MP 42-19: A multiparametric magnetic resonance imaging pilot study of periurethral fibrosis, a possible alternative source of LUTS

Alexander P. Kenigsberg1, Ryan J. Mauck1, Alberto Diaz de Leon2, Claus Roehrborn1, Douglas W. Strand1, Daniel N. Costa2

1Department of Urology, 2Department of Radiology, UT Southwestern Medical Center, Dallas, TX

Introduction & Objective

• We recently described a new fibroblast subtype around the prostatic urethra
• Examination of whole mounts from BPH patients undergoing simple prostatectomy revealed that about 20% had periurethral fibrosis (PUF)
• Single-cell RNA sequencing and immunostaining revealed that the origin of this fibrosis is the periurethral fibroblast, the only prostatic cell type that produces collagen
• Animal studies have demonstrated a relationship between periurethral fibrosis and lower urinary tract symptoms
• An emerging hypothesis is that PUF could be involved in the pathogenesis of LUTS, particularly in men with smaller prostate glands
• Clinical tools are needed
• The purpose of this study was to evaluate for the presence of PUF on mpMRI in men for whom whole-mount data is not available

Materials & Methods

• Men who underwent 3T endorectal coil mpMRI between 2016-2018 for elevated PSA
• MRI-estimated prostate volume <60cc, and known AUA symptom score were included
• Patients with PI-RADS v2 ≥ lesions in the transition zone or prior bladder outlet surgery were excluded
• Images were retrospectively reviewed by a radiologist dedicated to prostate MRI
• The reader was aware of suspected prostate cancer and blinded to all other clinicopathologic findings
• High-resolution, fast spin-echo axial T2-weighted images were assessed for the presence of PUF tissue (hypointense soft tissue encircling the intraprostatic urethra)
• Circumferential extent and maximum thickness of PUF were quantified
• Univariate analysis and Pearson correlation were used to evaluate the relationship between LUTS and PUF

Results

• 72 patients met inclusion criteria
• PUF was identified in 20/72 (28%) of cases
• In those with PUF, the mean circumferential extent was 47 degrees
• Mean thickness was 2.8mm
• The median AUA symptom score in the patient cohort was 7 (mild LUTS)
• Only 2/72 (2.8%) had an AUA symptom score ≥ 20 (severe)
• There was no difference in AUA symptom score between those with PUF and without (7.8 vs. 6.6, p=0.48)
• Circumferential extent, PUF thickness, PSA, and prostate size did not correlate with AUA symptom score
• Prostate cancer on biopsy did not predict moderate to severe LUTS (p=0.47)
• Only age correlated with AUA symptom score (r=0.3, p<0.01)

Conclusions

• PUF is identified on mpMRI
• The correlation between PUF and LUTS remains investigational
• This cohort had largely mild symptoms and further study is needed
• Fibrotic processes remain a potential explanation for LUTS in men with smaller glands and investigation is necessary to further define this relationship and identify these patients

Figures

Example of PUF demonstrated by multiparametric MRI. Axial high-resolution T2-weighted image (A) reveals a hypointense semicircumferential ill-defined soft tissue along the anterior half of the distal intraprostatic urethra (arrow). This is better delineated in the zoomed view (B) which also demonstrates its maximum thickness (white arrow, in this case 3mm) and circumferential extent (green curved arrow, in this case approximately 180 degrees).