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# Posterior Reconstruction and Outcomes of Laparoscopic Radical Prostatectomy in a High-Risk Setting

U. Anceschi, MD, M. Gaffi, MD, C. Molinari, MD, and C. Anceschi, MD

## ABSTRACT

**Background and Objectives:** To detail the technique and evaluate the impact of a personal modified posterior reconstruction technique (PDR) on the outcomes of extrafascial laparoscopic radical prostatectomy (eLRP) in a consecutive series of 52 patients affected by high-risk prostate cancer (HRPCa).

**Methods:** From October 2007 to March 2012, 52 patients underwent PDR during eLRP for HRPCa. Fifty-four patients who underwent eLRP for HRPCa with no PDR were considered as historical controls. Mean operative time (MOT), mean catheterization time (MCT), % continence and quality of life (QoL) at a scheduled follow-up, % anastomotic leakage, % adjuvant therapy were compared between the groups. Percentage of continence and QoL were prospectively assessed by self-administered validated questionnaires (ICI-Q-SF; SF-36) at 1, 3, 6, and12 months.

**Results:** PDR was associated wither higher continence rates at 1 and 3 mo ($P = .028$, $P = .006$), a lower incidence of cystographic leakage ($P = .002$), and an increased adjuvant radiotherapy rate ($P = .008$). At 1- and 3-mo interval, in the PDR group, we found a higher number of patients reporting better general health, ($P = .01$, $P = .03$) reduced role limitations due to physical health, ($P = .02$, $P = .001$), and emotional problems ($P = .001$, $P = .02$).

**Conclusions:** PDR is associated with a lower degree of anastomotic leakage, and it significantly enhances urinary continence at 1 and 3 mo. The increased adjuvant radiotherapy rate and quality of life after surgery observed with our technique suggest that in the high-risk setting an early functional recovery may substantially influence the oncologic outcome of eLRP.

**Key Words:** High-risk prostate cancer, Laparoscopic radical prostatectomy, Posterior reconstruction, Early continence.

## INTRODUCTION

Although no uniform definition for high-risk prostate cancer (HRPCa) exists, it is generally agreed that clinical suspicion of extraprostatic extension (cT3), high biopsy Gleason sum, (8–10) and high pretreatment PSA levels (≥20.0ng/mL) represent adverse disease characteristics.[1]

The best management of HRPCa remains debatable. In the last decade, for patients with HRPCa, urologists traditionally recommended radiotherapy or androgen deprivation therapy over radical prostatectomy (RP), because rates of incontinence with surgery were high and cure rates were discouraging.[2] With the development of a mini-invasive approach to RP and advancements in laparoscopic techniques, both morbidity and functional outcomes have improved substantially.[3,4]

According to several series, extrafascial laparoscopic radical prostatectomy (eLRP) in the high-risk setting appears to be a reasonable option in select cases,[5,6] but early recovery of urinary continence remains a challenge.[7] Posterior Denonvilliers' reconstruction (PDR) has recently emerged as a topic of current research interest in the attempt to improve the recovery of urinary continence after RP.[8]

We present a modified PDR performed in a series of 52 eLRPs for HRPCa. This report details the surgical steps, the feasibility, and the effectiveness of our technique in promoting early continence and enhancing QoL in men with high-risk disease.

Policlinico Tor Vergata, Department of Urology, Rome, Italy (Dr. U. Anceschi); S. Camillo-Forlanini Hospital, Department of Urology, Rome, Italy (Drs. Gaffi, Molinari, C. Acceschi).

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Address correspondence: to Umberto Anceschi, MD, Department of Urology, Viale dei Colli Portuensi 579 - CAP 00151 Rome (Italy). Policlinico Tor Vergata, Viale Oxford 81 00133- Rome – Italy. Telephone: +39–0665744402; Mobile: +39–3395836431, E-mail: umberto.anceschi@alice.it

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## MATERIALS AND METHODS

Between October 2007 and March 2012, 52 patients with HRPCa underwent eLRP with PDR (group A). As a historical control, 54 preceding patients with a suitable follow-up who had eLRP for HRPCa with no PDR (group B) were identified. Medical charts of all patients were reviewed from a prospectively maintained, institutional review board-approved database. All patients provided written informed consent prior to surgery. Each patient underwent preoperative tumor staging with chest/abdomen/pelvis contrast computed tomography scan (CT) or magnetic resonance imaging (MRI) and a comprehensive preoperative assessment. Characteristics of patients enrolled in the study are shown in **Table 1** and **Figure 1**, respectively. Patients affected by HRPCa who met one or more of the following criteria were included: cT3 disease, high biopsy Gleason sum ≥ 8; PSA levels ≥ 20ng/mL.[9] Any involuntary urine loss or pad use was chosen as the definition of incontinence. Patients with prior neoadjuvant therapy and impaired urinary continence before surgery were excluded from the analysis. All the procedures were performed by a single surgeon (CA) with extensive experience in eLRP for high-risk cases (>150 procedures).

### Surgical Procedure

Conventional laparoscopic radical prostatectomy has been described elsewhere extensively.[10] Briefly, a 5-port transperitoneal approach is used. An extended lymph node dissection is performed prior to RP, removing all lymphatic tissue between the external iliac vein and hypogastric vein above and below the obturator nerve, including the hypogastric and obturator lymph nodes.[11] The prostate anterior surface is exposed after defattering and the bladder neck (BN) is identified.

**Table 1.**
Patients' Baseline Characteristics

| Characteristics | PDR n=52 | No PDR n=54 | P Value |
|---|---|---|---|
| Age | 67.2 (52–74) | 64.5 (48–75) | .155 |
| BMI | 26 (23–28) | 26.1 (24–28) | .523 |
| Preoperative PSA | 24.2 (5–46) | 21.4 (4.3–68) | .615 |
| Mean Prostate size (g) | 56.2 (27–65) | 51.4 (31–80) | .118 |
| cT3 | 11 | 14 | — |
| Gleason Score ≥8 | 26 | 22 | . |
| PSA ≥20ng/mL | 18 | 19 | . |

Usually, in the high-risk setting, we do not spare the BN as a rule, and we dissect the prostate outside the lateral prostatic fascia (extrafascial RP), because the preservation of these structures may increase the likelihood of positive margins.[12] One of the key steps of our technique is blunt dissection of the posterior plane between the prostate and the rectal surface, sparing the posterior Denonvilliers' fascia (PDF). A deeper dissection at the perirectal fatty tissue should be avoided whenever possible, because if PDF is not adequately preserved, reconstruction may very difficult **(Figure 2)**.[8]

After puboprostatic ligaments are divided and the dorsal vein complex controlled with 12 mm-Ligasure Atlas, the anterior urethra is divided and the urethral lumen opened. Finally, the specimen is entrapped in the endobag.

PDR is done by placing a running Monosyn 2–0 suture on a UR-6 needle, approximating the cephalad Denonvilliers' fascia (posteriorly to the bladder) to the cut edge of the distal paraurethral Denonvilliers' remnant. The initial suture is placed at the posterior bladder neck 1cm to 2cm from its luminal edge **(Figure 3)**. The next suture is placed through the tissue posterior to the transected urethra **(Figure 4)**. PDR is provided by a running suture performed in an anticlockwise fashion. On tying this suture, reconstructed PDR provides posterior support to the vesicourethral anastomosis (VUA), while the bladder neck descends close to the urethral stump **(Figure 5)**. A standard completion of the vesicourethral anastomosis with interrupted stitches followed in both groups.[13] A drain was left in the Retzius space before desufflation.

Cystogram was performed in all patients prior to catheter removal. If no significant leak was detected, a trial to void was conducted **(Figure 6)**. In case of urinary leakage, the catheter was left in place and the cystogram repeated after a few days.

Continence rates and patients' health- related QoL were assessed with self-administrated validated ICQ-SF[14,15] and SF-36[16] questionnaires, respectively, at a scheduled follow-up (1, 3, 6, 12 mo after surgery). Sexual function evaluation was excluded for all extrafascial prostatectomies. No continence rehabilitation program was provided postoperatively in both groups. In case of positive surgical margins (PSMs) after eLRP, either immediate adjuvant radiotherapy or clinical monitoring followed by salvage radiotherapy when PSA exceeded 0.5 ng/mL were offered, according to patient's preference. During follow-up, any patient who was not referred to the radiotherapy unit of our hospital was excluded from the analysis. Patients with any pelvic lymph node involvement, regardless

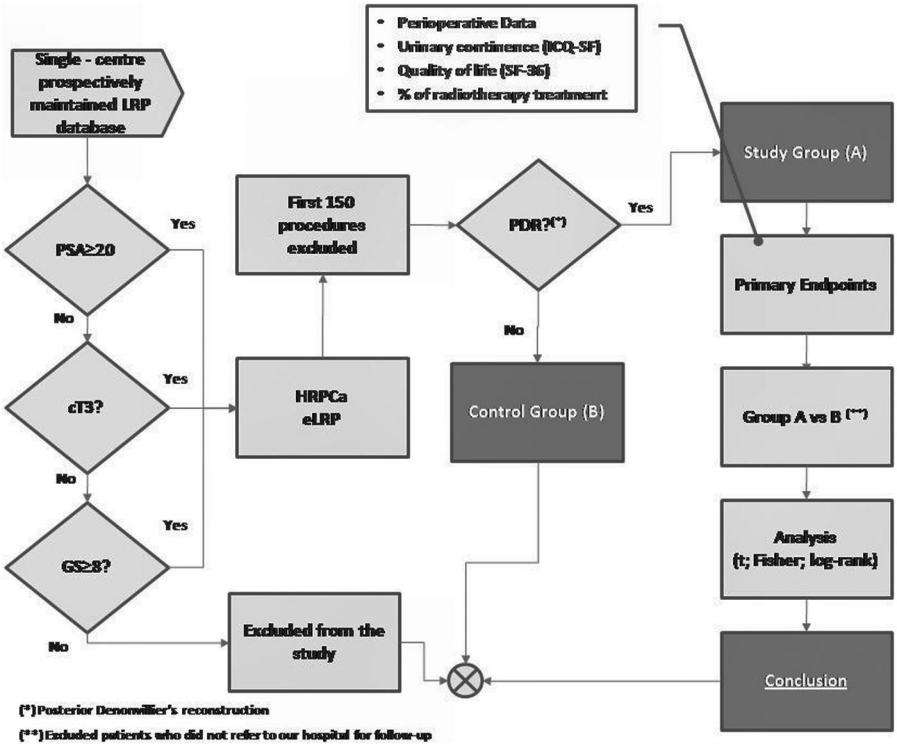


**Figure 1.** Summary of the study.

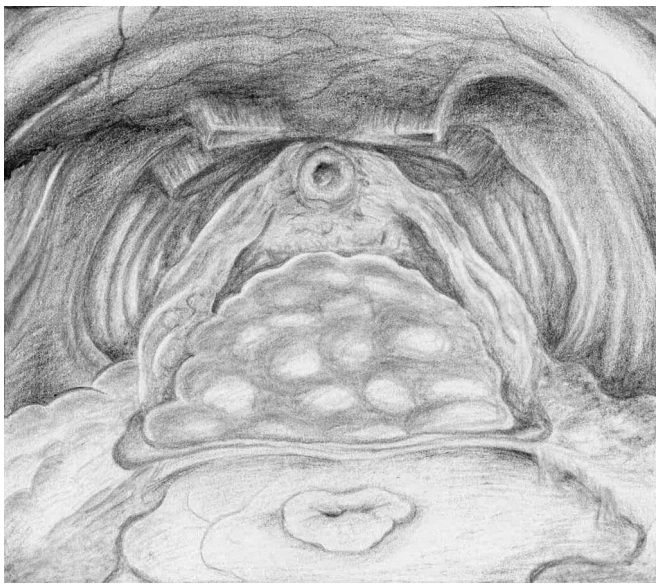

**Figure 2.** Intraoperative view after specimen retrieval.

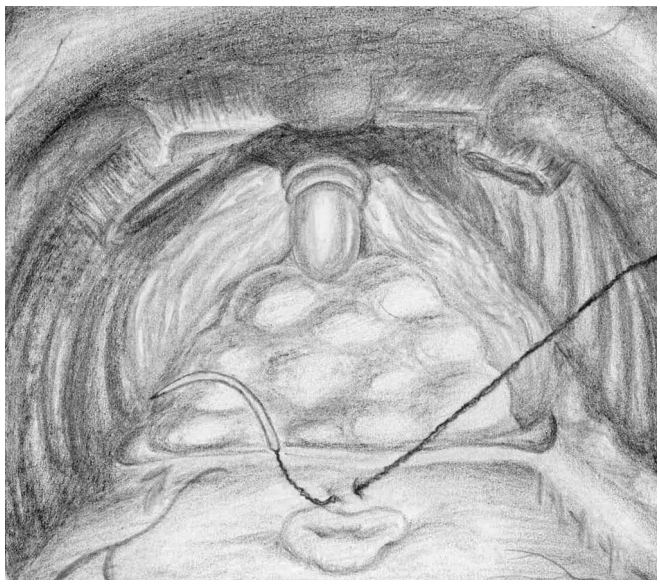

**Figure 3.** PDR reconstruction. Suture started at the posterior bladder neck.

of the status of the surgical margins, underwent adjuvant hormonal treatment.

Statistical analysis was performed using SPSS v.13 (SPSS Inc, Chicago, IL, USA). Fisher z test and Student *t* test were used for continence score and comparison of mean values, respectively. Continence status at 1 and 3 mo and the probability of adjuvant radiotherapy after surgery were assessed with the Kaplan-Meier method and compared in

**Figure 4.** Anticlockwise running suture placed through the tissue posterior to the transected urethra.

both groups with the log-rank test. A P value of $< 0.05$ was considered statistically significant.

## RESULTS

A comparison of preoperative characteristics between the 2 groups is presented in Table 1. There were no significant differences in body mass index, clinical or pathologic tumor stage and grade, preoperative PSA, prostate size, and number of lymph nodes removed.

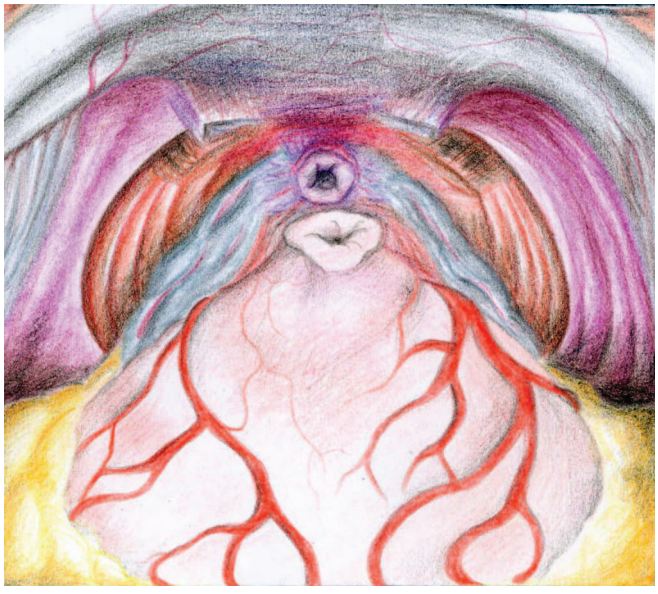

**Figure 5.** PDR completed. Final aspect before vesicourethral anastomosis.

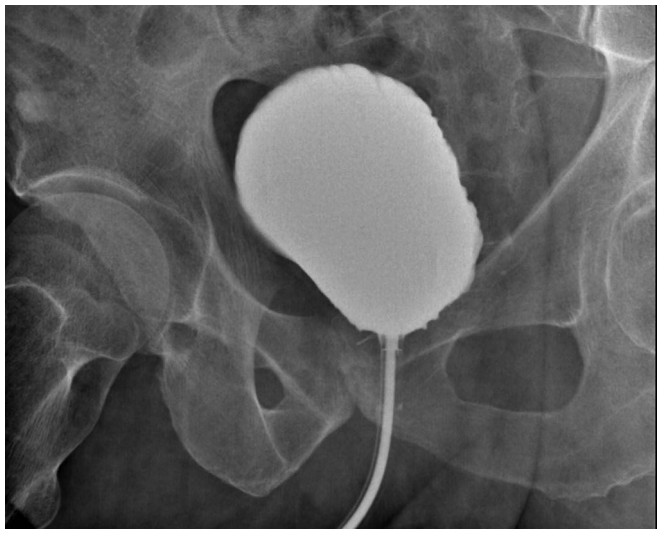

**Figure 6.** Cystogram in a patient with PDR showing no urinary leakage (sixth postoperative day).

**Table 2.**
Perioperative Parameters

| Results | PDR N=52 | No PDR N=54 | P Value |
|---|---|---|---|
| Mean operative time | 218 (122–412) | 230 (90–270) | .142 |
| Mean hospital stay | 6.8 | 7.2 | .440 |
| Urinary leakage (Cystogram) | 6 | 13 | .002 |
| Urinary retention | 2 | 4 | .519 |
| Mean lymph node number | 20 (12–28) | 22 (9–26) | .654 |
| Mean catheterization time | 7 | 11 | .118 |

Perioperative data are shown in Table 2. Mean operative time, mean catheterization time, mean hospital stay, and acute urinary retention rates were not statistically different between the groups. PDR technique resulted in lower anastomotic leakage rate ($P = .002$). The 2 groups had no significant differences in their pathologic stages, in the frequency of PSMs, and in the Gleason score of the surgical specimen **(Table 3)**. In the PDR group, the overall PSM rate was 32%, and the PSM rates in patients with pT2 and pT3 tumors were 25% and 30%, respectively. In the control group (no PDR), the overall PSM rate was 33%, and the PSM rates in patients with pT2 and pT3 tumors were 26% and 29%, respectively. The proportion of pa-

tients undergoing adjuvant radiotherapy was significantly higher in the PDR group ($P$ = .008; log-rank test, $P$ = .0056; **Figure 8**) while the salvage radiotherapy rate was higher in the no PDR group **(Table 3)**.

Median follow-up for urinary continence was 12 mo for the entire population. **(Table 4)**. Significant differences were recorded in the study group at both 1-mo and 3-mo intervals, respectively.

In the no-PDR group, the continence rates at 1, 3, 6, and 12 mo after catheter removal were 37%, 54%, 70%, and 72%, respectively. In the PDR group, the continence rates at 1, 3, 6, and 12 mo after catheter removal were 69%, 86%, 67%, and 73%, respectively. PDR technique resulted in significantly greater continence rates at 1-mo and 3-mo ($P$ = .0028; $P$ = .006; log-rank test, $P$ = .0002; **Figure 7**), although the rates at 6 mo and 12 mo were not significantly affected **(Table 4)**.

Finally, the proportion of patients returning to their baseline scores in all of the SF-36 domains was significantly different between groups **(Table 5)**. At 1- and 3-mo intervals, we found in the PDR group a higher number of patients reporting better general health, (1 mo: 92% $P$ = .001; 3 mo: 81% $P$ = .03) reduced role limitations due to physical health (1 mo: 62% $P$ = .02; 3 mo: 84% $P$ = .001) and emotional problems, respectively. (1 mo: 86%; $P$ = .001; 3 mo: 77%; $P$ = .02).

**Table 3.**
Pathologic Results

| Results | PDR n=52 | No PDR n=54 | P Value |
|---|---|---|---|
| pT2 | 12 | 18 | .243 |
| pT3 | 34 | 29 | .870 |
| pT4 | 6 | 7 | .569 |
| PSM rate pT2 | 25% | 26% | .714 |
| PSM rate pT3 | 30% | 29% | .629 |
| Overall PSM rate | 32% | 33% | .429 |
| Adjuvant radiotherapy rate | 16 (30.7%) | 6 (11.1%) | .008 |
| Salvage radiotherapy rate | 5 (9.6%) | 8 (14.8%) | .521 |

## DISCUSSION

In recent years, with the magnified stereoscopic view provided by laparoscopic surgery and the evolution of surgical technique, morbidity related to RP has been significantly reduced. As a consequence, indications for RP have been extended even to patients with high-risk prostate cancer who traditionally were offered radiotherapy or hormonal therapy.[2]

Several studies have shown excellent results in improving the continence rate after RP by a posterior reinforcing suture prior to VUA.[17] According to Nguyen et al.[18] the rationale behind PDR is that a reapproximation of the distal and proximal Denonvilliers' fascia remnants recreates posterior support. This theoretically improves the dynamic function and anatomical length of the urethral

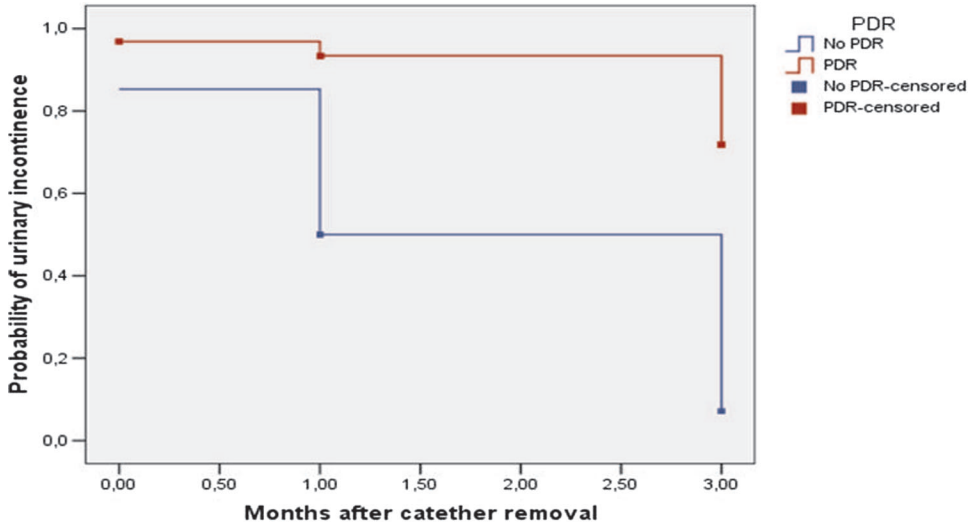


**Figure 7.** Kaplan-Meier analysis showing the probability of urinary continence after laparoscopic radical prostatectomy in the high-risk setting, with and without PDR.

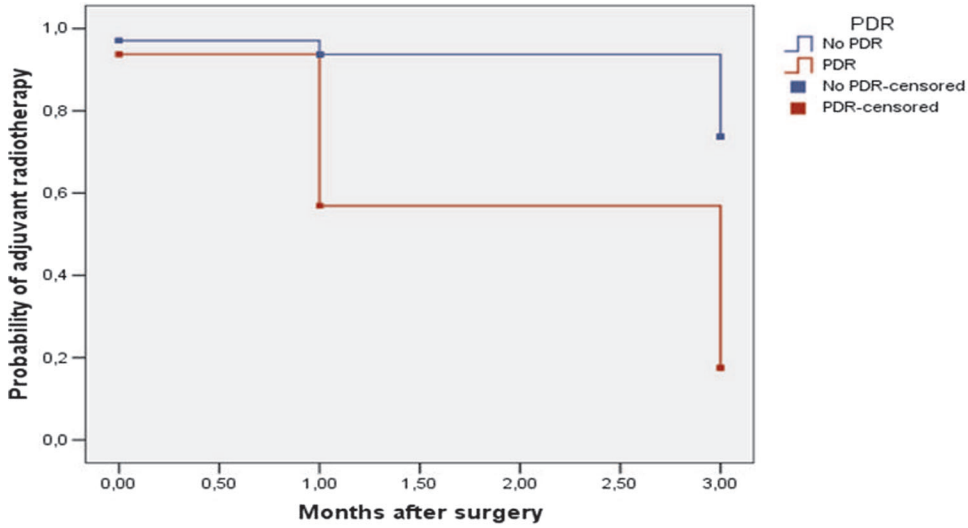


**Figure 8.** Kaplan-Meier analysis showing the probability of adjuvant radiotherapy after laparoscopic radical prostatectomy in the high-risk setting, with and without PDR.

**Table 4.**
Continence Rates

| Continence Rate | PDR n=52 | No PDR n=54 | P Value |
|---|---|---|---|
| Catheter Removal (1 week) | 19% | 22% | .657 |
| 30 days | 69% | 37% | .028 |
| 90 days | 86% | 54% | .006 |
| 180 days | 67% | 70% | .258 |
| 12 months | 73% | 72% | .820 |

stump, increasing continence rates. Since the initial description by Rocco et al.[9] and the introduction of robotic radical prostatectomy (RALP),[19] several reconstruction techniques with multiple variations have been described with conflicting outcomes.[8,20]

To our knowledge, no major series have investigated selectively the impact of PDR on the functional outcomes of eLRP for HRPCa. The continence rates in our series at 1, 3, 6, and 12 mo were 69%, 86%, 67%, 73%, respectively. At 1- and 3-mo intervals, these results seem to be comparable to results of other larger laparoscopic and robotic series,[7,21] but a significant decrease in urinary continence rate at 6 and 12 mo was observed in our groups, showing no benefit of PDR at a longer follow-up **(Table 4)**.

Variations in the techniques described for PDR may justify the disparity of our results with the data reported in the literature. Additionally, because intrafascial LRP for organ-confined PCa has shown a better continence rate compared to conventional LRP,[11] our negative trend may be related to the whole number of eLRP considered. Furthermore, a large number of patients in the study group underwent adjuvant radiotherapy, which adversely affects early and late urinary continence **(Figure 8)**.[22]

While it is debatable whether adjuvant radiotherapy improves biochemical-free survival and reduces the risk of local recurrence, the profound impact of radiation side-effects on patient's health-related QoL remains clear.[2] We believe that an early experience of urinary incontinence after eLRP may influence patient's adhesion to multimodal therapy. Thus, in the high-risk setting, a faster continence recovery after surgery may increase patient's compliance to an eventual postprostatectomy irradiation as demonstrated by the higher rate of adjuvant radiotherapy in the study group. This provides, indirectly, a further rationale for PDR, especially in high-risk disease.

Our study has several limitations. We analyzed a small series of patients, using a historical control group for the comparison. Then, we considered only patients with high-risk disease, which precludes a direct comparison with other series characterized by less-selective inclusion criteria.

We are aware that long-term follow-up and prospective randomized trials with larger series are necessary before adopting a new technique in routine surgical practice. Although the impact of PDR on long-term continence was less accentuated in our series, this technique is reproduc-

**Table 5.**
QoL Results According to SF-36 Domains

| SF-36 | Physical Functioning | | | Role Limititations (Physical) | | | Bodily Pain | | | General Health | | | Vitality | | | Social Functioning | | | Role Limitations (Emotional) | | | Mental Health | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Group*** | *PDR* | *No PDR* | P | *PDR* | *No PDR* | P | *PDR* | *No PDR* | P | *PDR* | *No PDR* | P | *PDR* | *No PDR* | P | *PDR* | *No PDR* | P | *PDR* | *No PDR* | P | *PDR* | *No PDR* | *P* |
| 1 months | 76% | 73% | .30 | 62% | 40% | .02 | 88% | 88% | .90 | 92% | 64% | .01 | 70% | 68% | .78 | 70% | 65% | .84 | 86% | 44% | .001 | 100% | 98% | .85 |
| 3 months | 75% | 75% | .61 | 84% | 46% | .00 | 91% | 92% | .86 | 81% | 53% | .03 | 75% | 70% | .88 | 69% | 62% | .76 | 77% | 41% | .02 | 98% | 98% | .92 |
| 6 months | 69% | 66% | .89 | 72% | 71% | .85 | 92% | 96% | .84 | 66% | 50% | .76 | 72% | 75% | .81 | 64% | 61% | .60 | 76% | 55% | .61 | 98% | 100% | .88 |
| 12 months | 60% | 68% | .83 | 72% | 78% | .90 | 94% | 96% | .81 | 66% | 50% | .52 | 72% | 75% | .66 | 69% | 75% | .41 | 75% | 64% | .68 | 99% | 100% | .95 |

ible with no increase in mean operative time. The approximation of posterior bladder neck to the urethral stump resulted in a reinforced watertight closure of the VUA as confirmed by the low anastomotic leakage rate in the study group **(Table 2 and Figure 5)**.

Because urinary incontinence remains a common and distressing consequence of eLRP especially in the high-risk setting, the introduction of surgical techniques that may improve early functional outcomes and lower the adverse effects on QoL should be encouraged.

## CONCLUSION

PDR has an impact at 1 and 3 mo on urinary continence but offers no clear advantages at a longer follow-up. A lower incidence of cystographic leak and an increased adjuvant radiotherapy rate were also observed in the study group. Whether PDR may significantly influence the early oncologic outcome of eLRP in the high-risk setting should be proven on larger randomized trials.

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