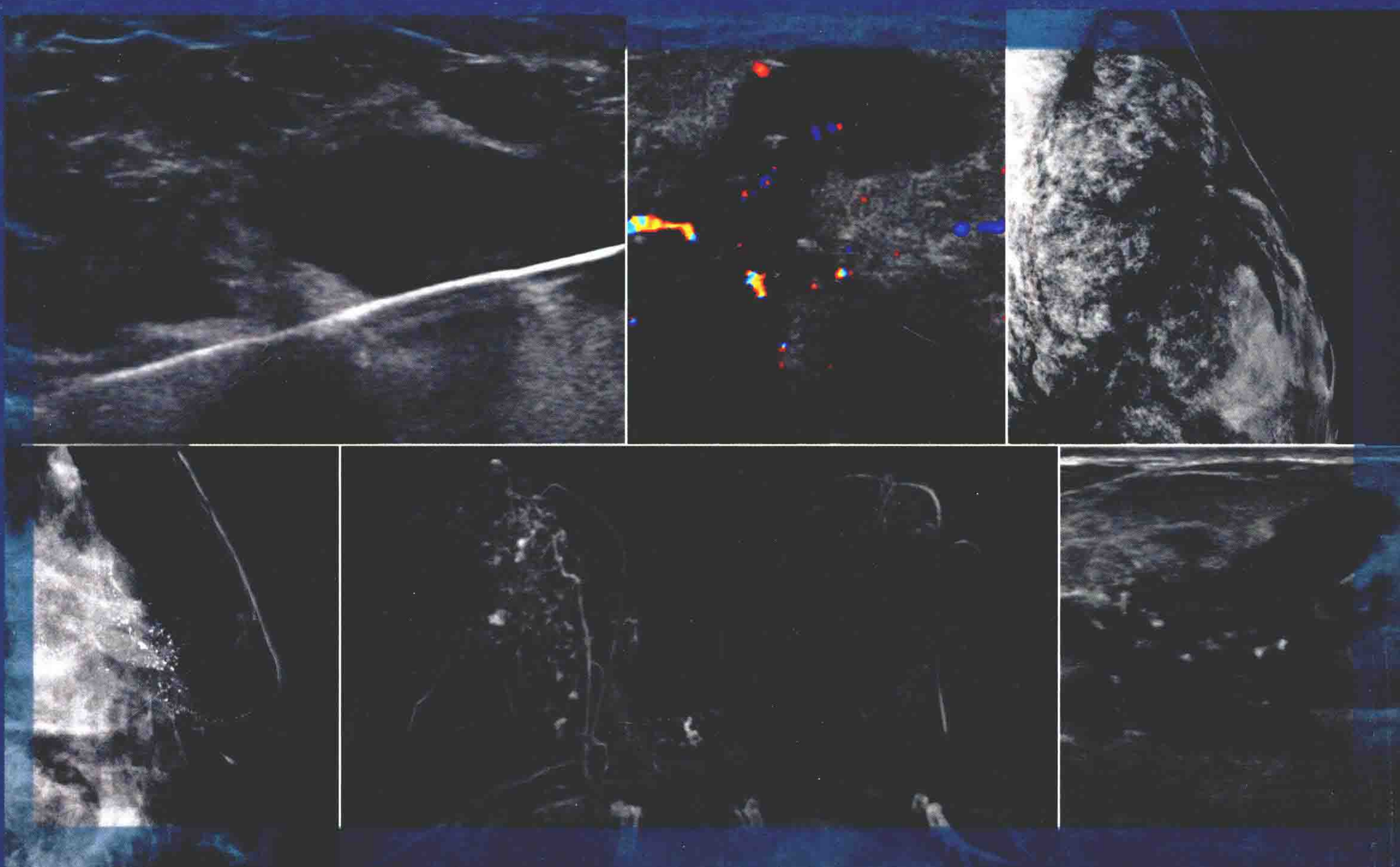
JENNIFER A. HARVEY
DAVID E. MARCH

MAKING THE DIAGNOSIS
A Practical Guide to Breast Imaging



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A Practical Guide to Breast Imaging

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MAKING THE DIAGNOSIS
A Practical Guide to Breast Imaging

We dedicate this book to the courageous women and men who face a diagnosis of breast cancer.

Preface

This book is intended to provide practical information on breast imaging, with the goal of improving breast cancer detection. This is not meant as a reference book or as a guide to prepare for board examinations. There are other books better suited for those purposes. The material in our book will be most useful to radiology residents and fellows, to generalists, and to those radiologists who subspecialize in another area and who also interpret breast imaging examinations.

This book provides information in an accessible format that will enable the reader to expand his or her fund of knowledge in breast imaging. The style is somewhat informal, which hopefully will make for enjoyable reading. The twenty chapters, divided into six sections, span a wide range of topics that are commonly encountered in breast imaging. Each chapter includes many practical scenarios intended to help radiologists decide how findings should be described, what to include in the differential diagnosis, and how the finding should be managed. Key points are summarized at the end of each chapter.

Each chapter is followed by cases carefully chosen to reinforce key points. The case material is the backbone of this book, and hundreds of images are included, highlighting the use of different modalities in many cases. This approach—rather than strict organization by modality—reflects the multimodality approach that is essential to breast imaging today. In reviewing the cases, the reader will benefit most by carefully analyzing the images and arriving at a conclusion before reviewing the answers. This will more closely simulate a true prospective clinical experience and encourage the reader to reach a conclusion on his or her own. However, if the finding is not clear, don't be discouraged! Some of the findings are quite subtle. Take what you can from these cases and understand that the finding would have been much more obvious to you on a high-resolution monitor.

Those who have experience in breast imaging will recognize that the most meaningful findings are often quite difficult to detect. Most texts, however, are limited to figures that show obvious findings. In working with the Elsevier team, one of our greatest challenges was to include more subtle cases in order to realistically portray findings commonly seen in practice. You may need to look really hard to see and understand these findings, and we advise that you review this text in excellent lighting (or, with electronic format, in high-resolution display)!

This book can be used in a number of ways. For the most industrious radiologist, it can be read in its entirety. If you are in training or new to breast imaging, this will give you a solid foundation for the practice of breast imaging. However, we understand that your time is precious, and this book can also be used to quickly review a specific topic. Review of the figure and case images is a good visual exercise when the findings are correlated with the ultimate diagnosis.

Although the material in this book is based on our combined experience of 40+ years in breast imaging, it should not be viewed in any sense as a standard of care for the practice of breast imaging. There is often more than one approach to a situation. For example, our good friend, Val Jackson, loves rolled views, whereas we would rather have spot compression views and an ultrasound. Either approach will work just fine. Our individual skills in breast imaging develop over time through different experiences and the use of different tools. This book is intended to give you many practical options in your approach. With experience, you will learn what techniques work best for you and your patients.

In breast imaging, we have the opportunity to detect and diagnose many malignancies at a time when the chance for cure is very high or to reassure patients when the findings are benign. We hope the material in this book will help you make the most of these opportunities. Our patients are counting on us. We can save lives.

Jennifer A. Harvey
David E. March

Acknowledgments

I am honored to have written this book with my good friend, David March. When I told an acquaintance that we were working on a book together, they replied, "And you're still friends?!" Presumably the demands of writing a book can undo a previously solid friendship. I am delighted to report that David remains a very good friend and colleague whom I very much respect. David is a very sharp, organized man. His passion for improving patient care is evident throughout this book. At times in the process, I believe my role was only to put in a few jokes.

My sons, Brendon, Taylor, Alexander, and Benjamin, were exceedingly tolerant of Mom working on the laptop at all hours. I am grateful for their humor and love. You will often see them in various slides during my lectures, such as my 12-year-old being well behaved and benign like a fibroadenoma. They have kindly indulged us with the opening picture to the Physics chapter (excluding Taylor) by doing their best geek imitation. They are my joy.

I would like to thank the many people that have given me a chance: Paul Capp, Bruce Hillman, Val Jackson, Larry Bassett, Etta Pisano, Tony Proto, the entire ABR and RSNA offices, and so many others. I would like to thank my many colleagues who let me question them so that we could learn together: Carl D'Orsi, Ed Sickles, Martin Yaffe, and Dan Kopans. I would like to thank my very, very good friends: Val Jackson, Mary Mahoney, Larry Bassett, and Michael Linver—you make me believe in myself. I would like to thank my fellow UVa breast imaging radiologists: Brandi Nicholson, Heather Peppard, Carrie Rochman, and Michael Cohen (who is a Virginian by heart)—you are not only my colleagues but also my friends. I would like to thank my technologists and staff—you treat every patient as though they were family. You are the best!

I would like to thank all of my residents and fellows for putting up with my merciless requests for recitation of differential diagnoses and facts and also for not asking too much of me in the mornings before I've had a really strong cup of tea. I love teaching you. Your questions make me think.

Finally, I am grateful to my patients and their families. You inspire me to be better.

Jennifer A. Harvey

There are numerous individuals who contributed either directly or indirectly to the preparation of this book. To those deserving of acknowledgment whose names I did not include, please accept my sincere apology for the oversight.

First, I would like to thank my wife, Carolyn, for her unwavering support and encouragement throughout this project, as well as for her expert editorial insights. I also appreciate the understanding of our sons, Kevin and Daniel March, and the encouragement of my mother, Susan March, my sister, Jocelyn Dreier, my brother, Christopher March, and their families.

My interest in breast imaging was sparked by the brilliant teaching of Dr. Stephen Feig during my residency at the Thomas Jefferson University Hospital. This book would surely never have been written without his dedication to teaching. I am also grateful to Dr. W. Max Cloud, who served as a role model at Radiology & Imaging through his leadership in establishing mammography in the region and by setting high standards for its interpretation.

One of the greatest privileges of my career has been to volunteer for the American Board of Radiology and to work with the phenomenal volunteers and staff associated with the Board. The Board's commitment to quality has attracted some of the most highly accomplished and dedicated breast imaging radiologists in the field. Exposure to the professional qualities embodied by these individuals has inspired my own efforts.

Through the Board, I was fortunate to meet my coauthor and friend, Dr. Jennifer Harvey. Working with Jennifer has been a remarkable educational experience on many levels. After working with Jennifer, "dedicated" and "driven" have taken on new meanings. Often, as I began early morning work on a chapter before the start of my clinical day, I would discover that Jennifer had been hard at work on the chapter the night before, signing off just a few hours before I woke up. I am grateful to Jennifer for sharing her remarkable experience and fund of knowledge in this text.

I would like to thank all of the technologists I have had the honor to work with while at Radiology & Imaging, Baystate Radiology & Imaging, the Baystate Comprehensive Breast Center, InMed Diagnostic Services, and the Baystate Breast & Wellness Center. These individuals currently include Jennie Benford, Susan Boucher, Grace Bryda, Lisa Cody, Elizabeth Daniel, Carol Day, Kimberly Duclos, Cathy Dusseault, Megan Fuss, Linda Garvey, Ann Marie Gentile, Gail Gladu, Catherine Grosh, Jean Hagner, Francine Johnson, Tina Juliano, Donna King, Ashley LaFortune, Diane Lane, Janice Miller, Roberta O'Neill, Edmarie Parrilla, Susan Pearson, Maureen Peczka, Sherry Piantoni, Joanne Picard, Amy Rivera, Carrie Rooney, Lauren Rosa, Nicole Sarrette, Carrie Silvia, Oksana Slivka, April Tabb, Danielle Thibault, and Danielle Toledo. The excellent work these individuals do every day has enabled the diagnosis of thousands of women with breast cancer, and I appreciate their dedication to patient care. A special acknowledgment goes to Janet Harp, our operations manager, Connie Desjardins, our Systems Analyst and Administrator, and Richard French, our IT Director, for their support and excellent work keeping things running smoothly at the Center.

I would like to thank the administration of Baystate Medical Center for their administrative expertise in planning and seeing to completion the beautiful, elegant, and patient-centered Baystate Breast & Wellness Center. I wish Baystate continued success in the pursuit of its mission to improve the health of the people in our communities with quality and compassion.

Special acknowledgment goes to my friends, Dr. Howard and Judy Raymond, for their support during this project, and to Dr. Holly Mason, my co-director at the Baystate Breast & Wellness Center. I also thank my breast imaging colleagues at Radiology & Imaging, especially Dr. Jennifer Hadro and Dr. Vivian Miller, for their assistance with challenging cases and their contributions to the breast imaging program at Baystate.

Finally, I thank our talented team at Elsevier, including Lisa Barnes, Joy Moore, Roxanne Halpine Ward, Kathryn DeFrancesco, and Steven Stave, whose expertise and patience helped bring this project to completion.

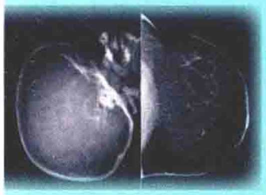
David E. March

Contents

SECTION I

APPROACH AND TECHNIQUE

CHAPTER 1



The First Question

The first question that a radiologist should consider when interpreting any study is, "Is this an adequate study?" That topic encompasses many points in breast imaging:
- *Is this the correct patient?*
- *Is this the correct study for this patient?*
- *Is the positioning adequate?*
- *Are any images blurry?*
- *Do the images have any correctable artifacts?*

Correct Patient/Correct Study

A quick check of patient name and an additional identifier such as date of birth or medical record number ensures that the correct patient is being reviewed. Checking the study date also confirms that the current study is being read (and not last year's study!). Another good check is to glance at the charge code and the study performed to ensure that they match. Finally, checking the number of images in the study will help make sure none are skipped during your review.

Knowing the indication for the study and the patient history are also important. Occasionally women may have completed a screening mammogram before informing the technologist about a palpable lump or other newly discovered clinical finding. These findings should be described in your report and diagnostic imaging should be recommended. If the patient referred for screening shares clinical complaints prior to the examination, she should optimally be rescheduled for diagnostic imaging.

- *Screening mammography* typically consists of two views of each breast: the craniocaudal (CC) and mediolateral oblique (MLO) views. Screening is performed for women with no symptoms of breast cancer, so they should not have any new breast lumps, palpable thickening, or worrisome nipple discharge. Screening mammography can be performed for women with a prior lumpectomy for breast cancer if their mammograms have shown benign findings for a number of years (typically 2 to 5 years after diagnosis in our practices). Screening performed at multiple sites in the community provides easy access for women. Direct supervision by a radiologist is not required (i.e., a radiologist does not have to be present).
- *Diagnostic mammography* is performed to evaluate a breast symptom that may be due to breast cancer (e.g., palpable lump or breast thickening) or to evaluate an abnormal screening mammogram. Women with recent breast cancer typically undergo diagnostic mammography. Ultrasound is often performed in conjunction with diagnostic mammography. Diagnostic mammography is nearly always performed under the direct supervision and interpretation of a radiologist on site.

Positioning

A poorly performed mammogram is a significant disservice to the patient. Radiologists may fear that a report stating that the examination is technically inadequate will hurt a technologist's feelings or that referring physicians will think poorly of the facility. However, everyone has a bad day now and then. No technologist is perfect. Every technologist occasionally will have patients who are just not positioned well. If feedback is given in a kind and supportive manner, it is often appreciated. If there is a trend of individual technologists having a high technical recall rate, focused feedback and training are helpful. Likewise, a facility often gains respect from referring health care providers if they understand that the radiologists expect the highest quality care for all patients. In our experience, consistent recall to repeat technically inadequate mammograms with feedback to the technologist is vital in creating and maintaining excellence.

An important point in understanding positioning for mammograms is that the upper inner quadrants of each breast (the cleavage area) are relatively fixed in position, whereas the inferior and lateral aspects of the breast are very mobile. This is why the technologist raises the image or film receptor when performing the CC view. There are cartoons jesting at why women have to stand on their toes for a mammogram. Now you know why! If you have never had a mammogram or seen one performed, ask a technologist if you can observe a screening mammogram. A good technologist is highly skilled at positioning even the most difficult patient. Ask her how she deals with women with very small breasts or who have a large abdomen. Watch how she works with the patient to obtain optimal compression. Your understanding (and respect for technologists) will be considerably elevated.

The Mediolateral Oblique View

The MLO view is positioned with the image receptor parallel to the pectoralis major muscle (typically between a 60- and 45-degree angle) and extends into the axilla. The pectoralis major muscle should be seen to at least the level of the *posterior nipple line* (Fig. 1-1).

Ideally, the inframammary fold should be visualized (Fig. 1-2). The last maneuver of the technologist in positioning the MLO view is to move the breast "up and out" (see Fig. 1-2). This means that the breast is pulled up and away from the pectoralis muscle, which allows for optimal compression of the breast. If the breast is not pulled up and out, the breast may droop with a "camel nose" appearance.

When the pectoralis muscle is thick, it may be difficult to obtain good compression of the front of the breast, particularly in large-breasted women. Some manufacturers address this issue by offering compression paddles that angle to allow compression of the anterior and posterior portions of the breast. Another approach is to obtain separate MLO views of the front of the breast, without the pectoralis muscle (front compression MLO views), to improve compression of the anterior breast (Fig. 1-3). It is helpful to get patients to relax their shoulders to get the pectoralis muscle (and breast tissue) into the MLO view (Box 1-1; Fig. 1-4).

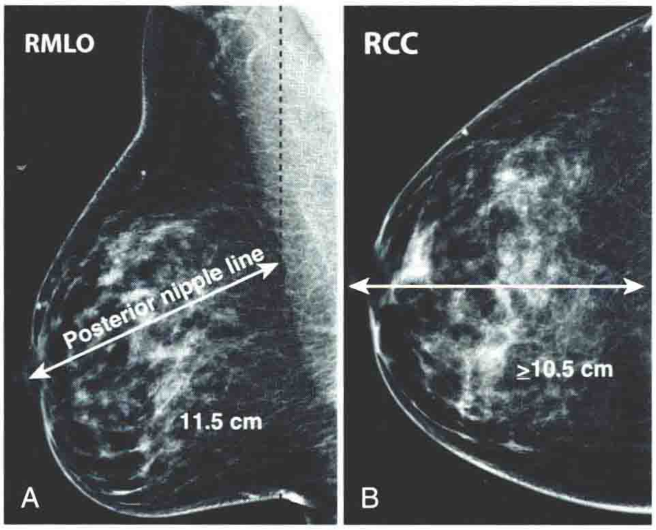


FIGURE 1-1 **Adequate Depth of Positioning on the Mammogram.** **A,** The depth on the mediolateral oblique (MLO) view is judged by the intersection of the pectoralis muscle with the posterior nipple line (*double arrow*). Therefore, the dashed line represents the minimal depth to be considered an adequate mammogram. **B,** If the posterior line measures 11.5 cm on the MLO view, then the posterior nipple line on the craniocaudal view must measure at least 10.5 cm to be adequately positioned for depth.

BOX 1-1 How to Get Great Muscle on Mediolateral Oblique Views

If you do this simple exercise, you will forever understand how your best technologists get great muscle and why others do not. Hang your arm relaxed down by your side. Now, grab your pectoralis muscle at the top of your axilla. See how the muscle is nice and soft and fat? Next, raise your shoulder. Feel how the muscle becomes concave? The best technologists get patients to relax their shoulders down, pushing the pectoralis muscle (and breast tissue) into the mediolateral oblique (MLO) view. Technologists who are nervous or don't get the patient to relax will struggle with MLO positioning (Fig. 1-4).

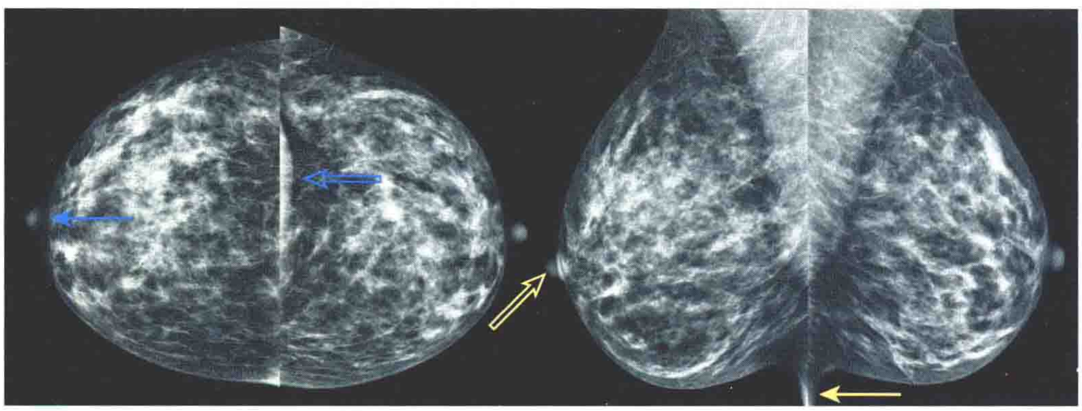


FIGURE 1-2 **Nicely Positioned Mammogram.** On the craniocaudal views (*left*), the nipples are well centered (*blue arrow*) and the pectoral muscle is seen on the left side (*blue open arrow*). On the mediolateral oblique views (*right*), the pectoralis muscles are convex and visualized well below the posterior nipple line. The breasts have been pulled "up and out" nicely in this mammogram so that the nipples are high on the image (*yellow open arrow*). This also results in opening up the inframammary fold without overlying skinfolds (*yellow arrow*).

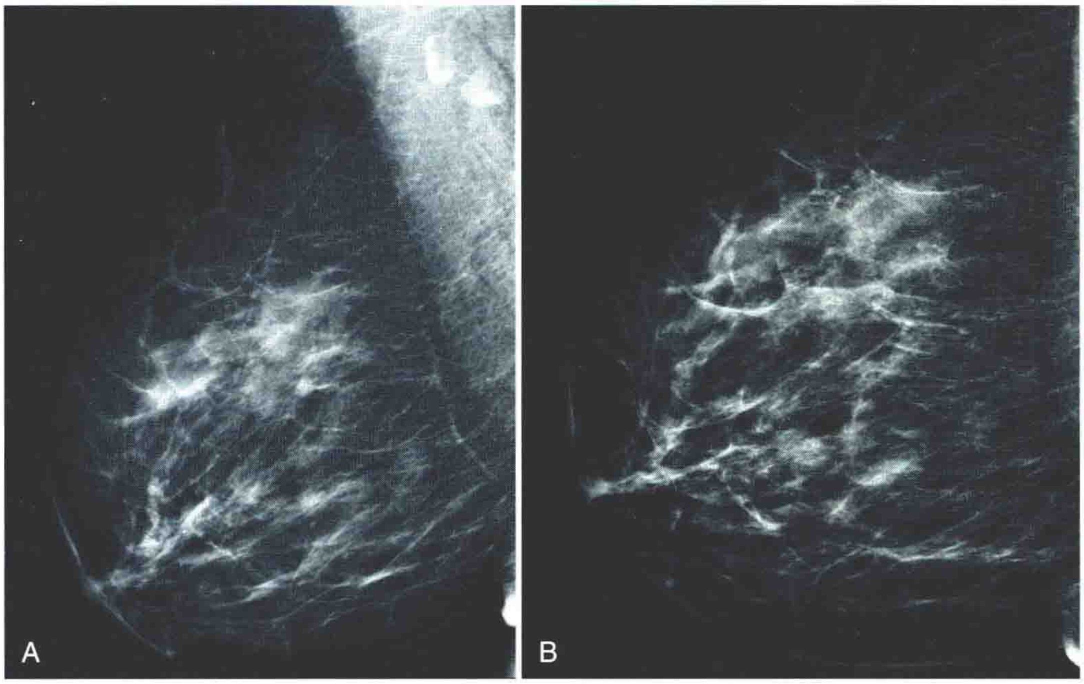


FIGURE 1-3 **Front Mediolateral Oblique (MLO) Views.** Sometimes it is difficult to obtain adequate compression of the front of the breast on the MLO views (**A**) if the pectoralis muscle is thick. Compression of just the front of the breast (**B**) in the MLO projection can improve sharpness.

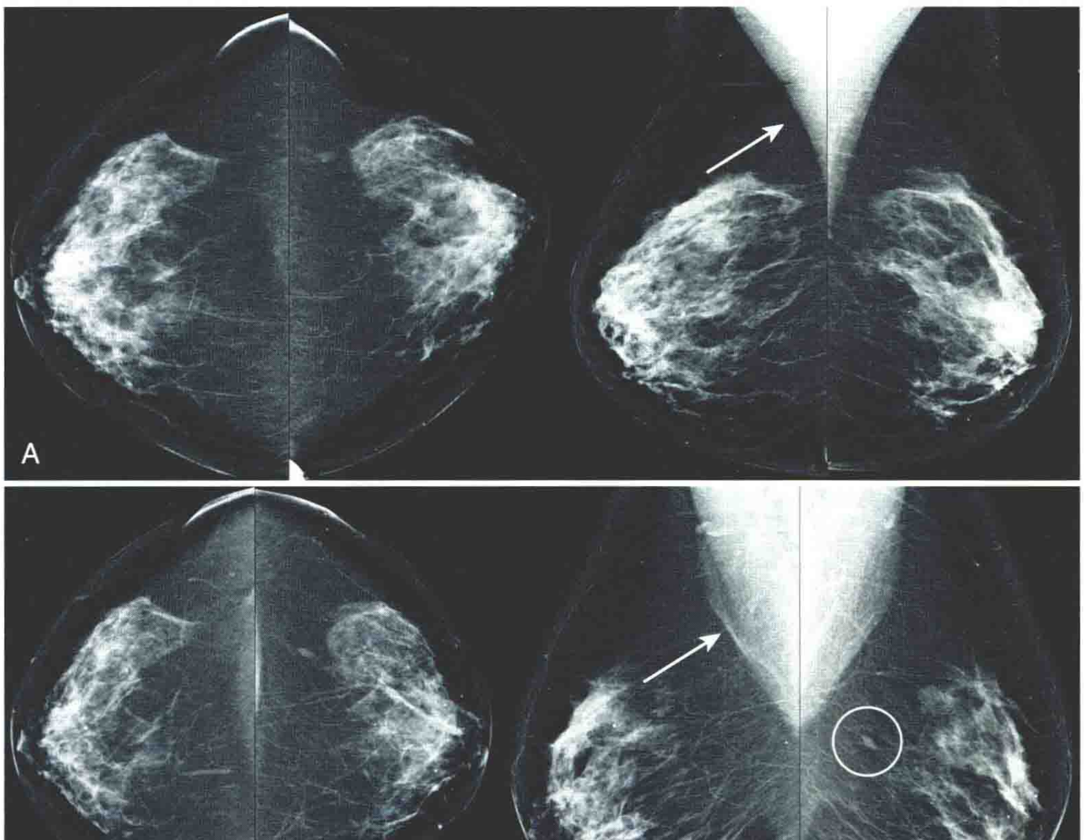


FIGURE 1-4 **Tense Versus Relaxed Pectoralis Muscles. A,** Bilateral mammogram with concave appearance to the pectoralis muscles (*arrow*). **B,** Bilateral mammogram the next year with a different technologist with a convex appearance to the pectoralis muscles (*arrow*). This is due to the muscle being relaxed. Note that a small oval mass in the lateral left breast is not visualized on the mediolateral oblique view on the first mammogram, but is readily apparent on the second (*circle*).

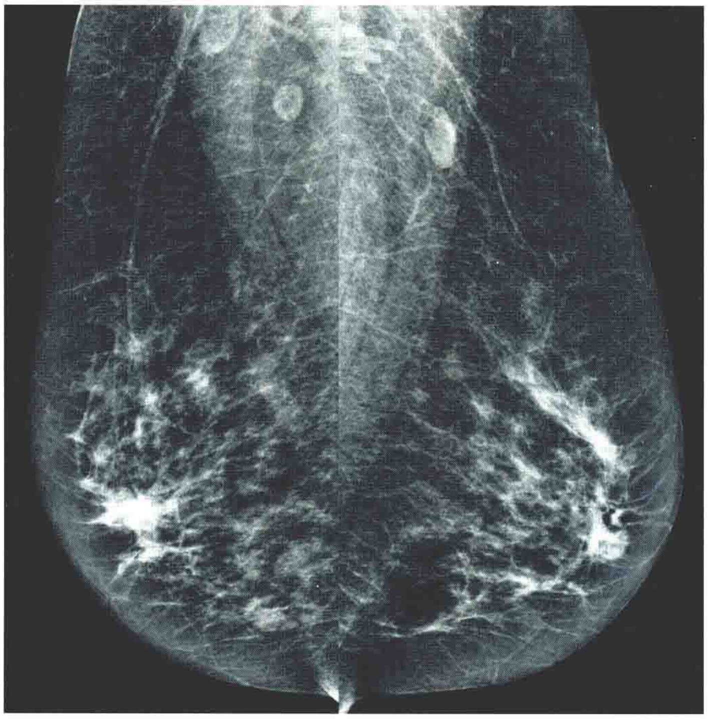


FIGURE 1-5 **Using the Lateral Medial Oblique (LMO) View.** A 67-year-old woman presents for screening. She has moderate pectus excavatum. LMO views were obtained instead of mediolateral oblique (MLO) views, allowing better visualization of the posterior breast. The appearance is similar to that obtained with MLO views.

When to Use a Lateral Medial Oblique View

The LMO (lateral medial oblique) view is obtained in the same projection as the MLO except that the machine is flipped over so that the image receptor is in the cleavage and the tube head is nearer the floor. In certain situations the LMO view may be preferable to the MLO view. The smaller size of the image receptor near the patient's head makes the LMO view useful for women with kyphosis or pectus excavatum (Fig. 1-5). An LMO view may also require less manipulation of hardware when internal devices such as a pacemaker or port are present in the cleavage area.

The Craniocaudal View

The CC view is typically performed horizontal to the floor, though the receptor may be rotated about 5 degrees toward the axilla if needed. Again, the receptor should be elevated in order to mobilize the inferior breast and image the superior breast. The nipple should be centered in the image and not pointing toward the lateral corner of the image. The cleavage of the contralateral breast should remain on the receptor; if it is pushed back, then medial tissue from the breast of interest will also be pushed off the receptor.

The pectoralis muscle should be visualized on at least 30% of CC views (see Fig. 1-2). Obviously the image is positioned far enough back if the pectoralis muscle is seen. So how can one tell if a CC view is positioned well if the pectoralis muscle is not present? Let's go back to the MLO view. The measured posterior nipple line should equal or be within at least 1 cm of the same line on the CC view (see Fig. 1-1). If it is not, then the CC view should be repeated.

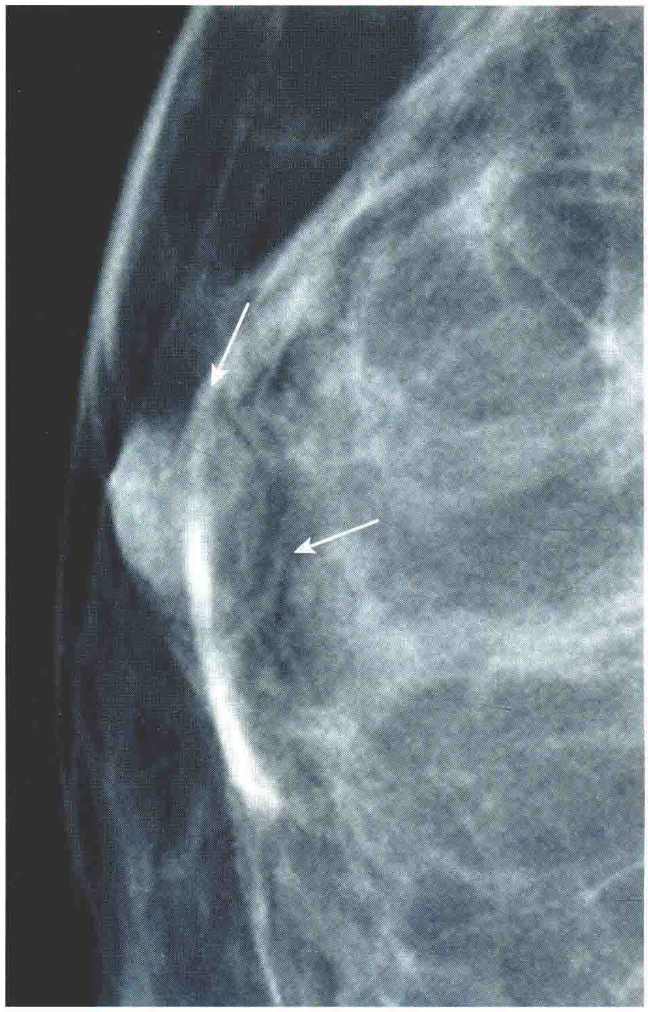


FIGURE 1-6 **Nipple Simulating a Mass.** The nipple may mimic a mass if not in profile. A halo of air (*arrows*) entrapped around the nipple helps to verify that the "mass" is the nipple.

For women who are very kyphotic, the CC from below (CCFB) view may improve visualization of the posterior breast tissue. This view is obtained by flipping the entire gantry upside down. The receptor (which is much smaller) is then in the area of the patient's face, rather than the tube head.

Nipple in Profile

The nipple should be in profile in one of the two views if possible. Sometimes the nipple can be mistaken for a mass and converging ducts as architectural distortion if it is not in profile (Fig. 1-6). In addition, subareolar cancers can be difficult to visualize when the nipple is not in profile.

Marking Scars and Skin Lesions

Wires may be taped to the skin to mark scars. This can be helpful to ensure that architectural distortion due to prior surgical biopsy does not undergo an unnecessary workup. Marking scars from reduction mammoplasty is not typically necessary if the surgical history is provided. An alternative to marking all scars directly is for the technologist to draw them on a diagram so they can be correlated with the mammographic findings.

Marking skin lesions can also reduce screening recall to evaluate a possible breast mass. We use BBs to mark skin lesions, but other markers are also available.

Blur

Blur can be due to generalized patient motion or breathing motion. Breathing motion often results in blur that predominates along the back of the image. Blur can also be due to inadequate compression, usually along the anterior portion of the breast or the inferior breast on the MLO view. In film-screen mammography, focal blur can occur when debris elevates the film away from the screen, causing poor film-screen contact.

Blur can be difficult to perceive on mammography. The easiest way to assess for blur is to look at the Cooper ligaments, which appear as white lines in the fat. They should be thin and crisp. If they are thick or fuzzy, then there is either breast edema or blur (Fig. 1-7). If there is edema, then there should also be skin thickening. If not, it is likely due to blur. Looking at the sharpness of calcifications and comparing their appearance with prior mammograms can also help determine whether blur is present.

With digital mammography, blur that is obvious on a five-megapixel monitor may be hard to see on the small lower resolution monitors in the acquisition room. Technologists may have a difficult time perceiving blur if only using the lower resolution monitors to review the images. We encourage the technologists to use the digital zoom to quickly check their images for blur before letting a screening patient go.

Correctable Artifacts

Artifacts have been considerably reduced with the elimination of film processors. If you are performing film-screen mammography, there are numerous artifacts that one must know about and understand well (pickoff from dirty rollers, temperature changes, dirty screens, fixer retention, static). We will be focusing on digital mammography in this section.

Grid Lines

All mammograms, except for magnification views, are performed with a reciprocating (moving) grid. This improves image contrast. Grid lines should normally blur out of the image because the grid is moving. Grid lines may uncommonly be visible with a properly functioning grid if there is a very short or a very long exposure; in these cases the grid lines have not had enough exposure time to blur or become superimposed during a lengthy exposure.

Grid lines are probably the most common correctable mammography artifact, particularly on film-screen, and may be difficult to recognize by an untrained eye. On most film-screen mammography and some digital units (General Electric), grid lines are visualized as fine, dark,

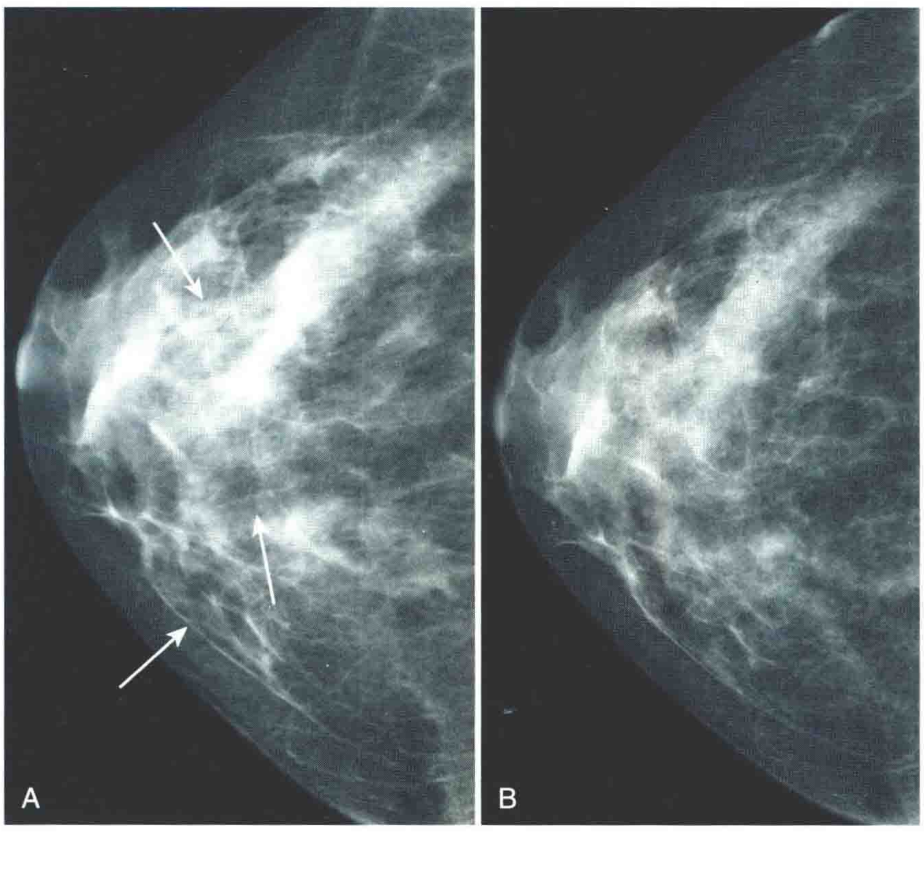


FIGURE 1-7 **Blur.** Craniocaudal (CC) views from the same patient. **A**, The Cooper ligaments appear thickened and fuzzy (*arrows*) due to blur, similar to Kerley B lines on a chest radiograph with pulmonary edema. **B**, Repeat CC view shows that the Cooper ligaments are very thin and normal in appearance.

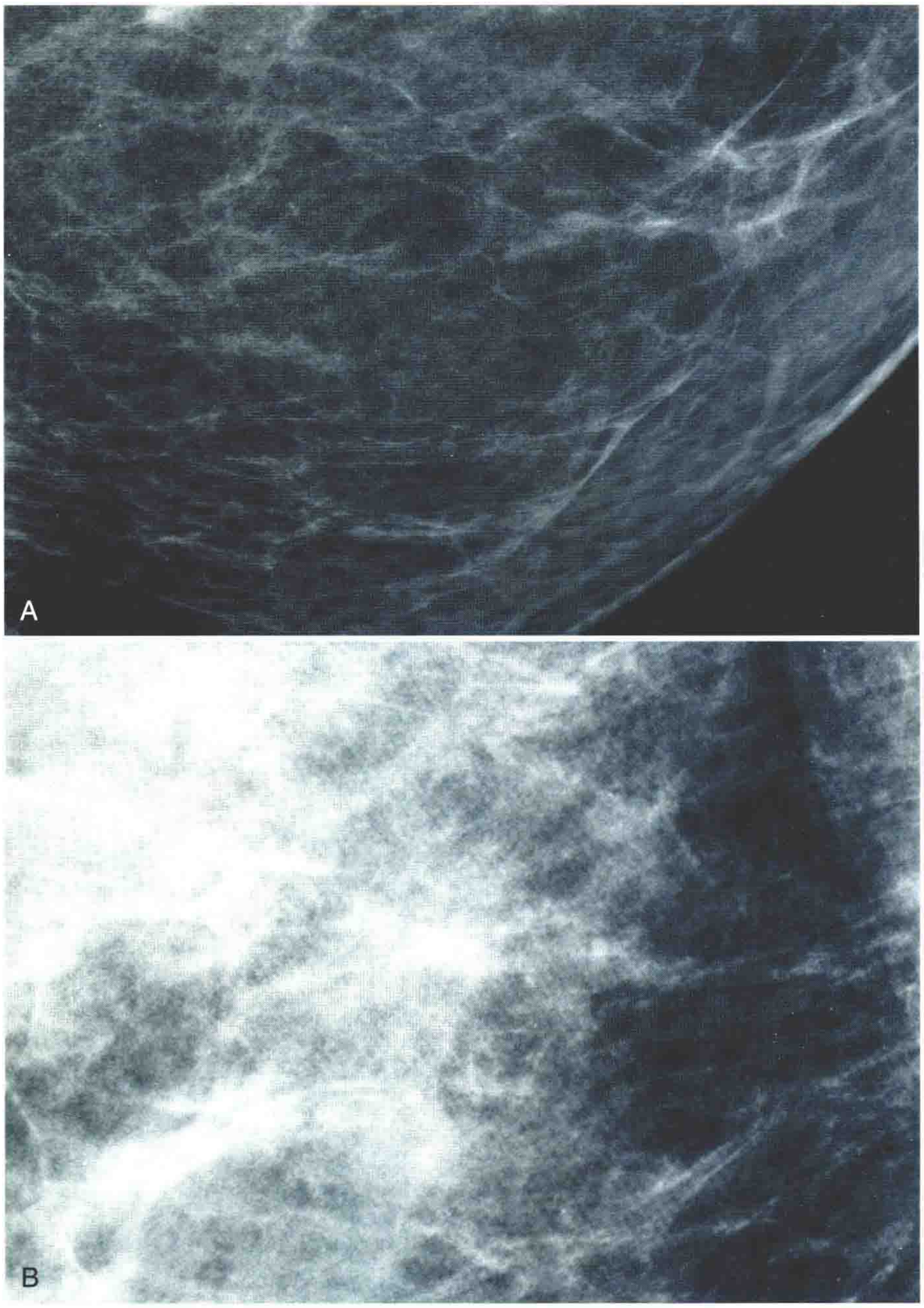


FIGURE 1-8 **Grid Lines. A,** Most mammography machines use grids that consist of thin parallel metal bars. When this type of grid is not functioning properly, fine, dark, horizontal lines are visible on the image. **B,** Some manufacturers use a different type of grid structure. When these grids malfunction, fine dark lines appear that are oriented at 45 degrees from the horizontal, creating sloping lines in an X-shaped pattern.

horizontal lines (Fig. 1-8). Some film-screen (Hologic) and many digital (Hologic, Siemens) units use mesh metallic grids that are oriented like an "X" on the image (see Fig. 1-8). The grid lines will be visualized as very fine, dark lines oriented obliquely across the image. If the grid is not functioning, a service call is needed to repair the unit before it can be used.

External Artifacts

Hair, patient gown, deodorant, talc, and tattoos can create artifacts on mammography. Ideally, the technologist will recognize and correct most of these problems at the time of the study. Deodorant has a typical appearance (Fig. 1-9) and is usually not confused with calcifications in the axilla. If there is an artifact on the mammogram, the technologist will ask the patient to remove or move the item and will repeat the image(s) in question. Talc and ointments are more problematic than deodorant because they often overlie the breast tissue.

Internal Artifacts

Internal artifacts include pacemakers, catheters, bullet fragments, retained hookwires, shunt tubing, and Dacron cuffs from Hickman catheters. They obviously cannot be removed but should be recognized for what they represent. For women with pacemakers or port catheters, an LMO view may be safer and easier to perform than an MLO view. With an LMO view, the pacemaker or

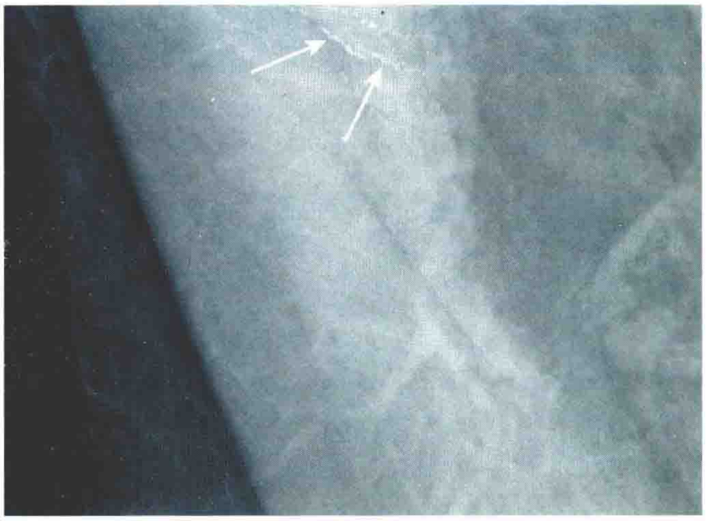


FIGURE 1-9 **Deodorant Artifact.** Close-up of a right MLO view shows high-density artifact (*arrows*) overlying the high axilla, characteristic of the appearance of deodorant. It is often clumpy and linear, as in this case.

catheter is placed next to the receptor and the compression plate is moved toward it, reducing motion.

Optimizing the Diagnostic Mammogram

Palpable abnormalities should be identified with a radiopaque marker over the area. This could be a triangle or metallic BB pellet. If a BB is used, then skin lesions such as moles should be marked with a different type of radiopaque identifier.

Spot compression views are typically obtained in CC and MLO projections with or without magnification. Spot compression views with magnification may have a small reduction in contrast. On the other hand, magnification allows better delineation of margins. Whether to magnify or not on spot compression views is a personal preference. Leaving the collimator open for spot compression views allows a larger view of the region to help ensure that the correct area was included and that the

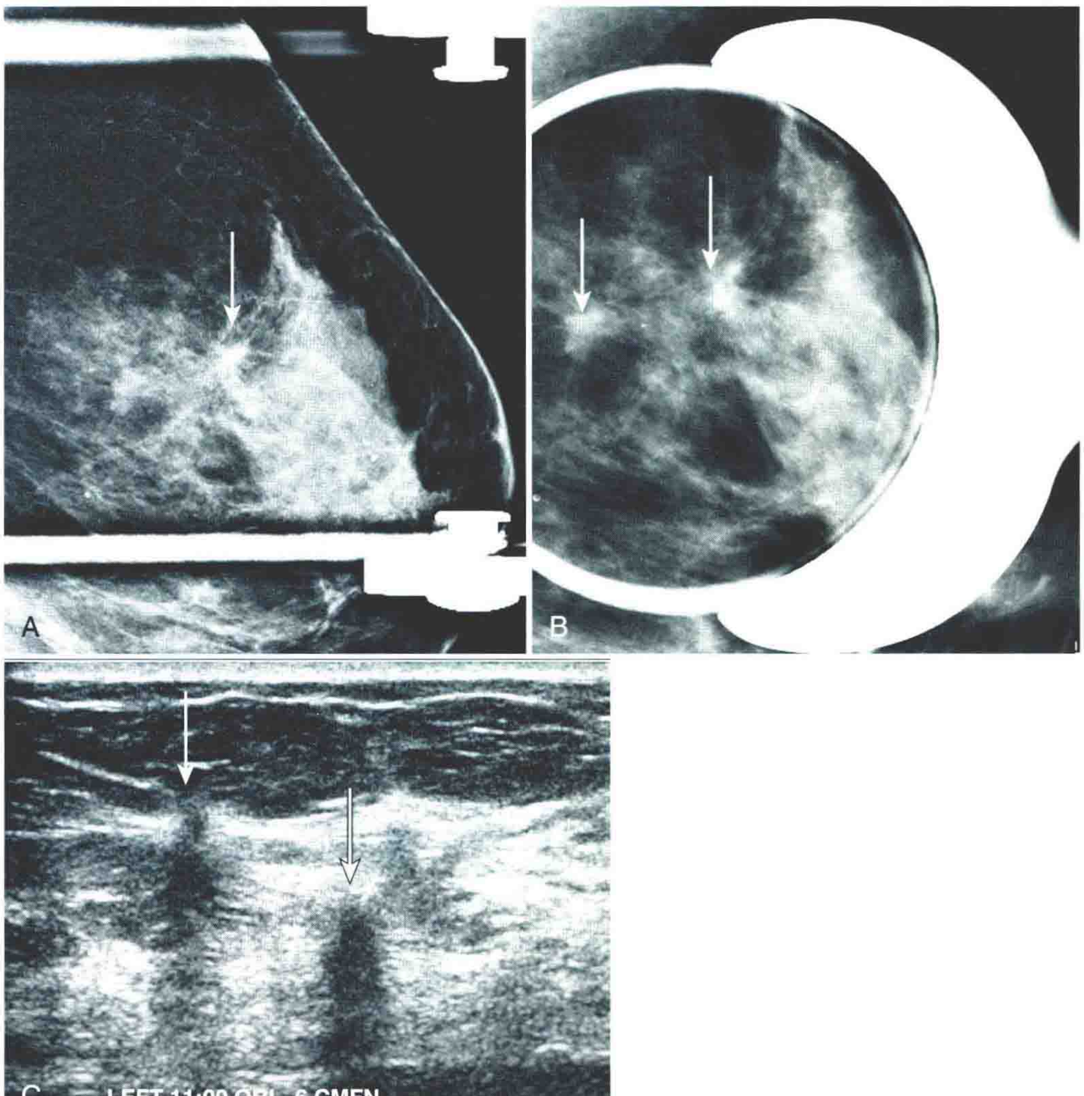


FIGURE 1-10 **Spot Compression Views with Large and Small Paddle.** This 49-year-old woman was recalled from screening for evaluation of a focal asymmetry in the left breast. **A,** On the MLO spot compression view using a large paddle, there is a subtle area of architectural distortion present (*arrow*). **B,** On the MLO spot compression view obtained using the small compression paddle, two areas of architectural distortion are clearly identified (*arrows*). **C,** Ultrasonography confirmed two adjacent, highly suspicious masses (*arrows*). Biopsy showed multifocal invasive ductal carcinoma.

lesion did not slip out from under the compression paddle. The use of a smaller paddle will result in better focal compression of the potentially abnormal area than that obtained with a large compression paddle (Fig. 1-10). A larger paddle allows good visualization of landmarks.

For women presenting with a palpable finding, spot compression views performed in CC and MLO projections, or tangentially to the palpable finding, often help visualize and characterize lesions more effectively than the routine views alone. These views should be taken with a radiopaque marker overlying the lump.

Magnification views are obtained in the CC and mediolateral (ML) projections. A true lateral view is used rather than MLO magnification so as not to miss milk of calcium. Collimating the beam to the area of concern and using spot compression reduces blur and improves contrast. Magnification views are optimal when scattered radiation is minimized (see discussion of physics in Chapter 2).

True lateral view: ML or LM? For screening recalls a true lateral view is often helpful for localizing a lesion. This is especially useful for one-view findings and when stereotactic biopsy will be performed. To make the lesion sharper, it should be as close as possible to the image receptor. Therefore, if the lesion is in the lateral breast, then an ML view is preferred. If the lesion is medial, then a lateral medial (LM) view will optimize lesion sharpness. If the lesion is not well seen on the CC view, then an ML view is obtained because most breast cancers (about 70%) occur in the lateral breast.

Final Comments

Imaging should be optimized for every patient. This approach is important if we are to provide the best patient care. The first question of those reviewing medicolegal cases is typically, "Is the study adequate?" If a cancer is missed due to poor positioning, blur, or a correctable artifact, the radiologist may have little ground to stand on.

Optimal imaging may not be possible for every patient. If suboptimal images are obtained, the reason for the limitation may be included in the report. For example, the MLO views may be suboptimal in women with a torn rotator cuff or stroke. Including this disclaimer in the report may reduce liability if the patient is later diagnosed with cancer in the posterior breast.

KEY POINTS

- The first question: Can you read this study? Is it the right patient? Is it the right examination? Is the study technically adequate for interpretation?
- Use the posterior nipple line to assess for adequate positioning on both the MLO and CC views.
- Check for blur and other correctable artifacts.
- Leave the collimator open for spot compression views when they are obtained for a mass or focal asymmetry.

Reference

Bassett LW, Hirbawi IA, DeBruhl N, Hayes MK. Mammographic positioning: Evaluation from the view box. Radiology 1993; 188(3):803-806.