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Through a multidisciplinary approach, as well as, a nuanced appreciation of patient goals and setting appropriate expectations, breast reconstruction can significantly improve the quality of life following mastectomy. A thorough review of the patient medical and surgical history in addition to oncologic treatments will facilitate discussion and recommendations for an individualized shared decision-making reconstructive process. Alloplastic reconstruction, although a highly popular modality, has important limitations. On the contrary, autologous reconstruction is more flexible but requires more thorough consideration.

## **Modern Approaches to Oncoplastic Surgical Treatment** 211

Heather R. Faulkner and Albert Losken

Partial breast reconstruction using oncoplastic techniques is performed at the time of lumpectomy and includes volume replacement techniques such as flaps and volume displacement techniques such as reduction and mastopexy. These techniques are used to preserve breast shape, contour, size, symmetry, inframammary fold position, and position of the nipple-areolar complex. Newer techniques such as autoaugmentation flaps and perforator flaps continue to broaden options and newer radiation therapy protocols will hopefully reduce side effects. Options for the oncoplastic approach now include higher risk patients as there is a larger repository of data on the safety and efficacy of this technique.

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Ara A. Salibian and Nolan S. Karp

The modern approach to implant-based breast reconstruction encompasses an evolution in surgical techniques, patient selection, implant technology, and use of support materials. Successful outcomes are defined by teamwork throughout the ablative and reconstructive processes as well as appropriate and evidence-based utilization of modern material technologies. Patient education, focus on patient-reported outcomes, and informed and shared decision-making are the key to all steps of these procedures.

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Francis D. Graziano, Jocelyn Lu, and Hani Sbitany

Prepectoral breast reconstruction has gained popularity due to numerous benefits in properly selected patients. Compared with subpectoral implant reconstruction, prepectoral reconstruction offers preservation of the pectoralis major muscle in its native position, resulting in decreased pain, no animation deformity, and improved arm range of motion/strength. Although prepectoral reconstruction is safe and

effective, the implant sits closer to the mastectomy skin flap. Acellular dermal matrices play a critical role, allowing for precise control of the breast envelope and providing long-term implant support. Careful patient selection and intraoperative mastectomy flap evaluation are critical to obtaining optimal results with prepectoral breast reconstruction.

### **Direct to Implant Reconstruction**

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Jordan M.S. Jacobs and Charles Andrew Salzberg

Implant-based breast reconstruction remains the most commonly performed type of restorative surgery after mastectomy for breast cancer. Placement of a tissue expander at the time of mastectomy allows gradual skin envelope expansion but requires additional surgery and time to completion of a patient's reconstruction. Direct-to-implant reconstruction provides a one-stage, final implant insertion, thereby bypassing the need for serial tissue expansion. With proper patient selection, successful preservation of the breast skin envelope, and accurate implant size and placement, direct-to-implant reconstruction has a very high rate of success and patient satisfaction.

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Megan E. Fracol, Megan M. Rodriguez, and Mark W. Clemens

Breast implant associated anaplastic large cell lymphoma (BIA-ALCL) is an uncommon and emerging malignancy caused by textured breast implants. The most common patient presentation is delayed seromas, other presentations include breast asymmetry, overlying skin rashes, palpable masses, lymphadenopathy, and capsular contracture. Confirmed diagnoses should receive lymphoma oncology consultation, multidisciplinary evaluation, and PET-CT or CT scan evaluation prior to surgical treatment. Disease confined to the capsule is curable in the majority of patients with complete surgical resection. BIA-ALCL is now recognized as one disease among a spectrum of inflammatory mediated malignancies which include implant-associated squamous cell carcinoma and B cell lymphoma.

### **Modern Approaches to Pedicled Latissimus Dorsi Flap Breast Reconstruction with Immediate Fat Transfer**

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The latissimus dorsi flap with immediate fat transfer is a viable option for fully autologous breast reconstruction in patients who are not candidates for free flap reconstruction. Technical modifications described in this article allow for high-volume and efficient fat grafting at the time of reconstruction to augment the flap and mitigate complications associated with the use of an implant.

### **Modern Approaches to Abdominal-Based Breast Reconstruction**

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Michael Borrero, Hugo St. Hilaire, and Robert Allen

Modern approaches to abdominal-based breast reconstruction have evolved since the introduction of the transverse musculocutaneous flap by Dr Carl Hartrampf in the 1980s. The natural evolution of this flap is the deep inferior epigastric perforator (DIEP) flap, as well as the superficial inferior epigastric artery flap. As breast reconstruction has advanced, so too has the utility and nuances of abdominal-based

flaps, including the deep circumflex iliac artery flap, extended flaps, stacked flaps; neurotization; and perforator exchange techniques. Even the delay phenomenon has been successfully applied to DIEP and SIEA flaps to augment flap perfusion.


**Operative Efficiency in Deep Inferior Epigastric Perforator Flap Reconstruction: Key Concepts and Implementation** 281

Sneha Subramaniam, Neil Tanna, and Mark L. Smith

The deep inferior epigastric perforator flap has become one of the most popular approaches for autologous breast reconstruction after mastectomy. As much of health care has moved to a value-based approach, reducing complications, operative time, and length of stay in deep inferior flap reconstruction is becoming increasingly important. In this article, we discuss important preoperative, intraoperative, and postoperative considerations to maximize efficiency when performing autologous breast reconstruction and offer tips on how to handle certain challenges.

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Zack Cohen, Said C. Azoury, Evan Matros, Jonas A. Nelson, and Robert J. Allen Jr

 Video content accompanies this article at <http://www.plasticsurgery.theclinics.com>.

Autologous free flap breast reconstruction allows for natural-appearing breasts, while avoiding the risks associated with implants, including exposure, rupture, and capsular contracture. However, this is offset by a much higher technical challenge. The abdomen remains the most common tissue source for autologous breast reconstruction. However, in patients with scant abdominal tissue, prior abdominal surgery, or a desire to avoid scarring in this region, thigh-based flaps remain a viable alternative. The profunda artery perforator (PAP) flap has emerged as a preferred alternative tissue source, due to excellent esthetic outcomes and low donor-site morbidity.

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The lumbar artery perforator (LAP) flap should be considered for autologous breast reconstruction when a patient's abdomen is unavailable as a donor site. The LAP flap can be harvested with dimensions and volume of distribution that facilitate the restoration of a naturally shaped breast with a sloping upper pole and maximal projection in the lower one-third. Harvest of LAP flaps lifts the buttocks and narrows the waist and, consequently, aesthetic improvement in body contour is generally achieved with these procedures. Although technically challenging, the LAP flap is a valuable tool in the practice of autologous breast reconstruction.

**Modern Approaches to Alternative Flap-Based Breast Reconstruction: Transverse Upper Gracilis Flap** 313

Jordan T. Blough and Michel H. Saint-Cyr

The transverse upper/myocutaneous gracilis is a medial thigh-based flap primarily reserved as a secondary choice for autologous reconstruction of small to moderate-sized breasts in women without a suitable abdominal donor site. Its consistent and reliable anatomy based on the medial circumflex femoral artery permits expedient flap harvest with relatively low donor site morbidity. The primary disadvantage is the limited achievable volume, often necessitating augmentation

such as extended flap modifications, autologous fat grafting, flap stacking, or even implant placement.

### **Modern Approaches to Alternative Flap-Based Breast Reconstruction: Stacked Flaps** 325

Nicholas T. Haddock and Sumeet S. Teotia

Total breast reconstruction following mastectomy requires multiple components to achieve an aesthetic result. In some situations, significant skin is required to provide the needed surface area to allow breast projection and breast ptosis. Additionally, ample volume is required to reconstruct all breast quadrants and provide sufficient projection. All aspects of the breast base must be filled to achieve total breast reconstruction. In very specific circumstances, multiple flaps are employed to accomplish this level of uncompromised aesthetic breast reconstruction. The abdomen, thigh, lumbar region, and buttock can all be used in some combination, as needed, to perform both unilateral and bilateral breast reconstruction. The ultimate goal is to provide superior aesthetic results in both the recipient breast and the donor site while maintaining a very low level of long-term morbidity.

### **Hybrid Microsurgical Breast Reconstruction:: HyFIL® & HyPAD™ Techniques** 337

Neil Tanna, Sarah L. Barnett, Emma L. Robinson, and Mark L. Smith

There are numerous indications for hybrid breast reconstruction, with the most common being patients who have inadequate donor site volume to achieve the desired breast volume. This article reviews all aspects of hybrid breast reconstruction, including preoperative and assessment, operative technique and considerations, and postoperative management.

### **Modern Approaches to Breast Neurotization** 347

Rebecca C. O'Neill and Aldona J. Spiegel

Absent or diminished breast sensation is a persistent problem for many postmastectomy patients. Breast neurotization is an opportunity to improve sensory outcomes, which are poor and unpredictable if left to chance. Several techniques for autologous and implant reconstruction have been described with successful clinical and patient-reported outcomes. Neurotization is a safe procedure with minimal risk for morbidity and it presents a fantastic avenue for future research.

### **Modern Innovations in Breast Surgery: Robotic Breast Surgery and Robotic Breast Reconstruction** 357

Katie G. Egan and Jesse C. Selber

Robotic surgery has a history of applications in multiple surgical areas and has been applied in plastic surgery over the past decade. Robotic surgery allows for minimal access incisions and decreased donor site morbidity in breast extirpative surgery, breast reconstruction, and lymphedema surgery. Although a learning curve exists for the use of this technology, it can be safely applied with careful preoperative planning. Robotic nipple-sparing mastectomy may be combined with either robotic alloplastic or robotic autologous reconstruction in the appropriate patient.