Grossing breast specimens: New machines and old techniques

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But first.....

2 Short = Superior

Blue = Anterior

2 Long = Lateral
Outline

• Grossing breast specimens – focus on margin evaluation
• A ‘tour’ of a wire localization excision through the system – our current approach.
• How might things change with the specimen radiography?
Types of large breast specimens

1. Mastectomy +/- axillary contents
2. Breast conserving surgery (60-70% of all cases)
   - Lumpectomy, segmental resection
     • Lesion palpable by surgeon
   - Wire localization excision**
     • Non palpable tumors (invasive and DCIS)
     • Calcifications for ADH, FEA
     • Radial scars, papillary lesions
Breast conserving surgery

• More difficult and time consuming to gross than mastectomy
• Often requires more sections
• Margin assessment crucial
Breast conserving surgery

- Most patients have radiation post surgery
- Selected patients may be spared radiation
- Small proportion have local recurrences
  - Young age
  - Extent of excision and rads/chemo
  - Multifocal disease
  - EIC positive
  - Molecular subtype
  - Margins
Margin evaluation

• Margin evaluation is an exercise in probabilities (not absolutes)
• Patients with positive margins are *more likely* to have residual disease at or near the primary site than those with negative margins
  – A positive margin does not guarantee residual disease
  – A negative margin does not preclude extensive residual disease
Limitation of margin assessment

• Technical and methodological
• Definition and interpretation
• Distribution of tumor in the breast
• Breast cancer biology
• Impact of systemic therapy
Technical and methodological

• Pancake phenomenon

Technical and methodological

• Specimen orientation and inking
  – Unoriented – all black
  – Poor orientation by surgeon – sutures (LSD)
  – Poor localization of margins by pathology - inking
  • Up to 31% disagreement between surgeon and pathologist in one study.

Arrow is pointing to which margin?
Technical and methodological

• No uniform sampling method
  – Ranges from limited sampling to total sequential embedding
  – Depends on size of specimens which depends on surgeon and institution and demographic
Definition and interpretation

• No consensus agreement among surgeons and oncologists as to what constitutes a ‘negative margin’
  – No tumor on ink
  – ≥ 1 mm
  – ≥ 2 mm
  – ≥ 5 mm
How do you define negative margins after local excision?: North America

- 45.90%
- 21.8%
- 7.4%
- 10%
- 10%
- 4.9%

☐ No tumor cells are seen on the inked margins
☒ No tumor cells are seen at <1 mm from inked margin
☐ No tumor cells are seen at <2 mm from inked margin
☐ No tumor cells are seen at <3 mm from inked margin
☐ No tumor cells are seen at <5 mm from inked margin
☐ No tumor cells are seen at <10 mm from inked margin

Definition and Interpretation

• Meta analysis with 14,571 patients from 21 studies
• No significant difference in LR rates associated with threshold margin widths of 1mm, 2mm or >5mm when adjusted for use of radiation boost or endocrine therapy
• “Therefore, based on our meta-analysis, it may be reasonable to define a minimum distance of 1 mm for negative margins in BCT of invasive breast cancer.”

SSO-ASTRO Consensus on margins in invasive breast cancer

- Up to ¼ of all breast conserving surgeries undergo re-excision, often for wider margins.
- No clear evidence
- Meta-analysis of 33 studies – 28,000 patients
The Bottom Line

• A positive margin, defined as ink on invasive cancer or DCIS, is associated with at least a 2-fold increase in local recurrence

• This increased risk is not nullified by delivery of a boost dose of radiation, delivery of systemic therapy, or favorable biology

• Negative margins (no ink on tumor) reduces risk of local recurrence – wider margin does not significantly lower this risk.

• *The routine practice of obtaining margins more widely clear than no ink on tumor is not indicated*
Definition and interpretation
The tumor is located at the inferior edge of the specimen, where there is marked cautery artifact and disruption of the tissue. While no definitive tumor cells are present on the inked surface, they are present within 0.1 cm of this margin.
Reporting margins

• Do the best you can, considering limitations.
• State any difficulties and explain interpretations in *Comments* or synoptic.
• From a pathologic standpoint, nothing has changed:
  – Positive = tumor on ink
  – Negative = anything less
    • Give distance (e.g. less than 0.1 cm, 0.2 cm, etc)
KUBTEC Specimen Radiography machine
Let’s follow a recent case....

Wire localization excision
Screening mammogram
(or skip if palpable mass)
Amorphous-type calcifications are present posteriorly in the upper-outer quadrant of the right breast and have a scattered distribution. Dimension over which calcifications are distributed is 20 mm. The noted finding has a low degree of suspicion for malignancy (BI-RADS Category 4A). A benign report is expected. Benign-appearing calcifications are also present.

Impression: There has been an increase in the calcifications since the previous examination.
Core biopsy
Day of surgery

1. Patient to DI for wire localization procedure
Day of surgery

2. Surgery – time recorded

3. Specimen fresh to DI – Confirm presence of lesion and localization with pins

Report: “The surgical specimen was radiographed. The localized abnormality is present in the specimen.”
Day of surgery

4. Specimen into formalin and transported down the street to Mackenzie Building.

5. Inked and sliced. Time recorded – this is the true ischemic time.
The next day

- Specimen is grossed.
7.0 cm M-L/10 = 0.7 cm
4 most lateral slices x 0.7 = 2.8 cm
Diagnosis

Ductal carcinoma in situ.

- Intermediate nuclear grade with associated calcifications
- Up to 2.8 cm in maximum linear extent
- Margins negative for DCIS; closest are anterior and lateral (both 0.3 cm)
How will the workflow change?
Current Wire insertion

Surgery

Specimen to DI

Inked, sliced, fixed.

To path lab and accessioned.

Imaged and pins placed by radiologist.

Grossed using paper legend.

Pathologist to sign out.

More ins if needed

Next day

IWK CDHA
Future

Wire insertion

Surgery

Specimen to path lab

Into formalin

Inked, sliced, imaged. (whole specimen image?)

Accessioned with SP # and DI #

Send to IMPAX and wait for report

Gross specimen using images in IMPAX

Pathologist to sign out using block legend on IMPAX

Next day
Theoretical case with specimen radiography
Slice #3 in its entirety
A3-anterior and superior margin
A4-superior deep margin
A5-anterior margin and lesion
A6-in deep margin
A7-anterior and inferior margin
A8-inferior and deep margin

Slice #4
A9-anterior margin and lesion
A10-deep margin and lesion
A11-anterior margin and lesion
A12-deep margin and lesion

Slice #5
A13-anterior margin and lesion
A14-deep margin and lesion
A15-anterior and inferior margin and lesion
A16-inferior and deep margin with lesion
Benefits

• Shorter ischemic time?
• Fewer sections?
• Decreased need for ‘more-ins?’
• Mastectomies
  – Will facilitate sampling in cases of extensive DCIS
  – PA will not have to spend ++ hours at IWK.

• But may be more work on our end....
Other uses for the machine

• Heart valves
• Coronary arteries
• Bone tumors
• Ophthalmic pathology
• Others?
Questions?