

MRI Analysis Of Architectural Changes In The Space Of Retzius After Radical Prostatectomy: Implications For Penile Implant Reservoir Placement

John P. Mulhall MD MSc FECSM FACS

John F. Sullivan MD MRCSI, Paul Foran MD
MRCPI, Christian J. Nelson PhD, Oguz Akin MD

Sexual and Reproductive Medicine Program

Urology Service, Department of Surgery

& Department of Radiology

Memorial Sloan-Kettering Cancer Center

NY, USA



Introduction

- Insertion of a three-piece inflatable penile prosthesis (IPP) reservoir is a “blind procedure”
- The traditional reservoir placement in the retropubic space (space of Retzius) may result in damage to bladder, bowel & femoral vessels
- A single previous cadaveric study has delineated pertinent anatomic relationships



Introduction

- Scarring within the retropubic space occurs post radical prostatectomy (RP)
- This can result in difficulties accessing & positioning IPP in post-RP patients
- We have attempted for the first time to evaluate pertinent anatomical measurements in an *in vivo* model using magnetic resonance imaging (MRI)



Study Aim

To use MRI to assess the effects of RP on pertinent retropubic anatomy with respect to IPP reservoir placement



Methods

- Pre & post op endorectal MRI studies in men with PCa were reviewed by an experienced MRI radiologist (AO)
- Study Inclusion criteria:
 - (i) availability of pre & post op MRI from single institution
 - (ii) post RP MRI (> 6 months)
 - (iii) no pre or post RP pelvic surgery or radiation
- All MRI scans were performed on a 3T system with T1 & T2 weighted images reviewed using axial & sagittal planes.



Methods

- Pertinent landmarks were evaluated by 2 independent readers, blinded to clinical & pathological data
- Bilateral measurements taken & data averaged (as no significant differences observed)
- Weighted Kappa inter-rater agreement ≥ 0.75
- Repeated measure t-test was used to assess differences in pre & post op values



Measurements

- (i) distance from external inguinal ring (EIR) to external iliac vein (EIV)
- (ii) superior aspect of pubic symphysis (PS) at midline to bladder
- (iii) EIR to nearest bladder point

- Correlation measured between bladder volume (Eliptoid formula) & (iii)

- Maximal post op scar thickness in retropubic space was quantified:

T2W measurement of scar (low signal) vs normal fat within space (midline)

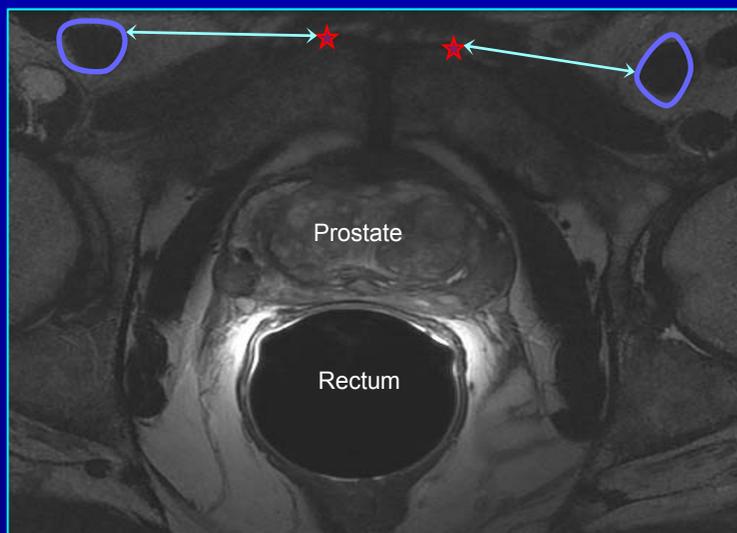


Fig 1: External inguinal ring (red) to external iliac vein (blue) (axial T2WI)

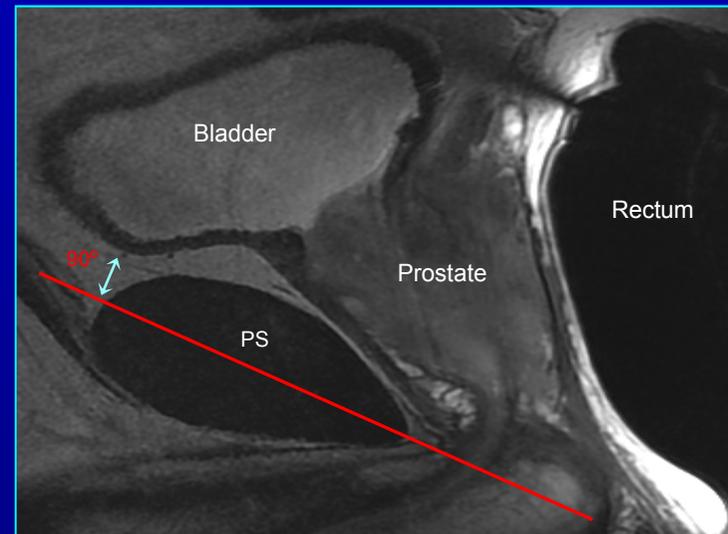


Fig 2: Superior aspect of pubic symphysis (PS) to bladder (midline-sagittal T2WI)

Results

- 22 patients were included in the analysis.
- Operative approach: RRP 64%, LP/RALP 36%
- Average Bladder Volume **93.04cm³** (34.5-177.6)
- As Bladder Vol ↑ by **10 cm³** > distance to EIR ↓ by **1mm**

Measurements Mean (SD)	Pre RP	Post RP
External Inguinal Ring to External Iliac Vein	3.00 (1.94-3.83)	2.95 (1.94-3.76)
External Inguinal Ring to Bladder	2.62 (1.47-3.92)	2.75 (2.10-4.10)
Superior Pubic Symphysis (midline) to Bladder	1.05 (0.56-1.82)	1.09 (0.69-1.62)

- No significant differences seen pre and post op



Post-RP Tissue Changes

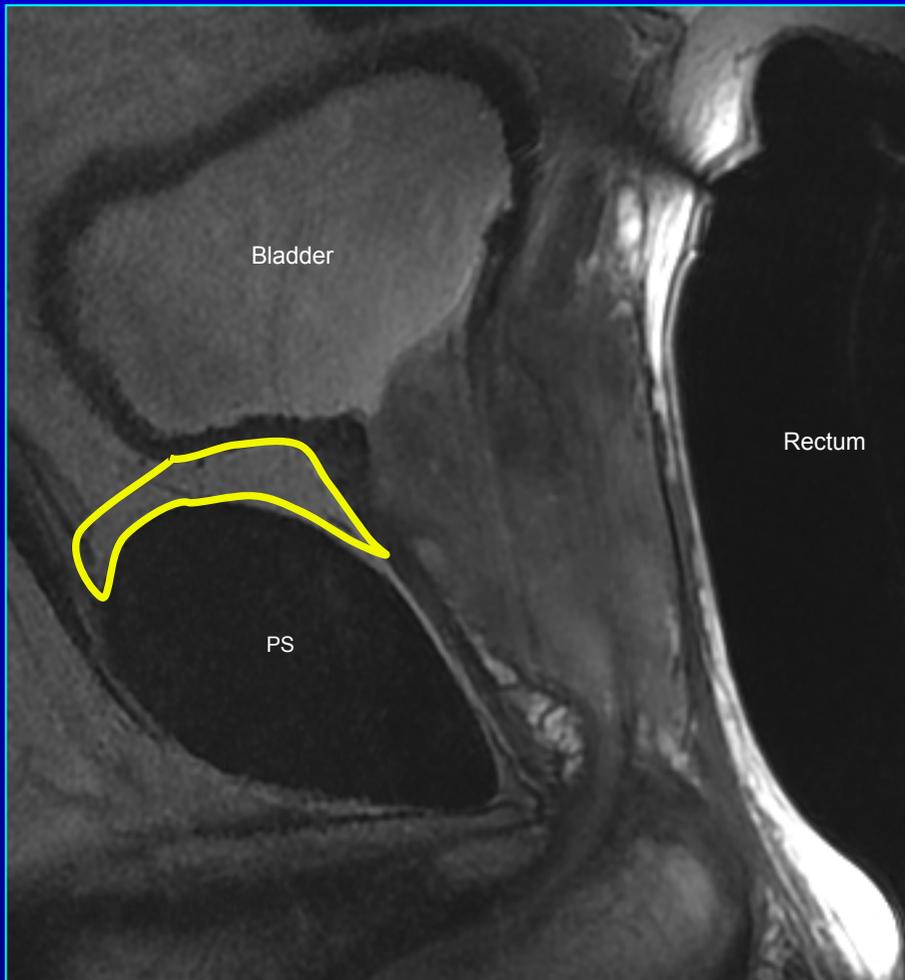
Qualitative Analysis

- Qualitative analysis of the tissue in the space of Retzius after RP demonstrated lower signal intensity with reduced fat content compared to preop studies
- Significant variability in tissue signal
 - Normal to dense scar
- Signal intensity in worst cases similar to that of sacrosinous ligament
- Tissue changes seen from bladder neck to dome of bladder (in decompressed state)



Post-RP Space of Retzius Changes

Quantitative Analysis



- Bladder to Pubis distance
 - Mean = 0.67 cm
 - Range = 0.55-1.0cm
- Significant difference observed in mean scar thickness in **open** 0.55cm vs **robotic** 0.28cm approaches (p=0.04)

Conclusion

- Small study number
- Close proximity of external iliac vein and bladder
- Importance of decompressing bladder during IPP placement
- Patients undergoing a laparoscopic procedure have significantly less post operative scarring in this region



Conclusion

- In this study we have attempted to highlight the changes in the architecture of the retropubic space post-RP
- These data should increase awareness of potential difficulty placing a reservoir in a standard space of Retzius location
- These findings support use of ectopic locations for reservoir in this patient population

