



Preoperative Bladder Bowel Dysfunction is the Most Important Predictive Factor for Postoperative Urinary Retention after Robot Assisted Laparoscopic Extravesical Ureteral Reimplantation: a Multi-center Study

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Background

Robot-assisted laparoscopic extravesical ureteral reimplantation (RALUR-EV):

- A viable minimally invasive surgical option for VUR
- Comparable success rates to open reimplantation at several pediatric hospitals

Postoperative acute urinary retention (pAUR):

- Open extravesical reimplantation: 3-22%
- RALUR-EV: 0-16%



Gerber and Koh, World J Urol 2019; Akhavan et al., J Pediatr Urol 2014; Song and Kim., Korean J Urol 2014; Casale et al., J Urol 2008; Barriera D et al, J Urol 1999

Authors	Year	Type	No. of Pt. (Unilat/Bilat)	Age (years) Median/Mean (range)	pAUR (%)		Preop BBD (%) (LUTD in Marchini)†
Barrieras D	1999	Open/Y Open/advancing suture	154 (0/154) 66 (0/154)	NA/NA (NA)	13 (8.4) 10 (15.2)		3yrs ≤ had higher rate of pAUR
Casale P	2008	RALUR-EV	41 (0/41)	NA/3.2 (1.3-6.8)	0 (0)		NA
Smith RP	2011	Open	25 (4/21)	NA/4.2 (NA)	0 (0)		NA

pAUR rate in bilateral cases = 4~37%,
except 1 center reporting 0%

Marchini GS	2012	Open	150 (0/150)	NA/3.5 (2.3-9.3)	0 (0)		2% 1.8 5% 7%)
Bayne AP	2012	RALUR-EV	150 (0/150)	NA/3.5 (2.3-9.3)	0 (0)		27%)
Kasturi S	2012	RALUR-EV	150 (0/150)	NA/3.5 (2.3-9.3)	0 (0)		NA
Schomburg JL	2014	Open	20 (1:3)	NA/4.3 (NA)	3 (15)		NA
		RALUR-EV	20 (3:7)	NA/6.2 (NA)	1 (5)		NA
Akhavan A	2014	RALUR-EV	50 (22/28)	6.2/7.2 (1.9-18.0)	1 (2)	4% in bilat	32 (64%)
Gundeti MS	2016	RALUR-EV	58 (33/25)	NA/5.3 (NA)	1 (1.7)	NA	NA (DES treated)
Boysen WR	2017	RALUR-EV	260 (157/103)	NA/6.6 (1-20)	4 (1.5)	3.9% in bilat	98 (37.7%)
Boysen WR	2018	RALUR-EV	143 (87/56)	NA/6.4 (NA)	4 (2.8)	7.1% in bilat, all bil	65 (45.5%)*
Kawal T	2018	RALUR-EV	128 (76/52)	4/NA (2-6‡)	11 (8.6)	13.4% in bilat, 5.2% in unilat	32 (25.0%)□

Background

Prognostic factor for pAUR after RALUR-EV:

- Historically: bilateral reimplantation
- However, in 2 recent studies: Male gender and length of surgical time, not bilaterality

Barrieras et al., J Urol 1999; Boysen et al., J Urol 2017

Srinivasan et al., J Pediatr Urol 2017; Kawal et al., J Pediatr Urol 2018



Study Objective

- To evaluate and confirm the predictive factors for pAUR after RALUR-EV

Methods



- Multi-institutional retrospective cohort study
- Two tertiary referral hospitals: A (TCH) & B(AMC)
- Perioperative data: age, gender, BMI, BBD, VUR grade, laterality of VUR, operation time, detrusorrhaphy stitch number, LOS, and complications

BMI, body mass index; BBD, bladder bowel dysfunction; VUR, vesicoureteral reflux; LOS, length of stay



Methods

- **pAUR** : defined as the need for urethral catheter replacement after the operation
- In case of **pAUR**: urethral catheter left for 2 weeks, subsequently removed with self-voiding in all cases
- Bladder bowel dysfunction: LUTD and bowel dysfunction
- Univariate and multivariate analysis was performed to identify predictive factors for **pAUR**.

Results

Table 1. Differences in demographic and perioperative data among the two institutions.

**117 patients
(174 ureteral units)**

Parameters	Institution A N = 97	Institution B N = 20	P-Value
Median age (years)	5.0 (1-16.2)	4.0 (0.8-19.0)	0.073
Median weight (kg)	18.6 (9.5-73.6)	14.7 (8.8-66.0)	0.009
Median height (cm)	112.0 (79.5-168.0)	101.0 (71.0-175.0)	0.032
Median BMI (kg/m ²)	16.3 (13.0-35.5)	16.3 (13.7-21.6)	0.344
Gender (%)			0.066
Male	27 (27.8)	10 (50.0)	
Female	70 (72.2)	10 (50.0)	
Laterality (%)			0.626
Unilateral	51 (52.6)	9 (45.0)	
Bilateral	46 (47.4)	11 (55.0)	
Bladder bowel dysfunction	47 (48.5)	2 (10.0)	0.001
Preoperative hydronephrosis	11 (12.1)	8 (42.1)	0.006
VUR Grade (%) [†]			0.002
I	13 (9.2)	0 (0)	
II	21 (14.9)	3 (9.7)	
III	65 (46.1)	7 (22.6)	
IV	30 (21.3)	14 (45.2)	
V	12 (8.5)	7 (22.6)	
Median total operative time (min)	199.0 (98.0-350.0)	178.0 (120.0-280.0)	0.340
Median console time (min)	149.0 (75.0-240.0)	105.0 (75.0-180.0)	0.002
Median No. of detrusorrhaphy stitches	6 (6-6)	4.5 (3-5)	<0.001

Mann-Whitney U test and chi square test

[†], calculated among 174 ureteral units; VUR, vesicoureteral reflux

Results

Table 2. Patient demographics and intra-operative factors for prediction of pAUR in RALUR-EV

**pAUR rate = 3.4%
(7.0% in bilateral)**

Parameters	pAUR (%) N = 4	No pAUR (%) N = 113	P-Value
Median age (years)	2.5	5.0	0.037
Median weight (kg)	13.9 (11.2-16.0)	20.1 (6.6-73.6)	0.039
Median height (cm)	92.0 (83.7-102.0)	113.2 (38.1-175.0)	0.040
Median BMI (kg/m ²)	16.1 (15.4-16.5)	16.4 (13.0-35.5)	0.550
Gender (%)			1.000
Male	1 (25.0)	36 (31.9)	
Female	3 (75.0)	77 (68.1)	
Laterality (%)			0.037
Unilateral	0 (0)	60 (53.1)	
Bilateral	4 (100.0)	53 (46.9)	
Bladder bowel dysfunction	3 (75.0)	46 (40.7)	0.307
Preoperative hydronephrosis	0 (0)	19 (17.8)	1.000
Persistent VUR after surgery	0 (0)	7 (6.0)	1.000
VUR Grade (%) [‡]			0.445
I	0 (0)	13 (7.9)	
II	0 (0)	24 (14.6)	
III	6 (75.0)	66 (40.2)	
IV	1 (12.5)	43 (26.2)	
V	1 (12.5)	18 (11.0)	
Median total operative time (min)	203 (187-250)	180 (98-360)	0.194
Median console time (min)	162 (144-183)	130 (75-240)	0.116
Median No. of detrusorrhaphy stitches	6 (6-6)	6 (3-6)	0.657

Mann-Whitney U test and Chi-square test;
‡, calculated among 174 ureteral units

Results

Table 3. Multivariable regression models for prediction of postoperative acute urinary retention

Variable	Multivariable analysis		
	OR	95% CI	P Value
Age	1.77	0.12-24.93	0.672
Weight	0.58	0.34-1.00	0.051
Height	1.04	0.71-1.52	0.828
BMI	10.42	0.03-2768-91	0.410
BBD	70.66	1.29-3842.93	0.037
Bilaterality	78696750	0.00-	0.996
Operative time	1.00	0.93-1.09	0.824
Console time	1.03	0.98-1.09	0.209

BMI, body mass index; BBD, bladder bowel dysfunction; VUR, vesicoureteral reflux

Limitations

- Retrospective design
- Heterogeneous characteristics in 2 institutions
- BBD diagnosis was not standardized
- Narcotics usage was not investigated

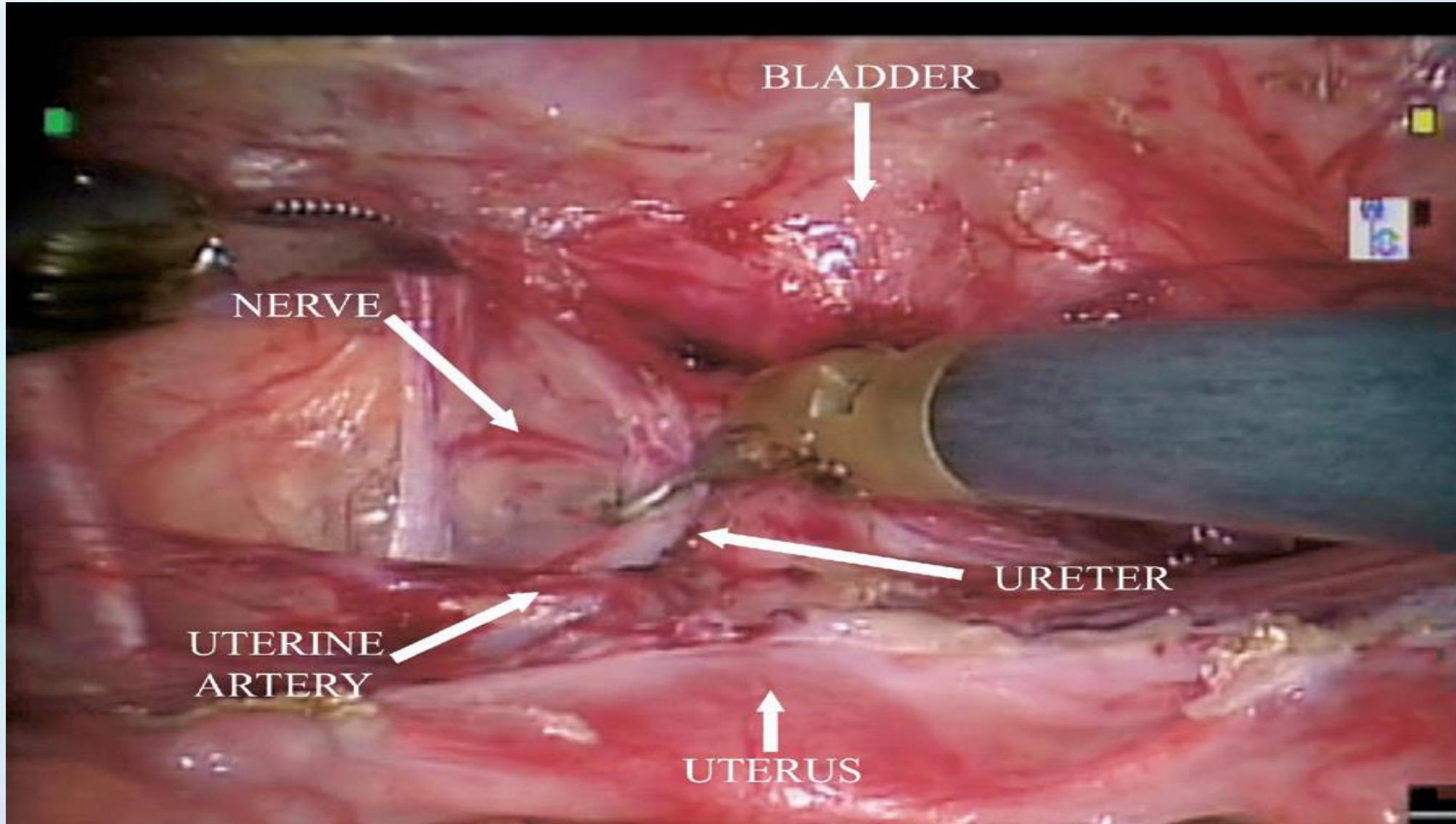
Conclusions

- **pAUR** after RALUR-EV less frequently occurred when compared to the previously reported open surgery series.
- **pAUR** occurred only in bilateral cases.
- Preoperative **BBD** but not male gender or surgical time was the most important predictive factor for **pAUR** after RALUR-EV.



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Casale P	2008	RALUR-EV	41 (0/41)	NA/3.2 (1.3-6.8)	0 (0)		NA
Smith RP	2011	Open RALUR-EV	25 (4/21) 25 (17/8)	NA/4.2 (NA) NA/5.8 (NA)	0 (0) 4 (16)	37% in bilat	NA NA
Marchini GS	2011	Open IV Open EV RALUR-EV Robot IV	22 (0/22) 17 (16/1) 20 (10/10) 19 (2/17)	NA/8.8 (NA) NA/6.1 (NA) NA/8.6 (NA) NA/9.9 (NA)	0 (0) 0 (0) 2 (10) 1 (5.2)	20% in bilat(Both LUTD+)	7 (32%) 2 (11.8) 7 (35%) 7 (37%)
Bayne AP	2012	Lap-EV	98 (52/46)	6/6.7 (0.9-20.3)	3 (3)	6.5% in bilat	24 (27%)
Kasturi S	2012	RALUR-EV	150 (0/150)	NA/3.5 (2.3-9.3)	0 (0)		NA
Schomburg JL	2014	Open RALUR-EV	20 (1:3) 20 (3:7)	NA/4.3 (NA) NA/6.2 (NA)	3 (15) 1 (5)		NA NA
Akhavan A	2014	RALUR-EV	50 (22/28)	6.2/7.2 (1.9-18.0)	1 (2)	4% in bilat	32 (64%)
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Addendum: Pelvic plexus

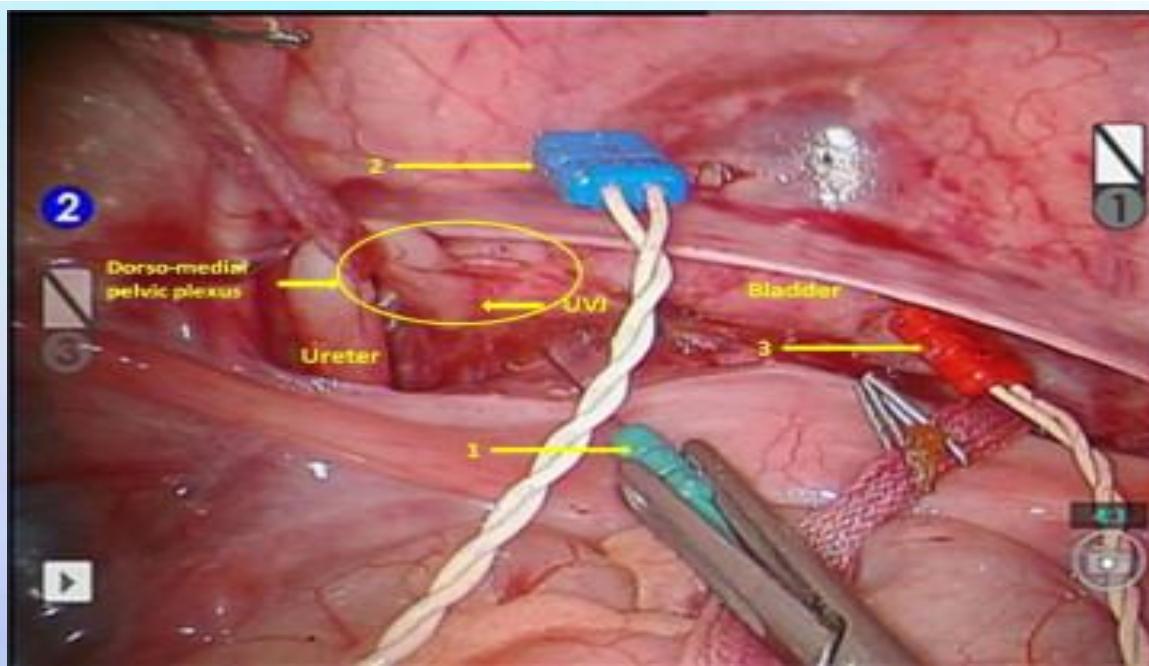
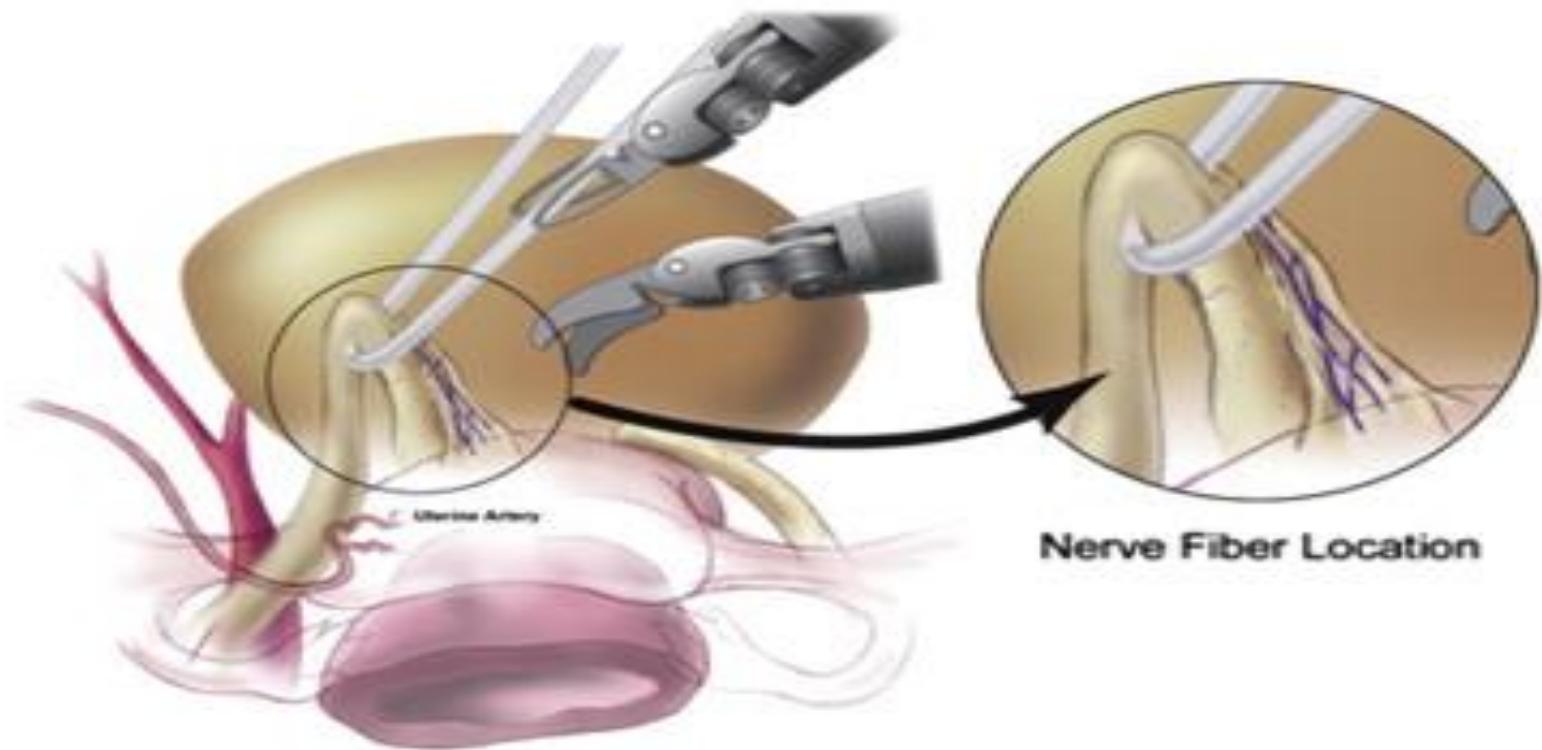
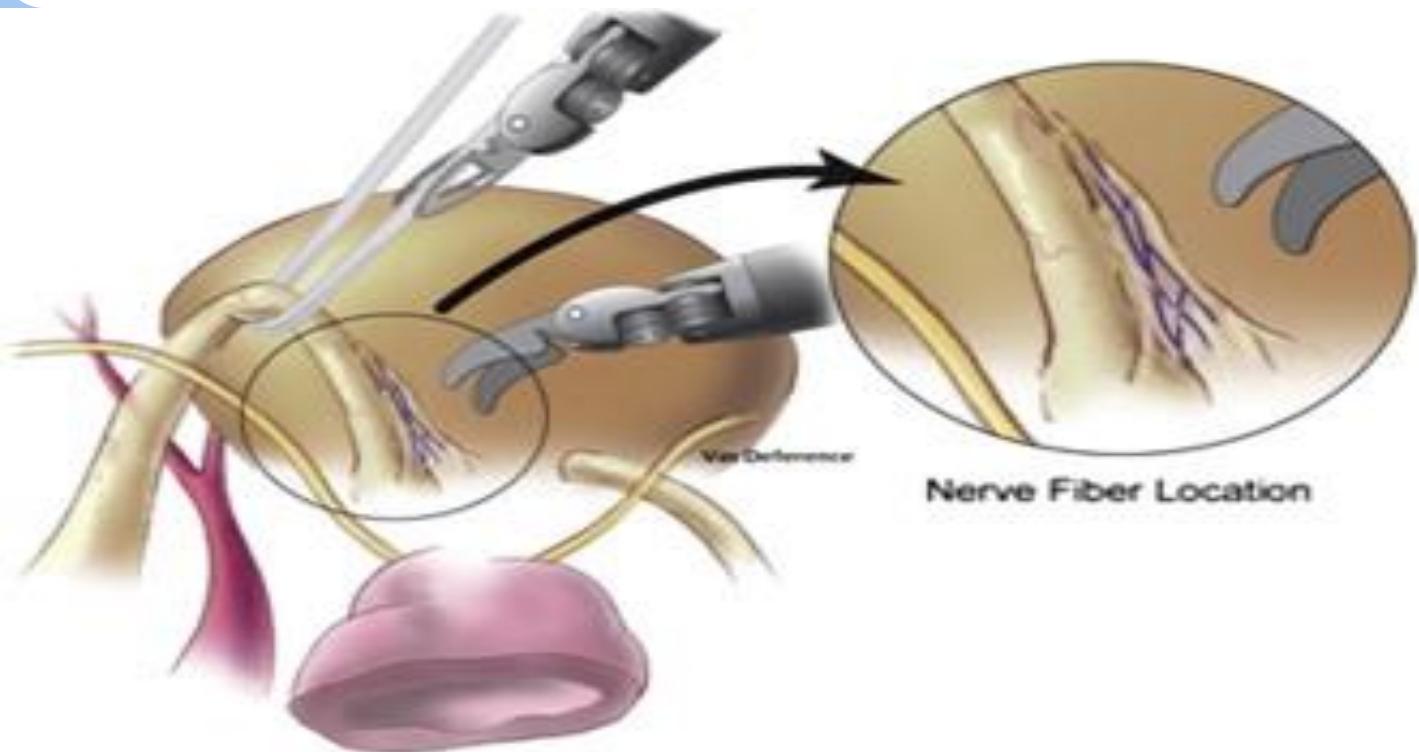


Operative success rates were 97.6%. There were no complications.

There were no episodes of urinary retention documented by bladder scanning

Pasquale Casale, et al, J Urol 2008

Addendum: Pelvic plexus



the inconsistent findings
raise questions about
the exact location of
the neurovascular bundle,

Parameters	BBD (%) N = 49	No BBD (%) N = 68	P-Value
Median age (years)	5.0 (2.0-16.0)	4.3 (1.0-19.0)	0.242
Median weight (kg)	20.2 (12.1-59.6)	17.8 (8.8-73.6)	0.096
Median height (cm)	113.2 (86.0-170.5)	105.5 (71.0-175.0)	0.125
Median BMI (kg/m²)	16.1 (13.6-24.9)	16.6 (13.0-35.5)	0.439
Gender (%)			0.687
Male	14 (28.6)	23 (33.8)	
Female	35 (71.4)	45 (66.2)	
Laterality (%)			0.691
Unilateral	25 (51.0)	35 (51.5)	
Bilateral	24 (49.0)	33 (48.5)	
Preoperative hydronephrosis	7 (14.2)	12 (17.6)	0.801
Preoperative renal scarring[†]	15 (78.9)	35 (81.4)	
Persistent VUR after surgery	4 (8.2)	3 (4.4)	0.450
VUR Grade (%)[‡]			0.511
I	7 (9.6)	7 (6.9)	
II	12 (16.4)	13 (12.9)	
III	33 (45.2)	39 (38.6)	
IV	14 (19.2)	30 (29.7)	
V	7 (9.6)	12 (11.9)	
Median total operative time (min)	195.0 (98.0-273.0)	181.0 (120.0-350.0)	0.562
Median console time (min)	146.0 (86.0-240.0)	125.7 (75.0-221.0)	0.037
Median No. of detrusorrhaphy stitches	6 (4-6)	6 (3-6)	0.002
Follow up duration	4.3 (0.9-24.0)	4.7 (0.2-33.0)	0.542

Table 4. Patient demographics and peri-operative factors by BBD