

ANATOMICAL BENCHMARKS IN PREOPERATIVE MAGNETIC RESONANCE IMAGING PREDICT EARLY CONTINENCE RECOVERY FOLLOWING ROBOTIC RADICAL PROSTATECTOMY

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ABSTRACT

Introduction and Objective: Urinary incontinence (UI) is one of the most distressful complications of radical prostatectomy ¹. Recently, several variations in the reconstruction technique ² aimed to change the final anastomosis position and virtual angles between anatomical benchmarks. The aim of the present study is to elucidate anatomical characteristics assessed preoperatively using 3 Tesla magnetic resonance imaging (MRI) that contribute to early recovery of urinary continence (UC) after robotic assisted radical prostatectomy (RARP).

Patients and Methods: We prospectively analyzed 72 consecutively patients that had underwent for RARP due prostate cancer diagnose and posterior rhabdosphinter reconstruction ³ was performed as the standard technique. All patients underwent 3-T mpMRI (3.0 T Trio® Siemens) before surgery due to the study protocol. Functional outcomes were assessed with EPIC questionnaires (1, 6 and 12mo after surgery) and with self-reported first continence date. Membranous urethral length (MUL), angle between MUL and prostatic axis (aMUP) were assessed in T2-weighted sagittal preoperative images. Univariate and multivariate analysis were performed with STATA v13.1.

Results: The median age was 63 years (47-75), rate of abnormal DRE was 31.94%, and median PSA was 6.5ng/ml (1.5-22.8). UC median assessed with self-reported continence date was 4 weeks after catheter removal (0-32). Date-based UC rates were 81.48% and 90.48% at 6 and 12 months, respectively. When considering UC as need of <=1 PAD/day, those rates were 67.21%, 92.59% and 95.24% at 1, 6 and 12mo respectively. Patients with lower aMUP parameters achieved UC early: 1 month after catheter removal continents had mean aMUP of 107.21° (90.28-124.15), while among those with UI it was 125.85° (95%CI 117.72-133.98); p=0.014. At 6 months aMUP was 114.24° (95%CI 104.62- 123.85) and 141.99° (95%CI 126.49-157.59), respectively; p=0.015. At 12mo, continents had greater preoperative MUL 16.06mm (95%CI 13.85-18.28), while patients with UI had 10.03mm (95%CI 8.72-12.13). No differences in aMUP were found at 12mo, neither in MUL at the 1st or 6thmo according UC status. Multivariate analyses were performed including prostate volume, BMI, clinical stage, imaging stage, aMUP and MUL. Only aMUP was an independent predictor of UC at 6 months HR 0.007 (95%CI: 0.002-0.012), p= 0.012.

Conclusions: Assessment of virtual angles between anatomical benchmarks as aMUP before procedure may help define which patients will recovery UC early, helping in treatment decision make.

OBJECTIVE

To elucidate anatomical characteristics assessed preoperatively using 3 Tesla magnetic resonance imaging (MRI) that contribute to early recovery of urinary continence (UC) after robotic assisted radical prostatectomy (RARP).

METHODS

Design and participants: Prospective study which analyzes 72 consecutively patients that had underwent for RARP with posterior rhabdosphinter reconstruction due prostate cancer diagnose (table 1). All patients underwent 3-T mpMRI (3.0 T Trio® Siemens) before surgery

MRI parameters (Fig 1):

- Membranous urethral length (MUL)
- Angle between MUL and prostatic axis (aMUP)

Functional outcomes (table 2):

- EPIC questionnaires (1, 6 and 12mo after urinary catheter removal)
- Self-reported first continence date

Statistical Analysis: STATA v13.1

Univariate and multivariate analysis were performed

Table 1. Demographic and clinical characteristics of the population sample.

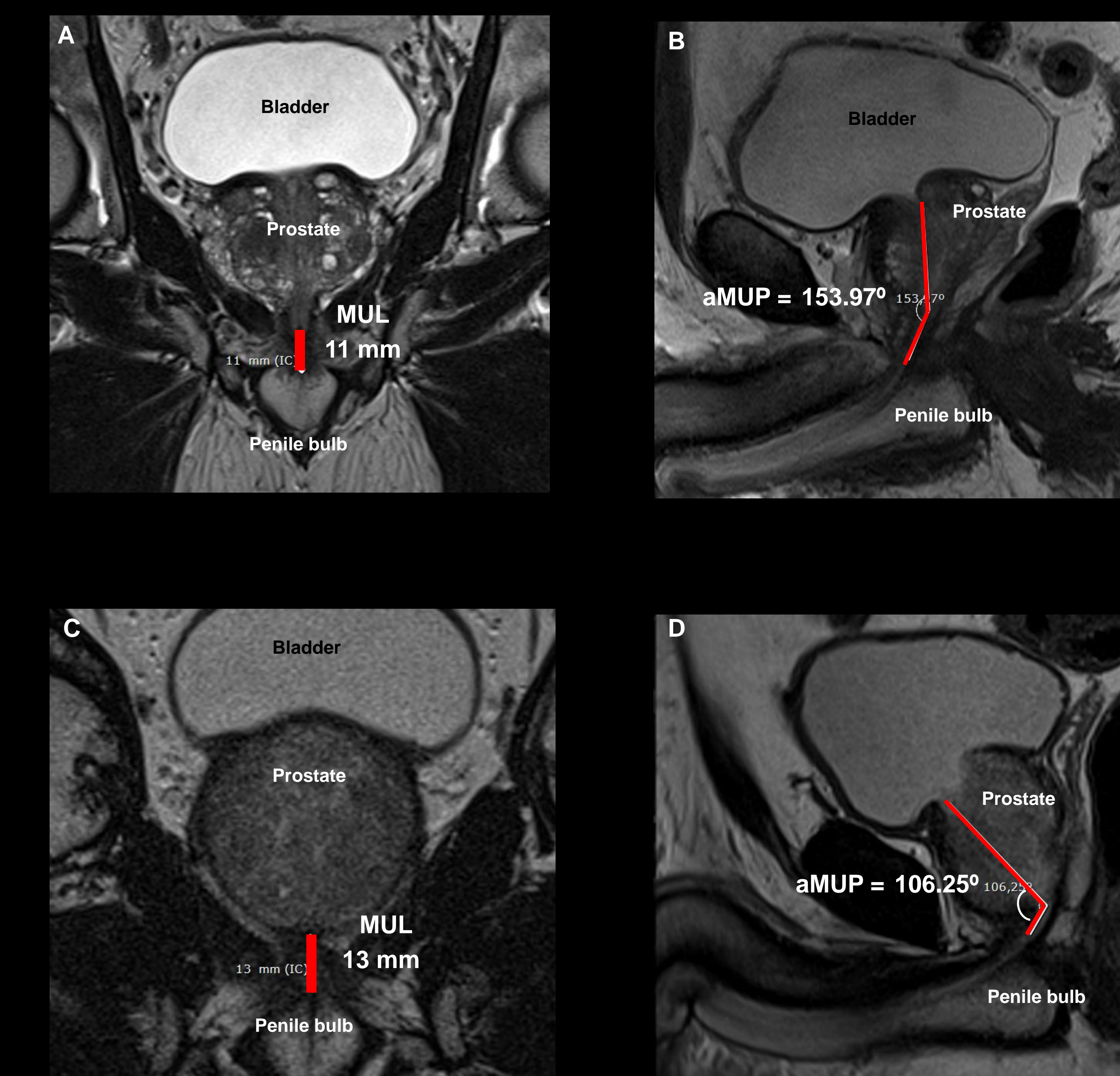
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|----------------------|----------------|---------------|------------|
| Men, no | 72 | Score Gleason | |
| Age*, years | 63 (47-75) | WHO Group | |
| PSA*, ng/mL | 6.5 (1.5-22.8) | 1 | 15 (20.8%) |
| DRE, positive (%) | 23 (31.4%) | 2 | 25 (34.7%) |
| PV*, cm ³ | 41 (15-155) | 3 | 21 (29.2%) |
| BMI* | 26 (19-36) | 4 | 8 (11.1%) |
| | | 5 | 3 (4.2%) |

* Median (range)

Table 2. Urinary Continence rates according to different criteria analysis

| Criteria | 1 month | 6 months | 12 months |
|--------------------|---------|----------|-----------|
| ≤ 1 PAD/d | 67.21 % | 92.59 % | 95.24 % |
| Self-reported date | 48.24% | 81.48% | 90.48% |

Fig 1. Multiparametric MRI images. A) and C) Membranous urethral length (MUL) in coronal section. B) and D) Angle between MUL and prostatic axis (aMUP)



RESULTS

Patients with lower aMUP parameters achieved UC early: urinary incontinents at 1 and 6 months after catheter removal had greater preoperative aMUP than continents (table 3 and 4).

Urinary continents had greater preoperative MUL than those who had not yet recovered urinary function at 12 months

No differences in aMUP were found at 12mo, neither in MUL at the 1st or 6th mo according UC status. Multivariate analyses were performed including prostate volume, BMI, clinical stage, imaging stage, aMUP and MUL. Only aMUP was an independent predictor of UC at 6 months HR 0.007 (95%CI: 0.002-0.012), p= 0.012.

Table 3. Univariate analysis

| variable | 1 month | | p value |
|----------|---------------------------------|----------------------------------|--------------|
| | Continents | Incontinents | |
| aMUP | 107.21° (95%CI 90.28-124.15) | 124.85° (95%CI 117.72-133.98) | 0.014 |
| MUL | 13.63 (95%CI 10.91-16.37) | 13.38 (95%CI 12.03-14.74) | > 0.05 |

| variable | 6 months | | p value |
|----------|-----------------------------------|----------------------------------|--------------|
| | Continents | Incontinents | |
| aMUP | 114.24° (95%CI 104.62- 123.85) | 141.99° (95%CI 126.49-157.59) | 0.015 |
| MUL | 13.84 (95%CI 12.38-15.31) | 12.86 (95%CI 8.38-17.34) | > 0.05 |

Table 4. Multivariate analysis

| variable | UC 6 months | | |
|----------------|--------------|---------------------|--------------|
| | HR | 95 % CI | p value |
| BMI | 0.023 | 0.008-0.054 | 0.1 |
| Clinical stage | 0.081 | 0.119-0.281 | 0.4 |
| PV | 0.001 | 0.006-0.004 | 0.7 |
| Imaging stage | 0.005 | 0.096-0.085 | 0.9 |
| aMUP | 0.007 | (95%CI:0.002-0.012) | 0.012 |

CONCLUSIONS

- aMUP was an independent predictor of urinary continence at 6 months
- Assessment of virtual angles between anatomical benchmarks as aMUP before procedure may help define which patients will recovery UC earlier, helping in treatment decision make.

REFERENCES

- Patel VR, Abdul-Muhsin HM, Schatloff O, et al. Critical review of "pentafecta" outcomes after robot-assisted laparoscopic prostatectomy in high-volume centres. BJU Int 2011;108:1007-17.
- Tewari A, Jhaveri J, Rao S, et al. Total reconstruction of the vesicourethral junction. BJU Int 2008;101:871-7.
- Coelho RF, Chauhan S, Orvieto MA, et al. Influence of modified posterior reconstruction of the rhabdosphinter on early recovery of continence and anastomotic leakage rates after robot-assisted radical prostatectomy. Eur Urol 2011;59:72-80.