

Preoperative breast MRI in patients with invasive lobular carcinoma reduces the rate of surgical re-excision

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Introduction:

In invasive lobular carcinoma (ILC) of the breast, the value of conventional imaging in the assessment of tumor load is doubtful at best. In a large series, there was no correlation between size at pathology and size at mammography. Size estimations using ultrasound have been shown unreliable in tumors over 2 cm. MRI measurements on the other hand show consistent correlation with pathology, correctly estimating tumor size in approximately 80% of patients.

The use of breast MRI in the preoperative setting is the focus of a large international controversy. It is shown that breast MRI has the ability to change surgical management prior to operation. Moreover, it has been shown that the MRI findings correspond to tumor growth, as specimen examinations show malignant cells at the location of MRI findings.

However, several authors argue that breast MRI only enlarges the volume of breast tissue that needs to be excised, because MRI usually detects more tumor mass than conventional imaging. Consequently, preoperative breast MRI will increase the amount of mastectomies and reduces the possibility of breast conserving therapy (BCT), while radiotherapy to the preserved breast is always part of BCT and residual tumor might in fact be effectively treated.

Nevertheless, incomplete tumor excision has been shown a predictor of tumor recurrence and decreases the overall prognosis (even after reexcision). Consequently, international guidelines demand re-excision after the detection of more than focally involved excision margins. We assessed the rate of re-excisions and the rate of mastectomies in patients with ILC treated in two large cancer centers in the Netherlands in relation to the performance of preoperative MRI, to assess whether preoperative MRI has the ability to reduce the rate of re-excisions without dramatically increasing the rate of mastectomies.

Materials and Methods:

We retrospectively retrieved all consecutive patients that were surgically treated for ILC in either of the two hospitals between the start of the use of breast MRI in the respective clinics and december 2005. We excluded all patients who had a history of cancer, who were initially treated with neoadjuvant chemotherapy, or who were initially treated at another hospital (except for excision biopsy to establish the diagnosis). Subsequently we assessed the initial type of surgery (mastectomy or BCT), the performance of re-excision (yes / no) and the final type of surgery (mastectomy / BCT).

During this period, breast MRI was not a standard procedure in the work-up of breast cancer, but was frequently applied due to the performance of several large prospective trials. Consequently, we assessed whether preoperative MRI was performed. Furthermore we evaluated the time between diagnosis, preoperative MRI and surgery, to assess whether preoperative MRI delayed the therapy. Statistical analysis was performed using the chi-square test for binomial comparisons and the t-test for unrelated samples in continuous data. P-values smaller than 0.05 were considered significant.

Results:

In total 267 women met the in- and exclusion criteria. 99 underwent preoperative MRI and 168 were surgically treated after conventional imaging only. The T-stage distribution was not different between groups ($p=0.6$) and the mean tumor size was 3.4 cm for both groups ($p=0.97$). Multifocality was found in 88/168 patients treated without preoperative MRI and in 55/99 patients with preoperative MRI ($p=0.6$). Initial performed surgery was BCT in 54 % of patients treated without preoperative MRI and in 55% of patients treated with preoperative MRI ($p=0.75$). However, re-excision was more common in the group that did not undergo preoperative MRI 25/168 vs. 5/99 ($p=0.01$) and final surgery was more often mastectomy in the patients that did not undergo MRI than in patients that did (99/168 vs. 48/99), though this did not reach statistical significance ($p=0.1$).

When evaluating only the patients that initially underwent BCT, there was also no difference in tumor size between groups (2.2 cm vs 2.1 cm ($p=0.6$)), but re-excision was performed in 26% of women without preoperative MRI and in only 9% of women with preoperative MRI ($p=0.01$).

The median time from diagnosis to MRI was 9 days (mean 11 days), however this was performed in the waiting period before surgery. The median time from diagnosis to final PA in patients in whom initial surgery was successful was 36 days in the patients without preoperative MRI and 39 days in patients with preoperative MRI, and as such not different. However, the need for re-excision increased the time to final PA to median values of respectively 78 and 79 days. As a direct consequence, the overall mean time from diagnosis to final PA was 36 days in patients that underwent preoperative MRI and 53 days in patients without MRI ($p=0.1$).

Conclusion:

Our study shows that preoperative MRI in patients with ILC has the ability to prevent incomplete tumor excision and subsequently indicated re-excision. As there was no difference in tumor size between groups, nor in the frequency of multifocality, these factors cannot explain the results. Moreover, the reduction of the re-excision rate is not caused by an upgrade of tumor surgery from BCT to mastectomy.

Due to the retrospective nature of this study, a selection bias may have occurred that could have masked the possibility of higher BCT rates in patients that did undergo preoperative MRI, caused by factors unrelated to the size and focality of the primary tumor. However, the separate evaluation of all patients that did undergo BCT still shows a clear reduction of need for re-excision in patients that did undergo preoperative MRI. Therefore, the reduced re-excision rates must at least partly be due to the improved knowledge of tumor location and extent within the breast. The medical team (radiologist and surgeon together) has been able to use this knowledge as a guide for therapy, consequently not increasing the rate of mastectomies in the patients evaluated with preoperative MRI, but rather decreasing it.

Furthermore, preoperative breast MRI did not increase the time from diagnosis to surgery. Naturally, this is dependent on the availability of MR time and may still be a bottleneck in clinical practice. The fact that most MRI investigations have been performed in the interest of research explains why there is no delay in this study, as a significant delay would have been deemed unethical. However, the (insignificant) decrease in time to final therapy with preoperative MRI is a consequence of the reduced need for re-excision and preoperative MRI has therefore also the ability to decrease the total therapy time.