reconstruction; patient-reported outcomes; autologous tissue breast reconstruction; implant reconstruction; oncoplastic breast reconstruction

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Introduction

Breast cancer is the most common cancer affecting the female population, and the treatment of breast cancer requires a multidisciplinary approach including breast oncology, medical oncology, radiation oncology, and plastic and reconstructive surgery (1). Certainly, breast cancer treatment can span a long period of time, which will have a dramatic impact on the patients' quality of life. In the past when these patients had little or no options

for reconstruction, the sequelae from a mastectomy or lumpectomy with adjuvant radiation treatment were permanent and serve as a constant reminder of their battle with breast cancer.

Fortunately the field of plastic and reconstructive surgery has made tremendous progress with improved technology and innovative techniques. Currently breast reconstruction has become more common and offers a wide variety of options to help restore these patients' sense of self and

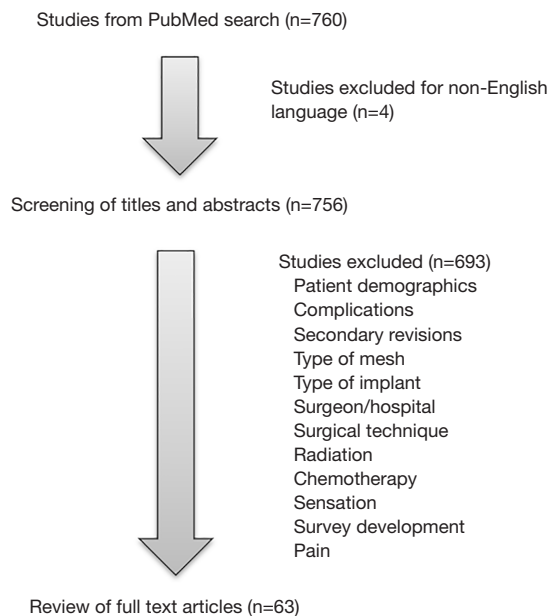


Figure 1 Literature review of patient reported outcomes for breast cancer reconstruction.

well-being. Patients now have the choice to undergo prosthetic reconstruction with implants or autologous tissue reconstruction with a multitude of free or pedicled flaps after a mastectomy. For those patients undergoing breast conservation treatment with a lumpectomy, oncoplastic reconstruction is also available to minimize the risks of deformity after radiotherapy (2).

Despite the wide array of options that are available, a successful reconstruction must be critically evaluated by not only the plastic surgeon but, more importantly, also by the patient. The treatment of medical diseases and conditions has recently shifted with a stronger focus on patient-reported outcomes (3-7). These data are extremely important to assess the effectiveness of treatment and surgical interventions while also incorporating input from the patient's perspective. There are multiple devices to evaluate patient-reported outcomes in the setting of breast cancer treatment such as the BREAST-Q, which have improved delivery of care in this patient population (8). These metrics provide a more standardized format to evaluate the patient's perception of her reconstructive results. This study reviews the results of breast reconstruction with particular focus on patient-reported outcomes after undergoing reconstruction. I presents this article in accordance with the Narrative Review reporting checklist (available at <https://atm.amegroups.com/article/view/10.21037/atm-23-1528/rc>).

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Methods

A literature review was performed on PubMed with the search terms “patient-reported outcomes”, “breast reconstruction”, and “breast cancer” (Figure 1). A total of 738 studies were identified and screened by the author where definitive patient-reported outcome measures were performed in the setting of breast reconstruction for cancer. Studies evaluating complications and patient demographics such as age, ethnicity, medical comorbidities, etc. were excluded. Moreover, any studies comparing types of implants, acellular dermal matrices, and secondary revisions are beyond the scope of this paper and were also excluded. Only articles written in English were included for review in the current study.

Discussion

Autologous tissue reconstruction

Autologous tissue reconstruction has evolved a great deal from the initial description of a pedicled transverse rectus abdominus myocutaneous flap (TRAM) by Hartrampf *et al.* (9). With advancements in surgical techniques, the development of free flaps offered a greater variety of options for autologous tissue reconstruction while also decreasing the risk of donor site morbidity (10,11). Patients now have to ability to undergo reconstruction using native tissue from the abdomen, buttocks, flanks, or lower extremities (12-21). In addition, further refinements have also allowed the plastic and reconstructive surgeon to restore sensation to the reconstructed breasts as well as to treat and to prevent lymphedema of the upper extremities (22-26).

Autologous reconstruction allows patients to use their native tissue as opposed to a prosthetic device. A recent prospective study of 73 patients undergoing 130 free deep inferior epigastric perforator (DIEP) flaps demonstrated significant improvements in all domains of breast satisfaction and sexual and psychosocial well-being after reconstruction in both the immediate and delayed settings (27). The same group reported improvement in quality of life metrics in obese patients compared to non-obese patients after reconstruction (28). Another large study of 1,790 patients revealed similar rates of satisfaction with abdominally-based flap reconstruction in all domains (29).

Although autologous flaps enable patients to undergo

breast reconstruction with their own tissue, there exist inherent characteristics pertaining to the donor site that can result in potential complications affecting patient satisfaction. A study evaluating abdominally-based breast reconstruction with data from the Mastectomy Reconstruction Outcomes Consortium (MROC) reported higher physical well-being in regards to the abdomen for superficial inferior epigastric artery (SIEA) and DIEP flaps compared to pedicled TRAM or free TRAM flaps. This study also stated bilateral breast reconstruction was associated with lower scores in regards to the physical well-being of the abdomen (30). A similar study of 657 patients reported similar findings that pedicled TRAM flaps yielded lower scores related to the abdomen as well as sexual well-being compared to free flaps which was even more prevalent in cases of bilateral reconstruction (31). Lastly patients also reported worse scores for the abdominal scars compared to the breast scars in terms of color, stiffness, thickness, and irregularity (32). These issues, which are not a concern with alloplastic breast reconstruction, must also be taken into account when discussing reconstructive options with the breast cancer patient as donor site morbidity can have a tremendous impact on her quality of life.

Even though the abdomen is generally considered the primary donor site for pedicled flap reconstruction of the breast, the back offers another alternative which does not require microvascular skills or techniques. The latissimus dorsi (LD) myocutaneous flap and the thoracodorsal artery perforator (TDAP) flap are additional options for breast reconstruction (33,34). Rindom *et al.* conducted a randomized controlled trial of 50 patients undergoing LD or TDAP flaps showing high patient satisfaction and quality of life amongst all patients after a follow-up of 1 year (35).

Free flap breast reconstruction with transverse upper gracilis (TUG) flaps and profunda artery perforator (PAP) flaps from the lower extremities have also gained popularity in recent years for those patients where the abdominal donor site is either not adequate or not available. Jessica *et al.* reports high rates of satisfaction with both the reconstructed breast and the inner thigh in 78 patients undergoing 103 TUG flaps with a 45% donor site complication rate (36).

Implant-based reconstruction

Prosthetic reconstruction with the use of tissue expanders and implants is the most common method of performing breast reconstruction (37,38). Similar to autologous tissue

breast reconstruction, implant-based reconstruction has also evolved a great deal with improvements in the prosthetic devices as well as changes in the position of the implants from total submuscular coverage to partial subpectoral coverage with an inferior acellular dermal matrix (ADM) sling to complete prepectoral placement. Furthermore, changes in implant technology and the advent of acellular dermal matrices have also had a tremendous impact on alloplastic breast reconstruction.

Prosthetic reconstruction offers the benefit of shorter surgery and shorter length of hospital stay without the need for complex microsurgical interventions. Therefore implant-based breast reconstruction comprises approximately 60% of all cases of breast reconstruction performed. Multiple studies on the traditional two-stage placement of a tissue expander followed by exchange for the permanent implant have reported high levels of patient satisfaction (39,40).

A study of 69 patients undergoing single-stage, prepectoral direct to implant reconstruction noted no difference in BREAST-Q scores preoperatively and postoperatively at 6 and 12 months (41). A similar study showed similar BREAST-Q scores when comparing prepectoral to subpectoral direct-to-implant reconstruction in 64 patients with only sexual well-being being scored higher in the subpectoral implant cohort (42). A large study of 1,077 patients also demonstrated no significant differences in patient-reported outcomes between smooth and textured implants despite higher rates of rippling with the former and higher rates of cellulitis with the latter (43). Seth *et al.* reported that the satisfaction with implant-based reconstruction is maintained over time at 12 years follow-up regardless of the need for radiation (44). These studies support the use of implants for breast reconstruction with high levels of patient satisfaction and quality of life metrics regardless of type of implant used, location of implant placement, or need for radiotherapy.

Oncoplastic reconstruction

Reconstruction for the treatment of breast cancer has traditionally been reserved for patients undergoing mastectomies; however, patients undergoing breast conservation surgery who are obligated to receive adjuvant radiation treatment would develop significant deformities and contour irregularities that would certainly benefit from reconstruction. Consequently, the concept of oncoplastic reconstruction has been promoted to prevent the adverse

sequelae after lumpectomy and radiation (45-48).

Rose *et al.* stated patients undergoing oncoplastic breast reconstruction had better health related quality of life outcomes in terms of psychosocial well-being compared to breast conservation surgery alone (49). A recent meta-analysis of 43 articles including 8,784 patients stated patients undergoing oncoplastic reconstruction had significantly higher scores on all patient-reported outcomes measures compared to standard partial mastectomy (50). Unfortunately, many patients do not know about the opportunity for reconstruction after a lumpectomy which identifies an area where the breast cancer treatment team has the ability to improve upon patient satisfaction (51). Evidently this study identifies another opportunity where the breast cancer team can provide additional guidance and support to the patient to improve her experience and level of satisfaction regarding her care.

No reconstruction

Although the field of plastic and reconstruction is able to offer many options for breast reconstruction for the treatment of malignancy, some patients choose to forego reconstruction altogether. Recently the “going flat” movement has not only raised awareness for not having breast reconstruction but also increased acceptance for the patient’s choice to only have a mastectomy. A recent survey study proved that patients are satisfied with their decision to undergo mastectomy alone; however, this can be greatly improved with more surgeon counseling regarding the options for reconstruction as well as support for their ultimate decision to go flat (52). Retrouvey *et al.* demonstrated no significant difference in patient-reported outcomes for sexual or physical well-being for immediate breast reconstruction, oncoplastic reconstruction, or mastectomy alone (53). Meanwhile Eltahir *et al.* stated patients undergoing breast reconstruction were significantly more satisfied with all patient-reported outcome measures compared to mastectomy alone (54). Perhaps the primary factor impacting patient satisfaction in avoiding reconstruction is allowing the patient to maintain her autonomy so that she can gather all the information and make the best decision for herself. At a time when the patient is most vulnerable and feels she has no control, the ability to make her own decision whether or not to undergo reconstruction can certainly increase her quality of life and overall well-being.

Comparison between types of reconstruction

Since there are multiple permutations for breast cancer surgery and reconstruction with countless other variables related to patient demographics and need for neoadjuvant and adjuvant treatments, comparative studies are necessary to gauge whether there are any differences in patient-reported outcomes amongst these options. Several small studies comparing two-stage expander and implant breast reconstruction to microvascular free flap reconstruction found higher quality of life measures and overall satisfaction with flap reconstruction compared to alloplastic reconstruction (55,56). Nelson *et al.* presented a study of 2,923 patients undergoing both immediate and delayed breast reconstruction and demonstrated higher patient-reported scores for aesthetics, psychosocial well-being, sexual well-being, and overall satisfaction with native tissue than implants alone (57). Another large study comparing 2,932 patients undergoing prosthetic reconstruction to 336 patients undergoing autologous tissue reconstruction over an 8-year period also reported patients undergoing autologous tissue reconstruction had significantly higher satisfaction scores and quality of life than their implant counterparts across all time points. The authors also reported postoperative radiation treatment results in lower breast scores while mental illness portended decreased satisfaction with the breast and well-being of the chest (57). Yet the same group conducted a propensity score matching analysis of patients undergoing autologous tissue and alloplastic breast reconstruction without radiation therapy and showed no difference in levels of satisfaction or well-being between the two groups within the first 2 years of surgery (58).

In addition to evaluating the differences between autologous flap reconstruction and implant-based reconstruction, there are also studies comparing oncoplastic breast reconstruction to reconstruction after a mastectomy. Kelsall *et al.* showed that patients who underwent oncoplastic reconstruction after breast conservation surgery had higher rates of satisfaction than patients who had immediate reconstruction after a mastectomy. Patient-reported scores were higher for psychosocial and physical well-being regardless of the need for adjuvant radiation treatment (59). Oncoplastic reconstruction of partial mastectomy defects is obviously a shorter operation with a shorter recovery period compared to reconstruction after a mastectomy resulting in higher patient satisfaction and quality of life.

Although many plastic and reconstructive surgeons purport microvascular autologous free flaps are the gold standard for breast reconstruction, the optimal type of reconstruction is the one that is best suited for each individual patient based upon her own wishes and desires. The development of various patient-reported outcome measures provides considerable information for both the provider and the patient to guide them through the long, difficult, shared decision-making process of breast cancer treatment in order to find the best choice. Clearly this is not a simple task as there is not a single reconstructive option that that can be uniformly applied to every patient making patient-reported quality of life measures so important in this particular field.

Conclusions

Patient-reported outcomes have become increasingly important in all fields of medicine to provide patients with the best possible medical treatment while also preserving their quality of life. In the realm of breast cancer care, patient satisfaction is multi-faceted and is dependent upon the treatment of malignancy and reconstruction. Patient-reported outcomes have proven that breast reconstruction decreases the physical and psychosocial anguish after a mastectomy or lumpectomy and improves patient's quality of life with high rates of satisfaction.

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