Understanding BI-RADS

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References

- ACR BI-RADS ATLAS
- BI-RADS frequently asked questions section from www.acr.org
- Breast Imaging by Bassett et al.
• ACR BI-RADS was initiated in 1988
• Clinicians complain about mammography reports that are lack of uniformity & vague management recommendation
• ACR developed a lexicon of terminology to standardize reporting & management recommendation
• The report should include:
  – Significant findings using standard terminology
  – Overall assessment (BI-RADS category)
  – Management recommendation

The findings, BI-RADS category and management recommendation should be concordant
• The assessment (BI-RADS) category should reflect the imaging findings of the case
• A concordant management recommendation should be provide
• An additional sentence should recommend the additional (discordant) management appropriate for the scenario
Assessment categories

- **BIRADS 0** – need additional image evaluation/ prior mammogram for comparison
- **BIRADS 1** - Negative (0% likelihood of malignancy)
- **BIRADS 2** - Benign (0% likelihood of malignancy)
- **BIRADS 3** - Probably benign (> 0 to 2% likelihood of malignancy)
- **BIRADS 4** - Suspicious abnormality (>2 to < 95% malignancy; average 30%)
- **BIRADS 5** - Highly suggestive of malignancy (>/>= 95% malignancy)
- **BIRADS 6** – Known biopsy-proven malignancy
BI-RADS 0

• Most used in a screening
  – Wait for additional mammographic view
  – Wait for additional US
  – Wait for old films

• Should not be used for diagnostic breast imaging findings that warrant further MRI
BI-RADS 1

• There is nothing to comment on. This is a normal examination.

• May have some benign findings that the interpreter choose not to describe such findings eg intramammary LN, benign calcifications

• Management recommendation is routine mammography screening
BI-RADS 1 – Negative
(not describe the benign calcifications)
BI-RADS 2

- Considered as normal assessment
- No mammographic evidence of malignancy
- Management recommendation is routine mammography screening
BI-RADS 2

- Benign findings were described in the report eg.
  - Intramammary LN
  - Benign calcifications
  - Degenerating fibroadenoma
  - Surgical clips
  - Fat-containing lesions
  - Implants
  - Architectural distortion from surgical scar
BI-RADS 2: calcified degenerating fibroadenoma
BI-RADS 2: intramammary LN
BI-RADS 2: post surgical scar
BI-RADS 2: surgical clips
BI-RADS 3

• The lesion is not expected to change over the follow up periods

• Most lesions will have short interval follow up (6 mo.) x 2 times then 1 year; if stable after 2-3 years then change to BI-RADS 2

• Shorter time follow up may be used eg. 1 mo in cases suspected trauma or infection
• Should not use BI-RADS 3 on screening mammogram
• It should be used after diagnostic work up
• The lesion may appear definitely benign on work up such as cyst, intramammary LN, skin calcifications → no need to be anxiety for 6 mo.
• Some lesions may appear suspicious on diagnostic work up and biopsy should not be delayed
On mammogram

• Suggested BI-RADS 3:
  – Noncalcified circumscribed solid mass
  – Focal asymmetry
  – Solitary group of punctate calcifications

*No robust scientific data for using BI-RADS 3 on palpable lesion
BI-RADS 3: a noncalcified circumscribed solid mass
BI-RADS 3: asymmetry (rt.)
BI-RADS 3: grouped punctate calcifications
On ultrasound
BI-RADS 3: an oval, circumscribed, hypoechoic solid mass, parallel orientation, no posterior feature or minimal posterior enhancement

*If the mass is palpable, the documents strong only in women < 40 years old*
BI-RADS 3: an isolated complicated cyst with uniform low level echo
Less strong evidence* for clustered microcysts (Size < 2-3 mm each; thin septum (< 0.5 mm thick)

* <500 cases on references, 0.5% malignancy
• BI-RADS 3 lesions based on expert’s opinion
  – A hyperechoic mass with central hypoechoic components and surrounding edema, consistent with but not diagnostic of fat necrosis
  – Architectural distortion thought to be due to postsurgical scar
BI-RADS 3: probably fat necrosis (history of trauma)
• If the lesion increase in size (> 20% diameter) during follow up → change to BI-RADS 4 and suggest biopsy

• If the lesion disappear or become apparently benign before 2 years → BI-RADS 2

• FNA or biopsy may be performed on BI-RADS 3 lesion when patient anxiety, patient cannot come for follow up
BI-RADS 4

- Findings that do not have classic appearance of malignancy and not typically benign; but findings suspicious enough to biopsy

- Subdivision into BI-RADS 4 A, 4 B, 4 C is an option

- Management recommendation is biopsy
BI-RADS 4 A

• Chance >2 to 10% malignancy
• A malignant finding is not expected
• Recommendation if biopsy/ FNA result is benign:
  – 6 mo. follow up
  or
  – Routine follow up

*Some patient may choose to decline biopsy if they accept the risk of 10% chance of malignancy
BI-RADS 4 A

• Examples:
  – A partially (<75%) circumscribed solid mass with US features suggestive of a fibroadenoma
  – Palpable solitary complicated cyst
  – Probable abscess (if typical abscess on US then it is BI-RADS 2)
BI-RADS 4A: a partially circumscribed solid mass with US features suggestive of a fibroadenoma
BI-RADS 4A: palpable complicated cyst.
(must be homogeneously low level echoes or fluid-fluid level, no thick wall, no thick septa, no internal solid component)
BI-RADS 4 A: probable abscess, aspiration showed pus.
BI-RADS 4 B

- Chance malignancy >10 to ≤ 50% malignancy
- Recommended follow up with benign biopsy result will depend on concordance
BI-RADS 4 B

• Examples of findings:
  – Coarse heterogeneous calcifications (13% malignancy)
  – A group of amorphous calcifications
  – A group of fine, pleomorphic calcifications
  – An otherwise nondescript solid mass with indistinct margin
BI-RADS 4B: coarse heterogeneous calcifications

Bx = degenerating fibroadenoma
BI-RADS 4B: coarse heterogeneous calcifications

Pathology = Invasive ductal CA
BI-RADS 4B: grouped amorphous calcifications

Biopsy = DCIS
BI-RADS 4B: grouped amorphous calcifications

Bx = fibrocystic change
BI-RADS 4B: Grouped pleomorphic calcifications

Fibrocystic change

Benign calcifications in ducts
BI-RADS 4B: Grouped pleomorphic calcifications

Bx = DCIS in all cases
BI-RADS 4B: a solid mass with (partly) indistinct margin

Core biopsy showed fibroadenoma
BI-RADS 4 C

• Findings high suspicion for malignancy but not highly suggestive of malignancy
• Chance malignancy > 50% to <95%
BI-RADS 4 C

• Examples
  – A new indistinct, irregular solid mass
  – A new group of fine linear calcifications

• Pathologist may initiate further histological evaluation of benign results of category 4C lesions
BI-RADS 4C: an indistinct, irregular solid mass
BIRADS 4C: new grouped fine linear branching calcifications

baseline

1 year later
BI-RADS 5

- Chance of malignancy \(\geq 95\%\)
- Used in classic examples of malignancy

- If biopsy result is benign \(\rightarrow\) suggest repeat (usually surgical) biopsy

- Recommendation is “biopsy should be performed in the absence of clinical contraindication” rather than “appropriate action should be taken”
BI-RADS 5

• Examples
  – An irregular, spiculated, high density mass with associated microcalcifications
  – New fine linear and branching calcifications + segmental distribution

• There is no single mammographic feature that is associated with a likelihood of malignancy of $\geq 95\%$, it takes a combination of suspicious imaging findings to justify a category 5 assessment
BI-RADS 5: An irregular, high density mass with associated microcalcifications, axillary lymphadenopathy
BI-RADS 5: segmental, fine linear branching calcifications
BI-RADS 5: segmental, fine linear branching calcifications
BI-RADS 5: a spiculated, irregular shaped, high density mass with skin retraction
BI-RADS 6

• Biopsy was already performed and the result was malignancy
• Examples:
  • Used for assessment **before** complete surgical excision
  • Follow up response to neoadjuvant chemotherapy
  • After attempted complete removal of target lesion by percutaneous core biopsy
BI-RADS 6

• If mammogram is done for evaluation after attempted complete surgical excision with positive resection margin on pathology:

• If there are residual positive imaging findings of malignancy → BI-RADS 6

• If imaging shows only post surgical scarring (although pathology result was margin positive); then BI-RADS 2 should be given with extra-sentence stating that pathology report suggest residual tumor
**BI-RADS 6**

- If suspicious findings other than the known cancer is found, then BI-RADS 4 or 5 should be given.

- If the other findings are not suspicious (benign or probably benign), then BI-RADS 6 should be given and add a sentence for proper management of the additional findings.
Palpable left breast mass: FNA showed ductal CA
Palpable left breast mass: FNA showed ductal CA
Palpable left breast mass: FNA showed ductal CA A spiculated, irregular mass on the right side.
Left: Known ductal CA
Right: angular margin, irregular mass with posterior shadow

Final BI-RADS 5 (right breast mass)
BI-RADS 6

• Recommendation should be:
  “surgical excision when clinically appropriate”
  instead of
  “appropriate action should be taken” (previous BI-RADS ed.)
• Some specific clinical scenarios may have management discordant with the assessment category or may confused radiologists
Scenario 1

• Patient with palpable breast abnormality
• Mammogram negative, ultrasound negative
• The radiologist may feels that the palpable lesion is worrisome and should be biopsy
• What BI-RADS category & recommendation should be?
• BI-RADS 1 – Negative (due to negative mammogram, US)
• Management recommendation: Routine mammography screening
• Adding sentence:
  -surgical consultation or tissue diagnosis if clinically indicated
  -since the palpable lesion is imaging negative; management should be based on clinical concern
• There is no test that ensure that a woman does not have breast cancer
• In case of palpable mass with imaging negative, management decision must be made based on clinical findings
• The likelihood of malignancy for palpable mass with negative mammogram and negative US is 0.1-4%
Scenario 2

• A simple cyst on US with pain or tenderness that need therapeutic aspiration to relieve symptom

• What BI-RADS category & recommendation should be?
• BI-RADS 2 – Benign finding
• Recommendation: routine mammography screening
• Adding sentence: aspiration to relieve the discomfort produced by the cyst
Scenario 3

• A woman with a ruptured implant but no imaging finding of malignancy
• Should have surgical consultation for implant removal and possible replacement

• What BI-RADS category & recommendation should be?
• BI-RADS 2 – Benign finding
• Recommendation: routine mammography screening
• Adding sentence: Surgical consultation that addresses proper treatment for the rupture implant
Scenario 4

- A woman with isolated complicated cyst on US. Mammogram negative
- The radiologist wants to follow up US in 6 mo.
- The woman cannot come for follow up

- What BI-RADS category & recommendation should be?
• BI-RADS 3: probably benign finding
• Recommendation: short interval follow up in 6 mo. by US
• Adding sentence: The patient cannot come for follow up so FNA was performed
Scenario 5

• Screening mammogram shows suspicious microcalcifications
• The radiologist suggests biopsy but the patient ask for follow up instead
• What BI-RADS category & recommendation should be?
• BI-RADS 4 – suspicious abnormality
• Recommendation: stereotactic biopsy grouped microcalcifications
• Adding sentence: the patient does not want to biopsy the microcalcifications and ask for short interval follow up. Follow up left mammogram next 6 mo. is planned
• On 6 mo. follow up, the microcalcifications are stable. What BI-RADS assessment should be?
• BI-RADS 4 – suspicious abnormality
Scenario 6

• Screening mammogram found an asymmetry.
• Diagnostic mammogram with ultrasound found no more abnormal finding (only asymmetry found)
• The radiologist wants to further investigate with MRI
• What BI-RADS assessment should be?
• Should not use BI-RADS 0 on **diagnostic** mammogram that warrant further evaluation with MRI
• BI-RADS (1-6) should be given (BI-RADS 3 for this case) and add a sentence to suggest MRI on the recommendation
• If MRI is not performed or negative/ benign, the management can still be done based on **diagnostic** study
Scenario 7

• A post-lumpectomy patient was sent for mammogram 6 mo. after surgery, what BI-RADS should be?

• After lumpectomy, the usual mammographic appearance is architectural distortion caused by surgery
• If no other suspicious sign $\rightarrow$ BI-RADS 2 is appropriate

• BI-RADS 3 should not be used when radiologist is “not sure” whether a finding is benign or suspicious

• During the post lumpectomy period, if the subsequent mammogram shows increased architectural distortion or other suspicious findings $\rightarrow$ BI-RADS 4 is appropriate
Scenario 8

• Do mammography examination performed on men require a BI-RADS assessment?
  • Yes.
• All mammography examination are require to have final assessment category but the management recommendations may differ because annual screening mammography is not usually appropriate
Conclusion

• Using proper BI-RADS assessment category with concordant management recommendation can guide clinician for appropriate treatment or follow up, reduce confusion in management

• Radiologists should have well knowledge and understand how to use the proper BI-RADS category
THANK YOU