

VALUE OF MAGNETIC RESONANCE IMAGING TO PREDICT URINARY INCONTINENCE AFTER RADICAL PROSTATECTOMY.

Hypothesis / aims of study

Urinary incontinence is one of the fearest complication after radical prostatectomy(RP). It has been widely studied how to reduce its incidence by modifying surgical technique. The aim of the present study was to find a measure of the pelvic floor that could influence in the appearance of urinary incontinence.

Study design, materials and methods

551 patients underwent surgery to remove localised prostate cancer T1-T2 between September 2002 and December 2011. All of them were clinically staged by Magnetic Resonance Imaging (MRI) and the International Consultation on Incontinence Questionnaire short form (ICIQ-SF) after a follow-up period of at least one year. We defined incontinence as any involuntary leakage of urine. The MRI was performed with a Siemens Magnetom® Aera or Symphony 1.5T (Siemens AG,Germany) MRI scanner before surgery. The measurements were taken at least one year after surgery in a blind manner.

The measurements taken and analysed were:

PS1- Length from the top of symphysis pubis to the Sacrum.

PS2- Length from the bottom of symphysis pubis to the coccyx.

P1- Prostate length.

P2- Prostate width.

P3- Prostate height.

Vol- Prostate volume according to the formula: $P2 \times P3 \times P1 \times 0.52$.

M- Urethral length in coronal and sagital.(MC, MS) From the apex of prostate to the urethral bulbus.

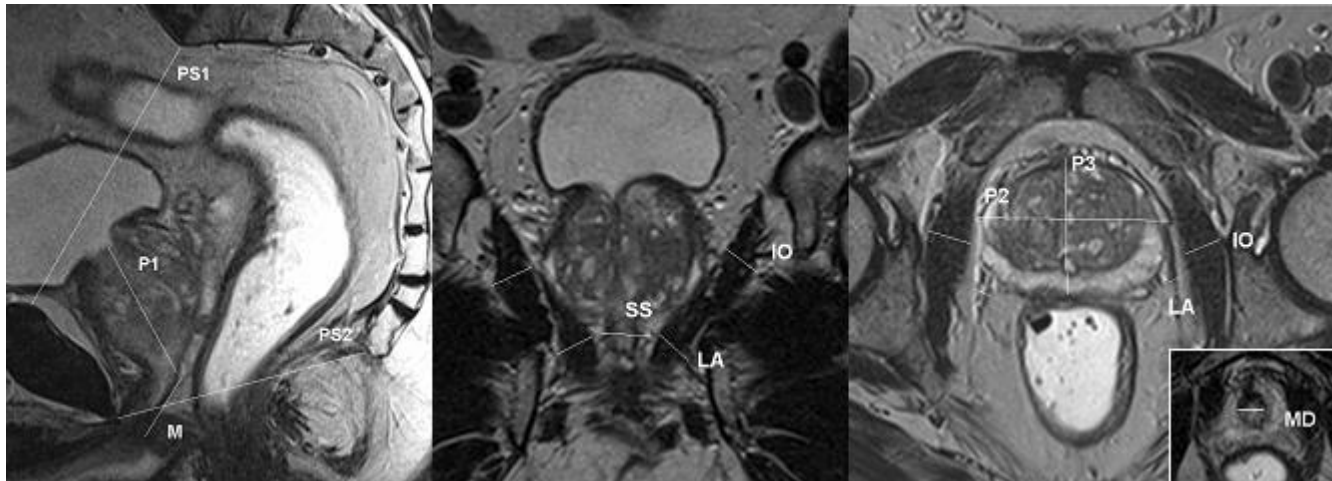
SS- Width of striated sphincter in coronal cut.

LA- Width of right and left levator ani muscle in axial and coronal cuts.(LARA, LALA, LARC, LALC). The sum of both sides was defined as another variable: Total LA A or C.

IO- Width of right and left Internal Obturator muscle in axial and coronal cuts.(IORA, IOLA, IORC, IOLC). The sum of both sides was defined as another variable: Total IO A or C.

MD- Width of the striated sphincter and urethra in axial cut.

Table 1. MRI cuts with measurements.



Average age at surgery was of 63 years(± 6.9), body mass index 27.5 kg/m^2 (± 3.2) and PSA 9.3 ng/ml (± 8.3). Overall, 356 patients (64.6%) had a gleason score 6 or lower, 55 patients (10%) a Gleason score 8 or higher, 189 patients (34.3%) had positive margins and 156 (28.5%) had stage pT3a/b. A total of 378 patients (68%) underwent a retropubic radical prostatectomy and 173 patients (32%) a laparoscopic radical prostatectomy. The average time for surgery was 187min (± 68).

Results

According to urinary incontinence definition, 122 patients (22%) were incontinent. Of these 115 patients (94% of incontinent) completed the ICIQ-SF questionnaire. Mean score was $10.9(\pm 16.4)$, and the mean of pads used per day was $1.7(\pm 1.3)$.

Only one pad was needed in 52(9.4%), 2 pads in 21(3.8%) and more than 3 pads in 19(3.4%). 23(18%) patients referred not to use any pad.

In the table 1 mean and range measurements taken is described in detail. An univariable analysis was performed in order to identify influential variables in the aparition of urinary incontinence. Finally a multivariable analysis were completed.

Table 1. MRI measurements description and analysis.

(cm)	Mean	Range	Univariable OR	p value	Multivariable OR	p value
PS1	10.42	(7.57-13.58)	0.98 (0.79-1.21)	0.8		
PS2	8.57	(6.28-11.34)	0.95 (0.75-1.20)	0.6		
P1	4.46	(1.67-8.48)	1.14 (0.92-1.41)	0.2		
P2	5.16	(2.38-7.97)	1.01 (0.76-1.33)	0.9		

P3	3.89	(1.52-6.64)	1.12 (0.85-1.48)	0.4		
VOL (cc)	49.30	(5.34-196.3)	1.01 (0.99-1.01)	0.1		
MC	1.51	(0.78-3.2)	0.61 (0.33-1.15)	0.1		
MS	1.44	(0.67-5.11)	0.58 (0.30-1.11)	0.09		
LA R A	0.52	(0.17-1.9)	1.10 (0.39-3.11)	0.8		
LA L A	0.55	(0.12-6.7)	1.08 (0.39-3.05)	0.8		
LA R C	1.20	(0.47-2.29)	1.52 (0.66-3.50)	0.3		
LA L C	1.21	(0.5-2.05)	1.43 (0.62-3.28)	0.4		
IO R A	1.46	(0.08-2.73)	0.54 (0.35-0.83)	0.005		.4
IO L A	1.47	(0.32-3.07)	0.59 (0.38-0.92)	0.019		.7
IO R C	1.79	(0.62-2.76)	0.64 (0.34-1.20)	0.1		
IO L C	1.77	(0.17-2.88)	0.50 (0.27-0.90)	0.021		.081
SS	1.28	(0.63-2.60)	0.87 (0.41-1.83)	0.7		
MD	1.38	(0.78-2.16)	4.90 (1.18-20.3)	0.029	4.83 (1.16-20.05)	.030
Total LAA	1.07	(0.00-7.46)	0.91 (0.57-1.47)	0.7		
Total LAC	2.42	(1.04-3.84)	1.26 (0.80-1.98)	0.3		
Total IOA	2.94	(0.43-5.49)	0.72 (0.57-0.91)	0.006		.5
Total IOC	3.56	(1.12-5.39)	0.71 (0.51-0.99)	0.043		.1

Interpretation of results

Neither size nor total volume of the prostate was significantly influenced the appearance of urinary incontinence. In univariate analysis, width of levator ani muscle and internal obturator muscle have been shown to make a difference. Multivariate analysis broadly supported the influence of width of membranous urethra and striated sphincter, previously identified in univariate analysis.

The best cut-off point was 1.45cm for membranous urethra and striated sphincter width [OR:2.1; CI(1.1-4.13)p=0.025]. According with these results, a 19%(CI:13.25-24.75) urinary incontinence risk could be predicted for those patients with membranous urethral width <1.45cm, where as a risk of 33% (CI: 27.55-38.75) could be the expected in those cases with a membranous urethral width ≥1.45cm.

Concluding message

Membranous urethral width was an independent predictor of urinary incontinence aparition after radical prostatectomy. More studies are required to evaluate the influence of the prostate size or volume, membranous urethral length and levator ani muscle.

If MRI is available, measurements analysis could be useful to predict urinary incontinence postprostatectomy.

Disclosures

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