

Imaging Techniques in Breast Cancer

D. DAVID DERSHAW, MD, AND MICHAEL OSBORNE, MD, MS, FRCS, FACS
 From the Department of Medical Imaging (D.D.D.), and Breast Service (M.O.),
 Memorial Sloan Kettering Cancer Center, New York

In the diagnosis of clinically inapparent breast cancer, mammography remains the most effective imaging modality, which is due in large part to its ability to detect microcalcifications. Of the ancillary modalities, sonography is the most useful because it readily differentiates cysts from other breast lesions. Internal mammary and axillary node imaging have been tried with varying levels of success, but false-positive and false-negative rates remain high with available techniques. Pulmonary metastases are best evaluated by chest X-ray with specificity increased by other imaging techniques. Liver and bone metastases may be screened for with isotope scans with computerized tomography, sonography, and magnetic resonance imaging, increasing the specificity of abnormal scans. CT and MRI are the most effective tools for evaluating CNS disease.

KEY WORDS: breast radiography, breast neoplasms: diagnosis, staging, metastatic

INTRODUCTION

Medical imaging techniques have made an important contribution to the diagnosis of carcinoma of the breast and the evaluation of local, regional, and distant disease. Mammography is an accepted technique for screening of asymptomatic women whereby nonpalpable breast carcinomas can be detected as well as a means by which the symptomatic patient can be further evaluated. The differential diagnosis of breast lesions may be narrowed by further evaluation utilizing sonography, and other imaging modalities such as computed tomography, magnetic resonance imaging, tomography, and diaphanography have been studied as means of diagnosing breast diseases. Detection of local regional spread of disease by nodal imaging has been attempted. Distant disease involving brain, lungs, liver, bone and other sites may be evaluated by routine radiography, computed tomography, magnetic resonance imaging, radioactive isotopes and other modalities. This article discusses the role of varying imaging techniques in the evaluation of primary breast lesions, their local and regional spread, and the diagnosis of distant metastases.

IMAGING THE BREAST Mammography

Although Salomon first reported radiography of the breast in the German literature in 1913, it was not until the work of Gershon-Cohen in 1960 with detailed path-

ologic anatomic correlation that real clinical interest in mammography began to develop. The development of specialized equipment and film for mammography and a significant reduction in the radiation exposure to the breast involved in this technique increased clinical acceptance of this modality. True clinical acceptance of mammography, however, did not begin to grow until the publication of two large series to study the efficacy of screening mammography for the early detection of breast cancer. The first of these was the Health Insurance Plan of Greater New York (HIP) study [1]. From 1963 to 1968, 62,000 women aged 40-64 years were studied in two equal-sized groups. One-half of these women acted as a control population. The other half received five successive annual physical examinations and mammograms. With 10-14 years of follow-up in the screen group, a 33% reduction in mortality was found [2]. The benefit of screening mammography, however, was limited only to women 50 years of age and older. Mortality was unchanged in the screened group for those women younger than 50 years of age. The conclusions of the HIP study were that reduced mortality from breast cancer could be obtained with screening mammography and routine breast examinations, and that this advantage to the

Address reprint requests to Dr. D. David Dershaw, Department of Medical Imaging, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY 10021.