

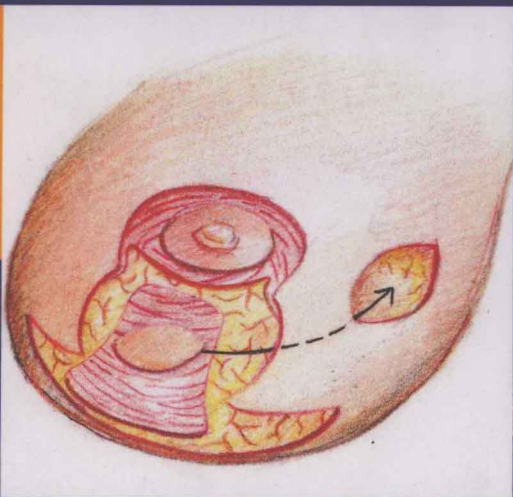
F. Fitzal · P. Schrenk

Editors

illustrated by B. Ammerer

Oncoplastic Breast Surgery

A Guide to Clinical Practice



Several different oncoplastic
techniques including:

Grisotti

Hall Findlay

Round Block

Inferior and superior pedicle



SpringerWienNewYork

Florian Fitzal, Peter Schrenk (Eds.)

ONCOPLASTIC BREAST SURGERY

A Guide to Clinical Practice



SpringerWienNewYork

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Preface

The initial idea to write a book on oncoplastic techniques was raised through a meeting on breast cancer treatment in Saalfelden, Austria two years ago. Contrary to the rather minor role breast surgery is conceded today compared to other treatment modalities the surgeons role on the further outcome of the disease is crucial and never compensated by radiation or adjuvant therapy.

Whereas surgery a decade ago was merely excision of the cancer and closure of the wound leaving behind a mutilated breast in many women, the advent of oncoplastic surgery completely changed the modern surgical approach to breast cancer.

The concept of oncoplastic breast surgery combines oncologic tumor resection - either breast conservation or mastectomy - with traditional or less traditional plastic surgical techniques.

The primary goal is to achieve an optimal cosmetic result with long time local tumor control. Some (non – randomized) studies available in patients following breast conservation oncoplastic surgery showed tumor resection to be associated with wider free margins, less patients needing re-operation surgery for involved or close margins, a widening of the indications for breast conservation surgery, a low complication rate and at least an equal local recurrence rate.

There is no doubt that oncoplastic breast surgery experienced a rapid rise with more patients demanding this kind of surgery. However, a profound knowledge of the different oncoplastic techniques is essential for the outcome.

This book describes various common oncoplastic techniques used in breast conservation surgery and mastectomy with immediate reconstruction. Surgeons experienced in a particular technique provide a

step by step description of oncoplastic surgical techniques and a special emphasis was put on to outline indications and contraindications for a technique.

Furthermore tips and tricks are provided at the end of each chapter which help to avoid common mistakes by surgeons learning a technique.

Re-shaped breasts constitute a diagnostic challenge for the radiologist with several postoperative changes not seen after standard quadrantectomy and mastectomy. This prompted us to include a chapter on this topic in a book primarily written for surgeons.

We hope that this book will assist breast surgeons in a better understanding of oncoplastic principles and encourage them to use techniques we are convinced that will turn out to be beneficial for their patients.

The editors want to thank all the contributing authors for their dedicated work and Bernard Ammerer for his artistic drawings that largely contribute to further understanding. Without their help we would have never been able to accomplish this book.

We would also like to thank the staff at Springer, Mag. Heller and Mrs. Stakemeier, for their support and guidance during publishing.

And last but not least we thank our families for their support and understanding, that time will always be too short.

Florian Fitzal, Peter Schrenk

Breast Surgery has developed greatly since its beginnings. What was simple and unfortunately often mutilating removal of the cancerous lesion often has become a sophisticated and quality-of-life-oriented part of the multi-disciplinary process in the treatment of a disease that nowadays affects 1 out of 8 women during their lifetime in the western world.

In parallel with this observation, surgeons have been the triggers of innovation. Going back for more than a century, it was a surgeon who developed the concept of locoregional cancer growth and the

development of a radicality that eventually revolutionized cancer treatment. Likewise, procedures aimed at minimizing morbidity and avoiding unnecessary harm and burden to patients were developed by surgeons, as where concepts of adjuvant and neo-adjuvant treatment strategies. While it appeared for a while that surgery may have lost its key role in the concert of multimodality therapy, it is now again realised that the way when and how we remove the tumour, greatly affects outcomes and the quality of life of our patients.

Oncoplastic surgery takes this development to the next level. This concept combines both oncologic and tumour biology awareness with modern technical aspects of surgery, trying to combine both principles for optimal outcome. This is not only a matter of surgical technique – it also demonstrates the strive of surgeons for continuing progress, and our empathy for those affected by the disease.

It is important for all of us that we have guidance and summaries of the background and state-of-the-art of such rather new fields. This is the great value of this wonderful book, where Florial Fitzal and Peter Schrenk, two of the most pronounced experts and innovators in the field, have managed to assemble a great group of authors to provide exactly that guidance and education. The book will be of interest to both experts and novices alike, and may provide interesting yet unknown little details to many experienced breast surgeons as well as those who intend to become experts in the field.

I hope that in addition to the natural focus of this overview on surgical technique, the readers will be able to sense the underlying greater concept – that optimising surgery has to find a balance between the intentions of cure and the preservation of an aesthetical shape of the breast, and that these concepts have to be embedded in a multidisciplinary concept in the treatment of breast cancer. It is more than satisfying that again surgeon take the effort and enthusiasm to improve the overall results, but are also willing to share their knowledge and achievements in an attempt to continue innovation and improvement that will eventually serve our grateful patients.

Michael Gnant

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The oncoplastic approach in surgery interlaces concepts of breast surgical oncology with the principles underlying reconstructive procedures in an endeavor to enhance both oncologic results and cosmetic performance. Having made substantial progress since the early 1990s, oncoplastic techniques today are refining the role of breast-conserving surgery in an accelerating number of breast cancer patients who are ineligible for conventional organ conservation.

Overall, oncoplastic breast surgery is well evidenced and clearly warranted to facilitate wide excision and clear margins without compromising esthetic outcome. While today's operative settings increasingly include specialist oncoplastic surgeons involved in both simple manipulations and sophisticated reconstruction - applying even to immediate intervention following skin-sparing mastectomy -, traditional collaboration between oncologic and plastic surgery in some situations would remain a viable and valuable treatment option.

The investigations compiled in the present volume, authored by oncologic, reconstructive and plastic surgeons in association, are guided by the evolving oncoplastic principle that any curative oncologic approach should incorporate its esthetic consequences - and that any cosmetic procedure should also allow for diligent oncologic considerations.

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1

GENERAL SURGERY

1.1 Surgical Anatomy

Elisabeth Würinger

A rich nervous and vascular supply to the mammary gland and to the nipple areola complex has long been known (Cooper 1840a; Marcus 1934). In turn, the location of the neurovascular structures within the breast has always been unpredictable and appeared to be distributed in a haphazard, randomized pattern. A practical approach to locate these structures is desirable in order to ensure safe viability and sensibility of the nipple in breast surgery.

Our investigations of the mammary gland showed a definite relationship between the course of the nerves and vessels and a coherent, strong suspension apparatus in the breast which can reliably be predicted and which displays a constant morphology (Würinger, Mader et al. 1998; Würinger, Tschabitscher 2003; Würinger 2009). The ligamentous suspension consists of a horizontal fibrous septum originating from the pectoralis fascia at the level of the fifth rib heading toward the nipple and its vertical ligamentous extensions which provide a medial and lateral line of fixation on either border of the septum (*Fig. 1 – 4*).

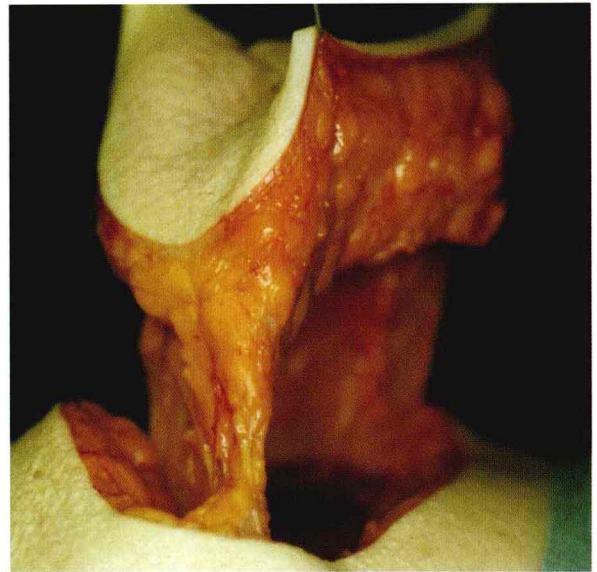
The medial vertical ligament stretches from the sternum along the second to the fifth rib, while the lateral vertical ligament attaches along the lateral border of the pectoralis minor muscle. Cranially, the vertical ligaments are connected along the second rib by the super-

ficial fascia and in this way form a circle of fibrous attachments. The line of fixation of this circle follows the borders of the pectoralis major muscle origin to a great extent. In an anterior direction, the vertical ligaments merge into the capsule of the breast. Thus, the ligamentous suspension also connects with the ligamenta suspensoria as described by Cooper (Cooper 1840b) as stretching from the anterior sheet of the superficial mammary fascia into the skin.

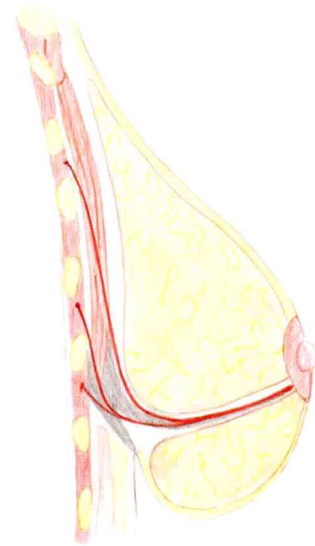
Arising from the same origin at the thoracic wall, the ligamentous suspension also has a superficial cutaneous component that merges into the overlying skin, thereby defining the actual bounds and shape of the breast. A rather weak medial cutaneous ligament stretches into the skin overlying the sternum. The superficial lateral ligament builds a strong connection between the pectoralis minor muscle and the skin and fascia of the axilla, thus producing an axillary hollow by the suspensory ligament of the axilla (*Fig. 4*). The superficial cutaneous part of the horizontal septum stretches from the same origin at the level of the fifth rib into the submammary crease by densifications of Cooper's ligaments (*Fig. 2*); it thereby forms the submammary crease.

The main importance of the ligamentous suspension lies in the fact that it acts as a guiding structure for neurovascular supply. The deep component of the ligamentous suspension, which attaches the breast to the thoracic wall, has a predictable relationship to the main vessels and nerves of the breast and the nipple-areola complex. It resembles the mesentery of the intestine both in its thin, pliable structure and in functional terms. The remaining parts of the breast receive no distinct vessels from the thoracic wall, as mentioned in previous descriptions of the hypervascular and hypovascular zones of the anterior chest wall (Palmer, Taylor 1986).

The horizontal septum is covered cranially and caudally by two dense layers of vessels running toward the nipple (*Fig. 2, Fig. 3*). The very distinct



1)



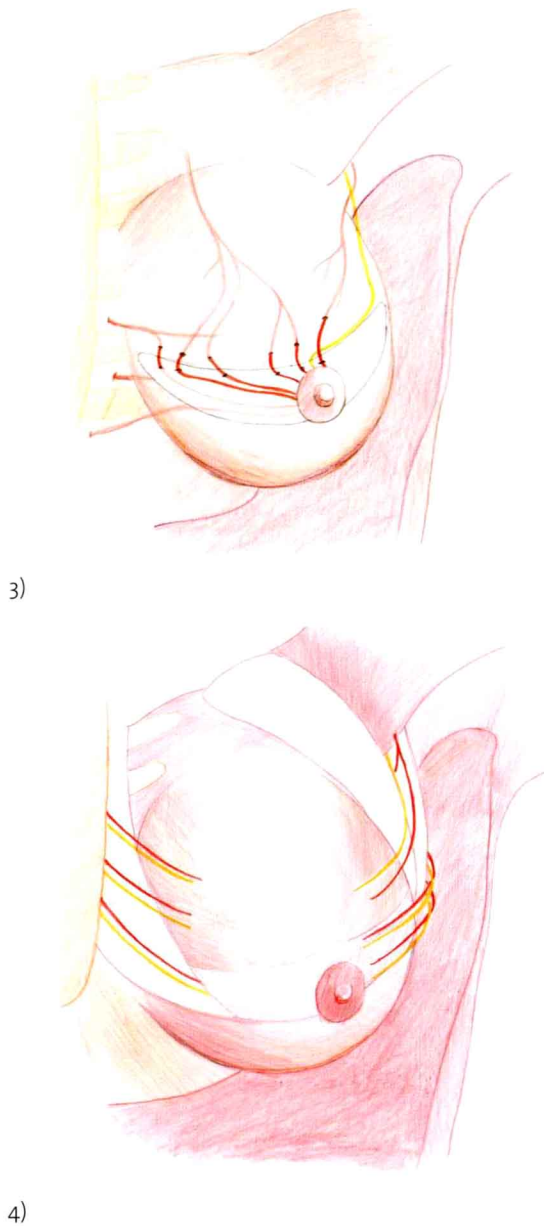
2)

Fig. 1:

Craniomedial view of the right breast in anatomical dissection, showing the horizontal septum and the medial ligament after blunt separation along the retromammary space.

Fig. 2:

Schematic vertical sectional view of the left breast, showing the horizontal septum guiding cranial and caudal vascular layers.

**Fig. 3:**

Schematic anteromedial view of the left breast, showing the neurovascular supply along the horizontal septum.

Fig. 4:

Same view, showing the neurovascular supply guided subcutaneously along the medial and lateral ligaments to the NAC.

cranial layer consists of branches of the thoracoacromial artery, emerging from the pectoralis major at the level of the fourth intercostal space, and a branch of the lateral thoracic artery. The caudal vascular layer is built by cutaneous perforating branches from anastomoses of the fourth and fifth, rarely also the sixth intercostal arteries, which together run in a cranial direction to attach to the horizontal septum.

The residual part of the fibrous circle also acts as a guiding structure for the main vascular supply, continuing to run subcutaneously along the capsule of the gland and finally building a subdermal periareolar network (**Fig. 4**). These are the perforating branches from anastomoses of the internal thoracic artery, which follow the medial vertical ligament, arising from the second to the fourth intercostal spaces, and branches of the lateral thoracic artery arising at the same level, which follow the lateral vertical ligament. These vessels run subcutaneously, protected within channels built by the fibrous structures of the ligaments, which merge into the superficial fascia. At the subdermal periareolar plexus, they anastomose with the vessels which come along the horizontal septum.

Both the large vessels and the large nerves run along the ligamentous suspension (Würinger, Mader et al. 1998). To the extent that they are developed, the anterior cutaneous branches of the second to fourth intercostal nerves are guided along the medial ligament and the corresponding lateral cutaneous branches along the lateral ligament (**Fig. 4**). Most importantly, the main nerve to the nipple, the deep branch of the lateral cutaneous branch of the fourth or sometimes the fifth intercostal nerve, always runs along the horizontal septum (**Fig. 3**).

Understanding the course of the main neurovascular supply along the horizontal septum is of avail in preserving viability and sensitivity to the nipple in operations of the breast, e.g. in breast reductions (Würinger 1999, 2005, 2010; Deventer et al. 2008; Hamdi et al. 2009).