2010

REAL-TIME BALLOON INFLATION ELASTOGRAPHY OF PROSTATE MIGHT SURPASS MRI FOR DETECTION OF PROSTATE CANCER.

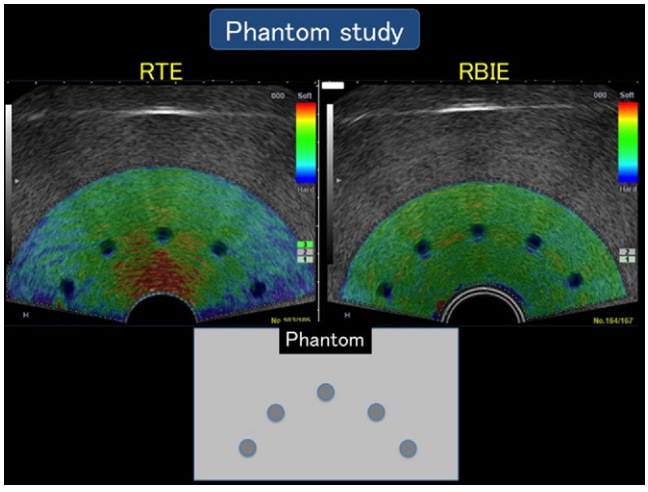
Masahiro Sumura, Yozo Mitsui, Naoko Arichi, Takeo Hiraoka, Koji Wake, Satoshi Honda, Hiroaki Yasumoto, Hiroaki Shiina, Mikio Igawa, Izumo, Shimane, Japan*

INTRODUCTION AND OBJECTIVES: Although the efficacy of real-time tissue elastography (RTE) for prostate cancer detection has been reported, the procedure is highly operator dependent. We speculated that the use of a pressure device might decrease operator dependency and increase the detection rate of RTE. A pressure device driven water pressure was developed for this study, which we termed real-time balloon inflation elastography (RBIE), and the procedure investigated for its effectiveness in detecting prostate cancer.

METHODS: From July, 2008 to February, 2009, 87 patients had abnormal digital rectal examination (DRE), PSA, and/ or TRUS findings, and were enrolled in this study. Their median age was 73 years -old (range 54-89), median PSA was 7.6 ng/mL (range 0.8-2606.0), and the median number of biopsy cores obtained from each was 8 (range 8-10). All patients were examined with MRI prior to prostate needle biopsy and a total of 733 specimens obtained by systemic biopsies were studied. The findings of RTE, RBIE, TRUS, PDUS, and MRI [T2WI, dynamic contrast enhanced images imaging (DCEI)] were compared with histopathological findings of the biopsy specimens.

RESULTS: Prostate cancer was detected in 48 of 87 patients (55.2%), and 178 of 733 specimens (24.3%), of which 49, 56, and 73 specimens had Gleason scores of 5-6, 7, and 8-10, respectively. Clinical stage was T1c, T2a-c, T3a-b, and T4 in 6, 26, 10, and 6 cases, respectively. The sensitivity of RBIE, RTE, TRUS, PDUS, T2WI, and DCEI was 72.5%, 71.9%, 75.8%, 75.8%, 72.5%, and 71.3%, respectively, while specificity was 97.7%, 85.8%, 85.4% 86.6%, 89.7%, and 91.5%, respectively. Sensitivity and specificity of RBIE were both superior to those of MRI.

CONCLUSIONS: RBIE is known to be a low cost and less invasive procedure, while its prostate cancer detection capability may be superior to that of MRI, which is expensive and time consuming.



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2011

LIMITATIONS OF REAL-TIME ELASTOGRAPHY IN THE DETECTION OF PROSTATE CANCER. IMPORTANT FACTS FOR FUTURE STUDIES.

Alexandre Pelzer, Julia Heinzelbecker, Matthias Kirchner, Philipp Stroebel, Stephan Maurice Michel, Mannheim, Germany*

INTRODUCTION AND OBJECTIVES: Real-time sonoelastography (HI-RTE) has been proven capable to visualize prostate cancer (PCa) areas and therefore can be used for PCa detection. However, application and assessment of this novel technique has several limitations that are important to know for the design of future studies. We evaluated the role of HI-RTE limitations by applying this method to patients before undergoing radical retropubic prostatectomy (RRP) and comparing the results with whole mounted sections.

METHODS: In this study 800 prostate sectors with biopsy proven PCa scheduled for RRP were included and underwent HI-RTE by 2 investigators. HI-RTE was done by using a transrectal ultrasound probe (EUB-7500HV Hitachi medical systems with EUP-V53W probe). Local elastography findings were compared with histology. Areas suspicious for PCa were depicted and documented blinded to the pathological reports. RRP specimens were serially step sectioned and whole mounted after a modified Stanford protocol, tumour areas were marked by felt pen and each prostate was divided into 16 sectors. Areas suspicious for PCa were correlated with the corresponding whole mounted sections by sectors. HI-RTE images compared to whole-mounted sections were evaluated based on the reports on diagnostic findings. False negative as well as false positive results were evaluated and characterised.

RESULTS: Until now 50 specimens with 800 prostate sectors were evaluated. Mean PSA of PCa patients was 9.5 ng/ml with Gleason Scores in between 6-9. Mean examination time was 14 (6 to 25 minutes). The most common cause for false negative and false positive characterisation of prostate tissues with a significant influence on sensitivity and specificity of the results were large transitional zone volume, patients after transurethral resection of the prostate, prostate volumes of more than 80ccm, large calcification in the peripheral zone after prostatitis, multifocal tumors with tumordiameters of less than 3-5 mm, very large tumours capturing the whole prostate and patients not able to relax pelvic floor musculature. Furthermore initial acquisition of HI-RTE skills seems to be tremendously/highly/very important to receive reliable results.

CONCLUSIONS: HI-RTE is a sensitive imaging modality for the detection of PCa and furthermore proved to be a high-specific imaging modality for lesion characterisation. However, patient selection and the knowledge of the technique's limitations are very important for to receive reliable results with high sensitivity and specificity in PCa detection.

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2012

VARDENAFIL MEDIATED IMAGE AMPLIFICATION IN POWER DOPPLER ULTRASOUND DIAGNOSTICS OF PROSTATIC DISEASES

Girolamo Morelli, Riccardo Pagni, Chiara Mariani, Andrea Morelli, Eva Mauro, Filippo Menchini Fabris, Nicola Armillotta, Davide Caramella, Riccardo Minervini, Pisa, Italy*

INTRODUCTION AND OBJECTIVES: Prostate cancer (PCa) and inflammatory changes in the prostate are associated with an elevated microcirculation density within the involved areas.Transrectal ultrasound with Contrast Enhanced Power Doppler (CEPDU) can provide a valuable diagnostic approach in detecting these areas.Phosphodiesterase-5 inhibitors (PDE5-I) induce nitric oxide (NO) mediated vasodilatation of the prostatic circulation (expecialy in the region of periurethral e bladder neck tissue).The aim of this study is to evaluate PDE5-I capacity on increasing the prostatic microcirculation visibility and hence the capacity to detect suspected areas,similarly as the use of CEPDU.

METHODS: Ninety-five patients with elevated PSA serum levels and both negative DRE and TRUS,have been recruited for the study since May 2008 until now.All patients underwent CEPDU and successive transrectal ultrasound evaluation with Power-Doppler,1 hr after oral somministration of Vardenafil 20 mg (PDE5-IPD. Areas with increased microcirculation,detected with the use of contrast medium,and those,visible after Vardenafil somministration, were recorded.All pa-

tients underwent multiple core prostatic biopsy with double sampling from the areas,indicated as suspected by the methods described above.

RESULTS: In our study 37/75 patients with prostatic pathology were identified by PDE5-IPD,while 28/75 were identified by CEPDU.PDE5-IPD has resulted in higher diagnostic efficacy in comparison to CEPDU exam.The biopsies performed within the areas identified by PDE5-IPD were 91 with 71.43% of these resulting positive for pathologic changes (PCa or inflammatory changes).The CEPDU exam has led to 110 biopsies with only 52.73% of them resulting positives, while with standard TRUS method 750 biopsies were performed with only 15.6% of cores positive for pathologic areas.In our study PDE5-IPD results more efficient than CEPDU (12% against the difference at 10 % LOC equal to 10.35%) and more sensitive than CEPDU (18,7% against the difference at 10 % LOC equal to 8,68%).

CONCLUSIONS: The association of Vardenafil and conventional transrectal ultrasound technique with Power Doppler,has reported better results to those obtained with the use of ultrasound contrast medium (CEPDU),confirming though it's high sensitivity to individuate either inflammatory changes,or PCa lesions.Introduction of this association could re-evaluate the utility of contrast medium for ultrasound evaluation of the prostate.The advantages of Vardenafil: durable effect,different mechanism of action, lower invasivity,and lower cost.

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2013

ANATOMIC TRANSRECTAL ULTRASOUND EVALUATION OF THE EXTERNAL URETHRAL SPHINCTER IN MALE SUBJECTS

Simone Crivellaro, Anna Palazzetti, Lorenzo Tosco, Udine, Italy; Ervin Kocjancic, Chicago, IL; Maria Abbinante, Bruno Frea, Udine, Italy*

INTRODUCTION AND OBJECTIVES: external urethral sphincter's anatomy and physiology have been matter of many papers without general consensus. Our purpose is to test out if transrectal ultrasonography (TRUS) is a reliable tool to assess rabdosphincter's morphology and, if it is, describe the anatomical and physiological informations we are able to obtain.

METHODS: 35 male subjects underwent TRUS, both longitudinal and transversal sections were acquired. Diameter, right and left lateral thickness and length of rabdosphincter were taken at rest, after coughing and after pelvic floor contraction. The ultrasonographic aspect of the external urethral sphincter has also been evaluated through a semi-quantitative scale dividing sphincters in anecogenic, moderately ecogenic and hyperecogenic. Contractility of the rabdosphincter has been measured through a new parameter: Sphincter Contraction Profile Index (SCPI) calculated as the ratio of the difference between sphincter's diameter after cough (Dc) and the diameter at rest (Dr) divided by the diameter at rest (Dc-Dr/Dr). We also calculated a pelvic floor CPI (PCPI) where we used the diameter of the sphincter after pelvic floor contraction.

RESULTS: external urethral sphincter has been easily assessable with TRUS in all subjects as an hypo-anecogenic ring shaped structure dorsal to membranous urethra which fades ventrally to it. Mean measured diameter was 12.09 mm, medium left lateral thickness was 2.4 mm, and medium right lateral thickness was 2.2 mm, medium length was 16.38 mm at rest. After coughing the same parameters were 12.26 mm, 2.4 mm, 2.3 mm, 15.1 mm and after pelvic floor contraction were 12.46 mm, 2.2 mm, 2.4 mm, 14.98 mm. Analysis of ultrasonographic aspect demonstrated that in young subjects tends to prevail an anecogenic rabdosphincter, and that ecogenicity varies with age of subjects in a way that makes hyperecogenicity more prevalent in older patients. SCPI and PCPI perfectly correlates with ultrasound visualized rabdosphincter contraction adding an objective assessment of its function

CONCLUSIONS: TRUS is an effective tool to assess the external urethral sphincter in male patients. We have been able to obtain additional information on it never reported before. Analysis of rabdosphincter contractility with SCPI and PCPI also permits a functional evaluation of this muscle which is the key structure in maintaining continence after radical prostatectomy.

Source of Funding: None

2014

ULTRASOUND-GUIDED IMPLANTATION OF ELECTROMAGNETIC TRANSPONDERS INTO THE PROSTATE BED FOR LOCALIZATION AND TRACKING DURING INTENSITY MODULATED RADIATION THERAPY FOLLOWING RADICAL PROSTATECTOMY

Daniel Canter, Mark Buyyounouski, Alexander Kutikov, Jinsheng Li, Richard E. Greenberg, Eric M. Horwitz, Stephen A. Boorjian, Philadelphia, PA*

INTRODUCTION AND OBJECTIVES: Radiation therapy (RT) after radical prostatectomy (RRP) has been associated with a survival benefit in both the adjuvant and salvage settings. Nevertheless, rectal and urethral toxicities of treatment have been demonstrated, while optimal targeting of the prostate bed following RRP remains challenging. The Calypso 4D Localization System (Calypso Medical Technologies, Seattle, WA) is a target positioning device that continuously monitors the location of three implantable electromagnetic transponders. This system has been previously utilized for prostate localization in patients undergoing primary RT. Here, we describe our technique of ultrasound-guided placement of Calypso transponders in the prostate bed following RRP for adjuvant/salvage RT.

METHODS: Seventeen patients presenting to Fox Chase Cancer Center for RT following RRP (2 adjuvant, 15 salvage) underwent transrectal ultrasound-guided placement of Calypso transponders prior to RT. After topical anesthesia was applied to the perianal area, a transrectal ultrasound of the prostate bed was performed. Using the sagittal orientation on the ultrasound probe, the region of the urethrovesical anastomosis was visualized, and 5 cc of lidocaine was injected on either side of the anastomosis for anesthetic as well as to distend the region between the rectal wall and bladder. The three Calypso transponders were placed approximately 1 cm apart in a triangular orientation around the anastomosis under ultrasound guidance.

RESULTS: All patients were successfully implanted with three transponders without peri-procedural complications. Appropriate seed position was confirmed by CT scan performed for RT simulation. All patients received intensity modulated RT, with a median radiation dose of 68 Gy (range 64-68). Treatment was well-tolerated, with no Grade 3 or 4 toxicities. Grade $>$ 2 enteritis was not observed; there were no cases of rectal bleeding. Genitourinary toxicity was noted in 10 patients, and consisted of Grade 1 and 2 frequency and dysuria. No patient developed gross hematuria or urinary retention. 16/17 patients achieved a reduction in PSA at the first post-RT follow-up.

CONCLUSIONS: The placement of Calypso transponders for adjuvant/salvage RT is a safe and efficacious method for treatment localization that is associated with an excellent acute toxicity profile. Longer follow-up will be required to evaluate the oncological benefit to this technique.

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2015

MRI PRIOR TO ROBOTIC PROSTATECTOMY OVER ESTIMATES T3 PATHOLOGICAL STAGE.

John Beatty, Benjamin Challacombe, Lisa Lavan, Elaine Wan, Timothy Dudderidge, Tina Rashid, Jordan Durrant, Christopher Ogden, London, United Kingdom*

INTRODUCTION AND OBJECTIVES: In the United Kingdom, the National Institute of Health and Clinical Excellence (NICE), an independent organisation responsible for health care guidance, does