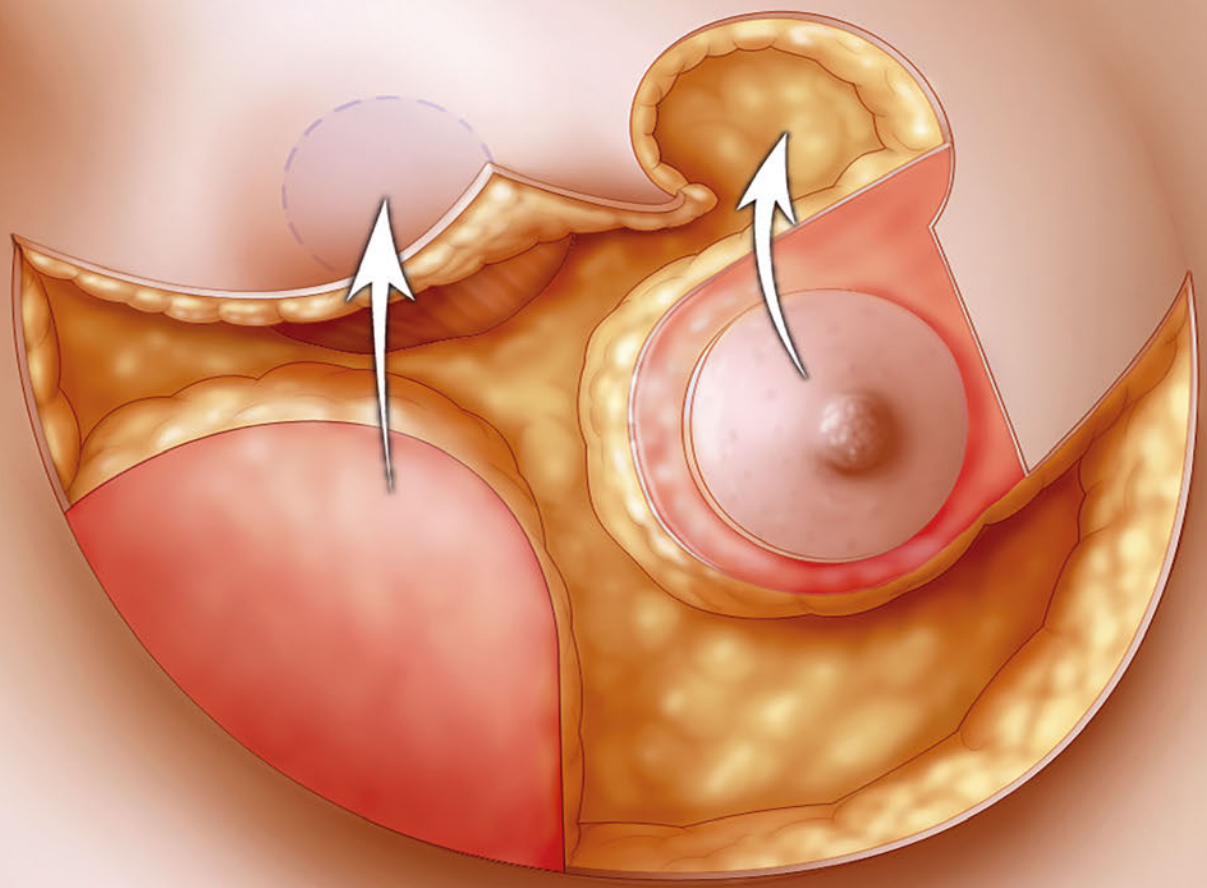
Partial Breast Reconstruction

Techniques in Oncoplastic Surgery

Second Edition



Albert Losken • Moustapha Hamdi

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DEDICATION

To my friends and family for their love and support, and to my children,
Madeline, Alex, Olivia, and Graham,
for keeping me whole

Albert Losken

For Jad, Ruby, Yussef, Sofie, and Mimi

Moustapha Hamdi

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FOREWORD

As plastic surgery has evolved over the past fifty years, the principles of reconstruction have merged and overlapped with those of aesthetic surgery. This phenomenon has exploded in aesthetic and reconstructive breast surgery, so much so that in many cases the stigma of the surgical treatment of breast cancer can be completely eliminated. Oncoplastic breast surgery is the epitome of this evolution in which the reconstructive breast surgeon must also be a skilled aesthetic surgeon.

Since the first edition of *Partial Breast Reconstruction: Techniques in Oncoplastic Surgery,* the awareness and utilization of oncoplastic breast concepts have become routine across the globe. Yet there remains a pervasive hunger for new and updated knowledge about breast-conserving treatment and oncoplastic techniques among breast specialists from the disciplines of surgery, plastic surgery, radiation oncology, medical oncology, and pathology. Fortunately, with the publication of the second edition of this excellent text, we have an updated compendium of authoritative information to fill the knowledge gap with the latest concepts and proven techniques in oncoplastic surgery.

From the first descriptions of oncoplastic concepts in Europe in the early 1990s and demonstrations of their efficacy, surgeons around the world have been compelled to begin incorporating these methods into the treatment of their patients. Innovations have rapidly advanced the field of oncoplastic surgery worldwide. Over the past two decades, breast-conserving procedures have progressed from rare cases treated by a few practitioners to mainstream procedures at the most well-recognized breast centers internationally. A major goal of the treatment of breast cancer is to resect the tumor so that breast shape is preserved or even improved. With the introduction of oncoplastic concepts, surgeons have been able to perform larger resections while reducing the risk of local recurrence. The resecting surgeon is free to remove any portion of the breast that is involved or at risk, knowing that the breast can be rearranged or new tissue can be brought in to create an aesthetic breast shape.

The introduction of oncoplastic techniques has had a positive impact on our patients, allowing more women to be treated with breast-conserving protocols. This book provides a road map for all specialists who provide surgical and adjunctive therapy for women facing breast cancer treatment. The second edition is replete with new chapters on external tissue expansion, new flaps, and much more detail on autologous fat grafting to the breast, a technique that has been truly revolutionary for breast reconstruction. Additionally, this new edition has greatly expanded video coverage and offers an e-book version so that the information can literally be available on a smartphone or tablet for ready access everywhere.

Drs. Albert Losken and Moustapha Hamdi, both experienced and internationally recognized plastic surgeons, have brought together the world's acknowledged experts in the practice of oncoplastic surgery to provide in-depth descriptions of the concepts and techniques used in modern breast centers. Each author contributes a unique and broad personal experience in oncoplastic methods, providing an exciting blend of ideas throughout the chapters. This book is the first of its kind to provide insights into and specific information about how oncoplastic breast surgery can and should be practiced. It has become the benchmark by which all other books on the subject are measured.

Drs. Losken and Hamdi have again spent innumerable hours editing and collating clinical cases and contributions to the second edition in addition to updating many of the chapters themselves. The result is a lasting and unique work for all physicians who set out to become practitioners of the art of oncoplastic surgery.

We sadly note the passing of Dr. Umberto Veronesi, whose landmark research in the field of breast-conserving surgery forged the trail for all of us who follow behind. Dr. Veronesi encouraged the development of the field of partial breast reconstruction and oncoplastic techniques even into the twilight of his life. May his spirit continue to permeate these pages and inspire the worldwide medical community to the great benefit of the many women who must battle breast cancer.

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PREFACE

The oncoplastic approach to partial breast reconstruction continues to gain acceptance and popularity as a reliable treatment option for women with breast cancer who wish to preserve their breasts. Since our initial publication of this book, there has been an exponential increase in the number of publications on this topic and likely an increase in the number of patients who have benefited from this approach. Since more women are now choosing to preserve their breasts, this form of partial breast reconstruction has helped broaden the indications for breast conservation therapy as well as improved the aesthetic results. The oncoplastic approach is now being adopted by all members of the multidisciplinary breast cancer team, and the importance of team awareness cannot be underscored.

The second edition of *Partial Breast Reconstruction: Techniques in Oncoplastic Surgery* evolved from improved traction and increased acceptance over the last decade. The first book was a comprehensive review of the topic from the various specialties all over the world. Although our perspectives differ on the basis of geography (American versus European), we share a common enthusiasm for partial breast reconstruction techniques and their potential benefits for our patients. The first edition was well received and is testament to the continued excitement that many feel about partial breast reconstruction. This edition was intended to update the content and add some newer perspectives and refined techniques. Newer video content, updated original chapters and additional chapters have been added to improve the overall impact. Longer follow-up and newer techniques in this edition also improves our understanding of the topic.

The concept of reconstructing quadrantectomy-type defects originated in Europe and has slowly gained acceptance and popularity in the United States and throughout the world. Given the global interest and controversial nature of some of the oncoplastic techniques that have been developed, we felt it only appropriate that this book provide a truly international perspective. Thus we are gratified at the international experts who have joined us in this writing endeavor; they hail from South America, the United Kingdom, Europe, and the United States. Many of these individuals have helped to pioneer and refine the breast conservation and partial breast reconstruction techniques discussed in this book. Chapter 1, for example, was written by Werner Audretsch, who coined the widely used term *oncoplastic.*

Because breast-conserving therapy crosses specialty lines and often requires a multidisciplinary team approach, this work covers a broad range of topics. Although the main focus of this book is on surgical techniques, it also covers oncologic principles, organizational strategies, indications for breast-conserving therapy, psychological aspects, challenges

related to radiotherapy, postoperative cancer surveillance, and other variables that must be taken into consideration to maximize patient safety and subsequently improve outcomes. To provide the patient with the best care possible, it is imperative that we understand and appreciate the contributions of all members of the multidisciplinary team.

This book focuses on prevention of the BCT deformity as well as amelioration of that deformity when it occurs. It also explores the risks and benefits of delayed versus immediate reconstruction of the partial mastectomy defect and how timing decisions and resection techniques affect care and aesthetics. Our goal is to provide our readers with the range of current options available for breast preservation and reconstruction. Thus comprehensive chapters are included on topics such as reduction and mastopexy techniques with parenchyma autoaugmentation, central defect reconstruction, fat grafting, and local flap and perforator flap reconstruction. Readers are taken systematically through the presentation, workup, surgical technique, and follow-up for each of the various approaches presented.

Finally, outcomes, complications, and surveillance are also addressed as the ultimate test of the worth of each procedure. Concepts are fully elucidated with numerous color illustrations, patient examples, key concepts, and critical issues highlighted throughout each chapter. The book is provided in both print and ebook format for ready access everywhere. Eight videos are included to document key techniques described in the book.

As we look ahead to the future of the oncoplastic approach, we can expect further refinements and technologic milestones in diagnosis, management, and outcomes—newer protocols for adjuvant and neoadjuvant therapy, improved imaging equipment, and advances in partial breast irradiation and radiotherapy techniques. One day, we may even be able to manage breast cancer on a cellular level. Each of these developments, along with newer surgical techniques, will offer surgeons and their patients a wealth of alternatives; the options and outcomes for women with breast cancer can only improve.

A final verdict on the oncoplastic approach must await the development of specific protocols for indications, benefits, and risks. The ultimate value of any new procedure or treatment plan depends on the positive impact that it has on our patients. We are now witnessing patient reported outcomes from patients demonstrating improvement in things like body image, self-esteem and sexuality when the oncoplastic approach is performed despite being treated for breast cancer. We recognize that this approach is not appropriate for all patients and all situations. Although we are encouraged by the advances being made in breast-conserving therapy and oncoplastic techniques, we also recognize that there is a paucity of large studies and long-term outcome data related to the oncoplastic approach. Therefore we challenge our international colleagues to embark on collaborative efforts to provide further insights into the most effective treatment protocols based on patient selection, surgical technique, and outcome measures. Our hope is that others will build on the existing foundation and will use this book as the inspiration for future growth and creativity.

Albert Losken
Moustapha Hamdi

ACKNOWLEDGMENTS

Many people have contributed to the production of this book. It represents the culmination of ideas and concepts from all over the world. I would like to acknowledge all of the experts and friends who helped to make it possible. The enthusiasm of Sue Hodgson to engage Moustapha Hamdi and myself and encourage us to update and refine the first edition was the initiating event and was greatly appreciated.

The first edition was meant to provide comprehensive educational material on oncoplastic breast reconstruction for the multidisciplinary team. It is a topic that truly covers many specialties and our goal was to bring it all together in one text and expose the topic to members of the team who might otherwise not have been exposed to such information. This was partially accomplished, and our goal with the second edition was to update the information and broaden our reach. Moustapha Hamdi and I have continued to communicate about partial breast reconstruction and we share each other's excitement on the topic. I appreciate his friendship and assistance with bringing the European component into the mix since this has been a topic adopted earlier on that side of the ocean.

A special word of thanks is also due to the contributing authors. Each of the individuals was chosen for his or her special expertise. They are a stellar group, including many who have led the way in this field. I am grateful for their willingness to share their wisdom and to invest their time in this effort.

My interest in the field of partial breast reconstruction began in the 1990s, while I was training under Dr. John Bostwick III at Emory University. He was one of the American pioneers in this field, and his excitement and enthusiasm for the art and science of reconstructive breast surgery were contagious. Partial breast defects were being reconstructed at the time using reduction techniques and latissimus dorsi flaps. It was clear to him that this was an invaluable approach, a concept that has now, more than 10 years later, attracted enormous interest and gained widespread acceptance. Although Dr. Bostwick is no longer with us, his teachings live on and continue to inspire.

When I joined the faculty at Emory, the value of oncoplastic techniques had already been established. The divisions of plastic surgery and surgical oncology had a close working relationship, and all aspects of breast reconstruction were being offered to patients.

My ability to expand on the partial breast reconstruction component of my practice was dependent on referrals from surgical oncology colleagues. I was truly fortunate that these individuals had the vision to understand the benefits of oncoplastic techniques and to support this effort. Toncred Marya Styblo is an Emory surgical oncologist with whom I have worked closely on this topic. She was an early adopter on oncoplastic breast surgery

and has continued to expand the indications for these procedures to offer the best care for her patients. I would like to recognize these surgeons, Toncred Styblo, Rogsberg Phillips, Monica Rizzo, Yara Robertson, William Wood, and Sheryl Gabram for the insights they have shared with me, for their continued support, and for allowing me to participate in the care of their patients. Their recognition of the importance of partial breast reconstruction for selected patients is an excellent example of how together we can achieve the best possible outcomes for breast cancer patients who wish to preserve their breasts.

I would also like to recognize my chief Grant Carlson and the Emory plastic surgery faculty for not only being great mentors and role models to me during my training, but also for their commitment to the principles and practice of plastic and reconstructive surgery. The Emory plastic surgery residents are an integral part of my practice and their enthusiasm is contagious and their assistance with all my patients is greatly appreciated. While in Atlanta, I have been honored to be associated with leaders and pioneers in the field of reconstructive breast surgery; their enthusiasm and creative energy have nurtured an environment that is conducive to excellence. This also has been made possible by the many contributions and achievements of additional local clinical faculty, including Frank Elliott, Mark Codner, James Namnoun, Foad Nahai, and Carl Hartrampf. I would also like to express my gratitude to the loyal staff at Emory for their tireless efforts in providing administrative support in an environment where the demands and expectations seem endless. Geraldine Tanner and Jane Baab keep me organized and maintain the clinical flow with ease and efficiency.

We are grateful for the creativity and expertise of the Thieme staff in crafting this beautiful second edition. This team of dedicated publishing professionals gave unflagging attention to every detail of the editing and production of this book.

These acknowledgments would be incomplete if I did not recognize my father, Wolfgang Losken, from whom I inherited my love of plastic surgery. He exposed me to the field at an early age, and his excitement and enthusiasm were truly inspiring. His guidance, his love, his example, and his support have instilled in me the value of being the best surgeon I can possibly be. Above all, he taught me the importance of being a good person.

Finally, I would like to acknowledge the rest of my family for their love, support, guidance, and endless patience throughout all my endeavors. My mother, Daisy, has taught me the importance of dedication and hard work, and has fostered a value system that has allowed me to achieve my goals. My sisters, Erica and Monica, have always been there for me emotionally, as have many other friends and family. Most important in my life are my children, Madeline, Alex, Olivia, and Graham, who continue to inspire me and are the source of endless joy.

Albert Losken

During my career, I have had the good fortune to be inspired and mentored by master surgeons who have helped to shape our specialty. When I was a medical student at Damascus University, I saw Dr. Carl R. Hartrampf on television demonstrating a pedicled TRAM flap for breast reconstruction. Dr. Hartrampf's skill and innovations inspired me to become a plastic surgeon. Four years later I entered the excellent training program at the Free University of Brussels in Belgium. There I learned the essentials of aesthetic and reconstructive breast surgery under the tutelage of four gifted surgeons: Madeline Lejour, Albert DeMay, Bruno Coessens, and Rika Deraemaeker. Next, during a microsurgery fellowship in Glasgow, I was encouraged to challenge conventional thinking by studying breast reconstruction with perforator free flaps. Martyn Webster, a true gentleman and wonderful teacher, guided me and helped me to increase my self-confidence when performing perforator flap reconstruction. Ultimately, I relocated to Gent, under the wise leadership of Stan Monstrey. While in Gent, I have worked extensively with Koen Van Landuyt and Phillip Blondeel to explore the amazing potential that perforator flaps offer for reconstructive surgery.

Other professional colleagues and friends have contributed much to my professional career. They have led by example and have been great sources of support. During the past 7 years at Gent University Hospital, I have felt a strong sense of teamwork and cooperation among the breast surgeons. I would like to extend sincere thanks to my colleagues in the senology group, especially Herman Depypere, for his faith in my abilities as I developed my own clinically proven techniques in partial breast reconstruction.

I also wish to express my appreciation to the assistants, nurses, trainees, and staff of the Plastic Surgery Department at Gent University Hospital for their unlimited support.

My deep personal appreciation goes to my friend and co-editor, Albert Losken. It has been a pleasure working with Bert on this book; his skill and dedication are truly impressive and are evident throughout the pages of this work.

I would also like to thank all of the contributing authors for their excellent chapters and for the insights that they were willing to share. All of these mentors and friends have shaped my destiny, and I am sincerely grateful to them for the roles that they have played.

Finally, I must acknowledge the achievements of the many innovators in the emerging field of oncoplastic surgery and partial breast reconstruction. These men and women are dedicated to providing the ultimate care to patients who require breast cancer therapy and breast reconstruction. I honor them for believing that our patients deserve only the best and their unwillingness to settle for anything less.

Moustapha Hamdi

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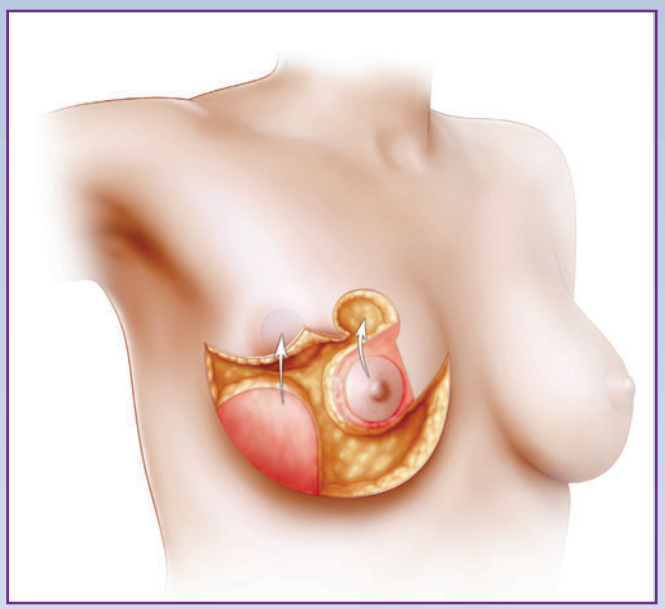
Part One



Evolution of Oncoplastic Surgery

1 Fundamentals of Oncoplastic Breast Surgery

Werner P. Audretsch

One of the main measures of successful breast cancer surgery is local control. It has been demonstrated that undertreatment followed by local failure is deleterious in some subgroups of patients. This knowledge has led to a shift in the treatment strategy for patients with breast cancer. Rather than rely on systemic interventions in response to inadequate surgical approaches, surgeons now place greater emphasis on meticulous planning and skilled execution combined with radiotherapy to minimize local relapse while maintaining cosmesis.[1] Oncoplastic surgery effectively accomplishes this goal by incorporating partial resection with immediate reconstruction. Today oncoplastic surgery is primarily performed to cope with unfavorable anatomy, relative tumor size and location, to challenge complex local treatments and postradiation breast surgery, and to remove the cancer without mutilation and with the tumor not touching ink for invasive disease and with at least 10 mm in ductal intraepithelial neoplasia (DIN). Oncoplastic surgery was not invented to extend unnecessary margins but to reduce reexcisions, recalls for distortion after prior breast-conserving surgery (BCS), and to lower the rate of mastectomies thus saving social and medical resources.[2]

ORIGIN OF ONCOPLASTIC SURGERY

The term oncoplastic surgery was introduced in 1993[3] and published a year later.[4] It encompasses unique approaches suggested by different surgeons and focuses on tumor resection and breast aesthetics through partial breast reconstruction techniques that minimize potential breast deformities.

The initial focus of oncoplastic surgery was on breast deformities after quadrantectomy,[5,6] and it became another alternative to consider during the initial surgical planning and decision-making process.

The oncoplastic surgical approach allowed surgeons to tailor techniques to prevent deformities, minimize margins, and reduce potential for local recurrence.

Terms such as cosmetic quadrantectomy,[7] aesthetic diagnostic round-block technique,[8] l*ow pole tumor reduction mammaplasty,*[9] and *central tumor reduction*[10] define the basic principles that formed the roots of oncoplastic surgery. These techniques bridge the gap between resection and immediate reconstruction to save form and function, which are integral parts of the body image. Independent from its linguistic roots, the term *oncoplastic* is a distinctive label for tumor-specific immediate reconstruction. The term *tumor-specific immediate reconstruction* (TSIR) was introduced by John Bostwick III in 1996.[11] This concept covers the complete spectrum of available techniques, from partial to total immediate breast reconstruction (IBR).

TSIR represented a decisive stage in the evolution of oncoplastic breast cancer surgery; it includes delayed procedures, total reconstruction, and salvage procedures. The oncoplastic concept implies not only the reconstruction of partial defects, but also the planning of resection in cosmetic units, if possible, to provide the most natural-appearing, aesthetic breast. These two terms, TSIR and oncoplastic, are similar in meaning; however, the oncoplastic approach also includes delayed and salvage procedures. Regardless of the terminology used, partial breast reconstruction has been a valuable addition to the management of women and men with breast cancer. Initially, the benefits were evident in Europe, where the techniques were used to treat quadrantectomy-type defects. More recently, the techniques have become common in the United States for lumpectomy defects.

Today, on a worldwide basis, oncoplastic surgery does not interfere with treatment protocols and is oncologically based on the Milan I trial. In addition, it has enabled breast cancer patients to have fewer fears about disfigurement.[12]

ANATOMIC CLASSIFICATION

The anatomic classification for the oncoplastic approach to partial mastectomy defects should include planning for a potential completion mastectomy.

The wider the excision, depending on the type of tumor,[13] the lower the risk of local failures potentially contributing to compromised cosmesis. To this end, two options have emerged: (1) partial reconstruction and (2) skin-sparing mastectomy (SSM) with reconstruction.[14]

The main factors that influence the approach to treating the deformity are:

- The location of the tumor (such as in the cleavage)
- The tumor/breast ratio
- The surgical resection (which may lead to nipple-areola distortion, retraction, and volume/size asymmetry)
- Radiotherapy (which may lead to skin effects, color differences, shrinkage, and fat necrosis)

A smaller tumor/breast ratio should yield better cosmetic results; however, similar ratios might yield different results, depending on the tumor location.

Any anatomic classification of breast tumors for an oncoplastic approach to partial mastectomy defects should include the location, size, shape, symmetry, tumor/breast ratio, and NAC.

Box 1-1 Anatomic Classification of Breast Tumors

Sites of Tumors and What They Affect

Upper outer quadrant—affects the lateral flow
Lower outer quadrant—affects the lateral flow
Central or borderline—retracts the nipple-areola complex
Upper inner quadrant—affects the cleavage
Lower inner quadrant—affects the crease
Superior pole—distorts upper pole fullness

Tumor/Breast Ratio

Lower is favorable
Higher is unfavorable

Nipple-Areola Complex

Central/subareolar, raising nipple-areola loss or retraction.

Noncentral/borderline of the breast quadrants, raising deep margin problems; these relate to the difficulties of deep clear margin resection, because the thin breast layer in the borderline of the breast makes achieving sufficient clearance in the third dimension, close to the muscle, difficult.

Avoiding Asymmetry

The most favorable anatomic situation for a partial mastectomy is asymmetry, especially when the affected breast is larger. The aim of avoiding asymmetry as a result of quadrantectomy was expressed in Veronesi's definition referring to quadrantectomy as a "bilateral approach," such as the "mirror" technique that was performed in the 1970s and 1980s as a way of balancing the volume of resection and the NAC position.[15] The latter technique contributed to recentralization techniques, introduced by Petit and Rietjens.[16] Oncoplastic planning often includes similar resections on the opposite side, such as a mirror biopsy, to improve symmetry. One approach is to perform the contralateral procedure after radiotherapy to allow edema and any breast fibrosis time to resolve.

TRAINING ONCOPLASTIC SURGEONS

Specialized training is an often-debated issue. The concept of a specialized breast surgeon on a European, American, or worldwide level is important, because breast cancer is a silent epidemic. It is estimated that 1.152 million women will be diagnosed with breast cancer in the coming year. Of these, 411,000 will die of tumor-specific causes. It is also estimated that 20.6 million survivors have been treated for breast cancer.[17] Breast centers and specialized breast surgeons are required to have proper accreditation. This ensures that patients are offered the best treatments possible, but it also offers trainees a solid aim for their fellowship, which includes curriculum as well as accreditation. The leading surgeons in this field are the individuals driving this specialty forward—they have established guidelines for training breast cancer specialists, including breast surgeons,[18] and have created and published a good practice guide[19]; these resources exemplify the current level of quality

of the curriculum in our daily practice. In Europe, the entry requirement of candidates for training and accreditation in breast surgery is to be currently licensed to practice as a general surgeon, plastic surgeon, or gynecologist. The training facility is based at a certified breast center consisting of integrated departments of senology (surgical breast oncology) and plastic surgery, including microsurgery.

The training facility should provide training options for physicians to acquire sufficient skills and practice to establish breast centers of excellence. Training options should include oncologic surgery, plastic and aesthetic surgery, principles of oncoplastic surgery, radiology, nuclear medicine, pathology, systemic therapy, radiotherapy, and others. Training options in the United States and other countries may vary; however, the ultimate goals are the same. These are detailed more extensively in Chapter 2.

TECHNICAL INSIGHTS

The following section highlights some of the oncoplastic techniques that are thoroughly detailed in other chapters. Terms that are common to oncoplastic breast surgery are also introduced. In short, this section demonstrates the depth, complexity, and constant evolution of the oncoplastic approach.

Cosmetic Quadrantectomy

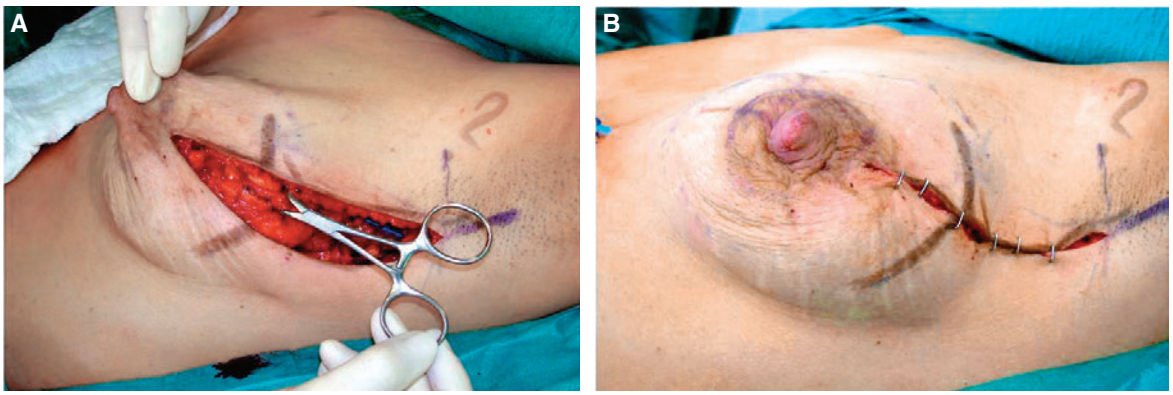


Fig. 1-1

Cosmetic quadrantectomy is one form of resection in which the aesthetic subunits of the breast are carefully considered. The goal is to perform the resection in a way that preserves a natural shape, depending on the patient's body image. The skin "pouch" technique *(A)*, with its resultant shrinking of the skin *(B)*, is one way to accomplish this.

Surgical Sequence

- Needle framing (to localize the extent or center of the tumor by ultrasound-guided needle localization in a 90-degree angle)
- Composite resection/ductectomy/quadrantectomy
- Margin and papilla biopsy
- Full-thickness defect closure with nipple-areola recentralization

PATIENT EXAMPLES

Local Flap Reconstruction (Matrix Rotation)

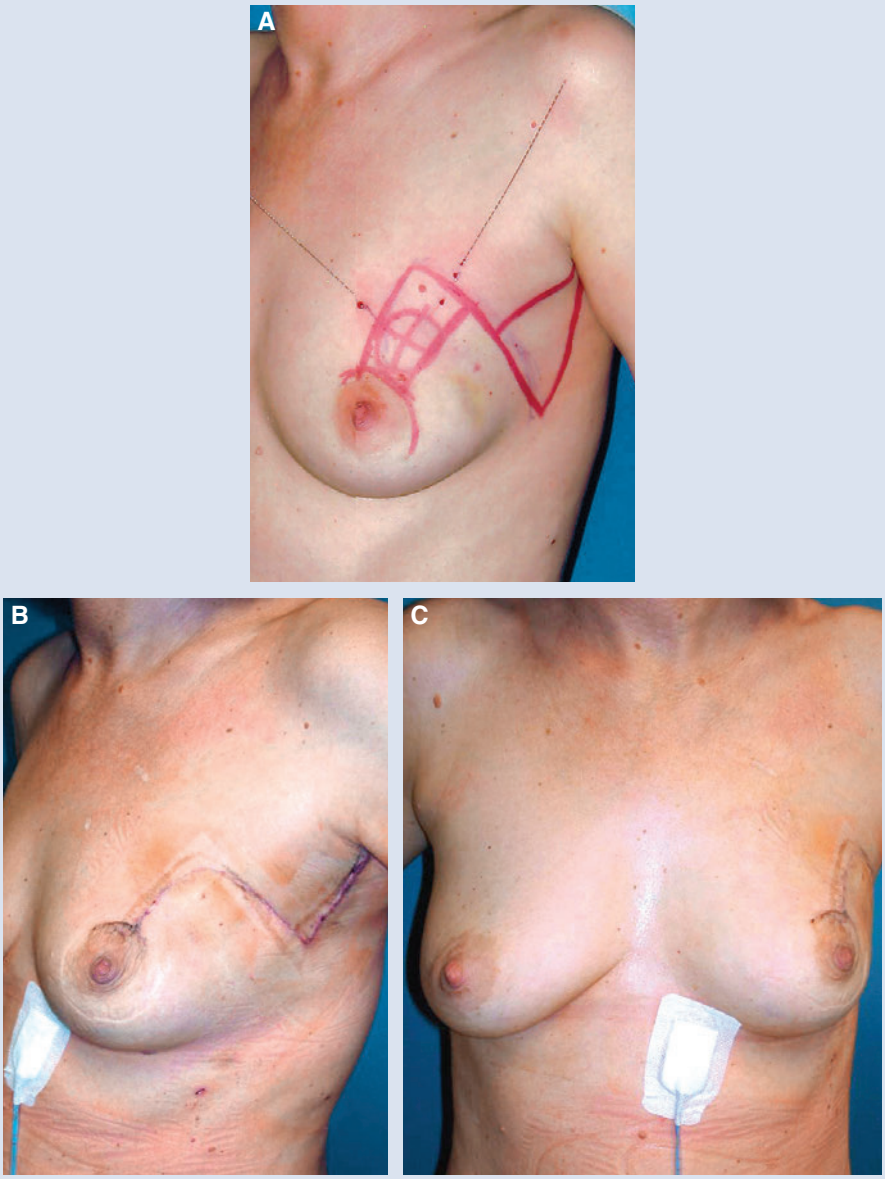


Fig. 1-2

This patient had BCT with matrix rotation of the outer quadrant. She is shown both preoperatively *(A)* and 2 days postoperatively (*B* and *C*).