Journal of Surgery
Farzat M, et al. J Surg 8: 1833
www.doi.org/10.29011/2575-9760.001833
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Research Article

Postoperative outcomes of Robot Assisted Radical Prostatectomy (RARP) after previous Transurethral Resection (TUR-P)

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Citation: Farzat M, Sukhanov J, Sharabaty I, Holtmannspötter C, Weib P, et al. (2023) Postoperative outcomes of Robot Assisted Radical Prostatectomy (RARP) after previous Transurethral Resection (TUR-P). J Surg 8: 1833 DOI: 10.29011/2575-9760.001833

Received Date: 21 June, 2023; **Accepted Date:** 24 June, 2023; **Published Date:** 26 June, 2023

Abstract

Objectives: A significant part of men have had a Transurethral Resection of the Prostate (TURP) Prior to Robot Assisted Radical Prostatectomy (RARP) for prostate cancer. Numerous studies reported inferior perioperative, oncological, and functional outcomes in those patients. Some authors even recommended open approach to treat such challenging cases. This study investigates the impact of previous TURP on the perioperative course after RARP in a single surgeon cohort of 500 consecutive cases.

Methods: Data of 500 patients from a tertiary referral center who underwent RARP was prospectively collected and afterwards retrospectively analyzed. Patients were divided into two groups: group1 standard RARP (sRARP) (n=466, 93,2%), and group 2 (RAPTUR) patients who received prior TURP (n=34, 6,8%). Demographic and perioperative data were analyzed. Postoperative outcomes, complications and readmission rates were compared between groups.

Results: the neurovascular bundles could be less spared in RAPTUR patients. All intraoperative parameters including length of hospital stay and catheter days were similar between groups. Rates of positive surgical margins were low in total and comparable in both groups (7,1% sRARP and 8,8% RAPTUR group). Groups were similar regarding hospital stay, catheter days, readmission rates, minor and major complications.

Conclusion: At large, RARP in men with previous TURP, may be challenging regarding nerve sparing. Nevertheless, results are comparable to patients without previous intervention. RARP in this cohort presents a solid therapy choice.

Keywords: Prostate cancer; RARP; Readmissions; TURP

Introduction

Nowadays Robot Assisted Radical Prostatectomy (RARP) is the standard approach in the surgical treatment of localized prostate cancer [1]. With growing surgical experience more patients, who were usually referred to radiation therapy, are being considered for the procedure. Yet plenty of men may have had a previous transurethral resection of the prostate to alleviate preexisting LUTs [2-4]. RARP after TURP necessitates longer operating times, greater blood loss, and results in higher complication rates and worse short-term continence outcomes [5]. Some authors found RARP after foregoing intervention to be combined with inferior oncological and functional results with severe incontinence reaching 25% [6,7]. Leyh-Bannurah et al. reported a compromise to functional long-term outcomes like potency and continence in a large cohort of almost 5000 men [8]. Others found it technically more challenging, but safe and feasible regarding long term functional and oncological results [9,10]. Some even recommended open approach in this group of men [11]. Some restricted it only for experienced surgeons [12]. RARP past TURP is also associated with longer Catheter days [13], Higher PSM, longer OR time and worse continence rates [12]. Generally, the impact of prior TURP on RARP is controversial. We aim in this study to investigate the functional and oncological outcomes in this cohort of men in a tertiary hospital operated by one surgeon.

Methods

All procedures (n=500) were completed transperitoneally with the Da Vinci X® Surgical Systems (Intuitive Surgical, Sunnyvale, CA, USA). All men received pelvic lymphadenectomy as well. No intraabdominal drainage was introduced. Prior to skin incision, intravenous single-shot antibiotics were administered. The Vesicourethral Anastomosis (VUA) was done in a one-layer fashion with a continuous circumferential double-armed barbed suture. In patients were the bladder neck could not be spared, a tennis-racket ventral reconstruction was done. A one layer Rocco stitch was incorporated in the anastomosis in majority of cases. After completion, patients received intraoperatively anastomosis water-tightness test with 200-300 ml sterile water. A transurethral (TUC) and a Suprapubic Catheter (SPC) were inserted in all men. After removing the transurethral catheter on the first postoperative day, patients were permitted to urinate spontaneously on POD 3-4. When the micturition trial was uneventful, the SPC was then removed the day after.

Participants and Methods

Data form 500 sequential patients who underwent Robot Assisted Radical Prostatectomy (RARP) between 04/2019 and 08/2022 by a specialized surgeon were included in this analysis. Of those 500 cases, 34 patients (6,8%) had previous Transurethral Resection of the Prostate (TUR-P) due to Lower Urinary Tract Symptoms (LUTS) prior to RARP. 4 men were incidentally diagnosed by TURP. The rest developed prostate cancer long after TURP with median time interval between the two procedures exceeding 1 year. Due to patient's uncertainty about the TURP dates, we could not reliably define the exact interval between TURP and RARP. Patients were divided in two groups. Standard RARP (n=466; 93,2%) men and RAPTUR (n=34; 6,8%) men. Preoperative patients´ characteristics and variables like age, American Association of Anesthesiology Morbidity Score (ASA) score, Prostate Volume In Transrectal Ultrasound (TRUS), Body Mass Index (BMI), preoperative Hemoglobin (Hgb), International Prostate Symptom Score (IPSS), International Index of Sexual Function (IIEF), were compared between groups. All postoperative complications within 90 days after the procedure were graded by the Clavien-Dindo Classification [14]. Minor complications are those managed conservatively. Major complications are those necessitating an intervention, intensive care or resulting in organ injury. Those serious complications are considered the primary point of the study. Since the transurethral catheter was removed on surgery's day or the Postoperative Day One (POD1), Length of suprapubic catheter days was the secondary endpoint. Statistical analysis was performed using SPSS®v27. Categorical variables were summarized as frequencies (percentage) and continuous variables as mean ± standard deviation and median values. The Kolmogorov-Smirnov one-sample test was used to verify normal distribution. Match pair analysis using independent T-Test for parametric numeric variables and Mann-Whitney U-Test for nonparametric variables were performed. Pearson Chi Square was also used to compare relative frequencies.

Ethics Statement

The study was conducted in accordance with the ethical standards of the Declaration of Helsinki and approved by the ethics committee of the medical association Westfalen-Lippe and Wilhelm's university of Münster (ethical vote: 2022-585-f-S).

Results

Baseline Parameters

RAPTUR group received less nerve sparing technique than standard cases (p=0.049). All other variables, with the exception of ASA score, were similar between groups. RAPTUR patients had more concomitant comorbidities than their counterparts (p=0.010). Despite a trend for higher baseline erectile function score in standard RARP patients (mean IIEF-5 score 15.5 vs. 10.3), statistical analysis showed no difference between groups (p=0.655). Details in table 1.

	Total Cohort (500)	sRARP N=466	RAPTUR N=34	p-Value
Age (year) Mean ± SD Median	66.8 ± 7.1 68	66.6 ± 6.6 68	70.5 ± 7.6 72	0.535
BMI (kg/m2) Mean±SD Median	28.4 ± 4.3 28	28 ± 4.4 28	29 ± 4.1 28	0.283
ASA-score				
1	99 (19,8)	94 (20,2)	2 (5,9)	0.01
2	317 (63,4)	292 (62,7)	22 (64,7)	
3	84 (16,8)	74 (15,9)	10 (29,4)	
Preoperative HGB (g/dl) Mean ± SD median	14.7 ± 1.18 14.8	14.7 ± 1.3 14.8	14.5 ± 1.3 14.8	0.537
IPSS Mean±SD median	11.4 ± 8.3 8.3	11.3 ± 8.3 8.3	11.9 ± 8.6 8.3	0.928
IIEF Mean±SD median	15.2 ± 8.7 17	15.5 ± 8.5 17	10.3 ± 6 17	0.655
Initial PSA (ng/ml) Mean±SD median	14.8 ± 24.5 8	14.6 ± 24 8	17.5 ± 29 7.6	0.157
Prostate-Volume (ml) Mean±SD median	49 ± 28 43	50 ± 28 45	35 ± 30 26	0.83
D'Amico Risk Classification Low risk Intermediate risk High risk				0.276
Low risk	117 (23,4)	111 (23,8)	6 (17,6)	
Intermediate risk	229 (45,8)	214 (45,9)	15 (44,1)	
High risk	154 (30,8)	141 (30,3)	13 (38,2)	
Preoperative Gleason score				0.782
5	1 (0,2)	1 (0,2)	0	
6	140 (28)	131 (28,1)	9 (26,5)	
3+4	176 (35,2)	166 (35,6)	10 (29,4)	
4+3	59 (11,8)	54 (11,6)	5 (14,7)	
8	82 (16,4)	77 (16,5)	5 (14,7)	
9	36 (7,2)	34 (7,3)	2 (5,9)	
10	5 (1,0)	2 (0,4)	3 (8,8)	
Unclassified*	1 (0,2)	0 (0,2)	0	
Neoadjuvant hormonal therapy	55	48 (10,2)	7 (20,5)	0.058
Nerve Sparing				0.049
Yes	374 (69,4)	330 (70,8)	17 (50)	
Partial	19 (3,8)	17 (3,6)	2 (5,9)	
No	134 (26,8)	119 (25,5)	15 (44,1)	

Categorical data are presented as numbers %,
SD: Standard Deviation,
ASA: American Association of Anesthesiology comorbidity score,
BMI: Body Mass Index,
HBG: Hemoglobin,
IIEF: International Index of Erectile Function,
IPSS: International Prostate Symptom Score,
PSA: Prostate Specific Antigen.

- Patietns received hormonal therapy before undergoing prostate biopsy

Table 1: Analysis of demographic, baseline clinical and preoperative characteristics between groups.

Intraoperative Data

There were no statistical differences between groups regarding all intraoperative parameters. Length of hospital stay, catheter days were similar between groups. In both groups almost 75% of men left the hospital without catheter (p=0.694) with a median of hospital stay of 5 days. Furthermore, the number of lymph node dissected (median 18 LN) and rates of positive surgical margins were comparable in both groups (7,1% standard and 8,8% RAPTUR group). Details in Table 2.

	Total (500)	sRARP N=466	RARTUR N=34	p-Value
OR-Time Mean ± SD median	151 ± 45 140	151 ± 45 140	147 ± 53 140	0.749
Prostate weight (g) Mean ± SD median	61± 25.6 55	62 ± 24 57	54 ± 36 49	0.125
Pathological stage				0.057
0	1 (0,2)	1 (0,2)	0	
pT1	1 (0,2)	0	1 (2,9)	
pT2	295 (59)	273 (58,6)	22 (64,7)	
pT3	183 (36,6)	174 (37,3)	9 (26,5)	
pT4	20 (4,0)	18 (3,9)	2 (5,9)	
Postoperative Gleason score				0.089
6	28 (5,6)	24 (5,2)	4 (11,8)	
3+4	282 (56,4)	264 (56,7)	18 (52,9)	
4+3	89 (17,8)	85 (18,2)	4 (11,8)	
8	26 (5,2)	25 (5,4)	1 (2,9)	
9	29 (5,8)	28 (6,0)	1 (2,9	
10	1 (0,2)	1 (0,2)	6 (17,6)	
Unclassified*	45 (9,0)	39 (8,4)		
Positive surgical margins	36 (7,2)	33 (7,1)	3 (8,8)	0.705
Number of Lymph nodes Mean ± SD median	19.6± 7.4 18	19.8 ± 7.4 18	19.1 ± 7.7 18	0.912

Positive Lymph nodes	87 (17,4)	82 (17,6)	5 (14,7)	0.668
Hgb-Difference (g/dl) Mean ± SD median	2.5 ± 4.8 2.6	2.7 ± 1.3 2.7	2.5 ± 1.2 2.5	0.74
Transfusion	7 (1,2)	7 (1,5)	0	0.472
hospitalization (days) Mean ± SD median	5.6 ± 1.5 5	5.6 ± 1.6 5	5.6 ± 1.2 5	0.965
Catheter days Mean ± SD median	6.9 ± 4.7 5	7 ± 4.8 5	7.2 ± 4.6 5	0.963
Catheter removed before discharge	368 (73.6)	342 (73,4)	26 (76,5)	0.694
Categorical data are presented as numbers %; Sd: Standard Deviation; Iqr: Interquartile Range; Hgb: Hemoglobin.				

Table 2: Intra- and postoperative data and pathological findings for all groups.

Complications and Readmissions

All minor and major complications plus readmissions were similar between groups (p=0.606, 0.0164 and 0.0398 respectively). In detail vesicourethral anastomosis related complications like Acute Urinary Retention (AUR), Urinary Tract Infections (UTI) or Secondary Vesicourethral Anastomosis Leakage (VUAL), occurred rarely in RAPTUR group. UTI are not primarily anastomoses related. UTI may have accompanied coexisting vesicourethral anastomosis leakage or micturition's disorders, so that we included them as anastomosis related. Upper Urinary Tract Obstructions (UUTO) occurred in cases when the ureter ostium was compromised in the anastomosis. Major complications included two lymphoceles which required insertion of a drainage in local anesthesia and one revision due to incisional hernia. Overall only 28/500 (5,6%) patients had to be readmitted after discharge within 90 days after RARP. Despite a trend toward higher incidence in RAPTUR group (8,8% vs. 5,4% in standard group), statistical analysis showed no difference (p=0.398). For more details we refer to table 3.

Complications in detail			Total (n=500)	sRARP N=466	RAPTUR N=34	p-value
Minor	Minor		74 (14,8)	70 (15)	4 (11,7)	0.606
	CDI 51 (10,2)	VTE	4 (0,8)	4 (0,8)	0	
		Elevated Labor Parameter	6 (1,2)	5 (1)	1 (0,3)	
		AUR	28 (5,6)	28 (6)	0	
		Diverse	13 (2,6)	11 (2,3)	1 (0,3)	
	CD II 23 (4,6)	Secondary VUAL*	11 (2,2)	10 (2,1)	1 (0,3)	
		UTI	11 (2,2)	10 (2,1)	1 (0,3)	
		Hematoma requiring Transfusion	1 (0,2)	1 (0,2)	0	
	Major		21 (4,2)	18 (3,6)	3 (8,8)	0.164

Major	CD III a 12 (2,4)	NSTEMI	1 (0,2)	1 (0,2)	0	0.398
		Hiatus Hernia	1 (0,2)	1 (0,2)	0	
		Symptomatic Lymphocele	10 (2.0)	8 (1,7)	2 (0,6)	
	CD III b 8 (1,6)	Revision	5 (1.0)	4 (0,8)	1 (0,3)	
		UUTO	3 (0,6)	3 (0,6)	0	
	CD VI 1 (0,2)	Rhabdomyolysis	1 (0,2)	1 (0,2)	0	
		Readmissions*	28 (5,6)	25 (5,4)	3 (8,8)	

*some patients came to emergency with mixed AUR+VUAL+UTIs; we listed the most serious complaint.
Categorical data are presented as numbers %,

AUR: Acute Urinary Retention,

UTI: Urinary Tract Infection,

VTE: Venous Thromboembolism,

VUAL: Vesicourethral Anastomosis Leakage,
UUTO: Upper Urinary Tract Obstruction.

Table 3: 90-day complications and Readmissions.

Discussion

The Major finding of our study is that RARP after previous TURP doesn't place patients at risk of eminent rates of serious complications or readmissions. Our findings confirm those of Bajpai and collogues [9]. Ley-Bannurah et al. in their large series similarly found no relevant differences in surgical outcomes regarding postoperative complications [8]. Disagreeing, Liao et al. found higher complication rates after TURP [7]. Patients will also have the same operating times, hospital stay days and same catheter days. The same fraction of men (every three out of 4 men) will leave the hospital without catheter. Furthermore, surgical technique related adverse events like Acute Urinary Retention (AUR), secondary Vesicourethral Anastomosis Leakage (VUAL) or Urinary Tract Infections (UTI) didn't occur more frequently in RARP patients with previous TUR-P. From oncological point of view and in agreement with others [8,10] the radical nature of the prostate cancer surgery was not compromised as positive surgical margins were not higher in RAPTUR patients. After foregoing TURP, higher positive surgical margins (PSM) up to 10% (30,6% vs. 20,9%) in laparoscopic and robot assisted radical prostatectomy were reported [7,15]. In our investigation PSM were generally low and no higher in TURP group(7,1 vs 8,8%). This comes in line with others [9,10]. Nevertheless, higher positive surgical margins rates were described by Carbin et al. albeit statistically insignificant. In their study, however, the Biochemical Recurrence (BCR) at one year (48.8% versus 60%, $p=0.0644$) was not significantly different [13]. Similarly, Liao et al. reported higher PSM and less nerve sparing technique received in such patients [7]. While we didn't have higher PSMs, nerve-sparing in RAPTUR group was less, which may partially explain the phenomena in which RAPTUR patients had less PSMs. Furthermore, although statistically not significant, locally advanced tumors T3-4 were also less reported in RAPTUR group compared to sRARP group (30% vs. 40% respectively). This may have also influenced the rate of PSMs in both groups. Likewise the number of lymph nodes removed was not inferior compared to standard RARP group (median of 18 Lymph nodes in both groups). Compliant with other authors, neurovascular bundles were less spared in RAPTUR patients because of technical difficulties due to the scar tissue changes caused by the TURP, making it harder to preserve the nerves [7,11]. Many authors reported on bladder neck reconstruction rate due to scar formation after previous TURP [7,10,13]. We didn't report the reconstruction rates due to researcher objective bias in reporting what is considered as a reconstruction. Instead we looked at the VUA-related complications like AUR and Secondary leakage, which didn't differ between groups. Worth mentioning is that our study lacks long term outcomes considering anastomoses stenosis, which represent one of this studies limitation. In our Study, we removed the transurethral catheter on POD1. Patients were drained via a suprapubic catheter, and they were allowed to urinate spontaneously on POD3-4. The catheter was then removed on the next day when micturition was uneventful. The median catheter days were 5 days in both groups. On the contrary the median catheter days in other studies were 2 days longer than standard

RARP and reached 10 days [13]. Furthermore, almost 75% of men in both groups left the hospital without catheter. This parameter was not thoroughly reported by others. Suggesting that RAPTUR doesn't necessitate longer draining despite low quality in bladder neck tissues being reconstructed or used for the vesicourethral anastomosis.

In our series, transfusion rates were low in general (7/500; 1,2%) [16]. Despite a trend for higher transfusion in the standard RARP group, statistical analysis showed no significant difference (p=0.472). On the contrary, Yang and associates reported in their laparoscopic cohort a greater probability of transfusion of (8.6% vs. 0%). Likewise, Bajbai et. al reported greater blood loss in RARP after TURP [9]. We didn't mention the intraoperative estimated blood loss, due to uncertainty in the measurement. To be more exact, we investigated the pre-postoperative hemoglobin-difference. Both groups had moderate hemoglobin-difference (2.7 vs. 2.5 g/dl) with no statistical relevance (p=0.0740). Our measurement harmonizes with the meta-analysis of Liao et al. [7]. Furthermore, the overall median console time was 140 minutes, and it was identical in both groups. Conversely to other reports from robotic [9,10] and laparoscopic cohorts [5]. Yang and associates reported in a LRP cohort longer operative time adding up to 50 minutes in patients with previous TURP (262 vs. 213 minutes) [5]. In their meta-analysis Liao and fellows found that OR-times in radical prostatectomy were comparable between patients with or without previous TURP [7]. Our study mirrors real world scenario as no exclusion criteria was set in a cohort of 500 consecutive cases from one surgeon with high proportion of patients with previous TURP (6,8%) and almost 40% possessing locally advanced tumors. The retrospective nature characterize the main limitation of our study. Additionally, we didn't include long-term functional and oncological outcomes like continence or biochemical recurrence because of the lack of long term follow-up data. This is incompletely rationalized by the national health care system in which follow up is not managed by tertiary referral centers. We reported outcomes, complications and readmissions within 90 days after RARP through passive follow up, in which we wrote every referring urologist and general physician to report functional, oncological and other postoperative outcomes of our patient. There was a trend to larger prostate volumes in sRARP patients measured by transrectal ultrasound (45 ml in sRARP vs. 26 ml RAPTUR; p=0.830). This trend repeated itself in prostate weight in the final pathological report (57g in sRARP vs 49 g in RAPTUR) (p=0.125). Suggesting inaccuracy in TRUS compared to pathological analysis. We refrained from using MRI measured Prostate volume since it wasn't forehanded in all patients.

Conclusion

At large, RARP in men with previous TURP, may be challenging regarding nerve sparing. Nevertheless, results are comparable to patients without previous intervention. RARP in this cohort presents a solid therapy choice and may warrant increased utilization.

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