

Identification of Histopathologic Subtype of Invasive Breast Cancer by Using Contrast-enhanced MRI

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Introduction:

Contrast-enhanced MRI has become an important method for evaluating breast cancer. Invasive ductal carcinoma of no special type (IDC-NST) can be classified into three subgroups: papillotubular carcinoma, solid-tubular carcinoma and scirrhous carcinoma by histological patterns [1]. These histopathologic subtypes are known to relate to patient prognosis; good in papillotubular carcinoma, intermediate in solid-tubular carcinoma and poor in scirrhous carcinoma. Furthermore, usefulness of this classification has been indicated with regard to the status of estrogen receptor, progesterone receptor, DNA ploidy, epidermal growth factor receptor, p53 protein, vascular proliferation and bcl-2 gene expression [2]. The purposes of this study were to elucidate the correlation between MRI features and histopathologic subtypes of IDC-NST and to evaluate if contrast-enhanced MRI can differentiate histopathologic subtypes of IDC-NST.

Methods:

Preoperative breast MR images were retrospectively evaluated in 87 women who had histopathologically-proven IDC-NST. Fat-suppressed contrast-enhanced MR images were obtained before and 2, 5 and 9 minutes after injection of the contrast medium with 1.5T imagers by using T1-weighted 3D fast gradient echo sequences (TR/TE=30/4, FA=35 degrees, matrix=192x256x32, FOV=220x220x96mm). Presence or absence of three distinct MRI findings, including (1) serrated border (enhancement that tapers as it comes apart from the mass), (2) delayed rim enhancement (enhancement that appears on the delayed image rimming the lesion), and (3) linear enhancement (linear enhancement that does not taper and arose and extended from the mass for longer than 5 mm) were assessed. Classification and regression analyses (Answer-Tree 3.1, SPSS Inc., Chicago, IL) were performed to construct the most efficient classification algorithm for predicting histopathologic subtype based on dynamic MRI features.

Results:

Histopathologic subtypes of the IDC-NST were scirrhous carcinoma in 35 patients, solid-tubular carcinoma in 19 and papillotubular carcinoma in 33. Serrated border was observed in 39 of the 87 patients (45%), delayed rim enhancement in 30 (35%), and linear enhancement in 30 (35%). Scirrhous carcinomas were closely associated with serrated border (31/35, 89%). Delayed rim enhancement was frequently observed in solid-tubular carcinomas (17/19, 90%), but was not typically seen in scirrhous carcinomas (2/35, 6%). Linear enhancement showed relatively high prevalence in papillotubular carcinomas (17/34, 50%) and scirrhous carcinomas (11/35, 31%). Histopathologic subtypes of IDC-NST can be correctly identified in 64 (74%) of 87 lesions by using the diagnostic algorithm generated by the classification and regression tree analyses.

Conclusion:

MRI features showed a close relationship with histopathologic subtypes of IDC-NST. Contrast-enhanced MRI can be used as a non-invasive diagnostic tool for identifying histopathologic subtypes of invasive breast cancer.

References

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