

## Could the Sling Position Influence the Clinical Outcome in Male Patients Treated for Urinary Incontinence? A Magnetic Resonance Imaging Study With a 3 Tesla System

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<b>OBJECTIVE</b>	To analyze the morphologic changes visible on magnetic resonance imaging (MRI) after sling procedure in continent patients and to compare MRI findings with the incontinent ones, to detect possible factors explaining the different clinical outcomes.
<b>METHODS</b>	Twenty-seven male patients who were treated with Advance sling for urinary stress incontinence after prostate surgery were enrolled: 16 had clinical recovery, whereas 11 had persistent incontinence. Patients after sling were defined as continent if used 0-1 dry "security pad" or incontinent >1 pad. Magnetic Resonance examinations were performed with a 3 Tesla system and included 3-dimensional T2-weighted sequence. Three readers performed a qualitative (representation of the bulb and indentation of the sling) and a quantitative analysis (length of the bulb posterior to the sling and distance of the sling from a line bisecting the pubic symphysis).
<b>RESULTS</b>	The sling was clearly recognizable in all 16 continent patients but only in 2 of 11 incontinent ones. The length of the bulb posterior to the sling was >10 mm (range, 10-28) in all continent patients and in 2 of the incontinent ones. The sling was coincident with a line drawn through the long axis of the pubic bone in 9 of 16 continent patients. A statistically significant association was found between MRI qualitative findings and continence status ( $P < .0001$ ).
<b>CONCLUSION</b>	On the basis of our MRI results, the position of the sling and, in particular, the length of the urethral bulb posterior to the sling seem to be correlated with continence and must be considered in case of treatment failure. UROLOGY 83: 471-476, 2014. © 2014 Elsevier Inc.

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**B**ulbar urethral sling procedures have been developed for the treatment of stress urinary incontinence (SUI) mainly performed after prostate surgery.

Most of the male slings provide continence by compressing the urethra. Retrourethral transobturator sling (RTS; AdVance, American Medical Systems, Minnetonka, MN) is a functional, noncompressive and non-obstructive, minimally invasive treatment for SUI. Repositioning the urethral sphincter inside the pelvis increases the functional membranous urethral length. The ideal candidates for sling placement would have residual urinary sphincter function, mobility of the membranous urethra, and a mild to moderate SUI. As reported

in published data, men with severe postprostatectomy SUI might also benefit of AdVance sling, although with lower outcome expectations.<sup>1,2</sup>

The overall reported success rate of this technique is 54.6%-90.6% at 1 year and 67.7%-77% after 2 years after radical retropubic prostatectomy,<sup>1</sup> and a recent study with 1-year and 3-year follow-up reported a rate of cured and improved patients of 76.9% and 76.8%, respectively, which indicates the durability of the treatment.<sup>3</sup> However, a failure rate of 20%-45% has been reported.<sup>4</sup>

The reasons for failure of the primary RTS are still poorly understood and might be related to inappropriate indications to sling positioning, incorrect placement, or sling slippage because of early postoperative increase of intra-abdominal pressure caused by physical activity. However, further studies are needed to evaluate potential risk factors for sling failure, such as age, degree of incontinence, preoperative detrusor overactivity or irradiation, type of prostate surgery, and previous invasive SUI treatment.<sup>5</sup> A possible factor influencing the outcome could be

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**Table 1.** Demographic data of patient population

Patients	Age	BMI	Radiotherapy	Pad Pre-sling	Time to MRI (mo)	Pad Post-sling	
Incontinent	#1	72	19.5	N	3	3	3
	#2	70	25	N	3	3	3
	#3	64	20.2	Y	5	3	5
	#4	73	21.3	N	5	6	5
	#5	81	21.6	N	5	28	5
	#6	63	22.4	N	4	20	3
	#7	57	24.6	N	4	11	3
	#8	71	23.9	N	5	3	5
	#9	68	20.9	N	5	30	3
	#10	74	23.7	N	4	4	4
	#11	77	22.4	N	5	6	4
Continent	#12	78	19.7	N	3	3	0
	#13	77	22.9	N	4	7	1
	#14	72	29.9	N	4	3	1
	#15	70	19.6	N	3	3	0
	#16	84	28.2	N	3	22	0
	#17	73	27.2	Y	4	29	1
	#18	70	19.3	N	3	48	0
	#19	63	20.6	N	3	30	0
	#20	71	28.4	N	5	28	1
	#21	75	24	N	5	7	1
	#22	71	22.5	N	3	6	0
	#23	72	21.9	N	3	6	0
	#24	62	20.7	N	3	48	0
	#25	69	24.1	N	4	4	0
	#26	40	29.2	N	2	9	0
	#27	48	18.7	N	2	9	0

BMI, body mass index; MRI, magnetic resonance imaging.

the positioning of the sling. This element has not been stressed in the published articles concerning imaging and in particular, magnetic resonance imaging (MRI).

The aim of our study was to analyze the morphologic changes visible on MRI after sling procedure in continent patients compared with the incontinent ones, to detect possible findings explaining the different clinical outcomes.

## MATERIALS AND METHODS

### Study Group

Between June 2008 and December 2012, 27 consecutive patients (age range, 40-84 years) were treated with RTS for SUI because of prostate surgery.

The study included men with mild to severe SUI; the degree of incontinence was based on pad usage over a 24-hour period. As in others studies, patients were defined as having mild incontinence if pad usage was 1 or 2 pads per day, moderate at >2-5 pads, and severe at >5 pads per day.<sup>6</sup> No patients had previously failed treatments for incontinence, and only 2 had been treated with previous adjuvant radiotherapy.

Sling implantation was done a minimum of 6 months after prostate surgery or adjuvant radiotherapy. Three experienced urologists (C.S, D.P, and C.G.) performed surgery according to the technique described by Redher and Gozzi.<sup>2</sup>

We defined the patient as continent when he did not need >1 security pad and incontinent if he needed >1 pad a day.

According to the aforementioned criteria, 11 of 27 (40.7%) had persistent incontinence after the sling placement, whereas 16 of 27 (59.3%) were continent. The mean age was comparable in continent and incontinent cases (68.5 vs 70 years).

One patient in each group (continent and incontinent) had radiotherapy; all the relevant demographic data are reported in Table 1.

Comprehensive preoperative workup was done in every patient and included full urodynamic assessment to exclude detrusor overactivity or detrusor sphincter dyssynergia, stress test (cough test), uroflowmetry, ultrasound for residual urine, flexible urethroscopy, and micturition cystography. Urethroscopy was performed to evaluate the sphincter function and mobility of the posterior urethra; during the examination, the "repositioning test" was done to simulate sling function. Patients who showed no sphincter contraction in this test were excluded from the study. Patients with sphincter contraction but not total sphincter closure were included.

### Magnetic Resonance Imaging

Informed written consent was obtained from all patients; an ethical institutional review board approved the study.

Magnetic resonance (MR) examinations were performed in supine position with a 3 Tesla system (GE; 750 Discovery, General Electric, MN) using an 8-channel phased-array coil.

The patients underwent MRI 3-48 months after surgery with a mean time interval of 14.1 months, which was longer in continent cases (Table 1).

One hour before MRI, all patients were asked to empty the bladder and then to drink 300 mL of water to obtain a consistently full bladder during imaging to achieve standardization. The examination was started when patients had the first desire to void.

The MR protocol included: 3-dimensional (3D) T2-weighted (T2w) sequence (CUBE) with the following parameters: TR/TE, 1500-1900/102-107, matrix 224-320 x 256-320, echo train length, slab partitions thickness 2.2 mm ZIP 2, FOV 28 x 25.2,

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