Preface

Imaging of the breast is primarily based on x-ray mammography, breast ultrasound, and MR mammography. Today, the full-field digital technique is well-established for the performance of x-ray mammography. Besides requiring less radiation exposure than conventional mammography, it offers additional advantages in the examination of young women and women with dense breast tissue by providing the opportunity to utilize a wide variety of postprocessing options. One of these options, the CAD System, has proven itself to be especially helpful in the detection of microcalcifications. Innovative aspects of modern breast ultrasound include the additional use of color duplex, 3D and 4D techniques. The third major examination method, MR mammography, has experienced a dramatic increase in its diagnostic significance. With the development of high-resolution MRI, MR mammography now possesses the highest sensitivity for the detection of both invasive and intraductal breast carcinomas.

Because of improved diagnostic imaging, the detection rate of small, nonpalpable carcinomas has increased. The current goal of early detection programs is the detection of breast cancer as an intraductal tumor, or as an invasive tumor under 1 cm in diameter. Patients with breast cancer detected at such an early stage generally have an excellent prognosis when treated appropriately.

With the increasing detection of early and/or small breast cancers, there is a growing necessity for image-guided diagnostic work-up of suspicious breast lesions. To obtain an accurate tissue diagnosis before definitive therapy is initiated, the primary tissue sampling of suspicious findings should be performed by percutaneous biopsy, and not by open surgery. Core needle biopsy of large palpable tumors may be performed under clinical guidance. However, tissue sampling of clinically occult findings should be performed using ultrasound, mammography, or MRI-guided core needle or vacuum-assisted needle biopsy. This procedural approach is in accordance with the course of action recommended for BI-RADS 4 and 5 findings in the recently revised European S3 guidelines for the early detection of breast cancer. By obtaining a definitive pathologic diagnosis before therapy, the number of unnecessary excisions for benign lesions has been substantially reduced. In addition, a pretherapeutic diagnostic work-up that confirms a breast carcinoma allows precise patient information and the appropriate planning of the surgical procedure, including the optimal strategy for lymphadenectomy.

Over the last several years, specialized and effective equipment has become available for the performance of percutaneous biopsies. Compatible biopsy equipment is available for use with all the different examination modalities. Large core biopsies (14 gauge to 19 gauge) and vacuum-assisted needle biopsies (8 gauge to 11 gauge) are currently the preferred biopsy methods. Fine-needle aspiration biopsies are presently reserved for a very few indications. In addition to biopsy equipment, there are a multitude of localization markers for the localization of lesions or target volumes before surgical excision. The spectrum of materials available includes localization wires in various configurations, clips and coils, and gel-markers visible on ultrasound.

Strategic approaches in breast diagnostics have also changed greatly in the last decades. In the 1970s, mammography and ultrasound were the predominant methods used in the diagnostic work-up of clinical findings. The fine-needle aspiration biopsy complemented these as part of what is referred to as the “triple test.” With the development and improvement of technical and procedural options, it has become increasingly feasible to diagnose clinically occult carcinomas and reduce the development of late-stage disease (secondary prevention). It is conceivable that further diagnostic developments will increasingly allow the detection of breast cancer precursors. In this context, minimally invasive interventional methods would gain a greater importance (primary prevention).

This book deals solely with the presently established interventional methods used in breast diagnostics. Our goal is to give a complete compilation of the indications and procedural approaches for each particular method at the current, state-of-the-art level. The book is enriched by the addition of tips and tricks, as well as common sources of error.

The heart of this book is concerned with ultrasound-, x-ray-, and MRI-guided interventional techniques for the percutaneous acquisition of tissue samples and the pretherapeutic localization of lesions. The corresponding Chapters 4, 5, and 6 begin with a synopsis of the most important characteristic features of each diagnostic method (ultrasound, mammography, MR mammography). Relevant diagnostic evaluation criteria and lesion classification are particularly addressed. This creates the common basis of standardized terminology and assessment categories required for understanding the following discussions pertaining to the interventional techniques. The chapters continue with explicit information on the application of each intervention method and include typical practical examples. A pertinent statement from the European S3 guidelines and a description of the course of action in special casuistic examples supplement each section. The chapters include a checklist intended to facilitate the preparation and performance of breast interventions. These central chapters are supplemented by statements and information pertaining to practice guidelines (Chapter 1) and patient preparation before performing an intervention (Chapter 2).

Chapter 7 is a generously illustrated overview of the materials and equipment currently available for the performance of breast interventions. The special features of several exemplary systems are presented in detail. Chapters 8 and 9 describe the preparation of core biopsy specimens for histopathologic examination and specimen imaging to confirm correct sampling, respectively. Chapter 10 deals with the performance of galactography, a rarely indicated examination technique. It also includes a statement on up-to-date, direct visualization techniques of the ductal system, e.g., ductoscopy.
Recognizing patients with early breast cancer who do not need to undergo a full axillary lymph node dissection is one of the most important innovative advances in breast cancer therapy. For node-negative patients whose lymph node dissection has been limited to the sentinel node(s), therapy has been adjusted to the stage of disease and the risk of complications such as arm lymphedema has been avoided. Chapter 11 describes the indications, performance, and limitations of the sentinel node biopsy technique.

The second essential section of this book deals with the currently valid pathology reporting categories, i.e. the B-classification system for core and vacuum biopsy specimens. Chapter 13 describes the individual pathologic B-categories and the resulting consequences for an appropriate course of action. The reader of this chapter will quickly realize that patient management requires an interdisciplinary approach to correlate specific radiologic findings with pathology, and decide on further recommendations and/or treatment. This chapter is supplemented with informative images and clear, comprehensive tables and graphs. Chapter 12 deals with the essential aspects of fine-needle aspiration and cytologic assessment.

The last chapter is an assortment of instructive case studies. The reader is encouraged to analyze the ultrasonographic, mammographic, and MR-mammographic images of these histopathologically verified findings. This compilation of cases is a representative sample of predominantly small, occult lesions that would typically be assessed primarily by percutaneous intervention.

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