Breast Cancer Screening With Imaging

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- Screening for breast cancer with mammography has been shown to decrease mortality from breast cancer, and mammography is the mainstay of screening for clinically occult disease.
- Other imaging including ultrasound and magnetic resonance imaging have been used as adjunctive screening tools, mainly for women who may be at increased risk for the development of breast cancer.

Radiation Risk

- An increased susceptibility to breast cancer has been documented among women exposed to high doses of radiation (1 to 20 Gy).
- Most mammographic views are approximately 2 mGy .
- Estimated lifetime risk of breast cancer death from a single mammogram in the age group from 40 to 49 years is approximately 2 in 1 million. In women aged 50 to 59 years, this risk is reduced to less than 1 in 1million; progressive reductions in risk are seen at older ages.
- These theoretical risks should be weighed against the risk of dying from spontaneous breast cancer, which would be approximately 700 per million in women aged 40 to 49 years and 1,000 per million in women aged 50 to 59 years.

Mammography

- ● Women at average risk for breast cancer: Annual screening from age 40
- ● Women at increased risk for breast cancer:
- Women with certain *BRCA1* or *BRCA2* mutations or who are untested but have first-degree relatives (mothers, sisters, or daughters) who are proved to have *BRCA* mutations Yearly starting by age 30 (but not before age 25)

Mammography

- Women with mothers or sisters with pre-menopausal breast cancer Yearly starting by age 30 (but not before age 25), or 10 years earlier than the age of diagnosis of the youngest affected relative
- Women with histories of mantle radiation (usually for Hodgkin's disease) received between the ages of 10 and 30 Yearly starting 8 years after the radiation therapy, but not before age 25
- Women with biopsy-proven lobular neoplasia (lobular carcinoma in situ and atypical lobular hyperplasia),atypical ductal hyperplasia (ADH), ductal carcinoma in situ (DCIS), invasive breast cancer or ovarian cancer
  Yearly from time of diagnosis, regardless of age

- ***Age at Which Annual Screening With Mammography Should Stop***

- ● When life expectancy is 5 to 7 years on the basis of age or comorbid conditions

- ● When abnormal results of screening would not be acted on because of age or comorbid conditions

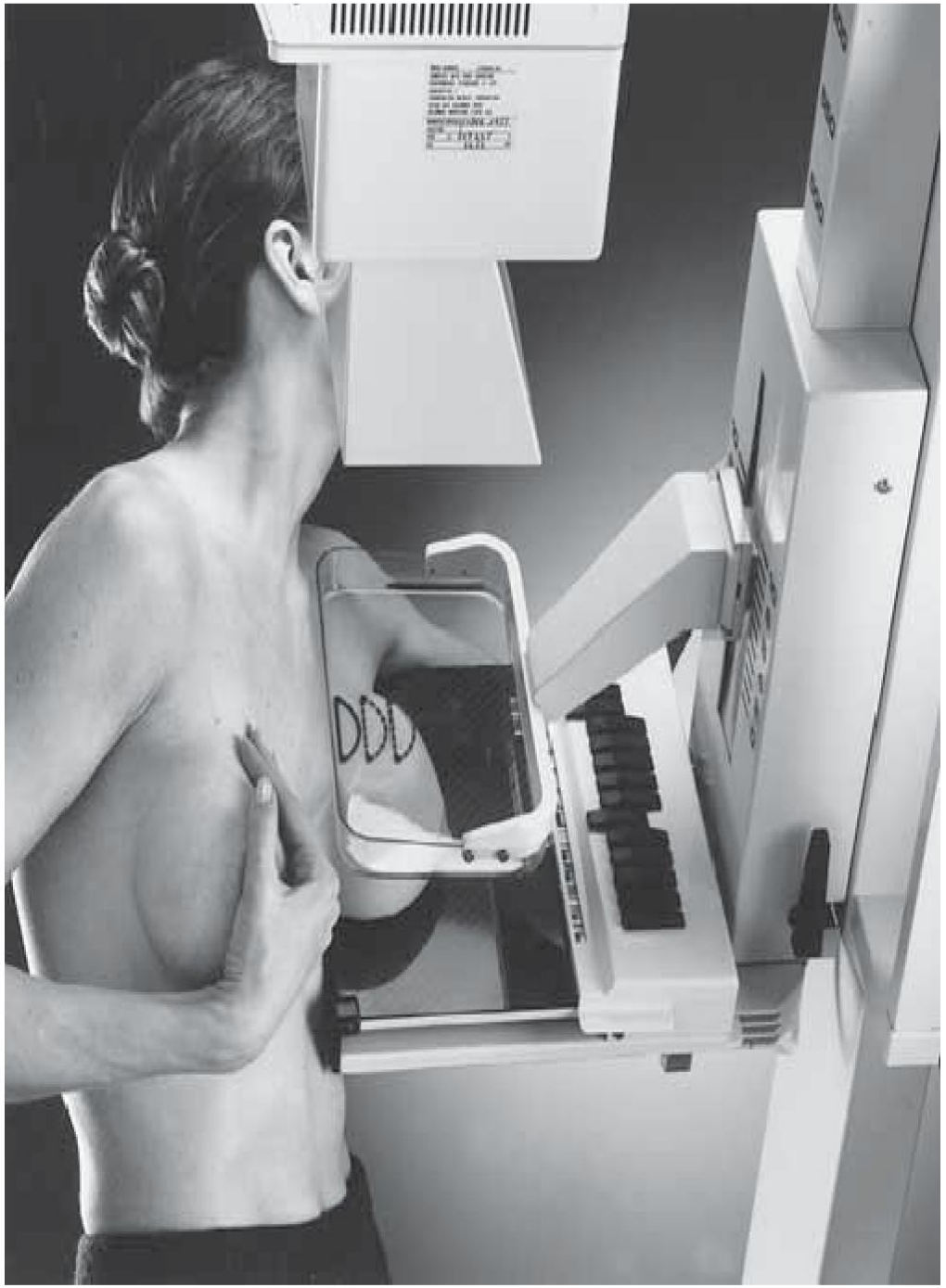


TABLE 21.13

BI-RADS® ASSESSMENT CATEGORIES

Category 0	Incomplete—need additional imaging evaluation and/or prior films for comparison
Category 1	Negative
Category 2	Benign
Category 3	Probably benign
Category 4	Suspicious
Category 5	Highly suggestive of malignancy
Category 6	Known biopsy-proven malignancy

BIRADS

- Assessment Category 0 is used when a finding needs additional evaluation or when prior films are needed for comparison. This is most commonly used when a lesion is detected at screening mammography. Additional mammographic views or perhaps an ultrasound is needed to further assess the finding and determine the likelihood of malignancy.
- Assessment Category 1 is a negative examination.Only the normal structures of the breast are present. There are no suspicious findings that require intervention or attention on follow-up.
- Assessment Category 2 is a benign finding. There is a lesion present, but it has a specific benign appearance. This is commonly used for findings such as cysts, fat necrosis, normal lymph nodes, etc.

BIRADS

- Assessment Category 3 is a probably benign finding. The likelihood of malignancy is low, <2%. Findings in Assessment Category 3 usually undergo short interval follow-up for a total of 2 years
- Assessment Category 4 is for findings that have a likelihood of malignancy between 2% and 95%. This is a very broad range! Category 4 can be further subdivided based on the likelihood of malignancy into Categories 4A (2% to 10%), 4B (10% to 50%), and 4C (50% to 95%).
- Assessment Category 5 is for lesions with a very high likelihood of malignancy(>95%). This category is used for classic appearance of cancers. Examples of BI-RADS Assessment Category 5 findings include irregular, spiculated, highdensity masses or segmental fine linear branching calcifications.
- Assessment Category 6 is a known or biopsy-proven malignancy.

TABLE 20.7

BI-RADS ASSESSMENTS AND RECOMMENDATIONS

BI-RADS ASSESSMENT	RECOMMENDATION
BI-RADS 0	Needs additional imaging evaluation and/or prior images for comparison
BI-RADS 1	Routine screening
BI-RADS 2	Routine screening
BI-RADS 3	Short term follow-up
BI-RADS 4	Tissue diagnosis
BI-RADS 5	Tissue diagnosis
BI-RADS 6	Appropriate action should be taken

TABLE 20.2

DIAGNOSTIC MAMMOGRAPHIC VIEWS

VIEW	ABBREVIATION	PURPOSE
90° lateral	ML (mediolateral) or LM (lateral medial)	Localizing lesion seen in one view Demonstrate milk of calcium due to its gravity dependency
Spot compression	—	Determine whether lesion is real or is a summation shadow
Spot compression with magnification	M	Better definition of margins of masses and morphology of calcifications
Exaggerated craniocaudal	XCCL	Show lesions in outer aspect of breast and axillary tail not seen on CC view
Cleavage view	CV	Show lesions deep in posteromedial breast not seen in CC view
Tangential	TAN	Verify skin lesions Show palpable lesions obscured by dense tissue
Rolled views	RM (rolled medial) or RL (rolled lateral)	Verify true lesions Determine location of lesion seen in one view by seeing how location changes
Lateromedial oblique	LMO	Improved visualization of superomedial tissue Improved tissue visualization and comfort for women with pectus excavatum, recent sternotomy, prominent pacemaker
Implant displacement	ID	Improved visualization of native breast tissue in women with implants

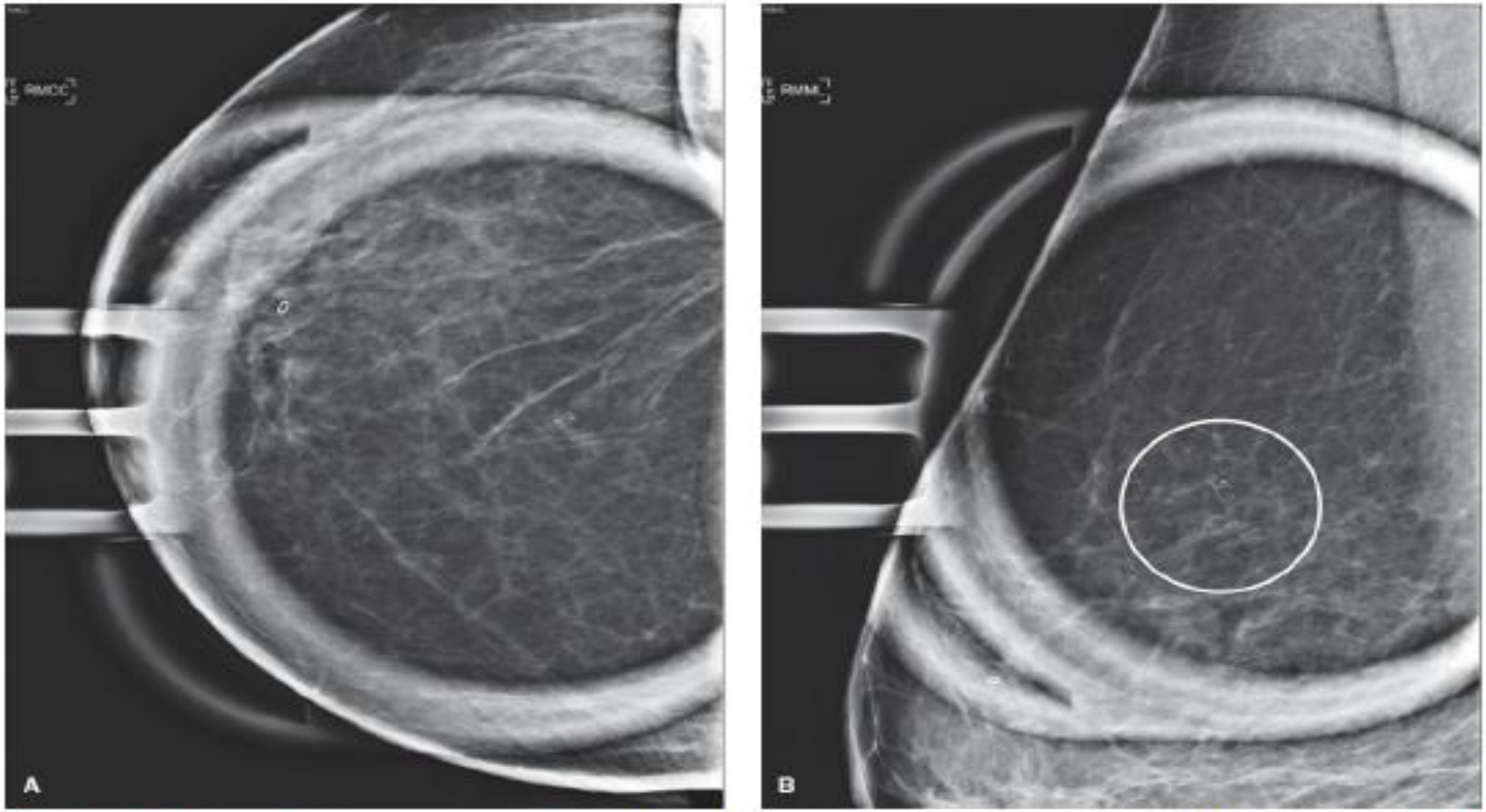


FIGURE 20.3. Suspicious Calcifications. A: Right magnification CC view. B: Right magnification ML view. A group of fine pleomorphic calcifications are identified (circle). Patient has history of prior benign biopsy marked by clip more anteriorly. Biopsy of the calcifications revealed ductal carcinoma in situ.

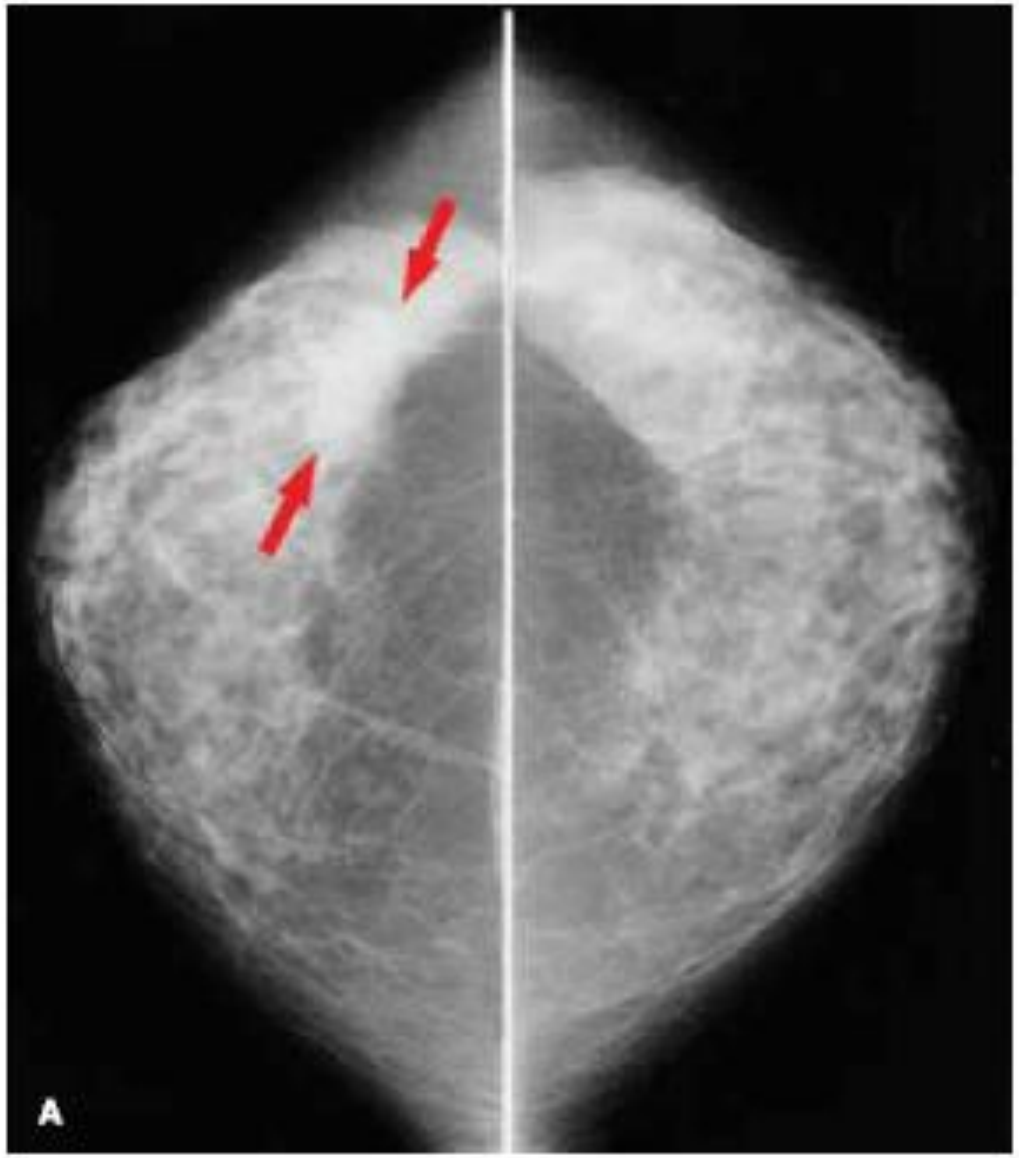


FIGURE 20.5. **Infiltrating Duct Carcinoma.** A. Craniocaudal views of both breasts, showing an asymmetric area of increased density in the outer aspect of the right breast (*arrows*). B. Magnification compression view shows this to be a true mass with defined, convex borders and increasing density toward its center.

Tomosynthesis

- Tomosynthesis in the diagnostic setting has been shown to perform comparable or superior to conventional diagnostic mammography.
- One study demonstrated improved efficiency with tomosynthesis in the diagnostic setting, with decreased amount of additional images needed compared to traditional 2D mammography.
- Due to its improved ability to differentiate superimposition versus true breast lesions, along with improved characterization of masses, tomosynthesis is increasingly being used in the diagnostic setting in lieu of 2D mammographic views; to evaluate masses,asymmetries, and architectural distortion

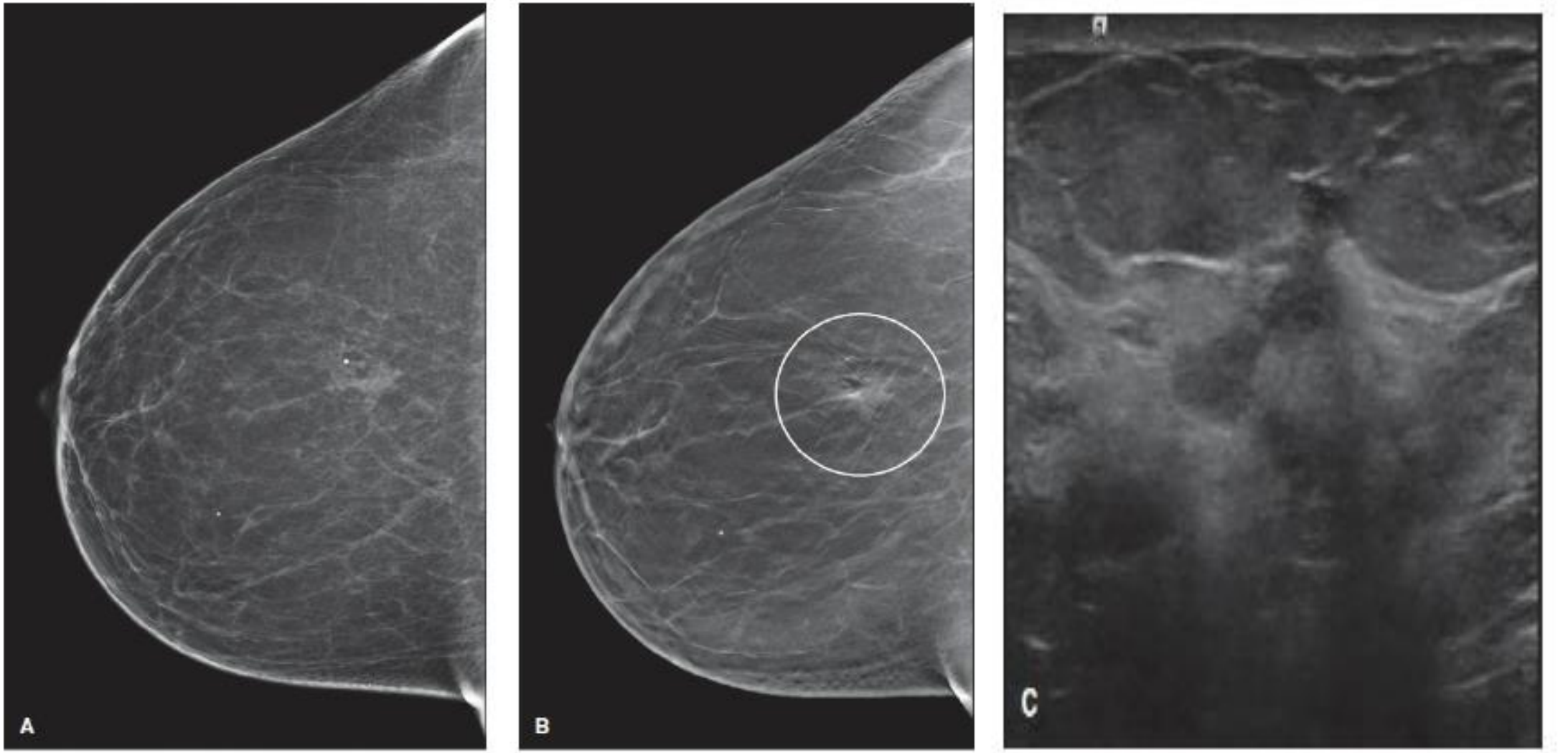


FIGURE 20.4. Tomosynthesis in Diagnostic Examination. A: Screening right CC identifies a developing asymmetry in the posterior aspect. B: Tomosynthesis allows better visualization and characterization. The finding now appears as an irregular-shaped mass with indistinct margins (circle). C: Ultrasound confirms an irregular-shaped mass. Biopsy revealed IDC.

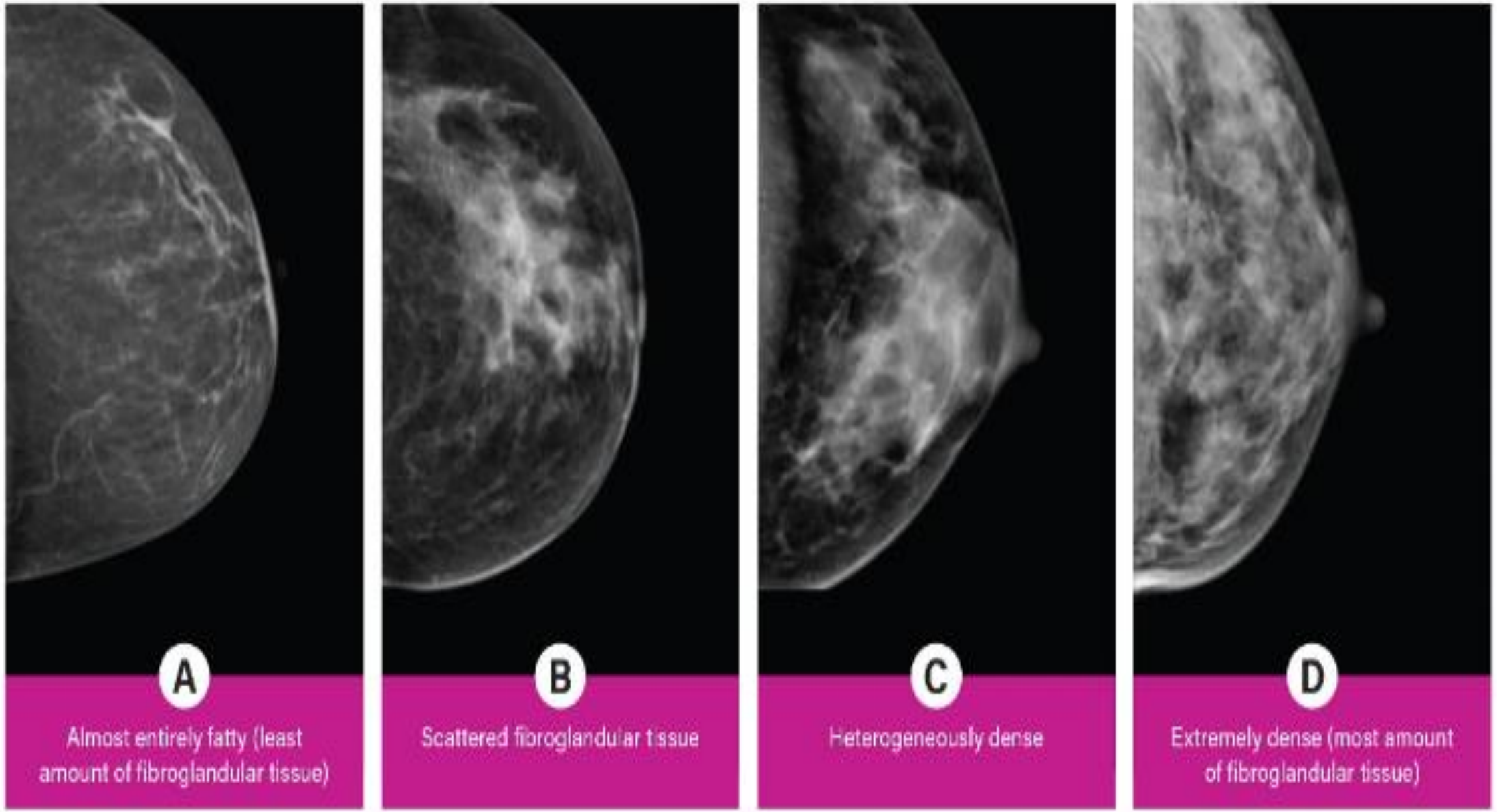
Ultrasound (in Addition to Mammography)

- The advantages of ultrasound are that it is less limited by breast density than mammography, is widely available, has no radiation, and sensitive in the detection of masses.
- The big disadvantages of ultrasound are that it is operator dependent, and has difficulty detecting calcifications and some forms of architectural distortion, which can both be signs of malignancy.
- Therefore, ultrasound is usually done alongside mammographic evaluation.
- A limitation of mammography is differentiating cystic from solid masses. Ultrasound is useful for differentiating if a mammographic mass is solid or cystic.

TABLE 21.2

BI-RADS® BREAST COMPOSITION CATEGORIES

a. The breasts are almost entirely fatty.
b. There are scattered areas of fibroglandular density.
c. The breasts are heterogeneously dense, which may obscure small masses.
d. The breasts are extremely dense, which lowers the sensitivity of mammography.


A
Almost entirely fatty (least amount of fibroglandular tissue)
B
Scattered fibroglandular tissue
C
Heterogeneously dense
D
Extremely dense (most amount of fibroglandular tissue)

INITIAL IMAGING RECOMMENDATION FOR A PALPABLE BREAST MASS

AGE	INITIAL IMAGING RECOMMENDATION
<30 years	Ultrasound
30–39 years	Mammography or ultrasound
≥40 years	Mammography

TABLE 20.3

INITIAL IMAGING RECOMMENDATION FOR PATHOLOGIC NIPPLE DISCHARGE

AGE	INITIAL IMAGING RECOMMENDATION
<30 years	Ultrasound
30–39 years	Mammography or ultrasound
≥40 years	Mammography

GALACTOGRAPHY

- Suspicious nipple discharge is an uncommon complaint, occurring in about 5% to 10% of women. In 10% to 15% of these women it is due to breast cancer, the rest of the causes are benign with the most common etiology representing a papilloma.
- Galactography is indicated for women with spontaneous, unilateral, single duct clear, or bloody nipple discharge. Often their conventional imagings (mammography and US) are normal.
- The procedure involves injecting less than 1 cc of iodinated contrast material into the offending duct using a 30-gauge blunt tip catheter. Topical analgesic can be placed onto the nipple areolar complex but is not necessary to do the procedure. After the duct is filled with contrast multiple images are taken to look for intraductal masses as evidenced by filling defects within the opacified duct.

TABLE 23.4

DIFFERENTIAL DIAGNOSIS FOR SUSPICIOUS NIPPLE DISCHARGE

Ductal carcinoma in situ
Papilloma
Duct ectasia
Mastitis
Fibrocystic changes

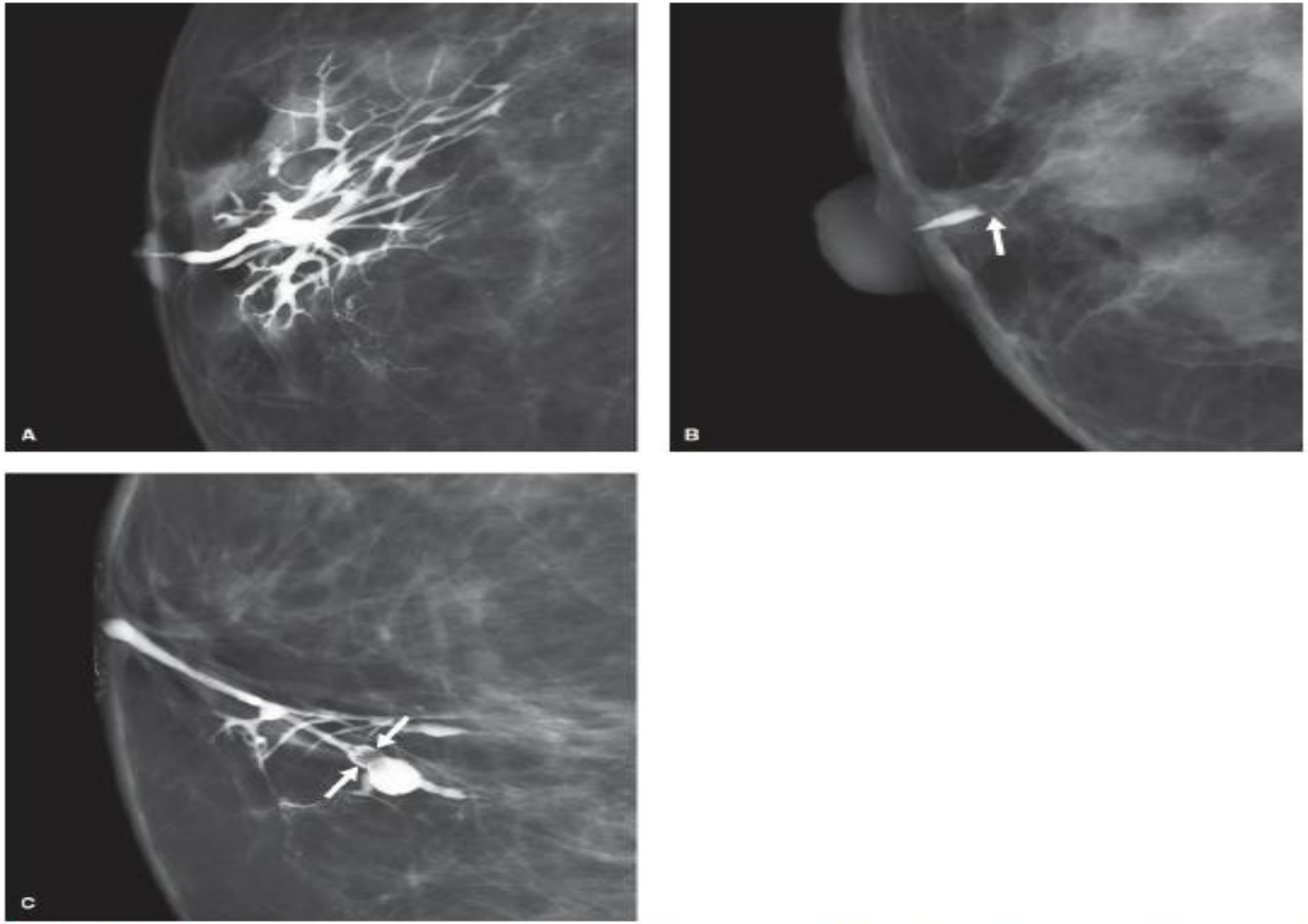


FIGURE 23.20. Galactogram A: Normal ductal system B: Abrupt termination of duct (arrow) consistent with an intraductal mass. Excision pathology result was papilloma. C: Filling defect in a side branch (between arrows). Excision pathology result was papilloma.

MRI

- MRI is currently only recommended as a supplement to mammography in high-risk women.

TABLE 22.1

INDICATIONS FOR CONTRAST-ENHANCED BREAST MAGNETIC RESONANCE (CE-MR) IMAGING OF THE BREAST

Breast cancer screening of high-risk patients
Preoperative staging of breast cancer
Postoperative evaluation in women with positive margins after lumpectomy
Monitoring response to neoadjuvant chemotherapy
Detection of mammographically occult malignancy in patients with axillary nodal metastasis
Workup of nipple discharge (*selectively*)
Evaluation of silicone implants

MRI (High Risk Patients)

- ● Proven carriers of a deleterious *BRCA* mutation
  Annually starting by age 30

- ● Untested first-degree relatives of proven *BRCA* mutation carriers
  Annually starting by age 30

- ● Women with 20% lifetime risk for breast cancer on the basis of family history
  Annually starting by age 30

- ● Women with histories of chest irradiation (usually as treatment for Hodgkin's disease)
  Annually starting 8 years after the radiation therapy

MRI (High Risk Patients)

- ● Women with newly diagnosed breast cancer and normal contralateral breast by conventional imaging and physical examination

Single screening MRI of the contralateral breast at the time of diagnosis

- ● May be considered in women with between 15% and 20% lifetime risk for breast cancer on the basis of personal history of breast or ovarian cancer or biopsyproven lobular neoplasia or ADH

Thank You For Your Attention