Is assessment of breast tumors with the sole use of DWI sufficient for breast cancer diagnosis?

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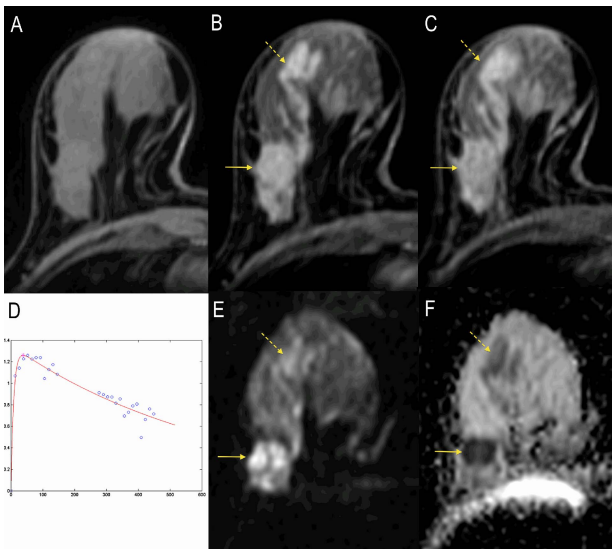
Introduction

Contrast enhanced breast MRI (ceMRI) is the most sensitive method for detection of breast cancer. Diffusion Weighted Imaging (DWI) is increasingly used in clinical practice in conjunction with CE-MRI. It has shown its value for lesion detection and differentiation and has been used together with T2w TSE images as an unenhanced alternative to ceMRI in mass lesions (1). Higher field strength at 3 Tesla can be invested in higher spatial resolution of DWI, overcoming limitations of DWI in small and non-mass lesions. Furthermore, improved sequence techniques overcome artifacts and distortions typically observed using DWI (2). The purpose of this study was to assess the sole use of DWI in non-selected group of MRI patients with an suspicious imaging finding and to compare its diagnostic accuracy to ceMRI in a multi-reader study.

Material and Methods

60 consecutive patients with an imaging abnormality (architectural distortion, asymmetric density, mass; BIRADS 0, 3-5) were included in this retrospective IRB approved study. All patients underwent 3T MRI (Siemens Tim Trio) using a dedicated 4-channel breast coil. Sequence protocol consisted of a DWI and a contrast-enhanced high temporal and spatial resolution 3D T1-weighted sequence. Gd-DOTA was used as contrast agent (Dotarem®, Guerbet, France), injected intravenously as a bolus (0.1 mmol/kg body weight) at 4 mL/s (power injector: Spectris Solaris EP, Medrad, Pittsburgh, PA, USA), and followed by a 20-mL saline flush. Two experienced readers trained in different institutions (r1, r2) independently read DWI and CE-MRI examinations and assigned a diagnosis (BIRADS scale 1=no lesion to 5= definite malignancy). Diagnostic criteria for malignancy in DWI were low ADC values, heterogeneous internal structure and unsharp borders on DWI images. Lesion size, localization and laterality, ADC values and BI-RADS criteria were assessed. Sensitivity, specificity, diagnostic accuracy and inter-reader variability (kappa statistics) were calculated for both readers. Contrast enhanced MRI data and histopathological diagnoses were used as the standard of reference.



Results

There were 34 benign and 38 malignant findings. Mean lesion size was 25.2mm (range 10-87mm) without significant differences between DWI and ceMRI. On the basis of DWI 60 (r1) and 59 (r2) lesions were correctly classified as benign (r1, r2: 26) and malignant (r1: 34, r2: 33). Three out of four false negative findings were DCIS. Sensitivity and specificity were 89.5%/76.5% (r1) and 86.8%/76.5% (r2). ceMRI showed a sensitivity and specificity of 89.5/85.3% (r1 and r2). Differences in sensitivity and specificity were not statistically significant (P>0.05). Interrater agreement for DWI was 0.919, interrater agreement for ceMRI was 0.990 and intermethod (DWI vs ceMRI) agreement was 0.849 (r1) and 0.767 (r2).

Conclusion

DWI for breast cancer diagnosis in breast MRI is feasible as sensitivities of DWI and ceMRI were equal. However, a higher number of false positive findings occured using DWI. As no additional cancers were detected using contrast agent, DWI may be used instead of ceMRI when exclusion of malignancy is the diagnostic task.

References

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