Interpretation of Surgical Specimen Radiographs for Pathology Residents: Breast

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Learning Objectives

- Understand the importance of communication between pathologists and radiologists in evaluating breast specimens obtained with image guidance
- Recognize the importance of radiographic information (including reviewing specimen radiographs) in ensuring optimal pathologic evaluation
- Correlate the histopathologic findings with imaging and clinical findings, in regards to calcifications, masses, densities, architectural distortions and enhancing lesions

Breast anatomy

- 1. Intercostal muscle
- 2. Pectoralis
- 3. Glandular tissue (lobules)
- 4. Nipple
- 5. Areola
- 6. Lactiferous ducts
- 7. Subcutaneous fat
- 8. Skin
- 9. Retromammary fat
- 10. Suspensory or Cooper's ligaments



Mammographic appearance

- 1. Intercostal muscle
- 2. Pectoralis
- 3. Glandular tissue (lobules)
- 4. Nipple
- 5. Areola
- 6. Lactiferous ducts
- 7. Subcutaneous fat
- 8. Skin
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Brief intro on mammography



Standard mammographic views

• CC – craniocaudal





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Breast Imaging by D. B. Kopans, 1998

Standard mammographic views

• MLO – mediolateral oblique



Breast Imaging by D. B. Kopans, 1998



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Abbreviated overview on BIRADS

- Breast Imaging and Reporting Data System (BIRADS)
- A lexicon for standardizing mammography reports
 - Also BIRADS for ultrasound, MRI reporting...

Mammographic masses

- Mass =
 - 3-dimensional and occupies space
 - Seen on two different mammographic projections
 - Convex borders



Mammographic masses

• Margins



Mammographic masses

• Density



Mammographic <u>calcifications</u>

• Typically benign





Large rod-like



CC

Round



Coarse or "popcorn-like"



Dystrophic



Large, irregular

Milk of calcium



Suture



Mammographic <u>calcifications</u>

• Suspicious

Amorphous



Too small or hazy to tell details

Fine pleomorphic



< 0.5 mm Vary in shape and size Dot-dash appearance

Coarse heterogeneous



> 0.5 mm

Fine linear or finelinear branching



Mammographic <u>calcifications</u>



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Architectural distortion

- Linear spiculations radiating from a common point, with no visible mass
- Due to focal breast tissue disruption
- DDx: malignancy vs. scar





- Focal asymmetry \rightarrow Involving less than one quadrant, seen on two views
- Global asymmetry \rightarrow involving the majority of <u>one</u> breast only (more than one quadrant)
- Developing asymmetry \rightarrow focal asymmetry that is new or increasing in size
 - Suspicious for malignancy

BIRADS assessment categories

- O: need additional imaging (only for screening mammo)
- 1: negative (normal breast)
- 2: benign (no follow-up needed)
- 3: probably benign (<2% risk of malignancy)
 - Short term follow-up
- 4: suspicious (2-95% risk of malignancy)
 - 4A low suspicion (2-10%)
 - 4B moderate suspicion (10-50%)
 - 4C high suspicion (50-95%)
- 5: highly suggestive of malignancy (>95% risk)
- 6: known biopsy-proven malignancy



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Case 1

Questioned right breast calcifications on recent screening mammogram.



Mammogram (magnification views)

Heterogeneous calcs + irregular mass

BIRADS 4C suspicious (high suspicion)

Recommend ultrasound-guided core biopsy

• Path = invasive lobular carcinoma





Targeted ultrasound



RIGHT 9:00 N + 10-11CM RADIAL

RIGHT 9:00 N + 10-11CM RADIAL



Radioactive seed localization for surgical guidance

Target = marker clip placed after biopsy (small cylindrical clip)

The other two clips are from benign biopsies (larger cylindrical clip, barbell-shaped clip)

Biopsy marker clips

CLIPS - SHAPES					
A. Coil	B. Letters	C. Rod, cylinder, cork	D. Ribbon	E. Bow tie	
	RS				
F. Wing	G. Barbell or hourglass	H. Heart	I. Infinity	J. Trafic signal	
		PI			
K. Top hat	L. Buckle	M. MicroMark	N. Name?	O. Radioactive seed	
			S		

Biopsy marker clips

Photographic Appearance	Mammographic Appearance	Shape
		Cork
L		"U" shaped
0	D	"Q" shaped
0		Ring
8	Å.	Ribbon
-	1700	Top hat

ed





Radioactive seed localization for surgical guidance





Lumpectomy surgical specimen radiograph (PACS**)





**with compression

Specimen radiograph (path)

A specimen radiograph is obtained and archived in Pathology which shows a cylinder-shaped biopsy clip associated with a mass and confirms removal of the radioactive seed.



Pathology report

- RIGHT BREAST, SEED LUMPECTOMY AND SENTINEL LYMPH NODE:
 - INVASIVE LOBULAR CARCINOMA, well differentiated (1.0 cm)
 - No LVI
 - LOBULAR CARCINOMA IN SITU
 - Negative sentinel lymph node
 - Negative margins
 - Residual cellularity 5% in 1.2 x 1.0 cm tumor bed
 - RCB-I
 - AJCC ypT1b N0(sn)
 - ER+, PR-, HER2 FISH +

Case 2

Questioned left breast mass on recent screening mammogram.

Spot compression views



Spot compression views



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3.0-

MLO

BIRADS 5 (highly suggestive of malignancy, >95% risk)

Recommend ultrasound-guided core biopsy

X

Path = invasive ductal carcinoma

Ultrasound-guided seed localization





LEFT 6:00 N + 1-2 cm Trans Post SEED

Post-seed mammograms

lateral

[™ LCC]

nipple

Target: Dominant 1.2cm mass with a ribbon clip. Adjacent smaller mass will be taken out in a single specimen Number of Radioseeds: 1

LS/EK

medial

inferior

superior

[^c LLM]

nipple

Specimen radiograph (PACS)



Specimen radiograph (path)

Shows a ribbon-shaped biopsy clip associated with a dominant solid mass and confirms removal of the radioactive seed.

**ribbon clip was present in specimen though obscured by
the paperclip



Pathology report

- INVASIVE DUCTAL CARCINOMA, moderately differentiated (0.9 cm)
- No LVI
- DUCTAL CARCINOMA IN SITU, solid and cribriform types (intermediate nuclear grade) present in 5 of 6 blocks
- Negative margins
- Core biopsy site
- Negative sentinel lymph nodes

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Case 3

Left breast DCIS diagnosed at outside hospital. Here for second opinion.

Left breast, LM projection

8 mm (Act

Are we done?

Bowtie clip surrounded by <u>fine linear branching</u> <u>pleomorphic calcs</u>, in keeping with biopsy-proven DCIS

Density = postprocedural hematoma



Left breast, LM projection

48 mm (Act)



Superior to the biopsy site, group of amorphous / pleomorphic calcs

BIRADS 4B suspicious (moderate suspicion)

Biopsy recommended

Path = atypical ductal hyperplasia (ADH) for which excision was recommended

Left breast, LM

48 mm (Act)

Localization planning for surgical excision

Post-biopsy

Wire localization using a lateral approach -SR/EK

Two Radioseeds to be placed at the anterior and posterior margins o f the calcs -SR/EK

Specimen radiographs (PACS)

Lumpectomy site 2 (inferior)

Left breast





Specimen radiograph (path)

Left 2:00, cylinder clip, wire loc

Shows a cylinder-shaped biopsy clip and a localization wire associated with amorphous calcifications.

Lumpectomy site 1 (superior)

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Specimen radiograph (path)

Left 5:00, bowtie clip, bracketed seed loc

Shows a bowtie-shaped biopsy clip associated with a dominant solid mass and confirms removal of the radioactive seeds.

Lumpectomy site 2 (inferior)



Specimen radiograph (path)

Left 5:00, bowtie clip in cassette



Right breast

Punctate calcs (BIRADS 4A) → Stereotactic core biopsy with placement of T-shaped clip

Path = ADH

Radioseed localization for excisional biopsy



Specimen radiograph (PACS)



Specimen radiograph (path)

Right, T clip, seed loc, no clip in specimen

Shows calcifications, confirms removal of the radioactive seed, and demonstrates no biopsy clip present in the specimen, in agreement with the post-operative radiograph reviewed in Centricity.

Final path = DCIS with positive margins



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Radioseed localization to T-shaped clip prior to re-excision



Lateral

superior

Specimen radiograph (PACS)



Pathology report

- LEFT BREAST 5:00, SEED LOCALIZED EXCISION:
 - DUCTAL CARCINOMA IN SITU, solid type (intermediate nuclear grade), with comedo necrosis and calcifications (7 of 9 blocks)
 - Atypical lobular hyperplasia
 - Biopsy site changes are present
- LEFT BREAST 2:00, WIRE LOCALIZED EXCISION:
 - Atypical ductal hyperplasia associated with calcifications
 - Biopsy site changes are present
- **RIGHT** BREAST 10:00, SEED LOCALIZED EXCISION:
 - DUCTAL CARCINOMA IN SITU, clinging type (intermediate to high nuclear grade), with necrosis and without calcifications (3 of 14 blocks)
 - In situ carcinoma is <0.1 cm from the anterior margin and >0.2 cm from all other margins
 - Biopsy site changes are not present

Summary approach to specimen radiograph

- Check pre-op imaging for targeted lesion +/- clips/seeds
 - Mass, calcs, architectural distortion, MRI enhancement
- Check compressed specimen radiograph in PACS
- Obtain specimen radiograph

Summary approach to specimen radiograph

- Gross description of specimen radiograph
 - Target is present?
 - Mass \rightarrow shape, density
 - Calcs \rightarrow distribution, appearance
 - Clip \rightarrow shape
 - Radioseed \rightarrow removed in Frozen Section Room?
- Important for billing to include
 (1)Whether radiograph was taken in path lab
 (2)Pathologist interpretation
 (3)Radiology interpretation

- Section specimen
 - Document which cassettes contain the biopsy clip (if present)
 - When possible, section specimen that contain multiple clips so that only one clip goes in each cassette

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