Robotic or Open Radical Prostatectomy in Men with Previous Transurethral Resection of Prostate

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Purpose: To assess and compare the surgical, oncological and functional outcomes of robotic and open radical prostatectomy (RP) in patients with history of transurethral resection of prostate (TURP).

Material and Methods: Total of 48 patients with mean ± SD age of 64.5 ± 6.0 years who had undergone TURP prior to RP were included. Thirty-one (64.58%) patients underwent robotic RP (group I) and 17 patients underwent open RP (group II). Variables evaluated included demographic characteristics, perioperative complications, functional and oncological outcomes. Biochemical recurrence (BCR) was defined as a detectable level of serum PSA after RP. Continence was defined as being pad free and potency as erection with or without medication enough for penetration.

Results: All patients had undetectable PSA after RP. Four patients (12.9%) from group I and 2 patients (11.8%) from group II had positive margins (*P* = .9). The rates of continence were 70% and 80.81% for group I and group II respectively (*P* = .47). Potency rate was 68.2% in group I and 46.1% in group II (*P* = . 31). The PSA value at the last follow-up was undetectable except in 2 patients who had PSA values of 0.2 and 1ng/mL respectively.

Conclusion: Robotic or open RP can be performed safely and effectively after TURP without compromising the oncological results. The outcomes of robotic RP are comparable to that of open RP. The patients who undergo robotic or open RP should be informed about increased likelihood of intra operative complications and worse post operative functional outcomes with respect to continence and erectile function.

Keywords: prostate; prostate cancer; radical prostatectomy; robotic surgical procedures; transurethral resection of prostate.

INTRODUCTION

Both, lower urinary tract symptoms as a result of prostate enlargement and prostate cancer are common in elderly men. Therefore, it is not uncommon for men to be diagnosed of cancer on transurethral resection of prostate (TURP) chips or to develop prostate cancer after having undergone TURP for benign prostatic enlargement. Such men present different outcomes on radical prostatectomy (RP) compared to those who have no previous intervention. The relative paucity of the number of patients who underwent a previous TURP makes any comparative study analysis somewhat difficult and also is a reflection of the few available studies on his subject in the literature. It is considered that previous prostatic resection may hinder optimal outcomes for radical prostatectomy in several ways[1-5]. Several studies have suggested that the outcomes of RP in men who have previously undergone pelvic or prostate surgeries are relatively poorer than those who have not undergone such surgery[6-8]. In a recent study we had evaluated the feasibility and safety of open or robotic RP after previous pelvic surgery and we concluded that open or robotic RP can be done safely and effectively in patients who have previously undergone pelvic surgery[7]. To our knowledge there is no study comparing the safety and efficacy of robotic or open RP in patients with prior TURP. The objective of the present study was to assess and compare the peri- and postoperative outcomes of patients with a history of TURP who underwent robotic or open RP for prostate cancer.

MATERIALS AND METHODS

The study population consisted of a consecutive series of 2400 men who had RP for prostate cancer between January 2007 and January 2011 at the University of Texas MD Anderson Cancer Center. In all, 48 patients with mean ± SD age of 64.5 ± 6.0 years who underwent open or robotic RP after prior TURP were identified. Thirty- one (64.6%) patients (Group I) underwent robotic RP and 17 patients (35.4%) (Group II) underwent open RP. The medical records of both groups were evaluated and compared in term of preoperative, intraoperative parameters and the oncological and functional outcomes. Thirty-five patients 74.9% had standard TUR and 13 (27.1%) patients had laser prostatectomy (*P* =. 34). The patients who underwent robotic RP usually had low stage and grade. The mean period between prior TURP and RP was 54.4 ± 68.6 months (range; 2-336). The mean values of preoperative PSA for group

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Table 1. The pre-operative demographic characteristics.

Variable a	Robotic RP	Open RP	Total	*P*
Patients	31(64.58)	17 (35.41)	48(100)	
Age year, (mean+ SD)	66.2 ± 5.5	64.7 ± 5.8	64.5 ± 6.0	0.74
Standard TURP	24/31(77.41)	13/17 (76.47)	35/48 (72.91)	0.34
Laser TURP	7/31(22.58)	6 (35.29)	13/48 (27.08)	
Interval between TUR and RP month (mean+SD)	76.11 ± 7.1	30.5 ± 3.3	54.4 ± 68.6	0.025
Volume of prostate mL (mean+SD)	38.3 ± 2.89	40.4 ± 2.7	37.2 ± 21.6	0.59
initial PSA ng/ml , (mean+SD)	6.4 ± 4.1	6.4 ± 4.8	5.7 ± 4.1	0.91
Preoperative PSA ng/mL (mean+SD)	5.5 ± 4.3	2.9 ± 2.3	4.4 ± 3.3	0.73
Gleason (score)				0.03
6	12 (38.7)	3 (17.64)	15 (31.25)	
7	16 (51.61)	8 (47.05)	24 (50)	
8	2 (6.4)	2 (11.76)	4 (8.33)	
9	1(3.22)	3 (17.64)	4 (8.33)	
10	0	1(5.88)	1(2.1)	
Clinical stages				0.23
T1c	26 (83.87)	9 (52.94)	35 (72.91)	
T2	5 (16.12)	7(41.17)	12(25)	
T4	0	1(5.88)	1(2.1)	

Abbreviations: RP, radical prostatectomy; PSA, prostate specific antigens; TURP, transurethral resection of prostate.
a Data are presented as no. of patients (%) unless otherwise indicated.

I and group II were 5.5+4.3 ng/mL and 2.9+2.3 ng/mL respectively (P = .73) (**Table1**). Thirteen patients (27.1%) were diagnosed by TUR while the remaining patients were diagnosed by transrectal ultrasound biopsy. The performance of neurovascular bundle (NVB) preservation and pelvic lymph node dissection (PLND) were dependent on the patient's preoperative serum PSA levels, clinical stage of prostate cancer and Gleason score. The extended lymph adenectomy included obturator, hypogastric, and external iliac lymph nodes. Ethical approval from MD Anderson Cancer Center was obtained and the study was carried out in compliance with the Helsinki Declaration. Biochemical recurrence (BCR) after RP was defined as a detectable level of serum PSA after RP. Patients were considered to be continent if they were pad free or small liner daily for security purposes only. Patients were considered to have erectile function if they could achieve erections with or without medication that were adequate enough for penetration intercourse. The mean hospitalization for group I and group II were 3 ± 2.6 and 4.5 ± 3.4 days respectively (P = .19). The mean follow-up periods for group I and group II were 15.5 ± 1.8 and 18.5+1.6 months respectively (P = .99).

SPSS ver. 10.0 (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. A p-value of greater than 0.05 was accepted as insignificant. Comparison between the parameters of subgroups was calculated by use of Student t-test, the Mann Whitney U test, and chi-square tests.

RESULTS

None of the robotic RP patients needed open conversion. The mean operative time for group I and group II were 277.4 ± 518.6 and 324.6 ± 159.0 minutes respectively (P = .33). Blood loss for patients in group I and group II were 250.7± 324.0 and 911+785.3 mL respectively (P = .01). Intraoperative findings, functional and oncological outcomes are shown in **Table 2**. Blood transfusion was done for 1 patient (3.2%) in group I and for 2 patients (17.6%) in group II. PLND was done for all patients in group II and for 20 patients (64.5%) in group I (P = .005). NVB preservation were performed for 18 patients (58.1%) and 8 patients (47.1%) in group I and group II respectively (P = .46). The numbers of lymph node yields were equal for both groups (P = .24). Two patients had positive lymph nodes involvements (6.4%) in group I and 1 patient (5.9%) in group II (P = .67). Rectal injury occurred in 1 patient (3.2%) from group I and in 1 patient (5.9%) from group II. Two patients had ureter transaction from the series of open RP. No urethral stricture was observed. Positive surgical margins (PSM) were detected in 4 patients (12.9%) from group I and in 2 patients (11.8%) from group II (P = .9). Post operative serum PSA level was undetectable in all patients. Biochemical recurrence occurred in 1 patient (3.2%) from group I and in 3 patients (17.5%) from group II (P = .02). The median values of PSA at BCR were 0.3 ng/mL (range, 0.2-0.4). Three patients received salvage radiotherapy and 1 patient received salvage hormonal therapy. Continence data at

Table 2. Intraoperative findings and postoperative outcomes.

Variable [a]	Robotic RP	Open RP	Total	*P*
NVB preservation	18/31 (58.06%)	8 (47.05%)	26 (54.16)	0.46
Patients had lymph nodes dissection	20/31(64.51)	17/17(100)	37 (77.08)	0.005
Hospitalization day (mean+SD)	3.0 ± 2.6	4.5 ± 3.4	2.7 ± 2.1	0.19
PSM	4 (12.90)	2 (11.76)	6 (12.5)	0.9
Seminal vesicle involvement	1(3.22)	2 (11.76)	3 (6.25)	0.24
Lymph node yields (mean+SD)	11.4 ± 4.3	11.7 ± 8.0	12.4 ± 7.6	0.24
Lymph node involvement	2(6.45)	1 (5.88)	3 (6.25)	0.67
Gleason score at specimen (median, range)	7 (6-9)	7 (6-9)	7 (6-9)	0.26
BCR	1(3.22)	3(17.64)	4 (8.33)	0.03
Pathologic stages				0.23
T2	26 (83.87)	10 (58.88)	36 (75)	
T3	5 (16.12)	5 (29.41)	10 (20.83)	
T4	0	1(5.88)	1(2.1)	
T0	0	1(5.88)	1(2.1)	
Continence[b]	14/20 (70)	9/11 (80.81)	23/31, 74.19*	0.47
Erection with or without medication [c]	15/22, 68.18%	6/13, 46.15%	21/35, 60%	0.31
Follow up month , (mean+SD)	15.5 ± 1.8	18.5 ± 1.6	17.3 ± 15.2	0.99

Abbreviations: RP, radical prostatectomy; PSA, prostate specific antigens; NVB, neurovascular bundle; PSM, positive surgical margins; BCR, Biochemical recurrence.

[a] Data are presented as no. of patients (%) unless otherwise indicated.

[b] Continence data were available for 20 patients of 31 patients who underwent robotic RP, and 11 of 17who underwent open RP.

[c] Erection function data were available for 22 of the 31 patients who underwent robotic RP, and 13 of 17 patients who underwent open RP.

6 months follow up were available for 31 patients; the rates of continence in group I and group II were 70% and 81.8% respectively (P = .47). Erection function data were available on 35 patients. Twenty-one patients (60%) were able to achieve erection with or without medical aid (i.e phosphodiesterase-5 inhibitors, intracavernous injection or vacuum). The PSA value at the last follow-up was undetectable in all patients in group I. Three patients in group II had detectable PSA level at last follow up; 0.2, 0.6 and 1 ng/mL respectively. Postoperative complications were mild and did not mandate surgical intervention except in one patient who developed hematuria due to benign polpoid mass at the vesico-urethral anastomosis which underwent transurethral resection. Three patients developed lymphocele which resolved spontaneously and one patient had prolonged leakage on the cystogram. Perioperative data and complications using the Clavien classification system were illustrated in **Table 3**.

DISCUSSION

The rate of prostate cancer detection revealed by transurethral resection of prostate or prostatectomy in patients with both negative PSA levels and negative digital examination findings is 6.4%[9]. The reports are conflicting as to whether or not previous TURP worsen the prognosis after radical prostate surgery as a result of fibrous scaring and altering tissue layers associated with difficult surgical procedures. Some authors considered prior TURP as a risk factor for anastomotic stricture, erectile dysfunction, and urinary incontinence, although several studies have not demonstrated any increased morbidity or detrimental effect on the oncological or functional results[6,8,10,11]. The outcomes of robotic RP are comparable to that of open RP with acceptable oncological results and worse post-operative functional outcomes with respect to continence and erectile function.

There are different results from different series of laparoscopic RP (LRP), and robot-assisted RP(RARP) after TURP. While Colombo et al. reported that open RP could be safely performed after previous TURP, Jaffe et al. and Gupta et al. reported worse surgical outcomes with high perioperative complications[1,4,10]. Menard et al. and Zugor et al. reported that LRP and RARP resulted in worse perioperative outcomes and higher complication rates without compromising the oncological outcomes[11,12]. Martin et al. reported no higher complication rate and similar oncological outcomes after RARP[13]. In the study of Elden et al., LRP resulted in no difference of complication rate and comparable PMS and BCR with delay incontinence and no difference in erection rate[14].

In our study, the operative time, hospitalization period and the number of lymph nodes yield were identical in both groups; however, the blood loss was less for patients in group I than those in group II. Pelvic lymph nodes dissection was done for all patients in group II.

Table 3. Perioperative data and complications using the Clavien classification system

Variable a	Robotic RP	Open RP	Total	*P*
Operative period minute (mean+SD)	277.4 ± 518.6	324.6 ± 159.0	255.8 ± 385.7	0.33
Blood loss mL (mean+SD)	250.7 ± 324.0	911.5 ± 785.3	450.5 ± 585.7	0.01
Blood transfusion	1(3.22)	2 (17.64)	3(6.25)	
Rectal injury	1(3.2)	1(5.88)	2(4.16)	
Hematuria	0	1(5.8)	1(2.1)	
Lymphocele	2 (6.44)	1(5.88)	3 (6.25)	
Leakage of urine	1(3.2)	0	1(2.1)	
Ureter transaction	0	2 (11.7)	2(4.16)	
Complications	5 (16.12)	5 (29.41)	10 (20.83)	
Clevien grade I	3 (9.67)	1(5.88)	4(8.33)	
Clevien grade II	1(3.22)	0	1(2.1)	
Clevien grade IIIa	1(3.22)	3(17.64)	4(8.33)	

[a] Data are presented as no. of patients (%) unless otherwise indicated.

The higher blood loss in group II may be due to the advance clinical stages of the prostate cancer; half the patient in group II had stage T2 and T4, while half of the patient in group I had stage T1c. The preoperative parameters in term of gleason score, clinical stages and the interval between TURP and RP were not homogenous. The long operative time in group II was due to the high grade and stage of the patients who underwent open RP (**Table1**). Rectal injury occurred in 2 patients and the primary repair was enough for both of them; one of these patients had two previous TURs and the last TURP was done 4 months before the open RP. Thus such patient is under high risk of rectal injury even in open surgery. The second patients who had rectal injury had robotic RP after laser prostatectomy. Ureter transaction occurred in two patients with open RP after prior standard TURP; one of them had two previous TURPs. During TURP capsular perforation and extravasations of the irrigation fluid, causes peri prostatic fibrosis[4]. Therefore waiting at least 3 months after TURP is recommended[11]. We believe that number of TURPs is important in increasing the incidence of intra operative complications. As half of patients who had intraoperative complications had two standard TURPs. All intra operative complications occurred in patients who had standard TURP except for one patient who had laser prostatectomy. This also may be due to the fact that laser is a less invasive procedure and usually is done by more experienced surgeons in well qualified medical centers, thus capsular perforation and periprostatic fibrosis may be less likely than in the standard TURPs. These intra operative findings demonstrated that open or robotic RP with bilateral PLND can be done safely and effectively in patients who have previously undergone prostate surgery.

Because of fibrosis surrounding the adhesion, it is difficult to identify NVB[4]. Suardi et al. evaluated the feasibility and safety of nerve sparing procedure during robotic RP in patients who had other invasive prostatic treatments e.g. holmium laser enuculeation, TURP or open prostatectomy[15]. The authors could preserve NVB in all patients who had holmium laser, and 86.6% of those who had TURP and 73.3% of those who had open prostatectomy[15]. Palisaar et al. could preserve the NVB in 25 patients (40%) out of 60 who underwent open RP after previous TURP[16]. Out of 25 patients, 15 (60%) could achieve sexual intercourse[11]. In our study we could preserve NVB for 58.1% of patients in group I and for 47.1% of patients in group II. The potency rates in group I was similar to the reported rates, however potency rate was low in group II. The preoperative erectile function was compromised, 71% (10/14) of those who were impotent after RP had pre operative erectile dysfunction and their median value of international index for erectile function (IEEF) score was 9.5. In group II 53.84% (7/13) of the patients had erectile dysfunction before RP. Out of 14 patients who had NVB preservation in group I, 10 patients (71.4%) could achieve enough erection and out of 7 patients who NVB preservation in Group II, 4 patients (57.1%) could achieve enough erection. Preservation of NVB after laser TURP is a challenging issue. Saurdi et al. was the first to report the feasibility of NVB preservation in patients with history of laser TURP (15), we could achieve NVB preservation in 7 patients (53.82%) out of 13 who had laser prostatectomy. Although, NVB preservation in open or robotic/ laparoscopic RP after previous TURP is difficult and challenging; it is possible and feasible.

Incontinence rate is expected to be higher after RP in patients with previous TURP because surrounding periprostatic adhesions and fibrosis make it difficult to preserve sufficient urethra to perform a proper urethrovesical anastomosis. In our study the overall continence rate was 74.2% at six months follow up with no pad usage. Katz et al. reported similar functional results after laparoscopic RP; 76% of their patients were completely continent[3]. Colombo et al. reported the highest

rate (86%) of continence[4]. In similar series, the rates of continence were reported to be 81% and 75% after open or robotic RP[10,16]. In our study continence rate after robotic or open RP are encouraging and identical to the reported rates of other series.

Higher PSM rates have been reported after robotic RP [17]. Some studies suggested that there is no difference in oncological efficacy[11]. Gupta et al. reported rate of 22.2% of PSM after robotic RP in patients with previous TURP and 12.9% in patients without previous TURP[10]. Other studies reported 19% and 26% rates of PSM after open or robotic RP respectively[11,16]. In the present study, PSM was low in both groups and even similar to patients who underwent RP without history of prostate surgery. The rate of positive surgical margins was 12.9% and 11.76 % for group I and group II respectively. All patients had undetectable PSA after surgery. Biochemical recurrence occurred in 4 patients, with PSA values less than 0.5 ng/ml. After salvage therapy, the last PSA values were undetectable in 2 of these patients and the remaining patients had PSA less than or equal to 1 ng/ml. The high rate of BCR in our study especially in group II may be due to poor preoperative oncologic features (clinical stage, gleason score). The advanced pathologic stages on the specimen, and involvement of seminal vesicle in 3 patients at pathologic specimens may also justify the early recurrence of the prostate cancer after surgery. Our data show that the oncological outcomes in term of PSM and BCR are acceptable and comparable to those reported by other series[10]. The majority of the postoperative complications were clinically insignificant and were resolved spontaneously with conservative approach. **Table 3** shows postoperative complications according to Clavien classification system.

CONCLUSIONS

Performing robotic or open RP for prostate cancer in patients who had previous TURP is a technically demanding issue. The outcomes of robotic RP are comparable to that of open RP with acceptable oncological results. The patients should be informed about the potential intra operative complications and worse post operative functional outcomes with respect to continence and erectile function.

CONFLICT OF INTEREST

None declared.

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