INTRODUCTION AND OBJECTIVES: To study the mechanism of the urine stream during micturition, we developed a noninvasive magnetic resonance image (MRI) protocol that simulates computational fluid dynamic (CFD) of male voiding.

METHODS: MRI uroflowgraphic assessment was done during urinary voiding in the lateral position. To visualize the entire pelvis and urethra, a sagittal plane image was obtained such that a line connecting the coccyx and pubic symphysis could be observed during micturition. In addition, 2 more images were collected, bilaterally, 1 cm from the midplane. Three coronal planar imaging, at the midplane including centerline of urethra, and 1 cm back side and front side were performed (figure 1A). We were collected the intermitted images until the end of voiding. Using the total 6 planar MRI digital imaging and communications in medicine (DICOM) files, we created a multiple 3D models during voiding. We created 7 models, to span the duration from initiation to terminal voiding (figure 1B). Those multiple intermitted models were converted to a serial dynamic model with special software. Pressure and velocity of the 3 different sites in the bladder simulation model were measured by CFD software. Those CFD results were compared with simple model. This simple model was artificially made in a shape resembling a balloon.

RESULTS: Deformation of the bladder neck appeared to be very complicated. FCD result showed real-time changes in stream, pressure, and velocity. The intravesical pressure differed depending on the measuring site (figure 2A). The actual 3D dynamic model created from MRI data showed highly intricate urine flow (figure 2B) compare with simple model.

CONCLUSIONS: A dynamic 3D model can be created from MRI data using CAD software. This new method is noninvasive and involves no radiation exposure. This dynamic model can be used for computational fluid dynamics simulation. This new method is useful in improving our understanding of the mechanism of urinary voiding.

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INTRODUCTION AND OBJECTIVES: Ultrasound imaging is a critical part of urological practice. Urology residents are encouraged to learn ultrasound technique and interpretation throughout their training. However, there is limited mandated education in this field. Currently, the only ultrasound procedure that is considered an index case is transrectal ultrasound for biopsy of the prostate. We investigated the current use of ultrasound in urological practice.

METHODS: We reviewed American Board of Urology (ABU) certification and recertification logs for practicing urologists from 2012-2014. We obtained data for specific codes: 76700-76776 (kidney), 76870 (scrotal), 76999 (unlisted), and 93975-93981 (Doppler including penile). Codes 51798 (PVR) and 76950 (ultrasound for interstitial radiotherapy) were excluded. We analyzed the results based on self identified demographic information provided by the urologists. Descriptive analysis of the data was performed.

RESULTS: The practices of 2427 urologists were reviewed. Of all urologists, 86% perform prostate, 42% renal, 32% scrotal and 8% perform penile ultrasounds. Of the 2427, 1800 (74%) self identify as general urologists. General and subspecialist urologists perform similar percentages of ultrasounds, except for pediatrics (0% penile) and andrology (44% penile) (Table 1). 1686 (69%) self-identify as in private practice and they performed more ultrasounds than academic urologists: prostate 89% vs 73%, renal 46% vs 25%, scrotal 36% vs 17%, penile 9% vs 6%, respectively.

CONCLUSIONS: Analysis of current ABU certification and recertification logs of practicing urologists demonstrates that in addition to prostate ultrasound, we should train residents in renal and scrotal ultrasound.

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