PP-14

Anterior prostate cancer: Gleason score based on MRI/TRUS elastic image fusion guided prostate biopsy vs prostatectomy

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Background: Gleason score (GS) based on needle prostate biopsy (PBx), is one of the most important factors in decision making for appropriate treatment of prostate cancer (PCa). The literature reports on 40-80% agreement of GS between PBx and prostatectomy. Anterior prostate cancers (APC) are commonly under-estimated by PBx due to the long distance from the rectum and limitation of ultrasound to define the anterior prostate.

Magnetic resonance imaging (MRI) can localize clinically important PCa. Further, low apparent diffusion coefficient (ADC) values of diffusion weighted imaging (DWI) can indicate the aggressiveness of PCa. Using elastic MRI/TRUS image fusion and real time navigation technology during the biopsy procedure, accurate targeted biopsies (TBs) can be performed, and all prostate regions can be reached.

The aim of this study was to evaluate the agreement of GS performed using MRI/TRUS elastic image fusion guided prostate biopsy versus GS after prostatectomy in patients with APC.

The aim of the study was to evaluate the agreement of GS between PBx and prostatectomy specimen when using MRI and targeted biopsies in patients with APC.

Materials & Method: Forty-eight patients with elevated prostate specific antigen (PSA) and suspicious APC on MRI were prospectively included in this quality control study conducted from January 2010 to February 2013. All patients underwent robot assisted laparoscopic prostatectomy (RALP) after MRI/TRUS guided PBx that confirmed APC.

Mean (range) of age, PSA and MRI-prostate volume were: 63 years (45-73 years), 19 ng/ml (4-44 ng/ml) and 45 ml (22-98 ml).

MRI was performed using 1.5T Avanto (Siemens®, Erlangen, Germany) and a 6-channel Body MATRIX® coil. The sequences were: axial 3D T2 weighted (T2w), axial diffusion weighted imaging (DWI) with apparent diffusion coefficient (ADC) map calculated from b50 and b1000. In addition, an axial DWI using b2000 was obtained. A suspicious APC were highlighted on axial T2 images as a circle in the areas with the lowest ADC signal.

Mean MRI-biopsy time was 5.4 weeks (range 0-52 weeks), and mean biopsy-RALP time 14.5 weeks (range 5-56 weeks). TBs were performed using 3D TRUS Accuvix V10 (Medison®, Korea) and elastic MRI/TRUS fusion and navigation system Urostation (Koelis®, La Tronche, France).

Biopsy groups were: initial biopsy in 3, and 1st -11th re-biopsies in 45 patients. Mean previous negative biopsy procedures was 3.1 (range 2-11). Of these, re-biopsy due to active surveillance was performed in 9/48 (19%) patients. Mean number of TBs from each MRI target was 2.4 (range 1-5), and performed using 18G Tru-Core II (Angiotech®, USA).

Both prostate biopsy material and prostatectomy specimen were evaluated according to the revisited Gleason grading system by the same group of uropathologists. Kappa (κ) statistics were used for measurement of agreement on GS.

Results: GSs in the 48 patients with prostatectomy were GS6 n=17, GS7 n=27, and GS8 n=4. GS agreement on biopsy versus prostatectomy was found in 43/48 (90%), κ 0.81.

GS over- and under-grading of biopsy were in 4/48 (8%) and 1/48 (2%). Upgrading to high risk cancer from biopsy GS 7 to prostatectomy GS 8 was found only in one patient.

Conclusion: MRI/TRUS guided prostate biopsies of MRI suspected APC offer a high agreement between Gleason score biopsy and prostatectomy.

A few biopsy cores are needed to achieve the diagnosis