Breast MRI interventional

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Breast MRI: respect indications

- Screening in BRACx mutation (or equivalent)
- Recurrence?
- Problem solving (after mammography & US / Biopsy)
- Implants examination
- Assessment of neoadjuvant chemotherapy
- Before treatment in some cases of breast cancer
  - BRACx and very high risk
  - < 40 year-old
  - Lobular carcinoma
  - Doubt about multifocality, size discordance

ACR, HAS, EUSOMA
MRI = low specificity

Accuracy of magnetic resonance in suspicious breast lesions: a systematic quantitative review and meta-analysis
Medeiros LR et al. Breast Cancer Research and Treatment 2011

- Se : 90% [0.88-0.92]
- Sp : 75% [0.70-0.79]
- LR+ : 3.64 [3-4.2]
- LR- : 0.12 [0.09-0.15]
- AUC : 0.91
- Point Q* : 0.84

- 17 studies (until 2013), MRI 2201 lesions
- Dg 2082 L: BL 1581, ML 501: Prevalence malignancy: 22% [2%-51%]

- 1266 / 2201 seen at 2nd look US: 57.7% [22.6 – 82.1%]
  ⇒ BL 829, ML 380, 57 ?
  - VPP = 31% [4-56%]
  - VPN = 88% [46.2-100%]

- Mass enhancement & Malignant L: significant variables,
- Size (cut-of 1cm) non significant variable

⇒ A negative 2nd look US not exclude malignancy
Indication of MRI breast biopsy

Type of lesions:

- Suspicious contrast enhancement: BI-RADS 4, 5 or even 3
- **AND** no target on mammography and US (2nd look)

→ Use the most effective, easiest and fastest method

→ **Average malignancy rate: 20-60%**
  
  - 3% < 5 mm / 31% > 20 mm
Practical conditions

Training recommendations - Eusoma 2010:
- Experienced breast centers
- Team with 150 Breast MRI and 50 biopsies / year
- Work alone after 3-15 procedures (French or European guidelines)

Equipment
- Magnet: 1T to 3 T, most often 1.5T
  - 2007 – 2009: Philips Intera 1,5T - 50 procedures
  - 2010 - now: GE discovery 750 3T – more than 200 procedures

2007 – 2016: 400 – 900 Breast MRI / year
Practical conditions

- **Equipment**
  - **Coils**: we use same coils for diagnosis and interventional
Practical conditions

- Equipment
  - Grids
Practical conditions

- **Equipment**
  - Devices:
    - Mammotome (Breast Care)
    - Atec (Suros)
    - Vacora (Bard)
    - Senorex Encor (Bard)

  7 to 11 gauges
Before procedure

- **Pre-VABB work-up : Valid indication**
  - review mammogram, US and MRI

- **Pre-VABB consultation :**
  - Check out contra-indications (CI to MRI, Relative CI: coagulation pb, locations of the lesion - close to the chest wall, nipple area, implant)
  - Explanations about procedure and associated complications
  - Patient leaves with:
    - Information letter
    - Contrast agent prescription
    - Blood coagulation test prescription
    - Letter of convocation
    - Need to be accompanied the day of biopsy
    - Convocation for MRI, MMG and results announcement 8 days later
Procedure: positioning

- Outside magnet’s room (need 2 MRI beds)
Procedure: Localizer

Localizer: next to the lesion
Procedure: target identification

Patient in magnet’s room

- Scout view
- One dynamic axial sequence in 3 phases (3x1mn20),
- Injection complete gadolinium volume 20 sec before the end of the 1st phase
- Matrix: 512x448, Slice 2,2mm

Phase 1

Phase 2

Phase 3
Procedure: target identification
Procedure: target location - Naval Warfare
Procedure: target location - Naval Warfare

**Localizer**

**Target**

*Image View*

*Patient View*

*7G MRI Grid Worksheet*

*Lateral Right Breast*

- Patient ID:
- Date:
- Depth of Target = cm
- Depth of Block = +2.0 cm
- Depth of Introducer = cm
Procedure : Choosing right needle
Trocar cannulate the biopsy channel

Obturator (yellow stick)
Image control;
→ position of biopsy channel

EnCor-Biopsy needle

Coaxial Cannula
Skin to target : 3,3 + Localizer : 2 = 5,3 cm
Procedure: Choosing right needle

- If the opposite side is less than 1.9 cm, be sure to anesthetize opposite skin.
Procedure: Implementation of Visiloc

- Disinfection of the selected square
- Local anesthesia, technician puts his hand on the patient for two goals: Reassure the patient and prevent movement in response to pain.
Procedure: Implementation of Visiloc
Coaxial control acquisition
Coaxial control acquisition
Coaxial control acquisition

Ok
OUTSIDE MRI ROOM
PROCESS
(2 MRI beds)
In general, two rounds of samples are taken so **12 samples**.
Suction is performed to 360° after each round.
What else?
!! Clip marking !!

- Remove the knife
- Release the clip through the coaxial
!! Clip marking !!

- When ? : Always !!!
  - Lesions BI-RADS 4, 5 : further surgery
  - Lesions BI-RADS 3 : follow-up
  - And if lesion seen on MMG or US : same lesion ?
End of procedure

- Replacing the visiloc

- Devices removal

- Patient in her bed
End of procedure

- Compression

- Dressing

Time compression: > 5-10 mn with ice packing
Before home return

- 1 gram paracetamol PO
- Snack (Water / fruit juice and biscuits)

- Advices:
  - ✔ No sport or physical activities for 2 Days
  - ✔ Remove white bandage at day 3
  - ✔ Showers possible with hydrophobe sticking

- The patient leaves the MRI with:
  - ✔ Instruction letter
  - ✔ Service phone number
  - ✔ Appointment for D8 control MRI and mammography
Tips and tricks

1. Positioning

2. Multiple procedure

3. Clip releasing
Pre-pectoral target

Target lesion near the chest wall

Ipsilateral rotation
1. Positioning in contralateral coil

   Instability
   Very thin women

2. Medial access

   Disadvantage:
   - longer way of access
   - worse visibility
More easy: Normal lateral access with anesthetize opposite skin
Small breast

- Always smaller than expected after compression

- Insert soft foam in compression’s opposite side
Procedure: positioning

The most important thing ..........

You have just one chance of correct positioning

→ To avoid mistakes: think twice + act fast !!
Multiple lesions

- 2 or 3 simultaneous procedures are possible
  - Same or opposite breast
  - Need 1 Visiloc kit and 1 probe per target
  - Need to use 2 grids if opposite biopsy site

- Do the targeting of all lesions at the same time:
  - Enhancement wash out can occurs very quickly
  - No need to reinject
  - Time sparing

- Do the coaxial location control in one-time acq
  - Homo or contralateral breast biopsy site
  - If OK proceed for each lesion as for unique VABB
Clip releasing

Easy but not so easy…….

Always aspire biopsy cavity with special program before clip releasing
Clip implementation

Don’t remove the plastic adapter before clip insertion
Clip releasing

8 days
- DCIS
- Clip 4 cm medial / target

What can you do for preoperative localization?
Put a new clip in hematoma at Day 8
…before it disappears
Procedure and Clip position control

- Guidelines:
  - New sequence after biopsy
  - MMG : CC + P

- We propose to do it at day 8
Mrs D. BRAC1, 32 years-old, 11.2010

8 mm Mass Enhancement
Medio lateral  right breast
Evolutive / 2009

BIRADS 5
01-2011 : Breast MRI VAB
MRI/ MMG Correlation

Clip lateral / target on CC view , OK on ML view
MRI/ MMG Correlation

Clip lateral / target on CC view, OK on ML view
Mrs D

- VABB Pathology report:
  - 2 samples with ADH lesions.
  - No invasive or DCIS lesions
Mrs D – 03/2011

Surgery, Pathology:
- HCA
- No malignancy
- Post VABB scar

No discordance

Next screening in 6 months
Masse enhancement
13 mm Right SE breast

BIRADS 5
MRI 11-2011

BIRADS 5
Biopsy: IDC
Surgery: 12mm IDC, 1N
+

JFM
Journées Francophones
d’Imagerie Médicale
What happened?

2 cm above
Frequent event

- Especially with large breast !!
We change our process

- Perform biopsy outside MRI room (20mn occupancy / 60mn) with no immediate clip control

Day 8:

- Fast Breast MRI: EGT1, One dynamic axial sequence in 3 phases
  - Clip?
  - All lesion removed? Persistent lesion?
  - Hematoma size

- MMG: CC & P
- US if you need another clip in hematoma

Results announcement
Discussion with results: always!!

- Borderline lesion or carcinoma = surgery

- Benign L with image concordant: Repeat MRI at 4 to 6 m

- Discrepancy between MRI and histological results: Repeat biopsy
Our experience - 2010-2014

- 3 T GEMS MRI-guided biopsy procedure
- 2010 – 2014 : 154 patients,
  - High risk : 25 %
  - Lobular carcinoma : 16%
  - Problem solving : 22%
  - Nipple discharge : 3%
  - DCIS study (IRCIS) : 5%
  - Other 29 %
Results

10 / 154 patients not done at 1st exam
- 1/10 : refusal – follow-up : BIRADS 2
- 2/10 : stop / bleeding, pain → clip & surgery : BL
- 7/10 lesions not seen → short (4-6 months) MRI follow-up :
  1 carcinoma

163 biopsies in 144 patients – 20 mn in MRI room & 40 mn outside
- Type : ME : 31%, NME : 69%
  → BIRADS 3 : 19%, BIRADS 4 : 72 %, BIRADS 5 : 9%
- Size 4 – 45mm (13mm)
- 12 tissue cores minimum
Results

- MRI-guided VABB results (163):
  - ML: 58 (36%) 26-72%
  - High risk: 10 (6%) 1-21%
  - BL: 95 (58%) 18-74%

- Histopathological results following surgery (74):
  - Concordant: 64 (87%), but 1FN
  - Underestimation: 6 (8%)
  - Overestimation: 0

4 neoadjuvant chemotherapy
Take home messages

1. Before: need for complete breast imaging
2. Consultation before
3. Clip always
4. Contrôle clip and process Day 8: short MRI sequences and MMG
5. Discussion with results: always!!
6. Short MRI follow-up: 4-6 months for all BL