

# ADVANCES IN ONCOLOGY

Current Developments in the Management of Solid Tumor Malignancies

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## IN FOCUS: Breast Cancer

### Breast Reconstruction After Therapy for Early Breast Cancer

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**H&O** What advances have changed the treatment algorithm for breast reconstruction in patients with early-stage breast cancer?

**GR** The greatest advance in breast reconstruction in early-stage breast cancer (stage 0–2), which occurred in the early 1990s, was skin-sparing mastectomy. A skin-sparing mastectomy limits the amount of skin of the breast removed in the procedure so that the shape of the breast can be restored much more effectively in terms of its roundness, projection, and natural-appearing contour. Hesitation on the part of oncologists to spare skin under the assumption that malignant cells would remain, leading to a higher incidence of recurrence, has been dispelled. Cases involving direct residual disease near the skin detectable by palpation or imaging are the only cause to remove additional skin to prevent recurrence. The skin-sparing mastectomy completely revolutionized breast reconstruction so that the aesthetic outcomes began to improve significantly. In fact, the reconstructed breast often has a better appearance than the presurgery breast, with a younger and perhaps more natural appearance. It was also shown in one of the studies conducted at The University of Texas M. D. Anderson Cancer Center that there was no difference in the rate of tumor recurrence after 7 years of follow-up in early breast cancer between skin-sparing and non-skin-sparing mastectomies.

**H&O** What advances have occurred in the design of breast implants used in this setting?

**GR** Advances in breast reconstruction have also occurred due to improved quality and variation in design of implants. Both saline and silicone implants have advanced, thanks to a great deal of research and development on the part of their manufacturers. Silicone implants have been associated with much notoriety since the early 1990s because of worries about insufficient data regarding the safety of these devices. The composition of silicone implants has been progressively and seemingly successfully modified to address these safety concerns. Silicone implants have been approved for use in reconstruction all along but not always for cosmetic surgery after questions arose. Today, the redesigned silicone implants, which now offer some variation in type, have been once again approved for general use. With currently available technology, the risk of silicone leeching outside the implant has been significantly reduced. The nature of the silicone contained within the implants seems to have been improved to the point that a cut in the implant will not cause extrusion of silicone. The improvement also maintains the softness of the implant. Currently, implants are employed in a majority of women worldwide who undergo breast reconstruction due to the established relative ease in restoring contour, shape, and projection of the breast.

On the other hand, some patients prefer not to use a foreign device. An aversion to implants is not uncommon, often due to perceptions of associated dangers. It is interesting to note that this aversion typically is present

not only with silicone implants but with saline implants as well, which have not been associated with the risks of leeching reported in the past with silicone implants. There is also fear of the body rejecting the implant, though silicone implants do not provoke this response. Of course, infection can occur in implant-based breast reconstruction, as would be expected with any surgical placement of a foreign device in the body. In patients who experience anxiety about foreign devices, it is possible to use the patient's own tissue, from the buttocks, abdomen, or back, in breast reconstruction—known as autologous transplantation.

**H&O** Could you discuss the advances in the use of autologous tissue transplantation in the setting of breast reconstruction?

**GR** There have been a number of advances in recent years in this setting with the use of different types of tissue, referred to as “flaps,” emphasizing the use of skin and fat without the use of the back, abdominal, or buttock muscle. Previously, the use of muscles in the abdomen or buttock was one of the mainstays of the harvesting of tissue from the donor site. If the tissue was to be taken from the abdomen, the operation removed some portion of the abdominal muscle as a carrier of the overlying skin and fat. More recently, the surgical technique has evolved to allow the flap's blood vessels to be harvested from the muscle without including the muscle, allowing the patient to maintain muscle activity. Based on the tissue harvested, and its vascular qualities, there are different surgical approaches available. In a common option, the tissue is completely removed from the body and then placed in the breast area. The blood vessels that vascularized the harvested tissue are connected to blood vessels present in the axilla or the chest. This technique, which spares muscles and was developed in the last 15 years, is known as perforator flap microvascular surgery. Patients who previously would have been at some risk of physical handicap because of the harvesting of muscle tissue can now often undergo surgery that spares their muscles, representing a significant advance for those patients who desire an alternative to implants.

There are circumstances in which an autologous tissue transplant would be combined with an implant in the setting of breast reconstruction. Typically, when tissue is harvested from the patient's back (ie, latissimus dorsi), unless the patient has a high body mass index, this site does not provide enough tissue to reconstruct a breast, except in cases when the breast is very small. Therefore, most commonly, back tissue (ie, skin and muscle) is combined with the implant in the reconstruction process. This myocutaneous technique is especially applicable when

it is not possible to use fully skin-sparing surgery and additional skin is necessary for the breast reconstruction. This technique was popular in the 1980s, and it has now returned into favor because it remains a less arduous and complicated operation in comparison to the microvascular or complete muscle procedures that take tissue from the abdomen or buttock. Women who would prefer an operation that has an easier recovery or who likely face a shortage of skin on the breast postmastectomy and who do not mind including an implant are candidates for latissimus dorsi-based surgery. This type of surgery, in my estimation, although it has been used for over 100 years, represents a technical advance because the aesthetic and functional outcomes have continually improved and are quite good overall.

**H&O** How is the site of the tissue harvest chosen?

**GR** When a patient goes through informed consent about breast reconstruction, she will tend to fall into a category based on preference due to body size, availability of donor sites, and emotional or opinion-based preferences for a particular site. Clinicians typically will explain all these options to a patient and indicate whether she is a candidate for one or all, taking into consideration lifestyle and activity levels (eg, participation in sports). If she has small children, this factor may dictate the approach or even the overall reconstructive option. For example, the constant need to pick up and carry a child may well affect the long-term uncomplicated healing of an abdominal donor site and an implant-based reconstruction may be a better option.

**H&O** What is the relevance of postmastectomy radiotherapy to breast reconstruction after therapy for early-stage breast cancer?

**GR** It would seem that the most significant controversy that has evolved in the last 5 years in the setting of breast reconstruction concerns the greater indications for and use of postmastectomy radiotherapy. Some women whose breast cancer is initially considered to be at an early stage nevertheless may be found to benefit from radiotherapy. Whereas radiotherapy was limited in the past to women with locally advanced disease, using current methods of detecting breast cancer, some women with early-stage disease will have positive indicators for micrometastatic disease, particularly in the axillary lymph nodes. A small percentage of women with early breast cancer will have positive nodal disease, in some circumstances qualifying them for the recommendation of postmastectomy radiotherapy. The algorithm of breast reconstruction has undergone an upheaval of sorts as a result of the

possibility of postmastectomy radiotherapy in patients with early-stage disease. Although the availability of skin-sparing mastectomy supported the use of immediate reconstruction by any surgical option available, with the expectation of outstanding aesthetic outcomes, the specter of postmastectomy radiotherapy has lessened the certainty that immediate reconstruction is the best option. Only when the patient has undergone surgery and had a pathologic assessment of her tissue is it possible to determine whether postmastectomy radiotherapy will confer benefit. This process of confirmation requires 10–14 days after surgery. Often, some patients with stage 2 disease now fall into a category of “at risk” for postmastectomy radiotherapy. Now, patients who wish to have immediate reconstructive surgery but are at risk must wait for the results of the pathology and thus undergo a temporizing operation, which preserves the skin-sparing mastectomy’s envelope of skin.

In a temporizing operation, a mechanism called a tissue expander is placed under the chest wall muscle, which, when inflated with saline, allows the patient to preserve the breast skin envelope for reconstruction while awaiting the final pathology study results. If the results are negative, the patient can elect to undergo any of the eligible reconstructive surgery options, but it is important to distinguish this two-part operation in an at-risk patient from the immediate reconstruction that would occur in a hypothetical patient for whom there was no evidence of more locally advanced disease. In contrast, if the pathologic study is positive for axillary spread of disease and it is determined that the patient would benefit from radiotherapy, the expander is deflated so the patient can undergo the radiation treatment without potential interference from the device within the radiation fields. A further option for an at-risk patient is a classic mastectomy, which does not spare most of the skin of the breast. In this setting, delayed reconstruction can occur 6–12 months or more later, when the patient feels ready to undergo this operation, after any necessary adjuvant therapy is completed. The disadvantage of this approach will be the loss of the breast skin envelope, making the aesthetic outcome of the reconstruction more challenging. Some patients who thought they would want to undergo reconstruction at a later time elect not to do so as time passes, often because the trauma of additional breast-area surgery seems daunting.

### **H&O** Could you describe the steps breast reconstruction comprises in at-risk patients?

**GR** If a patient who has undergone the temporizing procedure of the insertion of the expander does require postmastectomy radiotherapy based on the pathologic

findings, the first step is to continue to fill the tissue expander with saline fluid to the full size of the breast in anticipation of beginning radiotherapy within approximately 6 weeks of the mastectomy. Once radiotherapy is to begin, the saline is removed to avoid any distortion of the chest wall that could interfere with the homogeneity of the delivery of radiation to the local chest-wall tissues. A large foreign body on the chest wall during radiotherapy has been demonstrated to potentially adversely affect the treatment plan of radiotherapy. After radiotherapy has been completed, some time is allowed for superficial healing and the expander is inflated again to approximately the original size. The reconstruction plan then commences, typically in these patients utilizing an autologous transplantation of tissue because of fibrosis and decreased local tissue vascularity after radiotherapy.

In this setting, there is controversy as to whether there is a high risk of problems in the outcome if only an implant is used. Many studies indicate that there is a higher incidence of complications in women who have received radiotherapy in the setting of reconstruction comprising an implant alone. In some such patients, subsequent salvage of the implant reconstruction can be accomplished with the use of a covering autologous transplantation, such as the latissimus dorsi or indeed by replacement of the implant completely with autologous tissue. The reconstructive tissue in this setting has not been irradiated, which thus ameliorates the local tissue environment (by virtue of increasing vascularity) that had been irradiated originally. The breast that is composed of transplanted and nonirradiated tissue, in this fashion, typically remains soft and does not shrink. On the other hand, data show that patients who have undergone reconstruction and subsequently require radiotherapy have a high incidence of contraction and shrinkage of the tissue, which can change the position and shape of the breast, leading to significant asymmetry with the other breast within 1–2 years. This finding has changed the approach toward reconstruction in some patients with early-stage disease, with definitive immediate reconstruction considered to be a less attractive option in at-risk patients.

### **H&O** Could you describe the patient selection and planning process for breast reconstruction?

**GR** The planning of breast reconstruction is done in a multidisciplinary setting. Plastic surgeons and medical, radiation, and surgical oncologists consider a given patient’s desire for breast reconstruction and then determine together what would be the optimal circumstances under which this aspect of her total breast care could occur. Based on the patient’s clinical staging, this determination may include offering a patient a skin-sparing mastectomy

and immediate reconstruction, if she is a candidate. Members of the team determine which patients are considered at risk for radiotherapy, and these patients are given informed consent for a minimally delayed immediate reconstruction if no radiotherapy is needed. The reconstruction otherwise is delayed until after radiotherapy is finished if adjuvant radiation is determined to be recommended and the subsequent reconstructive approach will be further affected by the long-term effects of the radiation treatment. Although most patients with locally advanced breast disease undergo mastectomy and planned radiotherapy before consideration for reconstruction, select patients within this category in the multidisciplinary setting may undergo initial tissue-expander placement to preserve more of the breast skin envelope prior to undergoing radiotherapy, with the final reconstruction planned with autologous tissue after the radiotherapy is completed.

**H&O** How would you summarize the state of breast reconstruction today?

**GR** Patient preference for reconstruction and the optimal timing of surgery has increased the complexity of breast reconstruction in recent years due to advances

in knowledge, techniques, and technology. As a result of skin-sparing mastectomy, the pool of patients available for immediate reconstruction must be composed of patients with very early breast cancer because of the variable introduced by the possibility of postmastectomy radiotherapy. There is a class of patients between very early and locally advanced disease who are considered at risk for further multidisciplinary treatment, which will affect their reconstruction outcomes. Therefore, these patients must be informed of their options, and all members of the multidisciplinary team must be attentive to the timing of procedures.

**Suggested Readings**

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