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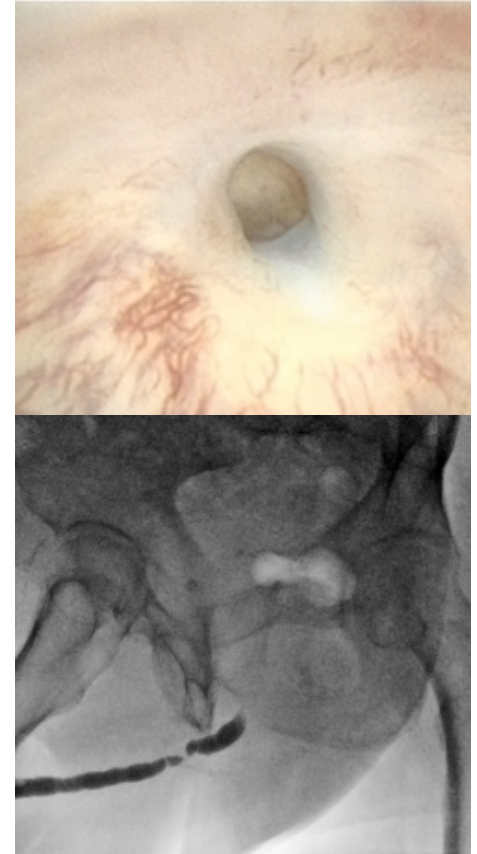
High-frequency ultrasound and shear wave elastography (SWE): Utility for pre- and post-urethral stricture surgery

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Background

- Cystoscopy and RUG are utilized pre- and post-operatively to assess urethral stricture disease
- Cystoscopy and RUG are able to characterize length, caliber, and location of the stricture, but are unable to evaluate the peri-urethral tissue
- 2-D ultrasound has been utilized to visualize peri-urethra fibrosis, but lacks quantitative analysis
- Shear wave elastography (SWE) is a ultrasound modality which measures tissue elasticity



Objective

- To evaluate shear wave elastography for the evaluation of corpus spongiosum elasticity pre- and post-urethral stricture surgery

Methods

- Patients with a single, bulbar urethral stricture who elected surgical repair were recruited from 10/2018 to 9/2019
- SWE imaging was performed under anesthesia prior to open surgical repair using an Aplio i800 scanner (Canon Medical Systems, Tustin, CA) and an i8CX1 transducer with the system's proprietary SWE package
- Upon acquisition of stricture images, 4 regions of interest (ROI) were placed on the corpus spongiosum - 2 on the stricture, 2 on healthy tissue
- Tissue elasticity (in kPa) was averaged across the ROIs
- SWE and the associated data analysis were then repeated for each patient during their 3-month post-operative appointment

Results

- 12 patients (mean age 57.1 ± 18.1 years and BMI 29.2 ± 6.8 kg/m²) have been enrolled
- Mean elasticity among the strictured urethra was lower before surgery (27.9 ± 5.8 kPa) compared to after surgery (36.8 ± 4.2 kPa) (n=7, p=0.56)
- Mean elasticity of the strictured portion was lower (27.9 ± 5.8 kPa) than that of the healthy urethra (29.9 ± 4.3 kPa) before surgery (n=12, p=0.19) and after surgery (36.8 ± 4.2 vs. 37.5 ± 3.4 kPa, n=7, p=0.32)

Results

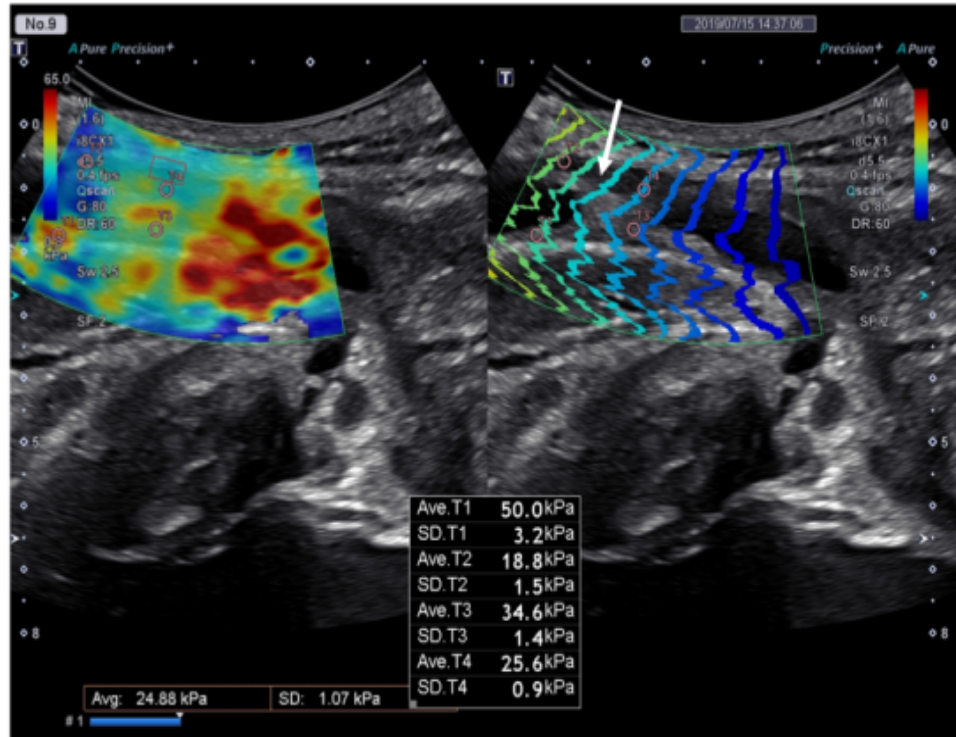


Figure 1: A mid-bulbar urethral stricture (arrow) identified with 2D grayscale ultrasonography. Four regions of interest plotted after acquisition of shear wave elastography imaging – 2 on stricture, 2 on healthy tissue.

Conclusions

- SWE may help to assess peri-urethral fibrosis in the initial characterization and post-operative follow-up of urethral stricture disease
- Further studies assessing the utility of SWE and optimizing the protocol should be performed in larger cohorts