

Given the accuracy of this modality, the system can be filled with saline solution without losing the ability to diagnose a fluid leak in the system.

**Source of Funding:** None

### 2304 STEREOTACTIC PROSTATE BIOPSY WITH PRE-INTERVENTIONAL MRI AND LIVE US FUSION

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**INTRODUCTION AND OBJECTIVES:** The key challenge for focal therapy of prostate cancer is to identify index lesions. In this context, we describe our initial experience with a new stereotactic prostate biopsy system, which integrates pre-interventional MRI data with peri-interventional ultrasound for perineal prostate biopsies.

**METHODS:** 33 patients were stereotactically biopsied (mean age of 64 yrs., mean PSA level of 8.2ng/ml and mean prostate vol. of 40ml). 21 of these 33 patients had already had a negative transrectal US-guided biopsy. All men underwent multimodal 3 Tesla MRI without endorectal coil including diffusion weighted imaging and dynamic contrast enhanced sequences as well as MR-spectroscopy. Suspicious lesions were marked by radiologists with over 10 years experience in reading prostate MRI before the obtained data were transferred to the stereotactic biopsy system.

Using a custom-made biplane TRUS probe mounted on a stepper device, 3D ultrasound data were generated to set the anatomic landmarks. Then MRI and TRUS imaging data were fused manually. As a result, the suspicious MRI lesions were superimposed onto the TRUS data. Next, 3D biopsy planning was performed including systematic biopsies from the peripheral and transitional zones of the prostate. Perineal biopsies were taken under live US imaging, and the location of each biopsy was documented in 3D.

**RESULTS:** 14 out of 33 patients were diagnosed with prostate cancer. These results showed a positive correlation between MRI findings and histopathology in 22 out of 33 patients. In MRI lesions marked as highly suspicious, the detection rate was 100%. Evaluating the biopsies from lesions marked as highly and as questionable suspicious together, prostate cancer was detected in 27.95%. In comparison, only 8% of the additional systematic biopsies were positive. Target registration error of the first 554 biopsy cores was 1.9 mm. For adverse effects, one patient experienced urinary retention. Post-interventional hemorrhage or urinary tract infection did not occur.

**CONCLUSIONS:** Perineal stereotactic prostate biopsies guided by the combination of MRI and ultrasound enable effective examination of suspicious MRI lesions. Additionally, each biopsy core taken may be documented accurately for its location in 3D. Thus, MRI data may be validated and different treatment options stratified in depth. At the same time the morbidity of the procedure was minimal.

**Source of Funding:** None

### 2305 NOVEL USE OF MRI TO DETECT REFLUX IN A BLADDER MODEL WITHOUT CATHETERS, IONIZING RADIATION, OR CONTRAST... OH MY!

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**INTRODUCTION AND OBJECTIVES:** Novel scanning and processing protocols have been developed to augment the diagnostic ability of magnetic resonance imaging (MRI). Single Shot Fast Spin Echo pulse sequencing (SSFSE) is one such technology. It allows one to image directional flow independent of contrast. We propose that using this technology, unenhanced urine can be used as an endogenous tracer, allowing for the measurement of urine flow back to the kidney. This could allow for the diagnosis of reflux without a catheter, contrast agent, or ionizing radiation.

**METHODS:** A model of the urinary tract was created with a "bladder" (reservoir and pump) designed to move normal saline along two 3mm diameter plastic tubes "ureters" at a rate mimicking urine flow, 3–5 mm/sec. In the MRI scanner, the protons of the fluid in the 'bladder' were excited in a 90 degree axial spin. As the urine moved into the ureters a 180 degree pulse was performed along the sagittal plane.

With reflux present (flow up the tubes), the fluid excited by the 90 degree pulse would leave the reservoir, but since it is constrained by the tubes it would also be excited by the 180 degree pulse. Only fluids that "see" both RF pulses are visible in the SSFSE sequencing, so only refluxing urine would enhance.

**RESULTS:** Performing the described modification of SSFSE MRI, we were able to excite the fluid in the model bladder for approximately 4 seconds, allowing the visualization of fluid reflux up the model urinary tract without the use of contrast agents. The temporal resolution was in the millisecond range.

**CONCLUSIONS:** Using a modification of a SSFSE, we were able to detect retrograde flow in a model ureter and bladder system using MRI. We hope to apply this technology to allow us to detect reflux in children without contrast, catheterization or ionizing radiation.

**Source of Funding:** None

### 2306 P40 PROVIDES VALUABLE FUNCTIONAL INFORMATION BEFORE AND AFTER SURGERY FOR PROBLEMATIC UPJ OBSTRUCTION PATIENTS WITH A NORMAL PREOPERATIVE T1/2

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**INTRODUCTION AND OBJECTIVES:** Evaluating patients for UPJ obstruction involves integrating both clinical symptoms and imaging findings. Renal scanning can provide important functional information to help identify patients who would benefit from surgical correction. T1/2 (time from diuretic administration to 50% clearance of tracer) > 20 min is the gold standard for obstruction, and improvement in T1/2 after pyeloplasty indicates resolution. However, many patients present preoperatively with symptoms but a normal T1/2 (<20min) and many continue to show a delayed T1/2 despite complete resolution of symptoms postoperatively. Our goal was to explore alternative analyses of renal scans that may augment T1/2 in diagnosing clinically significant UPJO.

**METHODS:** We retrospectively reviewed records of 96 consecutive adult patients undergoing laparoscopic or robotic-assisted pyeloplasty for UPJ obstruction from 2005 to 2010 by a single surgeon. 95% were symptomatic and 5% had unilateral decreased function by imaging. Pre and postoperative MAG3 lasix-washout renal scan images were available for review in 22 patients with primary unilateral UPJ obstruction and two kidneys. We assessed five parameters: differential renal function (DRF), time from diuretic administration to 50% clearance (T1/2), time from maximum tracer uptake to 50% clearance (M1/2), percent clearance at 20 minutes (P20) and percent clearance at 40 minutes (P40). The contralateral kidney served as a control and a paired T-test was used for analysis.

**RESULTS:** Preoperatively, 10 patients (46%) had a T1/2 > 20 min, 6 > 10 min (27%) and 6 < 10 min (27%). Three measures were significantly different between the affected and control kidney: T1/2, P20, and P40. In the affected kidney with a preoperative T1/2 > 20 min, both T1/2 and P40 decreased significantly after surgery. In the problematic subset of 12 patients with a "normal" preoperative T1/2 (<20min), P40 was still significantly different between the affected and control kidney (24% v. 9%, p=0.002) and decreased significantly before and after corrective pyeloplasty (24% to 16%, p=0.036). DRF did not show significant improvement postoperatively (p>0.05) and all parameters for the unaffected kidney did not show significant change before and after pyeloplasty (p>0.05) as expected.

**CONCLUSIONS:** P40 appears to be a useful alternative renal scan marker for assessing UPJ obstruction. Even in the problematic