IP2: The cost-effectiveness of breast magnetic resonance imaging (MRI) to detect a locoregional recurrence in patients with breast conserving therapy. Is it feasible in Latin America?

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POTENTIAL CONFLICT OF INTERESTS

No relevant potential conflict of interest of any authors about this panel.

OVERVIEW:

- Approximately 10 to 15 percent of patients with breast cancer will develop a locoregional recurrence within 10 years of treatment with breast conserving therapy.

- The breast tumor recurrences are generally detected either by finding a palpable mass on physical examination or as a change on surveillance mammography.

- Both radiotherapy and surgery can lead to changes in the breast, such as mass-like fibrosis, that can be difficult to distinguish from a local recurrence.
OVERVIEW:

- Breast MRI can be used to differentiate surgical scarring and radiation changes from breast cancer recurrence in cases where the physical examination and imaging with mammography and/or ultrasound is difficult to interpret.

- MRI of the breast is expensive, costing approximately 10 to 15 times more than mammography or ultrasound.

OVERVIEW:

- Because of limited specificity, the use of breast MRI can increment the costs of treatment due an increased in the number of unnecessary biopsies, delays definitive treatment, and increases the number of patients undergoing mastectomy.

- There is not evidence that breast MRI is cost effective as a routine component in the follow up of patients undergoing breast conserving therapy.
AGONIST

- Favorable Evidences

Why to use the MRI?
Mammogram following breast conservation and radiotherapy with a mass suspicious for malignancy.

Pre-contrast (upper) and post-contrast (lower) 3D T1 weighted sequence. No enhancement is seen. Fibrosis is demonstrated on biopsy.

Pre-contrast (upper) and post-contrast (lower) MRI after breast conservation. Rim enhancement (arrow) suggesting malignancy.
Mammographic surveillance after breast conservation treatment

- Mammography sensitivity may be limited for detection of recurrent disease in an architecturally changed (55 to 68%).


- Breast sonography sensitivity may be problematic because to insufficient distinction between diffuse acoustic shadowing caused by scar tissue and breast cancer and it’s sensitivity is limited when evaluating small or noninvasive lesions.

Ductal carcinoma in situ diagnostic

MRI for diagnosis of pure ductal carcinoma in situ: a prospective observational study.

- Investigate the sensitivity with which ductal carcinoma in situ (DCIS) is diagnosed by mammography and by breast MRI
- During a 5-year period, 7319 women who were referred to an academic national breast centre received MRI in addition to mammography for diagnostic assessment and screening.
- 193 women received a final surgical pathology diagnosis of pure DCIS. Of those, 167 had undergone both imaging tests preoperatively. 93 (56%) of these cases were diagnosed by mammography and 153 (92%) by MRI (p<0.0001).
- Of the 89 high-grade DCIS, 43 (48%) were missed by mammography, but diagnosed by MRI alone; all 43 cases missed by mammography were detected by MRI.
- MRI could help improve the ability to diagnose DCIS, especially DCIS with high nuclear grade

Prognosis following local recurrence after breast conserving treatment in young women with early breast cancer

van der Sangen MJ, Poortmans PM, Scheepers SW, Lemaire BM, van Berlo CL, Tjan-Heijnen VC, Voogd AC.

1. 124 patients with an isolated local recurrence in the breast following breast-conserving surgery and radiotherapy for early stage breast cancer diagnosed at the age of 40 years or younger.
2. The median follow-up of the patients after diagnosis of LR was 7.0 years.
3. Distant Metastases - the risk tended to be higher for patients with LR occurring within 5 years after BCT, as compared to patients with LR more than 5 years after BCT (Hazard ratio [HR], 1.89; p = 0.09).
4. A worse distant recurrence-free survival was also observed for patients with a LR measuring more than 2 cm in diameter, compared to those with a LR of 2 cm or smaller (HR, 2.88; p = 0.007), and for patients with a LR causing symptoms or suspicious findings at clinical breast examination, compared to those with a LR detected by breast imaging only (HR 3.70; p = 0.03).

What role of magnetic resonance imaging in the diagnosis of recurrence after breast conserving therapy?

Breast MRI screening of women with a personal history of breast cancer.

- Brennan S, Liberman L, Dershaw DD, Morris E.

- 1,699 breast MRI examinations performed from 1999 to 2001
- 144 women with prior breast cancer but no family history who commenced breast MRI screening during that time;
- 44 underwent biopsies prompted by MRI examination, 17 malignancies and 27 benign findings.
- Of 17 cancers, 10 were detected by MRI only.
- MRI screening of women with only a personal history of breast cancer was clinically valuable finding malignancies in 12%, with a reasonable biopsy rate (PPV, 39%).
Magnetic resonance imaging in breast cancer recurrence.
Belli P, Pastore G, Romani M, Terribile D, Canadè A, Costantini M.

- 40 patients undergoing breast conserving therapy
- In these patients, the clinical, mammographic and sonographic characteristics of local recurrence were nonspecific or dubious.
- All patients were examined at least 1 year after completion of radiation therapy.
- Breast cancer recurrence identified in 22 patients was confirmed on histology in all of them. There were only 2 cases of false positive results.
- MRI showed 95% accuracy, 100% sensitivity and 88.8% specificity with 5% false-positives and 100% negative predictive value.


Magnetic resonance imaging in the diagnosis of local recurrences in breast cancer.
Krämer S, Schulz-Wendtland R, Hagedorn K, Bautz W, Lang N.

- In 33 patients local recurrences within the breast were diagnosed after breast conserving surgery.
- The sensitivity for the diagnosis of local recurrences after BCT was as follows: palpation (51%), mammography (67%), ultrasound (85%) and NMR (91%).
- Mammography was not able to diagnose 11 local recurrences in radiodense breasts. Here ultrasound was able to diagnose 8 of 11 recurrences, while NMR was able to diagnose 10 of 11 recurrences.

What role of magnetic resonance imaging in the breast implants after cancer surgery?

Contrast-enhanced MR imaging of the breast in patients with breast implants after cancer surgery.  
Boné B, Aspelin P, Isberg B, Perbeck L, Veress B.

- 83 patients have been evaluated by semidynamic contrast-enhanced MR imaging.
- The findings were compared to physical examination, mammography and histopathology.
- Recurrence verified by histopathology occurred in 14 of 83 patients (17%).
- Contrast-enhanced MR imaging was superior to palpation and mammography in revealing recurrences, especially when these were located close to the chest wall.
- MR was also more sensitive in detecting multiple foci of cancers.

Breast augmentation and reconstructive surgery: MR imaging of implant rupture and malignancy.


- Accuracy of MRI in detecting prosthesis integrity and malignancy after breast augmentation and reconstruction
- Forty-one implants in 25 patients were analyzed by MRI before surgical removal.
- The sensitivity for detection of implant rupture was 86.7% with a specificity of 88.5%. The positive and negative predictive values were 81.3 and 92.0%, respectively.
- The linguine sign as a predictor of intracapsular implant rupture had a sensitivity of 80% with a specificity of 96.2%.
- Magnetic resonance imaging revealed two lesions with suspicious contrast enhancement (one carcinoma, one extra-abdominal fibromatosis).


Conclusions

- There are not studies in cost effectiveness of breast magnetic resonance imaging (MRI) to detect a locoregional recurrence in patients with breast conserving therapy.
- There’s necessary prospective and randomized studies, with large number of patients to justify the routine use of MRI-following BCT.
- MRI is more sensitive than is mammography, it is less specific, resulting in more false-positive biopsies.
Conclusions

- Routine use of post-BCT breast MRI:
  - Women with a proven BRCA mutation
  - Women with 20–25% lifetime risk for breast cancer
  - Evaluation of inconclusive clinical or imaging findings
  - Evaluation of implant rupture and malignancy

OPPPONENT

- Unfavorable Evidences
The MRI cost effectiveness in the early detection of breast cancer recurrence in patients undergoing treatment with conservative surgery.

Is it feasible in Latin America?

EVIDENCES

- Benefit in the detection of recurrence
- Survival
- Cost effectiveness
The evidence supports regular history, physical examination, and mammography as the cornerstone of appropriate breast cancer follow-up.

All patients should have a careful history and physical examination performed by a physician experienced in the surveillance of cancer patients and in breast examination.

For those who have undergone breast-conserving surgery, a post-treatment mammogram should be obtained 1 year after the initial mammogram and at least 6 months after completion of radiation therapy.
- It is not recommended for routine breast cancer follow-up in an otherwise asymptomatic patient with no specific findings on clinical examination.

2010

- The addition of breast MRI to the screening algorithm for women at greatest risk adds considerable cost.
  - Studies have suggested that for those at the greatest risk, carriers of the BRCA1 mutation, adding MRI to mammography increases screening cost by >$50,000 per cancer.

  - I. Griebsch, J. Brown, C. Boggis *et al.*
  - Cost effectiveness of screening with contrast enhanced magnetic resonance imaging vs X-ray mammography of women at a high familial risk of breast cancer
  
    Br J Cancer, 95 (2006), pp. 801–810
COSTS

• These costs increase considerably as the risk for developing cancer diminishes. It is to be expected that as women with decreasing risk undergo MRI, this will also increase the false-positive biopsy rate and other parameters of false-positive image interpretation.

• This is the rationale for limiting MRI screening to those women at the greatest risk for developing breast cancer.

2013

- Breast Cancer Follow-Up and Management After Primary Treatment
- Breast MRI is not recommended for routine

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Queries?

Thank you!