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# Effect of Bladder Neck Preservation during Endoscopic Extraperitoneal Radical Prostatectomy on Urinary Continence

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Anja Dietel<sup>a</sup> George Sakellaropoulos<sup>c</sup> Abdulrahman Al-Aown<sup>b</sup>  
Evangelos Liatsikos<sup>a, b</sup><sup>a</sup>Department of Urology, University of Leipzig, Leipzig, Germany; Departments of <sup>b</sup>Urology and <sup>c</sup>Medical Physics, University of Patras, Patras, Greece**Key Words**

Bladder neck preservation · Continence · Extraperitoneal prostatectomy · Positive surgical margins · Prostatectomy

**Abstract**

**Objective:** The current study investigates the effect of bladder neck (BN) preservation on postoperative continence and positive surgical margins (+SMs). **Patients and Methods:** 150 patients (group 1) who underwent BN-sparing endoscopic extraperitoneal radical prostatectomy (EERPE) and 90 patients treated with EERPE and BN resection (group 2) were retrospectively evaluated. **Results:** Both groups were similar for age, prostate-specific antigen and prostate size. There was no significant difference in operative time, mean blood loss or transfusion rate. Mean catheterization time was similar. The overall +SM rates were very similar at 10.7% for group 1 and 10.0% for group 2 (group 1, pT2 = 5.1% and pT3 = 30.3%; group 2, pT2 = 2.9% and pT3 = 33.3%). One of 16 patients in group 1 and 1 of 9 in group 2 had a +SM at BN. Statistically significant differences in continence were observed 24 h after catheter removal and 3 months postoperatively between both groups. **Conclusion:** BN preservation proved to have an impact on postoperative early continence of patients undergoing EERPE. Continence of patients who underwent BN preservation was improved after catheter re-

moval and at the 3-month follow-up in comparison to those without BN preservation, but +SMs were not affected by the BN-sparing surgery.

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**Introduction**

Endoscopic extraperitoneal radical prostatectomy (EERPE) represents an established method for the treatment of localized prostate cancer. Since its introduction in 2001, we have gained considerable experience, with >2,400 cases treated with EERPEs [1]. The increasing experience and the report of novel anatomical data led us to technical refinements such as neurovascular bundle and puboprostatic ligaments preservation as well as the use of an energy-free technique for dissection [1–3]. Bladder neck (BN) preservation is another refinement of the EERPE procedure.

The precise anatomy of the BN and its effect on continence have proven difficult to clarify. In the transverse plane, the BN is composed of two different muscles, the ventrolateral and dorsal longitudinal muscles which are positioned in an oblique direction. When the BN is examined in a truly transverse direction, there is a distinct circular muscle called the musculus sphincter vesicae [2,

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3]. Since incontinence represents an important postoperative issue of radical prostatectomy, the above muscle should be preserved as it represents a part of the continence mechanism. Klein [4] was the first to report a technical modification to preserve the BN and to improve continence. Several other investigators have concentrated on the BN and its preservation or reconstruction as a method to improve postoperative continence. The current study investigates the effect of BN preservation on continence in patients that underwent EERPE.

### Patients and Methods

Retrospective evaluation of 240 patients who had undergone EERPE for localized prostate cancer between June 2005 and December 2008 was performed. A single surgeon performed all cases. The population was divided in two groups according to the BN method used. Group 1 included patients that underwent BN preservation (n = 150), while group 2 comprised patients without BN preservation but with racket handle repair of the BN (n = 90) at the 12 o'clock position. Performance of BN preservation was defined as the absence of racket handle repair of the BN during the procedure.

Perioperative parameters such as operative time, transfusion and conversion rates, catheterization time, pathological results and positive surgical margin rate (+SMR) were reviewed from our surgical database. Surgical complications and ensuing additional interventions were reviewed and classified according to Clavien.

Information regarding postoperative continence was assessed 24 h after catheter removal, and 3, 6 and 12 months after EERPE. All patients were followed up for  $\geq 1$  year. Urinary continence was evaluated using the International Continence Society questionnaire. Postoperative continence was defined as the absence of need for pads or the use of one pad daily for security. Occasional urine leakage requiring 2–3 pads/day was classified as mild stress incontinence during the day with normal activity, including moderate sporting activity like walking. Patients requiring  $>3$  pads daily were considered as incontinent.

Postoperative cystography was performed in all patients on the 5th postoperative day. If the anastomosis and reconstructed bladder site (in group 2) were watertight, the catheter was removed. In case of leakage, catheterization (5–10 days) and cystography were repeated.

Any differences in continence between both groups were tested for significance using Fisher's exact test in cases of one degree of freedom, i.e. when the corresponding contingency tables were  $2 \times 2$ , and the  $\chi^2$  test otherwise. Significance level was set at 0.05.

### Results

The patients in both groups were similar for age, prostate-specific antigen (PSA) and prostate size. Perioperative parameters such as operative time, mean blood loss or transfusion rate were similar. The mean time of cath-

**Table 1.** Patient data

Characteristics	BN preservation (group 1)	No BN preservation (group 2)
Patients, n	150	90
Age, years	61.3 (41–75)	61.6 (47–81)
PSA, ng/ml	8.22 (2.3–36.3)	9.23 (0.6–56)
Operative time, min	131.7 (65–225)	136.1 (75–330)
Blood loss, ml	275 (20–750)	261 (40–750)
Transfusion rate, %	2.0	1.0
Prostate weight, g	43.3 (20–105)	45.7 (16–112)
Catheterization, days	6.1 (4–23)	6 (4–20)
>14 days, %	1.30	3.30

eterization did not differ between both groups, but more patients in group 2 (3.30%) required a catheter for  $>14$  days compared with group 1 (1.30%; table 1).

Group 1 patients had a lower postoperative Gleason grade but similar overall pathological stage (table 2). Overall +SMRs were very similar at 10.7% for group 1 and 10.0% for group 2. Patients with pT2 and pT3 disease in group 1 had a +SMR of 5.1 and 30.3%, respectively. In group 2, the +SMR for pT2 and pT3 patients was 2.9 and 33.3%, respectively. Of the 16 patients in group 1 with +SM, only 1 was located at BN (12 at the apex and 3 at other locations). In group 2, only 1 of 9 patients had +SM at BN (6 at the apex and 2 at other locations; table 2). At 12 months, 91.7% of patients in group 1 and 91.3% in group 2 had PSA  $<0.1$  ng/ml.

Continence was assessed by recording the pad usage 24 h after catheter removal, and 3, 6 and 12 months postoperatively. Table 3 demonstrates postoperative continence data. One day after catheter removal, 19.9% of patients in group 1 were continent, 50% used 2–3 pads and 30.1% required  $>3$  pads. In the group without BN preservation, 9.4% were continent, 50.6% needed 2–3 pads and 40%  $>3$  pads. In both groups, continence improved significantly with time. At 3 months, 73.3% of group 1 and 61.3% in group 2 were continent. Continent patients represented 86.5% of group 1 and 80.6% of group 2 at 6 months. Mild stress incontinence was reported by 8.1 and 14.5% in groups 1 and 2, respectively. Incontinence was noted in 5.4% of group 1 and 4.9% of group 2 patients. At 12 months, 93.5 and 91.5% of group 1 and group 2 patients were continent, respectively. Significantly improved continence was observed in group 1 at the time of catheter removal ( $p = 0.038$ ) and 3 months postoperatively ( $p = 0.045$ ).

**Table 2.** Pathology results

	BN preservation (group 1)	No BN preservation (group 2)
<i>Postoperative Gleason score, %</i>		
4–6	45.5	38.2
7	22.0	31.6
8–10	32.5	30.2
<i>Overall stage</i>		
pT2	117 (78%)	69 (76.7%)
pT2a	17 (11.3%)	8 (8.9%)
pT2b	4 (2.7%)	6 (6.7%)
pT2c	96 (64%)	55 (61.1%)
pT3	33 (22%)	21 (23.3%)
pT3a	19 (12.7%)	15 (16.6%)
pT3b	14 (9.3%)	6 (6.7%)
<i>+SM, R1 (overall)</i>		
BN	16 (10.7%)	9 (10.0%)
Apex	1	1
Other	12	6
	3	2
pT2	5.1%	2.9%
pT3	30.3%	33.3%

## Discussion

EERPE and laparoscopic radical prostatectomy enlarge the operative field and enable close dissection of the BN and its preservation, thus improving early postoperative continence after radical prostatectomy and therefore quality of life [5]. In the current study, patients treated with BN preservation revealed an advantage with respect to early continence. Nevertheless, no statistically significant difference was observed 6 and 12 months postoperatively.

Controversy exists in the current literature regarding BN preservation. The reported advantage of earlier return to continence should be balanced against the possibility of an increased +SMR. Shelfo et al. [6] studied 365 patients having BN-preserving radical retropubic prostatectomy (RRP) and observed that 88% were continent at 6 months with 7% having a +SM at BN. Poon et al. [7] retrospectively studied 101 patients having BN-sparing RRP and compared continence rates with patients having BN reconstruction either with a racket handle repair or an anterior bladder tube reconstruction. High continence rates  $\geq 93\%$  were achieved regardless of the BN approach used. No significant difference between each technique was observed in terms of continence. However, they also observed +SMs at the BN in 27.4% of the BN preservation cases, which was not significantly different to the group without BN preservation [7]. An earlier return to continence was observed

**Table 3.** Postoperative continence

Continence	Pads	BN preservation (group 1)	No BN preservation (group 2)
After catheter removal	0–1	19.9	9.4
	2–3	50.0	50.6
	>3	30.1	40.0
$\chi^2$ test ( $p = 0.038$ )			
At 3 months	0–1	73.3	61.3
	2–3	16.8	27.5
	>3	9.9	11.2
$\chi^2$ test ( $p = 0.045$ )			
At 6 months	0–1	86.5	80.6
	2–3	8.1	14.5
	>3	5.4	4.9
$\chi^2$ test ( $p = 0.416$ )			
At 12 months	0–1	93.5	91.5
	2–3	4.8	6.4
	>3	1.7	2.1
$\chi^2$ test ( $p = 0.92$ )			

by Lowe [8] in BN preservation patients compared with BN reconstruction cases. Continence was reported in 23.3 and 11.2% of patients at 1 month, 62 and 44% at 3 months, and 70 and 82% at 6 months, respectively. No difference was observed 12 months after the procedure. Deliveliotis et al. [9] reported similar experience with improved early continence but no long-term difference.

The potential increase in +SMR is one of the main concerns regarding preservation of the BN. An early open RRP series reported +SM in 35–40% [10]. Nevertheless, the surgical techniques have been refined in open, laparoscopic and robotic surgery to yield much lower +SMRs. The review of 2,400 patients who underwent EERPE found a +SMR of 8 and 35.6% for pT2 and pT3 prostate cancers, respectively [11]. These results are similar to other large series and to open and robotic prostatectomy [12–14]. Srougi et al. reported a randomized trial studying the BN preservation in open retropubic radical prostatectomy. The latter study was stopped after including 70 patients since +SMs (10%) were only found at the BN site of BN preservation cases. Moreover, continence with BN preservation was not reported to be significantly improved [15]. Bianco et al. [11] reported +SMs at the BN in only 2% of patients during BN-sparing RRP. The study included 675 patients that were retrospectively evaluated. In general, the improvement in +SMRs observed in recent studies could be attributed to better surgical tech-

niques as well as earlier tumor detection in the era of PSA testing and screening.

The results of the current study reveal an advantage of BN preservation over BN reconstruction approaches in terms of immediate/early postoperative continence. BN preservation provides improved early continence, which is reflected by the higher percentage of continent and mildly incontinent patients after catheter removal and 3 months postoperatively. The continence rates of the patients who underwent the BN preservation procedure were higher during the remaining follow-up schedule without achieving statistical significance.

The oncological outcome of the EERPE procedure regarding the presence of +SMs was not compromised with the BN-sparing procedure. In fact, the overall +SMRs were similar for both groups. Specifically, 10.7 and 10% of the cases in groups 1 and 2 were observed to have +SMs, respectively. BN was the site for +SM in 1 of 16 cases in the BN preservation group and in 1 of 9 cases of the bladder reconstruction group. As a result, the BN approach during EERPE does not have an impact on the +SMs observed postoperatively.

There are several limitations to this study. Although the data on our patients are collected prospectively, the study is retrospective in nature and patients are not randomized. The BN approach was decided intraoperatively. Thus, it is possible that patients were selected according

to individual features and technical considerations encountered intraoperatively. Cases of large prostate, prominent middle lobe or more difficult dissection would likely be spared the BN preservation approach. Even though the current study does not address the impact of these factors, the perioperative parameters such as operative time, blood loss and the size of the prostate as well as postoperative follow-up parameters such as continence did not vary across the study groups and EERPE patients in our experience [1].

Another problem was the definition and quantification of BN preservation. Data regarding bladder neck preservation or reconstruction were recorded in the operative notes, but the issue of accurate recording remains unclear since the definition of BN preservation is subjective and based on the absence of ratchet handle repair of the BN and the direct suturing of the BN on the urethra. In an attempt to eliminate any subjective biases due to individual reporting of the BN approach used, we included cases that were operated by the same surgeon.

In conclusion, BN preservation proved to have a postoperative effect on early continence in EERPE-treated patients. Continence of patients who underwent BN preservation was improved after catheter removal and at the 3-month follow-up in comparison to those without BN preservation, but +SMs were not influenced by the performance of BN preservation.

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