Correlation between MRI & biopsies under second look Ultrasound

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Introduction

Correlation between MRI & biopsies under second look US
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- **Retrospective study**
  - 100 patients
  - 2008 – 2009
  - 2\textsuperscript{nd} look US + Biopsy
  - Follow-up 2-4 years
Displacement?

Correlation between MRI & biopsies under second look US
Switch MRI ➔ Utrasound

- Displacement of the target
  - High in anterior-posterior axis: 30 à 60 mm\(^1\) (K=0.55)
  - Moderate in other axis: 10 mm\(^1\)

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Displacement

Breast cancer history, new microcalcifications of the left lower External Quadrant BI-RADS 4.
Displacement

MPR provides good showing of the distances between the lesion and the skin/muscle/scar
Agreement between MRI and US

- **Location of the target**
  - Anteror/posterior displacement
    - Fisher, p = 0.55
  - Cranio caudal displacement
    - Quadrant Superior/lower: Kappa=0.97
  - Lateral displacement
    - Quadrant Internal/External: Kappa=0.93
- **The hour topography**
  - Kappa=0.52
MIP provides good showing of the location of the lesions
Morphological findings

Correlation between MRI & biopsies under second look US
Agreement between MRI and US

- **Morphological findings**
  - **Shape:** benign vs suspicious
    - Kappa = 0.09
  - **Margin:** benign vs suspicious
    - Kappa = 0.23
  - **Size**
    - T-test, p = 0.0001
- **BIRADS 3 vs 4 & 5**
  - Kappa = 0.11
Agreement between MRI and US: morphological findings

46 yo, history of breast cancer

Agreement between MRI and US: morphological findings

46 yo, history of breast cancer
Pathology

IDC
SBR grade 1
Succes rate according morphological findings

Correlation between MRI & biopsies under second look US
Success rate of second look US: Mass versus non-mass

60 yo, staging of ILC of the right breast

63 yo, history of breast cancer, follow-up
Success rate of second look US: Mass versus non-mass

60 yo, staging of ILC of the right breast

63 yo, history of breast cancer, follow-up

Pathology

Dystrophy: adenosis

Scare sclerosis
Success rate of second look US: Suspicions versus benign

60 yo, left nipple retraction

57 yo, history of breast cancer, lymph nodes in left axilla

Success rate of second look US: Suspicions versus benign

60 yo, left nipple retraction

57 yo, history of breast cancer, lymph nodes in left axilla

T1 Sub

ACR 5
Success rate = 83%

T1 Sub

ACR 4
Success rate = 75%

Desmoïde fibroma

IDC, SBR grade II
## Success rate according to the size

<table>
<thead>
<tr>
<th>Size</th>
<th>Masses</th>
<th>Non-Masses</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5 mm</td>
<td>50%</td>
<td>?</td>
</tr>
<tr>
<td>5-10 mm</td>
<td>56%</td>
<td>13%</td>
</tr>
<tr>
<td>10-15 mm</td>
<td>72%</td>
<td>25%</td>
</tr>
<tr>
<td>&gt;15 mm</td>
<td>86%</td>
<td>42%</td>
</tr>
</tbody>
</table>

I. Meissnitzer M. Am J Roentgenol. 2009
Depth

Correlation between MRI & biopsies under second look US
Breast cancer risk according to depth

Chi2, p=0.066
Breast cancer risk according depth

45 yo, left breast cancer staging
Breast cancer risk according depth

45 yo, left breast cancer staging
Pathology

IDC
SBR grade II
Cancer rates according to risk factor

Correlation between MRI & biopsies under second look US
Cancer rate according to risk factors

- High risk versus no risk patient
  - Fisher test, $p=0.79$

- History of breast cancer in young patient
  - Fisher, $p=0.34$

- During staging
  - Fisher, $p=0.80$

- Be careful with suspicious Clinical findings
Risk factors

37 yo, BRCA1 mutation, history of right breast cancer, screening
Risk factors

37 yo, BRCA1 mutation, history of right breast cancer, screening
Risk factors

37 yo, BRCA1 mutation, history of right breast cancer, screening
Pathology

Fibrous dystrophy
Cancer rates according to morphological findings in MRI

Correlation between MRI & biopsies under second look US
Suspicious findings in MRI

- **Mass**
  - Margins: NPV = 0.86 *(Fisher test, p=0.03)*
  - Enhancement curves: NPV = 1 *(Fisher test, p=0.01)*
  - T1, T2, Shape, internal enhancement: *(Fisher test, p>0.072)*
  - Size *(Student’s t-test, p = 0.89)*.

- **Non-Mass**
  - Distribution, internal enhancement: NPV < 0.85 *(Fisher test, p>0.56)*

- **BIRADS**
  - BIRADS 3 : NPV = 0.94 *(Fisher, p=0.068)*
69 yo, breast cancer metastasis in axillary lymph nodes
Enhancement curves

69 yo, breast cancer metastasis in axillary lymph nodes
69 yo, breast cancer metastasis in axillary lymph nodes
Pathology

IDC
SBR grade III
Triple negative
Cancer rates according to morphological findings in US

Correlation between MRI & biopsies under second look US
Suspicious findings in US

- **Shape**: NPV = 0.90 (Fisher, p=0.025)
- **Margin**: NPV = 0.91 (Fisher, p=0.0046)
- **Orientation**: NPV = 0.87 (Fisher, p=0.0018)
- **Depth, echogenicity, posterior US Beam**: (Fisher, p=0.53)
- **Taille**: t-test, p=0.65
- **BI-RADS**: NPV = 0.95%, (Fisher, p=0.039)
44 yo, discrepancy between luminal breast cancer and triple negative lymph node metastasis
44 yo, discrepancy between luminal breast cancer and triple negative lymph node metastasis
44 yo, discrepancy between luminal breast cancer and triple negative lymph node metastasis
44 yo, discrepancy between luminal breast cancer and triple negative lymph node metastasis
Pathology

IDC
SBR Grade III
Inflammatory stroma
Conclusion

Correlation between MRI & biopsies under second look US
Take Home Messages

- Risk factors were not reliable criteria for establishing an indication for second look ultrasound
- Displacement in anterior-posterior axis
- Masses are found more frequently than non-mass
- BIRADS 5 are found more frequently than BIRADS 4
- Circumscribed contours and a progressive enhancement curve for masses on MRI had the strongest NPV (>0.85)
- Round or oval shape, circumscribed contours and the parallel orientation on US had the strongest NPV (>0.85)
- Correlation between abnormalities detected on MRI and US is sometimes delicate, biopsy and clip placement should be easily recommended
Litterature review


Pathology

Correlation between MRI & biopsies under second look US
Pathology
Fibrosis changes

59 yo, history of right breast cancer, right nipple retraction

46 yo, BRCA 2, history of breast cancer, follow up
Fibrosis changes

59 yo, history of right breast cancer, right nipple retraction

46 yo, BRCA 2, history of breast cancer, follow up
Pathology

Fibrous Dystrophy

Fibrosis, nuclear dystrophy post radiotherapy
MRI Findings

44 yo, staging of a right breast cancer

53 yo, distorsion in the upper quadrants of the left breast
MRI Findings

44 yo, staging of a right breast cancer

53 yo, distorsion in the upper quadrants of the left breast
Pathology

Fibrous Dystrophy

Dystrophy with atypical ductal hyperplasia