

VIBE with Parallel Acquisition Technique: Efficacy of MR Mammography in the Surgical Position

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Purpose:

The VIBE (volume interpolated breath-hold examination) sequence in combination with parallel acquisition technique (PAT) allows dynamic contrast-enhanced MRI of the breast with high temporal and spatial resolution. The aim of this study was to evaluate the clinical usefulness of MR mammography with this technique in the surgical position (supine MRM) for navigation surgery.

Materials and Methods:

Supine MRM was performed in 35 consecutive patients with breast cancer using a 1.5 T MR system (gradient field strength 30 mT/m) with a 6 channels body array coil. T2*-weighted first-pass perfusion images were obtained before, during and after the bolus injection of 0.1mmol Gd-DTPA/kg. Dynamic MRI with VIBE sequences using the GRAPPA (generalized autocalibrating partially parallel acquisition) algorithm (TR/TE/matrix/partition thickness/time of acquisition: 3.7 ms/ 1.7 ms/256 x 204/1.3 mm/20 s) was performed before and after perfusion MR imaging. The first phase was started 60 sec after commencing contrast injection (early phase). The second phase was started at a 90-sec delay from the start of the injection (intermediate phase). The third phase was started at a 4-min delay from the start of the injection (late phase). Maximum intensity projection (MIP) was done for visualization of breast cancer extent using early phase. The size of the lesion measured on supine MRM was compared with those determined histologically, and the deviation of the supine MRM findings was evaluated.

Results:

Supine MRM enabled visualization of all 35 breast carcinomas. Histopathological diagnosis was non-invasive ductal carcinomas in 3, and invasive ductal carcinomas in 32. Mastectomy was performed in 12 patients and breast conservation surgery in 23. Two cases showed a positive margin (8.7%). In invasive carcinoma, sensitivity and specificity for the detection of intraductal extension were 71% (10/14) and 100% (18/18), respectively. Accuracy for the detection of tumor extent with a deviation of less than 2 cm in length was 89% (31/35).

Conclusion:

MR mammography using VIBE with parallel imaging technique in the surgical position provides both high-spatial- and high-temporal-resolution images and is thought to be a promising method for surgical navigation.

Figure

3 58-year-old woman with breast cancer

MIP of supine MR image obtained 60 seconds after intravenous injection of contrast material shows a markedly enhancing mass in the lower inner quadrant of the left breast. Craniocaudal and transverse lines are drawn crossing over the nipple.

