Breast MRI of Invasive Breast Cancer

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BC Surgery Oncology Breast Cancer Update

Audrey Spielmann, MD
Outline

- Technique
- Indications
- Cases
- Pre-op Breast MRI
- Conclusion
Outline

- Excluded
  - Screening
  - Post-op MRI
  - DCIS
  - Breast Implant integrity
Name: ____________________
Date of Birth: ________________
Referring Physician: __________________

Reason for Exam:

______ Implant Assessment
______ Enlarged lymph glands under arm
______ Breast Lump (right / left)
______ Known breast cancer (R / L)
______ Nipple Discharge (right / left)
______ Other:__________________________

Previous Mammogram
Where/When: __________________________

Previous Ultrasound:
Where/When: __________________________
Technique

Breast MRI Questionnaire

Previous Breast Surgery: (yes/no)

Where/When: ______________ R/L breast

Benign/Malignant

Pre-menopausal (yes/no) First day of LMP: _______________
Exam should be scheduled for Day 7-14 of cycle

Post-menopausal (yes/no) On HRT? _______________
HRT should be stopped 3 months prior to exam—consult your physician

Do you have a family history of breast cancer (if yes, please indicate age of diagnosis)

Mother _____ Sister _____ Grandmother _____ Aunt _____
Daughter _____
Have you had any of the following treatments:
(If yes, please indicate where & when)

_____ Lumpectomy
_____ Chemotherapy
_____ Tamoxifen
_____ Needle biopsy

_____ Mastectomy
_____ Radiation
_____ HRT/BCP

Patient Signature: ____________________________
Date: ____________________________
Technique

Positioning
Technique

Sequences

- Coronal STIR
- Ax FSE T2 or STIR
- 3D VIBRANT with fat saturation-precontrast, immediate post injection and 3 more consecutive runs (scan time <1.5 minutes)
- Post-processing-subtraction
Breast MRI
BI-RADS Lexicon

- Lesion Morphology
  - Mass (3D)
  - Area of non-mass-like enhancement
  - Focus (<5mm)

- Enhancement Kinetics
MRI BI-RADS Lexicon
Mass-Irregular shape
MRI BI-RADS Lexicon
Mass-Irregular shape

57 yo
Mammo +, US Bx
MRI BI-RADS Lexicon
Asymmetric Enhancement

45 yo Bx DCIS
Breast MRI
Enhancement Kinetics

angiogenesis
Breast MRI

Time-signal intensity curve

Breast MRI
Time-signal intensity curve

Indications
ACR practice guidelines (2008)

- Screening
  - High risk patients
  - Contralateral breast (3-5% occult malignancy)
  - Breast Augmentation
Indications
Breast Augmentation

54 y woman
Implants 20 y ago
Palpable mass L
Mammo +
US bx
Indications

ACR practice guidelines (2008)

- Extent of disease
  - Multifocality and Multicentricity
  - Invasion deep to fascia
  - Postlumpectomy + margins
  - Neoadjuvant chemotherapy
Indications

ACR practice guidelines (2008)

- Additional evaluation of clinical/imaging findings
  - Recurrence
  - Occult Breast Cancer
  - Lesion characterization
  - PO tissue reconstruction
  - MRI-guided biopsy

ACR practice guidelines (2008)
Breast MRI Indications

Pre-operative Evaluation

- Tumour size and location
- Multifocality & Multicentricity (occult disease 15-37%)
- Chest wall or pectoralis muscle invasion, nipple or skin invasion
- Axillary or internal mammary LN
- Metastasis
Breast MRI Indications

Pre-operative Evaluation

- Ipsilateral cancer was found on MRI in 19/70 (27%)
  - 20% same quadrant
  - 4% different quadrant
  - 3% same and different

- Strong family Hx or infiltrating lobular histology

Liberman L et al. AJR 2003; 180:901-910
Breast MRI Indications

Pre-operative Evaluation

Liberman L et al. AJR 2003; 180:901-910
Breast MRI Indications

Pre-operative Evaluation
Breast MRI Indications

Pre-operative Evaluation

50 yo woman
77 yo mother dx metastatic breast Ca
Thickening L UOQ
Mammo -, US - in area but lesion in L UIQ
US Bx → infiltrating lobular Ca
Breast MRI Indications

Pre-operative Evaluation
Breast MRI Indications
Pre-operative Evaluation

42 y woman
Palpable L breast mass
Breast MRI Indications

Pre-operative Evaluation
Breast MRI Indications

Pre-operative Evaluation
Pre-op Breast MRI
Chest Wall invasion

41 y woman
Palpable L breast mass UOQ
Bx infiltrating poorly-differentiated ductal carcinoma
Breast MRI Indications

Contralateral breast screening pre-op

- 3-5% synchronous contralateral breast Ca on MRI only
  - 30/969 (3%) contralateral breast Ca
  - 121/969 (12.5%) Bx
  - 30 + bx(24.8%)
    - 18 invasive Ca
    - 12 DCIS
    - All node negative

Breast MRI Indications

- Contralateral breast screening pre-op

  - Risk of occult Ca in contralateral breast 1 year post neg MRI 0.3%

Pre-op Breast MRI
Radiological Perspective

- Additional breast tumour foci
  - 15-37% ipsilateral breast
  - 3-5% contralateral breast
- Alters clinical management 10-31%
- Biopsy of suspicious lesions before Δ surgical approach
Pre-op Breast MRI
Surgical Perspective

- Conflicting endorsement
- Cleveland clinic fully promotes pre-op breast MRI without restriction
- 327 patients - 25% pts occult but suspicious lesions
- 13% pts occult and separate tumours
- 75% no additional suspicious foci

Pre-op Breast MRI
Surgical Perspective

- 267 patients invasive Ca
- Surgical management Δ to
closer/separate excision or
mastectomy in 26% (69/267)
- Confirmed on path that necessary
71% (49/267)
- 46% lobular Ca altered management

Pre-op Breast MRI
Surgical Perspective

- Occult primary malignancy
- BRCA1/2/other genetic mutation
- Major discrepancy between mammo and US
- (ILC, very dense breasts)
**Pre-op Breast MRI**

**Assumptions**

- Meta-analysis observational studies (2610 women)
  - Improved surgical planning
  - Reduce re-excision surgery
  - Reduce local recurrence
- Not substantiated by trials
- Additional foci tx with radiation & chemotherapy

Houssami N & Hayes D, CA Cancer J Clin 2009
Pre-op Breast MRI

Assumptions

- 15/18 studies quoted in the meta-analysis ≤ 2004 back to 1995
- 3/18 > 2004
- Marked improvement in image quality

Houssami N & Hayes D, CA Cancer J Clin 2009
Increased risk of recurrence

- Involvement of surgical margins
- Extensive cancer ID clinically or mammographically
- Presence of locally advanced Ca
Breast MRI Indications

Pre-operative Evaluation

Extent of cancer underestimated clinically and mammographically

Liberman L et al. AJR 2003; 180:901-910
Pre-op Breast MRI

**Pros**
- Extent (MF vs MC)
- Screen CL breast
- Chest wall invasion
- Patient & Surgeon reassured

**Cons**
- Additional Imaging
- Further biopsy
- Delay in surgery
- More pt anxiety
- More extensive lumpectomy or conversion to mastectomy
Pre-op Breast MRI

Conclusion

- Pre-op Breast MRI will find otherwise occult ipsilateral and contralateral tumour foci
- Must bx MRI suspicious lesions
- Patient awareness that further bx and delay in surgery
- Negative MRI for MC/CL disease reassuring
Pre-op Breast MRI

Conclusion

- Particularly helpful
  - Axillary nodes-occult primary
  - Genetic Ca
  - Lobular Carcinoma
  - Very dense breasts/young patients
More research (randomized, controlled prospective trials) needed to study longterm impact on local recurrence, morbidity and mortality.

Pre-op Breast MRI

Conclusion
Thank You!