The Clinical Value of Diffusion Weighted Image for Prostate Cancer at 3 Tesla

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Purpose: In order to evaluate the clinical value of Diffusion Weighted Imaging(DWI) for prostate cancer(PC) at 3 Tesla.

Materials and Methods: Fourteen cases of pathologically proved PC entered the study. The pathology was confirmed according to the surgical specimen in 8 and biopsy specimen in 6 cases. The age ranged form 44 to 79 years old (mean: 64.5). The serum PSA value at the time of MR exam was form 4.9 to 10.9ng/dl (mean: 9.6ng/dl). All patients underwent MR exams before fine needle biopsy. The MR machine was a Magnetom Trio 3 Tesla (Siemens Inc. Ealangen, Germany). A 8-channel body array coil was used. The pulse sequence for DWI was SE type single shot EPI with TR of 2000msec, TE of 61msec with parallel imaging technique. FOV was 25x25cm with acquisition matrix of 128x128. The slice thickness was 5 to 6mm with 10% interslice gap. ADC map for each slice was created for evaluation. The b-factor employed was 0, 300 and 600 along 3 orthogonal planes. Standard T2WI was obtained with Turbo Spin Echo sequence with TR of 5500msec, TE of 83 msec. The Echo Train Length was 13. FOV was 25x32cm with acquisition matrix of 320x512. The slice thickness was 3 mm with 10% interslice gap. Three radiologists were to evaluate the images and asked to detect the exact location of the cancer focus for each image series of DWI(b=600), ADC map and T2WI with minimal clinical information.

Results: ADC map could detect the cancer foci in 12 of 16 cancer foci while DWI and T2WI could only detect 8 and 7 foci respectively. All of 4 cancer foci in transitional zone and internal zone were successfully detected by ADC map while DWI and T2WI could detect only 2 and 1 respectively.

Consideration: The standard management for suspected PC cases with elevated serum PSA level is 6 point blind fine needle biopsy so far, however the positive rate is reported to be around 20% for cases with PSA less than 10ng/dl. Our results with low level PSA demonstrated that ADC map could detect nearly 75% of cancer foci before biopsy which should have a clinical impact to change the management. High SNR at 3 Tesla enabled thin slice DWI suitable for small cancer focus detection together with short TE value with strong gradient system.

Conclusion: DWI at 3 Tesla should be an important tool for small PC detection.