SS 18 GU-09 11:10 English

Prostate cancer: prediction of upgrade in gleason score 6 between prostate biopsies and pathology following radical prostatectomy by using MR imaging

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PURPOSE: To assess retrospectively the use of MR imaging for predicting upgrade of Gleason score (GS) 6 prostate cancerfrom biopsy to radical prostatectomy (RP).

MATERIALS AND METHODS: Eighty two patients with biopsy GS 6 or 7 prostate cancers, who underwent MRI at 3.0 T, were included in this study. The patients were divided into 3 groups: group 1 (biopsy GS 6 and RP GS 6), group 2 (biopsy GS 6 and RP GS 7), group 3 (biopsy GS 7 and RP GS 7). All MR images were reviewed by two readers in consensus. Apparent diffusion coefficient (ADCtum) and tumor size were measured by drawing the regions of interest were on T2-weighted images and ADC maps at sites of visible tumor confirmed at RP. Relative ADCs (rADCnon and rADCobt) were calculated by ADC (tumor)/ADC (noncancerous prostate) and ADC (tumor)/ADC (ipsilateral obturator muscle), respectively. Prostate-specific antigen density (PSAD) was calculated as initial PSA divided by planimetric prostate volume measured onT2-weighted images.

RESULTS: A total of 34(53.1%) patients with biopsy GS 6 were upgraded to GS 7 at RP. The mean ADCtum, rADCnon, rADCobt, and tumor size were not significantly different among three groups (group 1, 1043.3×10^{-6} mm²/sec, 0.72, 1.31, and 1.13 cm²; group 2, 1068.9×10^{-6} mm²/sec, 0.78, 1.54, and 1.48 cm²; group 3, 1055.1×10^{-6} mm²/sec, 0.74, 1.41, and 1.68 cm²). PSAD was significantly lower in group 1 than those in group 2 and 3, respectively (group 1, 0.18; group 2, 0.39; group 3, 0.34). In the logistic model, PSAD was found to be the single best predictor of upgrade of GS 6 prostate cancer (p = 0.002). With cut-off point of 0.25, PSAD had a sensitivity of 61.8%, a specificity of 90.0% and area under the receiver operating characteristic curve of 0.774.

CONCLUSION: PSAD calculated by using MR imaging may be useful for prediction of GS upgrading following RP in biopsy-proven, low-risk prostate cancers. Further studies are warranted to help provide the valuable MR imaging parameters as predictors of GS upgrading.