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Retrospective Study of Laparoscopic Radical Prostatectomy for Localized Prostate Cancer after Transurethral Resection of the Prostate Compared with Retropubic Radical Prostatectomy at the Same Institution

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Abstract

Background: Radical prostatectomy (RP) for localized prostate cancer after transurethral resection of the prostate (TUR-P) is technically difficult because of periprostatic adhesion and changes in the form of the prostate. The advantages of laparoscopic RP (LRP) over retropubic RP (RRP) include a less invasive operation through a small wound, a clearer field of vision, and reduced blood loss, and, therefore, LRP may represent the optimal method for RP after TUR-P. The present study compared clinical, oncological, and pathological outcomes between LRP and RRP after TUR-P at our institution.

Methods: Twenty patients underwent TUR-P for benign prostatic hyperplasia, followed by LRP (12 patients) or RRP (8 patients) after localized prostate cancer was diagnosed at our institution from November 1998 through December 2006. Median patient age was 67.5 years (range, 52–73 years). The median duration of follow-up was 96 months (range, 60–144 months). Operative time, volume of blood loss, duration of indwelling urethral catheter use, degree of urinary incontinence, pathological findings, oncological outcomes, and complications were compared between LRP and RRP.

Results: No significant difference in operative time or amount blood loss was recognized between LRP and RRP. Urinary incontinence in the early and late postoperative periods was significantly more severe after LRP than after RRP. Oncological outcomes and results of pathological examinations were comparable between LRP and RRP.

Conclusion: We found no significant differences in clinical, pathological, and oncological outcomes, except for urinary incontinence, between LRP and RRP.
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Key words: laparoscopic radical prostatectomy, localized prostate cancer, post-transurethral resection of the prostate, retropubic radical prostatectomy

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Introduction

The incidence of prostate cancer 7 years after transurethral resection of the prostate (TUR-P) has been reported to be approximately 4%[1]. The prognosis of stage A prostate cancer detected after TUR-P is generally good, but stage A2 prostate cancer requires aggressive treatment[2–4]. Although radical prostatectomy (RP) is widely performed to treat localized prostate cancer, many studies have shown that retropubic RP (RRP) and laparoscopic RP (LRP) are difficult to perform after TUR-P because perforation of the prostatic capsule during TUR-P with extravasation of blood and irrigation fluid can result in periprostatic fibrosis and distortion of the surgical planes[1,2,5–7].

LRP is a new procedure, and learning the correct operative technique requires a certain level of experience. However, the advantages of LRP over RRP include a less invasive operation through a small wound, clearer fields of vision, and less blood loss[8]. LRP as performed by an experienced surgeon may thus represent the optimal technique for technically difficult RP after TUR-P. However, to our knowledge, no reports have compared LRP and RRP after TUR-P at the same institution in Japan.

The present study retrospectively compared clinical, pathological, and oncological outcomes between LRP and RRP performed for localized prostate cancer after TUR-P at our institution.

Materials and Methods

The subjects were 20 patients who underwent TUR-P for benign prostatic hyperplasia, followed by RP (LRP for 12 patients and RRP for 8 patients) for localized prostate cancer at our institution from November 1998 through December 2006. In 3 of the 8 patients treated with RRP and 7 of the 12 patients treated with LRP prostate cancer was diagnosed on the basis of prostate biopsies after high levels of prostate-specific antigen (PSA) had been observed during follow-up. In the remaining 10 patients (50%), 5 treated with 5 RRP and 5 treated with LRP, prostate cancer was diagnosed incidentally during TUR-P. Patients with high levels of PSA underwent 14-core biopsy under transrectal ultrasonography and received a definitive diagnosis of adenocarcinoma. The TNM classification was determined in all cases according to the results of computed tomography, magnetic resonance imaging, and bone scintigraphy after localized prostate cancer was diagnosed. None of the patients received hormonal therapy before RP.

LRP was performed with a transperitoneal approach as previously described[9]. The method reported by Walsh et al. was used for RRP[10]. Lymph-node dissection was performed in all cases, but neurovascular bundle preservation was not attempted. Levels of PSA were measured every 3 to 6 months postoperatively. A PSA failure was defined as a level ≥0.2 ng/mL after RP. Urinary incontinence was evaluated at 1, 6, 12, and 24 months after surgery with the daily number of pads and defined as mild (0–1 pads), moderate (2–4 pads), or severe (5 or more pads). The median observation period after RP was 96 months (range, 60–144 months).

Clinical factors and pathological findings were compared between RRP and LRP. Variables for clinical analysis included intraoperative complications, operative time, amount of blood loss, duration of indwelling urethral catheter use, degree of urinary incontinence, postoperative complications, and PSA failure. Pathological examinations comprised determinations of the Gleason score, staging, and surgical margins.

All data are expressed as median ± standard deviation (SD). Comparisons between groups were performed with Student's *t*-test. Differences with $P < 0.05$ were considered statistically significant.

Results

Patient Characteristics

The median age, the preoperative PSA level, and the clinical T stage did not differ between patients treated with LRP and those treated with RRP groups (**Table 1**). The median interval from TUR-P to RP did not differ significantly between LRP (43 months; range, 4–120 months) and RRP (21 months; range, 2–168 months) for all prostate tumors. For

Table 1 Patient characteristics

	RRP	LRP	*P*-value RRP vs. LRP
Number	8	12	—
Age (years)	67.5 (52–72)	69.0 (55–73)	NS
PSA (ng/mL)	7.6 (2.2–33.0)	6.5 (0.6–18.0)	NS
Interval from TUR-P to RP (months)	21 (2–168)	43 (4–120)	NS
Clinical stage			NS
T1a	1	2	
T1b	4	3	
T1c	1	2	
T2a	2	4	
T2b	0	1	

Table 2 Pathological examinations

	RRP (n = 8)	LRP (n = 12)	*P*-value RRP vs. LRP
Specimen volume (g)	28.5 (15–62)	31 (12–56)	NS
Gleason score			NS
≤6	5	7	
7	2	4	
≧8	1	1	
Pathological stage			NS
pT0	2	0	
pT2a	1	5	
pT2b	3	1	
pT2c	1	4	
pT3a	1	2	
Surgical margin			NS
Negative	7	10	
Positive	1	2	

prostate cancers diagnosed incidentally during TUR-P, the mean interval from TUR-P was 4 months for LRP and 6 months for RRP. For prostate cancers diagnosed with prostate biopsy, the mean interval from TUR-P was 84 months for LRP and 77 months for RRP.

Pathological Examinations

Cases of pT2a and pT2c tended to be more frequent with LRP, and cases of pT2b tended to be more frequent with RRP, but difference between the groups was not significant (**Table 2**). Well-differentiated adenocarcinoma was the most common diagnosis (12 of 20 patients) in both patients treated with LRP and those treated with RRP. Positive surgical margins were identified in 2 patients (16.7%) treated with LRP and in 1 patient (12.5%) treated with RRP.

Clinical Examinations

Median operative time, median blood loss, and duration of indwelling urethral catheter use did not differ significantly between LRP and RRP (**Table 3**). Both in the early postoperative stage (<1 month after RP) and in the late postoperative stage (>2 years after RP), urinary incontinence was significantly less severe with RRP than with LRP.

Complications

Rectal injury was identified in 2 patients treated with LRP and 1 patient treated with RRP (**Table 4**). Furthermore, bladder injury occurred in 2 patients treated with LRP. Anastomotic leakage was found in 2 patients treated with LRP and 1 patient treated

Table 3 Clinical examinations

	RRP (n = 8)	LRP (n = 12)	*P*-value RRP vs. LRP
Operative time (min)	272 ± 67	255 ± 117	NS
Blood loss (mL)	2,145 ± 1,651	750 ± 879	NS
Duration of indwelling urethral catheter use	14 (7–30)	10 (6–90)	NS
PSA failure	3	2	NS
Urinary incontinence (early)			$P<0.05$
Mild	5	3	
Moderate	3	5	
Severe	0	4	
Urinary incontinence (late)			$P<0.01$
None	8	4	
Mild	0	6	
Moderate	0	1	
Severe	0	1	

Table 4 Intraoperative and postoperative complications

	RRP (n = 8)	LRP (n = 12)
Blood loss > 2,000 mL	4	3
Rectal injury	1	2
Bladder injury	0	2
Anastomotic leakage	1	2
Urethral stricture	1	0
Inguinal hernia	0	3
Vesicorectal fistula	0	1

with RRP. Inguinal hernia developed in 3 patients treated with LRP. A vesicorectal fistula developed in 1 patient after LRP but was successfully closed after 3 months.

Discussion

Performing RP after TUR-P is often considered technically difficult because of the anatomical differences that result from a general decrease in transitional zone volume, the obscure border between the bladder neck and the prostate, and periprostatic adhesions[2,5,6,11]. As a result, many studies have found that RP after TUR-P is inferior to RP without previous TUR-P in terms of clinical factors, such as operative time and intraoperative complications[2,5,6,11]. In addition, pathological findings and functional outcomes for RP after TUR-P reportedly show some problems in comparison with RP without previous TUR-P[2,6].

The potential advantages of LRP over RRP include reduced blood loss, improved visualization and better preservation of anatomical structures, and a shorter period of convalescence[8]. We assumed that LRP after TUR-P would show advantages over RRP after TUR-P. Therefore, we compared clinical factors, pathological findings, and oncological outcomes between LRP and RRP after TUR-P.

First, we considered intraoperative factors. The median blood loss with LRP was 750 mL, which was more than the 450 to 458 mL described in some earlier studies[2,6]. However, other studies found levels of blood loss similar to those of the present study[5,7]. We found no significant difference in the amount of blood loss between LRP and RRP, although blood loss tended to be less with LRP than with RRP (p= 0.059).

Results such as the amount of blood loss showed a tendency in the present study to be associated with operative time. This association was attributed to the field of view being obscured by bleeding due to periprostatic fibrosis and to distortion of the surgical planes, both of which increased operative time. In conventional articles, operative time of RP after TUR-P was significantly greater than that of RP without TUR-P[2,5–7]. However, operative time for LRP was 255 minutes and was comparable to that in other studies[5,7]. Moreover, we found no significant difference between LRP and RRP in terms of

operative time, although operative time tended to be shorter with LRP than with RRP. Accordingly, we believe that LRP following TUR-P tends to be less invasive than RRP following TUR-P.

Complications, such as bleeding, rectal injury, bladder injury, and anastomotic leakage, were similar to those in conventional reports[2,5,6]. However, we have the impression that the rate of complications (rectal injury, anastomotic leakage and bladder injury) in the present study was slightly higher with LRP than with RRP, but the difference was not significant because of the small number of RP cases. However, we believe that LRP requires more skill than does RRP. In terms of indices of surgical invasiveness, such as blood loss, operative time, and complications, LRP after TUR-P appears equal to RRP after TUR-P.

Some studies have found that oncological outcomes of RP after TUR-P are worse than those of RP without previous TUR-P[5,6], whereas other studies have found the converse[2,12]. In the present study, the rate of positive surgical margins was comparable between RRP (12.5%) and LRP (16.7%) and were lower than in other studies[6,11,12]. In addition, we found no significant difference between LRP and RRP in terms of the rate of PSA failure after 8 years. Therefore, we consider RP after TUR-P to be oncologically safe, with no significant difference between LRP and RRP.

Postoperative urinary incontinence affects quality of life, but previous studies have found that the severity of urinary continence is equivalent between LRP and RRP[13,14]. However, in the present study, urinary continence was more severe after LRP than after RRP. The cause of this difference is unclear, but a possible contributing factor is sphincter insufficiency due to coagulatory hemostatic maneuvers for some parts of the dorsal vein complex in LRP. However, for the present cases, we could not reach a clear conclusion due to the effects of such factors as neurogenic bladder, overactive bladder, and intrinsic sphincter deficiency.

In addition, nerve-sparing surgery (NSS) was not performed in the present study. Because we believe that the neurovascular bundle is difficult to identify in RP after TURP, we did not perform NSS. This failure to perform NSS is a possible reason for the relative scarcity of positive surgical margins. However, we must make greater efforts to perform NSS in the future, because the prognosis for stage A prostate cancer is good.

In the present study, no significant differences were recognized in clinical, pathological, and oncological outcomes between LRP and RRP. However, LRP appears to produce more severe postoperative urinary incontinence than does RRP. Improvements in technique are thus needed. Furthermore, limitations of this study included the small number of cases, differences in patient characteristics, and the retrospective design. We therefore intend to study a larger number of cases and to use a prospective design in the future. In addition, we will need to examine the differences between RP without TUR-P and RP after TUR-P.

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