Arab Journal of Urology (2011) 9, 107–112

Arab Journal of Urology
(Official Journal of the Arab Association of Urology)

www.sciencedirect.com

ONCOLOGY/RECONSTRUCTION

ORIGINAL ARTICLE

Prostate-sparing cystectomy: Potential functional advantages and objective oncological risks; a case series and review

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Received 6 April 2011, Received in revised form 20 May 2011, Accepted 8 June 2011
Available online 10 September 2011

KEYWORDS

Bladder cancer;
Prostate-sparing cystectomy;
Continence;
Erectile function

ABBREVIATIONS

PSC, prostate-sparing cystectomy; RC, radical cystectomy; IIEF, International Index of Erectile Function; MVAC, methotrexate, vinblastine, adriamycin and cisplatin; CIC, clean intermittent catheterisation; PDE5, phosphodiesterase-5

Abstract *Objectives:* Prostate-sparing cystectomy (PSC) has been debated over the last decade; our aim was to assess the functional results and to evaluate the oncological outcome after PSC, to judge the value of this technique.

Patients and methods: Twenty-six men (median age 62 years) who were candidates for radical cystectomy were operated between 2004 and 2009 in the urology departments of Foch Hospital, Suresnes, France, and Theodor Bilharz Research Institute, Giza, Egypt. They all underwent a PSC with orthotopic bladder substitution. The functional results were assessed at 1, 3 and 6 months, with the final results evaluated at 1 year. Incontinence was classified according to pads used per day, and erectile function after PSC was assessed using the International Index of Erectile Function questionnaire. There was a strict follow-up for oncological failure, with special attention given to the remnant of the prostate and prostatic urethra.

Results: The final functional results were assessed at 1 year, with daytime continence achieved in 22 patients (95%) and nocturnal leak in four (13%). At 1 year, 18 patients (83%) reported having erections on sexual stimulation. The median follow-up was 43 months, with an overall incidence of recurrence of 30% and a median time to metastasis of 30 months. At 36 months, the overall survival rate was 81%, with a tumour-free survival rate of 70%.

Conclusion: PSC was no better than standard radical cystectomy, and should only be offered to patients who prefer preservation of their sexual function and continence over appropriate tumour control.

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2090-598X

Peer review under responsibility of Arab Association of Urology.
doi:10.1016/j.aju.2011.06.010

Production and hosting by Elsevier

Introduction

Radical cystectomy (RC) with pelvic lymph-node dissection is the treatment of choice for managing muscle-invasive bladder cancer, and high grade BCG-refractory nonmuscle-invasive TCC [1], with an overall 5-year disease-free survival rate of 60–70% [1,2]. Erectile dysfunction is almost always present in patients after RC; even with nerve-sparing protocols, potency does not exceed 60% [3,4]. Similarly, improved continence after orthotopic bladder substitution has been reported in patients undergoing attempted nerve-sparing procedures [5], with age being the main prognostic factor.

As the issue of quality of life is becoming increasingly important in oncology [6], and RC, with preservation of the prostate, vasa deferentia, seminal vesicles and neurovascular bundles, with orthotopic urinary diversion, has been studied as an alternative surgical treatment for carcinoma of the bladder [7]. The preservation of these structures, together with avoidance of pelvic dissection, has led to better potency and continence after surgery [8]. However, this might increase the oncological risk, as associated cancer of the prostate was described in up to half of RC specimens, and the prostatic urethral remnants can increase the risk of local recurrence.

The prostate-sparing cystectomy (PSC) technique has been the subject of heated debate, with experts judging it as a step in the wrong direction, and others countering that the procedure offers excellent functional results with no added oncological risks [9]. We aimed to evaluate the functional and early oncological results of PSC to evaluate the safety of this treatment option, to determine if it fulfils the goal of obtaining the best functional results without jeopardising adequate oncological control, the main objective of oncological surgery.

Patients and methods

This study included 26 patients with a median (range) age of 62 (42–79) years, operated on in the urology departments of the Foch Hospital, France, and Theodor Bilharz Research Institute, Giza, Egypt, between 2004 and 2009. Patients included had either pathologically confirmed invasive bladder cancer (clinically T2N0Mx/o), or nonmuscle-invasive TCC recurrent after at least one course of BCG (Table 1). All patients had a standard preoperative evaluation for bladder cancer. Screening for an associated carcinoma of the prostate was done using a DRE and PSA determination, using a PSA threshold of 4 ng/mL. Two patients had TRUS-guided biopsies, which were negative for malignancy.

We used a PSC as described by Botto et al. [10], with ablation of the prostatic urethra either a few weeks before the PSC or at the same surgery, except in two patients in whom TURP was delayed until the postoperative determination of pouch-emptying function.

The follow-up protocol consisted of a visit at 30 days after PSC to evaluate the final pathology of the disease and the need for any adjuvant treatment. Pouch function was assessed in terms of continence and capacity. Instructions were given to the patients for timed voiding, and to wake up once at night for pouch evacuation for the first few weeks, until adequate pouch capacity developed. In the absence of any complication, all patients were followed every 3 months for 2 years, twice yearly for another 2 years and then yearly thereafter. Follow-up protocols consisted of a complete physical examination, together with a urine cytology, blood chemistry and serum electrolytes. Ultrasonography of the urinary tract was done to assess pouch volume and residual volume. Special attention was given to the remnant of the prostate and prostatic urethra, with serial PSA determination and check cystoscopy. In the present study, the assessment of functional results in terms of continence and erectile function began at 3 months after PSC, with the final results determined at 12 months. We considered patients continent when they were completely dry during the day and night and used no pads. Potency was defined as the ability to obtain and maintain an erection sufficient for adequate sexual intercourse. The International Index of Erectile Function (IIEF) questionnaire was completed by all patients before PSC, but only patients with adequate erectile function could complete the questionnaire after PSC.

Results

Of the 26 patients included in the study, 17 had a TURP as a separate procedure up to 6 weeks before PSC, while six had the TURP at the time of PSC. TURP was also scheduled after PSC for two patients, but one of them did not need a further procedure for the remnant of his prostate as he emptied the pouch well, with no significant residual urine. Finally, one patient had a Millin's adenomectomy at the time of PSC.

The median (range) operative duration was 335 (310–450) min, including the time for TURP. The median (range) operative blood loss was estimated at 700 (300–2500) mL. Seven of the 26 patients received a blood transfusion.

Early complications occurred in six patients (23%); one died on the first day after PSC from a massive pulmonary embolism. Late complications developed in four patients (15%); two developed recurrent UTI, one had a bulbar urethral stricture, treated endoscopically, and one developed a ureteroileal stricture that was managed by open surgical revision.

The final pathological staging is shown in Table 1; two patients had positive lymph nodes on final pathological staging, even though the results were negative on frozen-section examination. Both patients had pT3 tumours. The first patient was given adjuvant chemotherapy in the form of six courses of methotrexate, vinblastine, adriamycin and cisplatin (MVAC), but adjuvant treatment was withheld for the second patient due to rapid deterioration of his general condition.

Table 1 The characteristics of the 26 patients.

Variable	*n* (%)
Tumour type	
TCC	22 (85)
Nonmuscle-invasive	18 (80)
muscle-invasive	4 (20)
Squamous cell carcinoma	3 (12)
Adenocarcinoma	1 (3)
Definitive pathological stage	
pT0/T1/Cis	8 (30)
pT2	13 (50)
pT3	5 (20)
N+	2 (7)
Associated prostate cancer	2 (7)

The final pathological examination showed an associated carcinoma of the prostate in two patients who had a TURP at the time of PSC, despite being negative before surgery in the screening protocol. One patient with a Gleason score of 7 (4 + 3) had immediate hormonal treatment; the second had a Gleason score of 6 (3 + 3) and was offered an active surveillance protocol.

Oncological results

The median (range) follow-up was 43 (6–50) months, with a mean (SD) follow-up of 38 (13.8) months. Eighteen of the 26 patients (70%) in the study were followed for >40 months. Two patients were lost to follow-up during the first year, one of whom died perioperatively.

The overall incidence of metastasis was 30%, with a median (range) time to metastasis of 30 (10–40) months, and a mean (SD) time to metastasis of 27 (11.2) months. Two patients (7%) developed an isolated pelvic recurrence. Of the two patients who had positive lymph nodes, one was given six cycles of MVAC chemotherapy immediately, with a complete response, and was alive and tumour-free at 50 months. Adjuvant chemotherapy was withheld for the second patient, who developed pulmonary metastasis at 10 months and died 3 months later. There was no case of prostatic urethral recurrence or de novo development of prostate cancer during the follow-up.

Twenty-one patients were alive and assessed at 36 months, with an overall survival rate of 81% and a tumour-free survival rate of 70% (Figs. 1 and 2). For patients with a pathologically confirmed organ-confined tumour (⩽pT2N0Mx/0) the overall survival rate was 90% at 36 months, but this decreased to 75% after 40 months.

Functional results

Continence was evaluated in terms of daytime continence and nocturnal leak. Patients were considered continent when they were dry both day and night. The degree of incontinence was classified according to the number of protective pads used per day, with the use of one, two and three or more pads equivalent to mild, moderate and severe incontinence, respectively.

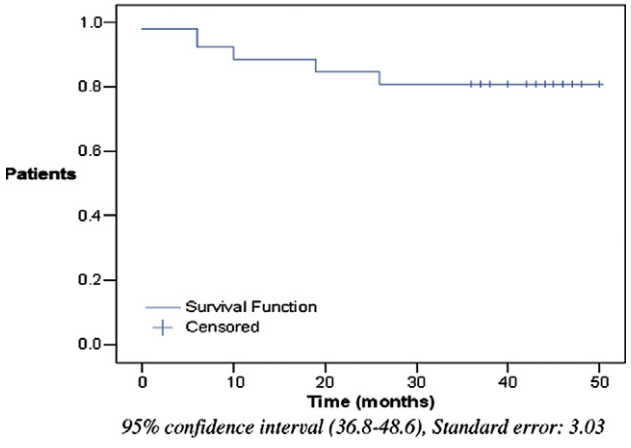

Figure 1 Overall survival after PSC.

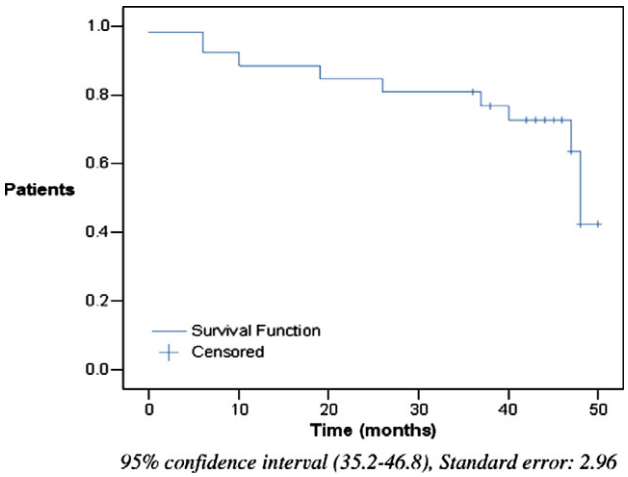

Figure 2 Tumour-free survival after PSC.

Immediately on catheter removal, daytime continence was achieved in 19 patients (76%), and night-time continence in 10 (40%). Final continence results were evaluated for each patient in the 12th month of follow-up. Twenty-three patients reached this point and completed a questionnaire about their degree of day and night continence, the use of protective pads, the presence of stress incontinence, and an estimate of residual urine. Twenty-two patients (95%) were completely dry by day, and four had a nocturnal leak (13%). The median (range) residual urine volume was 40 (30–150) mL. One patient had a persistently high residual urine volume during the follow-up and he used a clean intermittent catheterization (CIC) protocol; cystoscopy showed no anatomical obstruction. A urodynamic evaluation showed a normal urethral closing pressure with an adequate functional length. The pouch pressure was low, and patient failed to void despite abdominal straining. The patient remained on CIC and was regularly followed, with a stable course (Table 2).

Twenty-three of the 26 patients had adequate erectile function before surgery, with an IIEF score of 25–28, but four regularly used phosphodiesterase-5 (PDE5) inhibitors. Erectile function was assessed at 3, 6 and 12 months after PSC. In the absence of contraindications, patients who were unable to have an adequate erection sufficient for intercourse at 6 months after PSC were prescribed PDE5 inhibitors, but not earlier. At 3 months of follow-up, 11 patients (47%) were able to obtain an erection after sexual stimulation at least once. Five of them considered their sexual relations to be at preoperative levels. At 6 months, 15 patients (65%) reported having erections with successful intercourse on sexual stimulation. PDE5 inhibitors were prescribed for six patients who were unable to obtain an erection after surgery. One patient was offered intracavernous injection, as he had a nitrated derivative in his usual treatment. The final results of erectile function were assessed at 1 year after PSC; only 22 patients reached the 1-year follow-up and had adequate erectile function before PSC to be eligible to complete the questionnaire on the presence and absence of erection, the quality of erection, the presence of vaginal penetration, the use of medication and overall satisfaction with their erectile function. Nineteen patients (83%) reported having an erection on sexual stimula-

Table 2 Functional results.

Function	*n* (%)
Continence	
Daytime, continent	22 (95)
Mild incontinence	1 (4)
Night, continent	20 (86)
Nocturnal leak	3 (13)
CIC	1 (4)
Erectile function	
Obtained erection	18 (83)
Successful intercourse	17 (73)

tion at 1 year of follow-up; 17 (73%) considered their erection sufficient for satisfactory sexual intercourse (Table 2).

Discussion

In 2002, Vallencien et al. [9] published their 10-year follow-up results of 100 patients who had PSC in their centre. Although the functional results were very promising, the lack of a long-term follow-up (81 patients were followed for only 12 months), together with a higher incidence of distant metastasis, was disappointing. The longest mean follow-up of 90 months was in the series of Terrone et al. [11], which included 28 patients; 24 of them had superficial TCC and the indication for PSC was not clear. The same was seen in the series of Muto et al. [12], which included 68 patients with a mean follow-up of 68 months, but 63 had nonmuscle-invasive disease. The study of Horenblas et al. [13] included 44 patients; nine had lymph node involvement detected before PSC. Extrapolation of data from these series is thus difficult.

As the incidence of carcinoma of the prostate in radical cystoprostatectomy series approaches 50% [14,15], all series on PSC included a preoperative detection protocol for carcinoma of the prostate, and followed the prostatic remnants after surgery. This markedly decreases the incidence of associated cancer of the prostate, but it was never zero.

An evaluation of the oncological results of PSC series, including our study (Table 3) shows an incidence of local recurrence, including prostatic urethral recurrence, comparable to that of large cystoprostatectomy series [16–20]. In a review of their 1054 RCs, Stein and Skinner [17] reported that locoregional recurrence occurred in 77 patients (7%), and the mean time to recurrence was 18 months. These values were confirmed by Hautman et al. [18] in their review of 788 patients, with an incidence of locoregional recurrence of 9% and a mean time to recurrence of 7 months (Table 3).

In the present study, six patients (23%) developed distant metastasis, two had isolated bone metastasis, one had pulmonary metastasis, one had pancreatic metastasis, and two had multiple organ metastasis uncommon in patients with bladder cancer. There were no neoadjuvant treatments given in the present study, with adjuvant chemotherapy given to one patient.

Distant metastasis developed in 31% of the patients included in the study of Vallancien et al. [9], and the mean time to metastasis development was 20 months. Although Terrone et al. [11] reported a 15% incidence of distant metastasis in their study, neoadjuvant chemotherapy was used. In the series of Horenblas et al. [13], the exact incidence of distant failure was not clearly noted, and 10 patients died from distant metastasis, but the authors did not state the number of patients living with the disease (Table 3).

The overall incidence of distant recurrence after radical cystoprostatectomy is 10–35% [17–20]. The development of distant metastasis correlates with tumour stage and presence of lymph node invasion. In their series of cystoprostatectomies which included 788 patients, Hautmann et al. [18] reported the incidence of distant metastasis, all stages confined, to be 18%, with a mean time to metastasis of 12 months. In a series including 1054 patients, Stein and Skinner [17] reported the overall incidence of distant metastasis to be ≈22% at a mean follow-up of 12 months, and in that study ≈15% of the patients received neoadjuvant chemotherapy. A 10% incidence of distant metastasis was reported by Abou Elenein et al. [19] in a series of 450 RCs (Table 4).

We were unable to find an objective explanation for the relatively higher incidence of distant recurrence in PSC. TCC of the prostate (either contiguous or not) was diagnosed in up to 15% in the cystoprostatectomy specimen [21], with prostatic involvement being difficult to diagnose before surgery [22]; this led us to accept the hypothesis that opening of the venous channels during prostatic ablation in the presence of bladder tumour might enhance the dissemination of malignant cells.

The preservation of sexual function is a major concern in sexually active men, regardless of age. In their evaluation of nerve-sparing radical cystoprostatectomy, Walsh and Mostwin [23] reported that 67% of the patients included in the study were potent after surgery. Similar results were obtained by Marshall [24], who reported a 71% rate of preservation of

Table 3 Oncological results in series of PSC and RC.

Reference	No. of patients	Mean follow-up (months)	Local recurrence, *n* (%)	Distant metastasis, *n* (%)
PSC				
[9]	100	38	2 (2)	31 (31)
[11]	28	90	2 (7)	4 (14)
[12]	68	68	0	5 (7)
[13]	44	42	4 (7)	10 died from metastases
Present series	26	38	2 (7)	6 (23)
RC				
[17]	1054	122	77 (7)	234 (22)
[18]	788	54	73 (9)	140 (18)
[19]	450	38	50 (4)	179 (35)
[20]	145	15	27 (18)	31 (10)

Table 4 Functional results after nerve-sparing RC or PSC.

Reference	No. of patients	Mean age (years)	EF (for RC) or successful intercourse (PSC) (%)	Continence, % or *n* (%)	
				Day	Night
RC					
[23]	101	59	42	NR	
[24]	20	52	71	95[a]	
[25]	116	64	22	94	74
[18]	290	63	NR	84	83
[19]	450	NR	NR	93	80
PSC					
[9]	100	38	80	88 (97)	85 (95)
[11]	28	90	92	22 (79)	16 (59)
[12]	68	68	90	58 (95)	19 (31)
Present series	26	38	83	22 (95)	20 (86)

EF, erectile function; NR, not recorded.
[a] Overall continence.

erectile function in their series including 20 patients with a mean age of 52 years. However, Turner et al. [25] reported that the incidence of return of erectile function was $< 22\%$ in a series of 116 patients with a mean age of 64 years (Table 4).

The preservation of erectile function seems to be more successful in patients undergoing PSC than for the standard nerve-sparing procedure. Vallencien et al. [9] reported preservation of potency in 80% of the patients included in their series. This was confirmed by Terrone et al. [11] and Muto et al. [12], who reported preservation of erectile function in 92% and 90% of patients included in their studies. Age and preoperative erectile function were the main predictive factors for the postoperative recovery of potency. Avoiding disturbance to the neurovascular bundle along its course, especially at the level of the seminal vesicle and within the endopelvic fascia, seems to be the most important technical point for the successful preservation of erectile function (Table 4).

The evaluation of continence after PSC showed an improvement mainly in nocturnal continence and time to achieve continence; it also seems that, as with standard RC, the patient's age is an independent prognostic factor for recovery of continence. The evaluation of continence after standard RC, and even with a nerve-sparing protocol, shows excellent results (Table 4). Any correlation among serial continence results in different series, whether after PSC or standard RC, is biased by the nonuniformity of patient selection, together with a lack of standardization of definitions of continence in various series.

The present study had several limitations. There were few patients included. Although our aim was to include patients with T2 tumour, the definitive pathological results showed upstaging in $\approx 25\%$, with two discovered to have positive lymph nodes, although they were negative on frozen-section analysis, thus these two patients had a pT3b tumours. Two patients who had a TURP at the time of PSC were discovered to have an associated carcinoma of the prostate on their definitive pathology, if PSC is selected we recommend TURP be done earlier.

In conclusion, this evaluation of PSC showed a higher incidence of distant failure than for standard RC, and the functional results, especially erectile function and nocturnal continence, were subjectively better. We think that PSC can only be offered to patients who, after being well informed of the risks, prefer to preserve their sexual function and continence over appropriate tumour control.

Conflict of interest

None declared.

References

[1] Stein JP, Liekovsky G, Cote R. Radical cystectomy in the treatment of invasive bladder cancer: long term results in 1054 patients. *J Clin Oncol* 2001;**19**:666–75.

[2] Lebret T, Herve JM, Botto H. Study of survival after cystectomy for bladder cancer: report of 504 cases. *Prog Urol* 2000;**10**:553–60.

[3] Walsh PC, Mostwin JL. Radical prostatectomy and cystoprostatectomy with preservation of potency. Results using a new nerve-sparing technique. *Br J Urol* 1984;**56**:694–7.

[4] Turner WH, Danuser H, Moehrle K, Studer UE. The effect of nerve sparing cystectomy technique on postoperative continence after orthotopic bladder substitution. *J Urol* 1997;**158**(6): 2118–22.

[5] Walsh PC, Donker PJ. Impotence following radical prostatectomy: insight into etiology and prevention. *J Urol* 1982;**128**:492–7.

[6] Rivera I, Wajsman Z. Bladder-sparing treatment of invasive bladder cancer. *Cancer Cont* 2000;**7**:340–6.

[7] Spitz A, Stein JP, Lieskovsky G, Skinner DG. Orthotopic urinary diversion with preservation of erectile and ejaculatory function in men requiring radical cystectomy for nonurothelial malignancy: a new technique. *J Urol* 1999;**161**:1761–4.

[8] Colombo R, Bertini R, Salonia A, Da Pozzo LF. Nerve and seminal sparing radical cystectomy with orthotopic urinary diversion for select patients with superficial bladder cancer: an innovative surgical approach. *J Urol* 2001;**165**:51–5.

[9] Vallencien G, Abou El Fettouh H, Cathelineau X. Cystectomy with prostate sparing for bladder cancer in 100 patients: 10-year experience. *J Urol* 2002;**168**:2413–7.

[10] Botto H, Sebe P, Molinie V. Prostatic capsule- and seminal sparing cystectomy for bladder carcinoma: initial results for selected patients. *Urol Oncol* 2005;**23**:219–25.

[11] Terrone C, Cracco C, Rosseti RS. Supra-ampullar cystectomy with preservation of sexual function and ileal orthotopic reservoir for bladder tumor: twenty years of experience. *Eur Urol* 2004; **46**:261–7.

[12] Muto G, Bardari F, D'Urso L. Seminal sparing cystectomy and ileocapsuloplasty: long term follow up results. *J Urol* 2004;**172**: 76–80.

[13] Horenblas S, Mienhardet W, Ijzerman W. Sexuality preserving cystectomy and neobladder: initial results. *J Urol* 2001;**1766**: 837–40.

[14] Revelo MP, Cookson MS, Chang SS. Incidence and location of prostate and urothelial carcinoma in prostate from cystoprostatectomies: implication for possible apical sparing surgery. *J Urol* 2004;**171**:646–51.

[15] Winfield HN, Reddy PK, Lange PH. Coexisting adenocarcinoma of prostate in patients undergoing cystoprostatectomy for bladder cancer. *Urology* 1987;**30**:100–4.

[16] Stein JP, Clark P, Skinner DG. Urethral tumor recurrence following cystectomy and urinary diversion: clinical and pathological characteristics in 768 patients. *J Urol* 2005;**173**(4): 1163–8.

[17] Stein JP, Skinner DG. Results with radical cystectomy for treating bladder cancer. A 'reference standard' for high-grade, invasive bladder cancer. *BJU Int* 2003;**92**(1):12–7.

[18] Hautmann RE, Gschwend JE, de Petriconi RC, Kron M, Volkmer BG. Cystectomy for transitional cell carcinoma of the bladder: results of a surgery only series in the neobladder era. *J Urol* 2006;**176**(2):486–92.

[19] Abou Elenein H, Ghoneim M. Functional results of orthotopic ileal neobladder with serous-lined extramural ureteral reimplantation: experience with 450 patients. *J Urol* 2001;**165**:32–4.

[20] Honma I, Masumori N, Sato E, Takayanagi A, Takahashi A, Takahashi A, et al. Local recurrence after radical cystectomy for invasive bladder cancer: an analysis of predictive factors. *Urology* 2004;**64**(4):744–8.

[21] Saad M, Abdel-Rahim M, Abol-Enein H, Ghoniem MA. Concomitant pathology in the prostate in cystoprostatectomy specimens: a prospective study and review. *BJU Int* 2008;**102**: 1544–50.

[22] Stein JP, Hautmann RE, Penson D, Skinner DG. Prostate-sparing cystectomy: a review of the oncologic and functional outcomes. Contraindicated in patients with bladder cancer. *Urol Oncol* 2009;**27**(5):466–72.

[23] Walsh PC, Mostwin JL. Radical prostatectomy and cystoprostatectomy with preservation of potency. Results using a new nerve-sparing technique. *Br J Urol* 1984;**56**:694.

[24] Marshall FF. Ileocolic neobladder after cystectomy. *Urol Clin North Am* 1991;**18**(4):631.

[25] Turner WH, Danuser H, Moehrle K, Studer UE. The effect of nerve sparing cystectomy technique on postoperative continence after orthotopic bladder substitution. *J Urol* 1997;**158**(6): 2118.