

Options and considerations in the timing of breast reconstruction after mastectomy

■ ABSTRACT

Timing of breast reconstruction after mastectomy is determined primarily by patient factors and the need for postmastectomy radiation therapy. If the risk of needing postmastectomy radiation is low, then immediate reconstruction produces the optimal aesthetic result. If the risk of needing postmastectomy radiation is high, then delayed reconstruction is preferable to optimize both radiation delivery and aesthetic outcome. For patients with an increased risk of needing postmastectomy radiation, “delayed-immediate” reconstruction, which involves placing a tissue expander at the time of mastectomy and awaiting pathology results to determine the need for radiation and guide reconstruction scheduling, is a viable approach. Thorough and informed physician counseling about the pros and cons of these options is critical for all women undergoing mastectomy.

Timing of breast reconstruction after mastectomy involves many factors that are important in choosing between three options—immediate, delayed, or “delayed-immediate” reconstruction.

Immediate reconstruction is performed at the time of initial breast cancer surgery and allows for joint planning of incisions between the oncologic and plastic surgery teams. This produces the optimal aesthetic result since it allows for preservation of the breast skin envelope and sometimes for nipple preservation, and is oncologically safe for patients treated for cure of their cancers.

Delayed reconstruction involves initially performing a mastectomy and then determining the need for postmastectomy radiation, which cannot be assessed until review of permanent sections on pathology. Reconstruction is then performed after chemotherapy, radiation therapy, or both (if needed) are completed.

Delayed-immediate reconstruction involves placing a tissue expander at the time of skin-sparing mastectomy to preserve the breast skin envelope. After the final pathology is reviewed following mastectomy, immediate reconstruction is performed if the patient does not require postmastectomy radiation therapy. If radiation therapy is required, then the patient undergoes standard delayed reconstruction after the radiation therapy is completed. This allows for skin conservation, thereby improving aesthetic outcome, while still allowing final reconstructive decisions to be made after it is determined whether radiation will be required.

■ IMMEDIATE RECONSTRUCTION: WHEN INDICATED, THE OPTION WITH THE BEST AESTHETIC RESULTS

Currently, the majority of breast reconstructions are performed as immediate reconstructions at the time of mastectomy. Immediate reconstruction is a routine consideration for patients suspected to have stage 0, I, or IIA breast cancers (see table on page S12 of this supplement, in the article on staging and surgical treatment by Hammer et al). These patients with early-stage cancer represent more than 70% of women who undergo mastectomy. Less-extensive resection of the breast skin by oncologic surgeons and the development of reconstructive options by plastic surgeons have improved quality of life for breast cancer patients.¹ Nipple-sparing mastectomy in selected patients is associated with high levels of patient satisfaction, improved aesthetic outcomes, and oncologic safety in the setting of early-stage tumors with no skin involvement.²

Oncologic safety is established

Numerous factors affect patient decision-making regarding reconstruction. The primary reason patients elect not to undergo immediate reconstruction is fear that reconstruction will hamper the ability to detect a cancer recurrence. In addition, patients as well as many physicians may have the unfounded fear that cancer cells can remain viable in the mastectomy bed and therefore that immediate reconstruction is ill-advised.

Multiple studies have shown that immediate recon-

Both authors reported that they have no commercial affiliations or financial interests that pose a potential conflict of interest with this article.

struction is oncologically safe after mastectomy, even in patients with locally advanced breast cancer.

In a study of 540 patients who underwent immediate reconstruction following mastectomy, Newman et al identified 50 patients with locally advanced breast cancer; all of these patients received postoperative chemotherapy, and 40% received postoperative radiation therapy as determined by tumor characteristics.³ At median follow-up of 58.5 months, there were no differences in either local or distant recurrence between these 50 patients and 72 matched patients with locally advanced breast cancer who did not undergo immediate reconstruction but received standard chemotherapy and radiation therapy for locally advanced disease.³

Similarly, a study by Langstein et al demonstrated that immediate reconstruction does not delay detection of cancer recurrence in the chest wall, in that the time to diagnosis of recurrence was similar whether patients underwent immediate reconstruction or not.⁴ No differences in local recurrence rates were noted based on the type of reconstruction performed (autologous flaps or implants). In addition, most cases of chest wall recurrence were associated with distant metastatic disease.⁴

Importance of physician input, other factors

Physician input is of vital importance to the patient considering mastectomy with immediate reconstruction. Traditionally, many patients have been advised by their health care providers to wait until mastectomy and chemotherapy or radiation therapy are complete before considering reconstruction. After undergoing such physically and emotionally exhausting treatments, however, patients are often spent and have no interest in undergoing another surgical procedure. Proper counseling by physicians—including the explanation that immediate reconstruction is associated with no difference in recurrence or survival outcomes compared with delayed reconstruction or no reconstruction at all—is essential to allay the fear of recurrence or death that often guides patients' decision-making.

Indeed, a recent questionnaire-based study of factors influencing mastectomy patients' choices regarding reconstruction found that patients regarded their surgeon's advice as the most important factor.¹ Moreover, women in the study who chose to undergo reconstruction were more likely than women who chose mastectomy alone to identify their surgeon's advice as the most important influencing factor. These women who chose reconstruction also were more likely than those not choosing reconstruction to have discussed their decision with their partner and to express interest in meeting other women who had

undergone mastectomy. The study's quality-of-life assessment demonstrated that women who chose reconstruction were in better physical health, placed more importance on body image and sexuality, and were less afraid of surgery compared with those not choosing reconstruction.¹

The type of cancerous lesion also contributes to patient decision-making regarding immediate reconstruction. Patients with ductal carcinoma in situ are twice as likely to choose immediate reconstruction as those with invasive cancer.⁵ Age plays an important role as well. Younger patients are more likely to elect to undergo reconstruction, with patients younger than age 50 having a 4.3-fold greater likelihood of choosing reconstruction than their older counterparts.⁵

Accounting for adjuvant medical therapy

Preoperative evaluation and postoperative histologic lymph node status determine the potential need for adjuvant therapy and facilitate optimal surgical decision-making. Chemotherapy usually begins within 30 to 40 days after surgery but can be delayed up to 12 weeks. Thus, a reconstruction that will be healed within this time frame is ideal. Reconstruction choices that involve well-vascularized tissue will optimize healing prior to chemotherapy. Chemotherapy cannot be started in the presence of seroma, infection, or necrotic tissue. In cases of breast conservation surgery and radiation therapy only, radiation can be delayed up to 8 weeks for complete healing prior to its commencement.

In a patient who will require radiation, autologous reconstruction (using the patient's own tissue) is preferable to tissue expander and implant reconstruction. Indications for radiation after mastectomy include tumor invasion of the chest wall, invasive cancers larger than 5 centimeters, and, in some cases, positive lymph nodes. Patients who undergo radiation of an autologous flap often have some shrinkage of the flap volume. Dense scar formation, capsular contraction, and implant extrusion may occur with radiation of implants, leading to a poor cosmetic outcome. Implant reconstructions that fail for these reasons are best corrected by autologous means.

Another consideration that should be addressed between the oncologic surgeon and the plastic surgeon is the possibility of an axillary lymph node dissection after reconstruction in the event of a positive sentinel node biopsy. If the oncologic surgeon must return to the axilla for removal of nodes after reconstruction, cooperation is needed between the two teams for incision planning and dissection. This is especially true in cases of microvascular free-tissue

Comparative outcomes of immediate and delayed postmastectomy reconstruction



FIGURE 1. Top panels: A patient who underwent immediate postmastectomy reconstruction of the left breast. **Bottom panels:** A patient who underwent delayed postmastectomy reconstruction of the left breast. In both patients the deep inferior epigastric perforator (DIEP) free flap technique was used. The postoperative photo of the patient at the top was taken 14 months after immediate reconstruction. The postoperative photo of the patient at the bottom was taken 17 months after mastectomy and 3 months after the DIEP reconstruction.

transfer reconstruction, in which vessels in the axilla are used for anastomosis. Recent data suggest that most microsurgery practitioners prefer to use the internal mammary vessels to avoid the need to return for another operation involving the axilla, which can jeopardize flap viability.⁶

■ DELAYED RECONSTRUCTION: A VIABLE OPTION REQUIRING REALISTIC EXPECTATIONS

Although reconstruction at the time of mastectomy is the preferred approach at present, delayed reconstruction in a patient who previously had a mastectomy is also a viable option. Since surgical therapy for breast cancer has been practiced long before reconstructive procedures were in widespread use, many patients were not offered any reconstructive options at the time of mastectomy. Other patients chose to delay reconstruction until after radiation therapy and/or chemotherapy were completed.

Why patients may choose to delay

Delayed reconstruction may be preferable for patients who are not ready to make a decision at the time of initial surgery as a result of the overwhelming news of their cancer diagnosis and the many treatment options they have to consider. These patients may benefit from

first focusing on treatment of their cancer and reserving consideration of reconstruction for later. In other cases, patients with multiple medical comorbidities may benefit from a staged procedure to minimize the length of surgery. It should be recognized, however, that if reconstruction is not performed at the time of initial mastectomy, the likelihood that it ultimately will be performed may be significantly reduced.

What prompts the decision to eventually seek reconstruction?

The goals of patients seeking delayed reconstruction are numerous. Some express a desire to put the “cancer phase” of their life behind them, while others hope to escape the stigma of being different. Generally these women wish to think, feel, and carry on their lives as they did before their mastectomy. In addition, patients may desire a tangible, lasting result to symbolize that their treatment is finished. In the late phase of the recovery process, breast reconstruction may be viewed as a healthy route of return to the patient’s “normal” life before cancer.

It is important for mastectomy patients to know that they are still candidates for breast reconstruction as a delayed procedure, even if their mastectomy was performed in the distant past.

Expectations must be tempered

It is of vital importance that patients have realistic expectations for the outcome of delayed reconstruction, particularly in fields that have been previously radiated (**Figure 1**). Lengthy preoperative counseling is critical, as is clear communication among all physicians caring for the patient. Unrealistic expectations can lead to extreme patient dissatisfaction. Patients must also be aware of the potential for complications, some of which might require future surgery, as well as planned future procedures that require more surgery, including reconstruction of the nipple and/or areola and procedures to achieve symmetry in the contralateral breast.

■ DELAYED-IMMEDIATE RECONSTRUCTION

The goal of delayed-immediate reconstruction is to optimize reconstruction in patients who are at risk of needing postmastectomy radiation therapy, since it is not known until after review of permanent sections, several days following mastectomy, whether these patients will require radiation.

The rationale

If immediate reconstruction is performed and the patient is found to have pathologic lymph node involvement, postoperative radiation therapy may compromise aesthetic results. Additionally, the reconstructed breast may pose technical difficulties in terms of delivery of radiation to the internal mammary nodes. At the same time, if breast reconstruction is delayed and final pathology review shows that radiation is not indicated, the mastectomy skin and shape of the breast skin envelope will be lost (and the aesthetic outcome compromised) unless measures are taken to preserve them.⁷

The protocol at a glance

Those measures to preserve the breast skin envelope consist of placement of a tissue expander at the time of mastectomy, pending final pathology results. If no radiation therapy is needed, the optimal reconstructive procedure can be chosen and performed within the next 1 to 2 weeks. If radiation is necessary, the expander can be deflated in the clinic before initiation of radiation therapy, to optimize radiation delivery to the internal mammary nodes. The expander can then be serially expanded after radiation, and delayed reconstruction with an autologous flap can be performed at a later date. Delayed-immediate reconstruction also offers the opportunity to revise the inframammary crease and debride any nonviable mastectomy skin.

Insurance coverage is federally mandated

Patients should be aware that the Women's Health and Cancer Rights Act of 1998 (see article by Djohan et al earlier in this supplement) applies to delayed and delayed-immediate reconstruction as well as to immediate reconstruction, requiring that medical insurers that cover mastectomy cover these procedures as well.

■ CONCLUSIONS

The timing of breast reconstruction is determined primarily by patient factors and the necessity for postmastectomy radiation therapy. If the risk of needing postmastectomy radiation is low, then immediate reconstruction produces the optimal aesthetic outcome. The main advantage of immediate reconstruction is the availability of relatively supple nonscarred tissue that can be recruited for reconstruction. If the risk of needing postmastectomy radiation is high, then delayed reconstruction is preferable to optimize both radiation delivery and aesthetic outcome. Delayed reconstruction is somewhat more challenging, as it involves well-healed scar tissue that is already retracted and adherent to the chest. Nevertheless, reconstruction remains possible at this point and options depend on tissue quality and the plastic surgeon's expertise. For patients with an increased risk of needing postmastectomy radiation, delayed-immediate reconstruction represents a viable approach that optimizes oncologic as well as aesthetic outcomes regardless of whether the patient ultimately does or does not need radiation therapy.

■ REFERENCES

1. Ananian P, Houvenaeghel G, Protière C, et al. Determinants of patients' choice of reconstruction with mastectomy for primary breast cancer. *Ann Surg Oncol* 2004; 11:762–771.
2. Patani N, Devalia H, Anderson A, Mokbel K. Oncologic safety and patient satisfaction with skin-sparing mastectomy and immediate breast reconstruction. *Surg Oncol* [published online ahead of print December 17, 2007].
3. Newman LA, Kuerer HM, Hunt KK, et al. Feasibility of immediate breast reconstruction for locally advanced breast cancer. *Ann Surg Oncol* 1999; 6:671–675.
4. Langstein HN, Cheng MH, Singletary SE, et al. Breast cancer recurrence after immediate reconstruction: patterns and significance. *Plast Reconstr Surg* 2003; 111:712–722.
5. Morrow M, Scott SK, Menck HR, Mustoe TA, Winchester DP. Factors influencing the use of breast reconstruction postmastectomy: a National Cancer Database study. *J Am Coll Surg* 2001; 192:1–8.
6. Saint-Cyr M, Youssef A, Bae HW, Robb GL, Chang DW. Changing trends in recipient vessel selection for microvascular autologous breast reconstruction: an analysis of 1483 consecutive cases. *Plast Reconstr Surg* 2007; 119:1993–2000.
7. Kronowitz SJ, Hunt KK, Kuerer HM, et al. Delayed-immediate breast reconstruction. *Plast Reconstr Surg* 2004; 113:1617–1628.

Correspondence: Preya Ananthakrishnan, MD, Department of General Surgery, Cleveland Clinic, 9500 Euclid Avenue, A80, Cleveland, OH 44195; ananthp@ccf.org.