

Innovations and advancements in breast reconstruction

Over the past 20 years, there have been many innovations and advancements that have elevated the quality of breast reconstruction following partial or total mastectomy. These advancements have focused on improving surgical and aesthetic outcomes as well as reducing adverse events. As such, breast reconstruction has become an aesthetic procedure as much as it is a reconstructive procedure because plastic surgeons are now able to create a breast that has natural contour and symmetry and allow women to maintain full function. Some of the innovations and advancements include improved devices and techniques that optimize breast shape as well as various technologies that have facilitated our understanding of anatomy, physiology, perfusion, and monitoring.

The purpose of this supplement was to invite experienced plastic surgeons to contribute an article on a topic within their area of expertise. The goal was to allow the readership to appreciate many of these innovations and advancements. By creating this supplement, surgeons, residents, students and the public at large will have access to high quality, current, state-of-the-art, and up-to-date information on autologous, prosthetic, and oncoplastic procedures for breast reconstruction following mastectomy.

The supplement will be published in two parts. Supplement one will focus on preoperative planning, prosthetic reconstruction, autologous reconstruction and oncoplastic surgery. Supplement two will focus on prosthetic reconstruction, autologous reconstruction, and ancillary procedures such as fat grafting, lymphatic mapping, and radiation therapy.

Supplement one begins with the preoperative planning for breast reconstruction and its role in providing the foundation for determining the optimal procedure following partial or total mastectomy. Losken *et al.*, review the multiple components of the preoperative assessment including the patient's history, goals, imaging, and key elements of the physical exam. Consideration for tumor biology, staging, chemotherapy, and radiation therapy are reviewed to facilitate decision-making with regard to the type and timing of reconstruction. This is followed by an update on current devices for prosthetic breast reconstruction as well as an update on current strategies with 1-stage prosthetic reconstruction. Devices such as tissue expanders, saline implants, and silicone gel implants have undergone significant improvements with regard to shape, texture and durability over the recent years and are reviewed by O'Shaughnessy. Colwell reviews the critical elements of the 1-stage procedure including patient selection, surgical technique, surgical judgment, and postoperative care.

The section on autologous reconstruction is perhaps the most comprehensive. Our understanding of flap physiology and perfusion has been greatly increased and is reviewed by Dr. St. Cyr. He discusses the vascular anatomy and physiology of the cutaneous circulation in order to better understand the patterns of blood flow and perfusion patterns from individual perforators. This perforasome concept has provided insight to advance perforator flap harvest and modifications in design for a variety of perforator and muscle sparing flaps. Nahabedian reviews many of the aspects of autologous breast reconstruction that are relevant to breast shaping in-order to achieve reproducible and predictable aesthetic outcomes. The subsequent manuscript is focused on improving the aesthetic appearance of the abdominal donor site. Various strategies are reviewed including patient selection, closure technique, use of reinforcement material, and umbilical inseting.

The final papers in supplement one focus on oncoplastic surgery and the various imaging modalities used for autologous reconstruction. Sbitany *et al.* review the approach to evaluating and treating patients undergoing oncoplastic breast reconstruction. Various techniques are described based upon an oncoplastic algorithm. Surgical complications, oncologic outcomes and aesthetic outcomes are reviewed. The Rozen manuscript thoroughly reviews the indications and value of preoperative and intraoperative imaging to better understand the vascular/perforator anatomy as well as flap perfusion.

In the second supplement, Butler and Wu review and compare the various abdominal flaps that include the muscle sparing free transverse rectus abdominis myocutaneous (MsfTRAM), the deep inferior epigastric artery perforator (DIEP), and the superficial inferior epigastric artery (SIEA) flaps. They compare flap success rate, operative times, abdominal donor site morbidity, hospital lengths of stay and associated costs. Dayan reviews the alternate donor site flaps that are derived from the thigh and gluteal region with an emphasis on indications, surgical technique and reducing morbidity.

Acellular dermal matrices (ADM) have revolutionized prosthetic reconstruction in many countries and have facilitated the process and technique. Kim *et al.* provide an algorithm for ADM use that is based on body mass index, breast size, pre and post-operative radiation therapy, pectoralis anatomy, flap vascularity, skin excess, and sentinel node status to reduce

complication rates, provide a basis for selective use, and improve aesthetic outcomes. The final two manuscripts in this section are focused on 1- and 2-stage prosthetic breast reconstruction. Jacobsen reviews the 2-stage procedure with an emphasis on the various options for tissue expander placement that include subpectoral or prepectoral. The role of ADM is again reviewed with the 1- and 2-stage techniques.

Ancillary procedures in the setting of breast reconstruction are also reviewed and include radiation therapy, autologous fat grafting, lymphatic mapping and lymphedema surgery. The Kronowitz manuscript is focused on the effects of radiation on both prosthetic and autologous breast reconstruction. The Gabriel manuscript reviews the indications and current techniques for fat grafting at various stages of both autologous and prosthetic reconstruction. He also provides best practice strategies based on the published literature and extensive clinical experience. Patel has focused on the management of lymphedema and has reviewed the details of the current operative treatment strategies and modern imaging modalities.

The final section is focused on oncoplastic breast surgery. Miraliakbari *et al.* review a novel and innovative oncoplastic approach known as the biplanar technique utilizing volume displacement and replacement techniques simultaneously. Indications and 2-year outcomes are reviewed. Zaha reviews their experience with oncoplastic replacement procedures using the omental flap.

In summary, we hope that this supplement on innovations and advancement in breast reconstruction will prove to be a valuable resource to the practitioner. I would like to thank the staff of *Gland Surgery* for their valuable assistance in preparing this manuscript and for creating this Journal that is open access and indexed in PubMed. I would also like to thank all the authors that took time away from their busy schedules to prepare these manuscripts.



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