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Quadrant-ablation focal therapy of prostate cancer: Candidate selection through a combination of extended biopsy and MRI

Y. Matsuoka¹, N. Numao¹, K. Saito¹, H. Tanaka², S. Yoshida², M. Yokoyama¹, J. Ishioka¹, F. Koga¹, H. Masuda¹, Y. Fujii¹, K. Kihara¹

¹ Department of Urology, Tokyo Medical and Dental University Graduate School, Tokyo, Japan

² Department of Radiology, Ochanomizu Surugadai Clinic, Tokyo, Japan

Introduction & Objectives: Accurate identification of a possible area that could be preserved without treatment is requisite for focal therapy (FT) of prostate cancer (PC). We provide hemiablation FT for selected patients based on our findings that a combination of 14-core biopsy (Bx) and MRI identifies appropriate candidates for hemiablation with a negative predictive value (NPV) of 95% for prostate lobes with significant cancer (SC). In cases with PC which is confined to unilateral anterior region, however, bilateral preservation of the posterior prostatic parenchyma and neurovascular bundles (NVB) might be considered acceptable. In quadrant-ablation FT, ablation region could be set up individually dependent on the size and location of PC; ablation to 1, 2, or 3 quadrants of the prostate. We investigated the applicability of Bx combined with MRI to patient selection for quadrant-ablation FT on a per-quadrant basis.

Material & Methods: We examined 480 quadrants in 120 patients with clinically localized PC who underwent multiparametric MRI and 14-core Bx followed by radical prostatectomy (RP) between 2007 and 2012. MRI and RP findings were analyzed in each quadrant: anterior or posterior halves of a lobe. In Bx, anterior and posterior quadrants were assessed through anterior/lateral/apical 4-core sampling and posterior/lateral 5-core sampling, respectively. Indolent cancer (IC) was defined as organ-confined disease with tumor volume $<0.50 \text{ cm}^3$ and Gleason score (GS) $\leq 3+4$ without Gleason pattern 5. SC was defined as a lesion that did not fulfill the conditions of IC. When a focus of SC extended to the adjacent quadrant, both areas were assigned to quadrants with SC (qSC). We believe that quadrants with no cancer (qNC) and quadrants with IC (qIC) could be preserved without treatment. Predictive performance of MRI, Bx, and their combination in identifying qSC was assessed.

Results: The median PSA was 6.7 ng/ml. MRI was positive in 123 anterior quadrants (51%) and 113 posterior quadrants (47%). PC was detected through the anterior quadrant Bx in 151 lobes (63%) and through the posterior quadrant Bx in 151 lobes (63%). Anterior quadrant Bx-GSs were $\leq 3+4$ in 105 and $\geq 4+3$ in 46 quadrants, and posterior quadrant Bx-GSs were $\leq 3+4$ in 96 and $\geq 4+3$ in 55 quadrants. In RP specimens, qNC, qIC, and qSC were found in 48 (20%), 65 (27%), and 127 anterior quadrants (53%), respectively, and 68 (28%), 46 (19%), and 126 posterior quadrants (53%), respectively. Positive predictive values/NPV/sensitivity/specificity of MRI, Bx, and their combination were 82/78/80/81%, 66/70/79/55%, and 67/90/95/47% for anterior qSC, respectively, and 87/78/78/87%, 72/81/87/63%, and 72/93/96/58% for posterior qSC, respectively. The NPV of Bx for anterior and posterior qSC was improved by the addition of MRI findings ($p < 0.05$ for both).

Conclusions: SC was absent in 90% of anterior quadrants and 93% of posterior quadrants in which both Bx sampling and MRI were negative. The combination of extended Bx and MRI leads to identify candidates suitable for quadrant-ablation FT in a reliable and practical manner.