Pentafecta Outcomes of 230 Cases of Robotic-assisted Radical Prostatectomy with Bilateral Neurovascular Bundle Preservation

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Abstract. *Aim: We analyzed pentafecta outcomes [complication-free, continence, potency, negative surgical margins (NSM)], biochemical recurrence (BCR)-free] of 230 patients undergoing robotic-assisted radical prostatectomy (RARP) with bilateral neurovascular (NVB) preservation. Patients and Methods: Patient outcomes (group I, cases 1-115; group II, cases 116-230) were assessed prospectively. Definitions were: continence, using no pads; potency, ability to achieve/maintain erections firm enough for sexual intercourse; positive surgical margin, presence of tumor tissue on inked specimen surface; and BCR, two consecutive PSA levels >0.2 ng/ml after RALP. Results: The mean patient age was 62.5 years, mean PSA=8.62 ng/ml. The complication-free rate was 93.9% (216/230), continence rate 98.3% (226/230), potency 86.1% (198/230), NSM 77.0% (177/230) and BCR-free 92.6% (213/230). The trifecta rate (continence, potency, BCR-free) was 81.7% (188/230). The pentafecta rate was 60.4% (139/230). Conclusion: Pentafecta is the new standard of outcomes for RARP with bilateral NVB, with patient selection and reduced positive surgical margins attaining best outcomes.*

The trifecta, which includes continence, potency and biochemical recurrence (BCR)-free survival, has been the standard outcome measure for radical retropubic prostatectomy (RRP), laparoscopic radical prostatectomy (LRP), and robotic-assisted radical prostatectomy (RARP). In previous review studies, the trifecta rate was 42%-62% in RRP series, 54.4% in LRP series and 44%-91% of RARP series (1, 2).

Since the first publication of 30 cases (3), 48 LRP and 50 cases were reported in an RARP series in 2002 (4). In this era of robotic surgery, the bar for standard outcome measures of radical prostatectomy has been raised gradually in high-volume Centers. The highest trifecta outcomes were achieved in 91% of patients (*i.e.* 97.9%, 96.6%, and 91.3% achieved continence, potency, and a cancer-free status, respectively) 18 months after undergoing RARP (2). In such cases, reducing and preventing perioperative complications is paramount. If patients have excellent trifecta outcomes, but develop complications such as postoperative hemorrhage or blood transfusion reaction, the results are still not favorable. In addition, although positive surgical margins (PSM) do not inevitably lead to BCR, patients worry about tumor recurrence and may need for adjuvant treatment. The risk of BCR with PSM after RARP has been reported (5). The hazard ratio (HR) risk of BCR was 2.84-fold in PSM of >3mm/multifocal positivity, compared to negative surgical margins (NSM) (5). Therefore, traditional trifecta outcomes have been expanded to include perioperative complication-free and negative surgical margins. This transforms outcome measures to the more comprehensive 'pentafecta', a new concept for reporting outcomes of RARPas proposed by Patel *et al.* in 2011 (6).

Table I. *Comparison of preoperative clinical characteristics of robotic-assisted radical prostatectomy.*

Clinical data	Group I, Case 1-115(%)	Group II, Case 116-230(%)	p-Value	Total(%)
Mean age±SD, years	61.6±6.1	63.4±7.1	0.038	62.5±6.7
Mean BMI±SD, kg/m²	24.4±2.9	24.6±2.7	0.591	24.5±2.8
ASA, n (%)				
I	22 (19.1%)	18 (15.7%)	0.391	40 (17.4%)
II	87 (75.7%)	86 (74.8%)		173 (75.2%)
III	6 (5.2%)	11 (9.6%)		17 (7.4%)
Mean PSA±SD, (ng/ml)	9.15±5.57	8.08±4.10	0.098	8.62±4.91
Mean tumor biopsy percentage±SD	11.07±11.04	7.53±8.21	0.008	9.33±9.89
Biopsy Gleason score, n (%)				
2-6	87 (75.7%)	86 (74.8%)	0.210	173 (75.2%)
7	26 (22.6%)	22 (19.1%)		48 (20.9%)
8-10	2 (1.7%)	7 (6.1%)		9 (3.9%)
Clinical stage, n (%)				
T1	65 (56.5%)	70 (60.9%)	0.592	135 (58.7%)
T2	50 (43.5%)	45 (39.1%)		95 (41.3%)
Risk, n (%)				
Low	54 (47.0%)	71 (61.7%)	0.070	125 (54.3%)
Intermediate	43 (37.4%)	29 (25.2%)		72 (31.3%)
High	18 (15.7%)	15 (13.0%)		33 (14.3%)

BMI: Body mass index, PSA density: PSA/prostate volume by transrectal sonography, ASA: American Society of Anesthesiologists anesthetic/surgical risks class.

Table II. *Comparison of operation parameters of robotic-assisted radical prostatectomy.*

Factor	Group I	Group II	p-Value	Total
Mean console time±SD, min	137.72±54.37	106.26±28.03	<0.001	121.99±45.95
Mean vesicourethralanastomosis time, min	24.37±10.15	19.68±7.24	<0.001	22.02±9.10
Mean blood loss±SD, ml	153.59±218.80	91.26±75.22	0.004	122.43±166.20
Transfusion rate, n (%)	1(0.87%)	0 (0%)	1.000	1(0.43%)
Mean tumor volume±SD, ml	5.14±4.15	4.55±5.44	0.364	4.85±4.83
Mean specimen volume±SD, ml	39.37±18.94	39.32±17.24	0.986	39.34±18.06
pT2/pT3, n (%)	70 (60.9%)/ 45 (39.1%)	78 (67.8%)/ 37 (32.2%)	0.335	148 (64.3%)/ 82 (35.7%)
N0/N1, n (%)	113 (98.3%)/ 2 (1.7%)	114 (99.1%)/ 1 (0.9%)	1.000	227 (98.7%)/ 3 (1.3%)

The pentafecta outcome measures include three main components: perioperative complication-free, best functional recovery in continence and erectile function, and long-term oncological control without PSM and BCR. However, surgery for high-risk patients may often involve tradeoffs, such as when preservation of bilateral NVB is performed and the PSM rate is increased (1). The purpose of the present study was to analyze the pentafecta outcomes of 230 selected patients undergoing RARP with bilateral NVB preservation performed by a single surgeon.

Patients and Methods

From December 2005 to March 2015, 950 cases of RARP were performed by a single surgeon (Y.C. Ou) at our Institution. Among these, 275 cases performed after January 2014 and followed-up for less than one year were excluded. Patients who received neoadjuvant hormonal therapy, radiation therapy, brachytherapy, high-intensity focused ultrasound (HIFU) and cryotherapy previously were also excluded, as were patients with preoperative impotence or urine incontinence.

Finally, a total of 328 potent patients (preoperative International Index of Erectile Function, IIEF-5 score>21) underwent RARP with follow-up of more than one year, bilateral NVB preservation in 230 cases and unilateral NVB preservation in 98 cases (7). Only the 230 patients who had undergone RARP with bilateral NVB preservation were enrolled in the present study. All patients provided signed informed consent and the study protocol was approved by the Institutional Review Board.

Patients were classified into two groups. Group I enrolled 115 cases (cases 1-115) from 375 cases performed from December 2005 to March 2012. Group II enrolled 115 cases (cases116-230) from 300 cases performed from March 2012 to December 2013. Prospective data were collected and preoperative and intraoperative parameters were reviewed retrospectively. Patients with preoperative low-, intermediate- and high-risk classifications were assessed by the D'Amico system (8).

RARP was performed *via* transperitoneal approach with a da Vinci four-arm system and six ports were taken, as described in detail previously (9-12). Perioperative complications were recorded based on modifications of the Clavien system (12). Patients were followed-up regularly for clinical outcomes for a minimum of 12 months after RARP. Postoperative parameters (perioperative complications, continence rate, potency rate, NSM and BCR-free) were analyzed for all patients. Continence was defined as the use of no pads. Potency was defined as the ability to achieve and maintain satisfactory erections firm enough for sexual intercourse with or without the use of oral phosphodiesterase type 5 (PDE-5) inhibitors. NSM was defined as the absence of tumor tissue on the stained surface of the whole-mounted specimen. The BCR rate was defined as two consecutive PSA levels of >0.2 ng/ml after RARP.

Statistical analysis. All data are presented as the mean±standard deviation (SD). Statistical calculations and analyses were

Table III. *Comparison of pentafecta of robotic-assisted radical prostatectomy between the two patient groups.*

Factor	Group I, n(%)	Group II, n(%)	*p*-Value	Total
Continence	113 (98.3%)	113 (98.3%)	1.000	226 (98.3%)
Potency	96 (83.5%)	102 (88.7%)	0.341	198 (86.1%)
BCR-free survival	107 (93.0%)	106 (92.2%)	1.000	213 (92.6%)
Trifecta	93 (80.9%)	95 (82.6%)	0.864	188 (81.7%)
Complication-free	111 (96.5%)	105 (91.3%)	0.168	216 (93.9%)
Negative surgical margin (NSM)	84 (73.0%)	93 (80.9%)	0.210	177 (77.0%)
Pentafecta	69 (60.0%)	70 (60.9%)	1.000	139 (60.4%)

BCR: Biochemical recurrence; NSM: negative surgical margin.

performed using the statistical package for the social sciences, SPSS 15.1 for Windows (SPSS, Inc., Chicago, IL, USA). The independent samples *t*-test and Chi-square test were used for statistical comparisons where appropriate. Statistical significance was defined as *p*<0.05.

Results

Comparisons of patients' preoperative clinical characteristics between group I and group II are presented in Table I. Group II had statistically significant older age than group I (63.4±7.1 years old *versus* 61.6±6.1 years old, *p*=0.038), and group II had significantly lower biopsy tumor percentage than group I (7.53±8.21% *versus* 11.07±11.04%, *p*=0.008).

Operative parameters in both groups are shown in Table II. The console time and vesicourethral anastomosis time were significantly shorter in group II than in group I. Estimated blood loss and transfusion rates were lower in group II than in the group I, but statistical significance was only demonstrated for blood loss. The trifecta and pentafecta rates were 81.7% (188/230) and 60.4% (139/230), respectively (Table III). No statistically significant differences were found between the two groups in the pentafecta outcomes of RARP.

Comparison of general data of achieved pentafecta (N=139 case) *versus* failed pentafecta (N=91 cases) of RARP are shown in Table IV. Related general data, except for age and preoperative PSA levels, were similar in both groups. The D'Amico risk did not influence achievement of pentafecta. Patients who achieved pentafecta had statistically significant younger age than patients with failed pentafecta (61.8±6.8 years old *versus* 63.6±6.4 years old, *p*=0.041); the group achieving pentafecta had statistically significant lower preoperative PSA levels than patients with failed pentafecta (7.88±3.87 ng/ml *versus* 9.74±6.01ng/ml, *p*=0.01).

Table IV. *Comparison of general data of achieved pentafecta versus failed pentafecta of robotic-assisted radical prostatectomy (RARP).*

Clinical data	Achieved pentafecta (n=139)	Failed pentafecta (n=91)	*p*-Value	Total
Mean age±SD, years	61.8±6.8	63.6±6.4	0.041	62.5±6.7
BMI, kg/m^2	24.3±2.7	24.7±2.9	0.396	24.5±2.8
ASA,n(%)				
I	26 (18.7%)	14 (15.4%)	0.500	40 (17.4%)
II	101 (72.7%)	72 (79.1%)		173 (75.2%)
III	12 (8.6%)	5 (5.5%)		17 (7.4%)
Mean PSA±SD (ng/ml)	7.88±3.87	9.74±6.01	0.010	8.62±4.91
Mean tumor biopsy percentage±SD	8.29±8.21	10.93±11.9	0.073	9.33±9.89
Biopsy Gleason score, n(%)				
2-6	104 (74.8%)	69 (75.8%)	0.926	173 (75.2%)
7	29 (20.9%)	19 (20.9%)		48 (20.9%)
8-10	6 (4.3%)	3 (3.3%)		9 (3.9%)
Clinical stage, n(%)				
T1	81 (58.3%)	54 (59.3%)	0.981	135 (58.7%)
T2	58 (41.7%)	37 (40.7%)		95 (41.3%)
Risk, n(%)				
Low	83 (59.7%)	42 (46.2%)	0.070	125 (54.3%)
Intermediate	41 (29.5%)	31 (34.1%)		72 (31.3%)
High	15 (10.8%)	18 (19.8%)		33 (14.3%)

BMI: Body mass index, PSA density: PSA/prostate volume by transrectalsonography, ASA: American Society of Anesthesiologists anesthetic/surgical risks class.

Reasons for failed pentafecta in 91 cases included 41.8% (38/91) due to NSM, 64.8% (59/91) due to potency rate, 81.3% (74/91) due to lack of BCR-free survival, 84.6% (77/91) due to complications, and 95.6% (87/91) due to reduced continence (Table V). The group achieving pentafecta had pT2 in 109 (78.4%) patients and pT3 in 30 (21.6%) patients; however, the failed pentafecta group had pT2 in 39 (42.9%) patients, pT3 in 52 (57.1%) patients, showing statistically significant differences (*p*<0.001) (Table V). Among patients achieving pentafecta, the greatest obstacle to achievement was NSM. The key factors to achieving pentafecta were decreasing PSM and pathologic pT3 (Table V). The cut-off value of PSA level from 5 ng/ml to 8 ng/ml did not affect the pentafecta rate. The cut-off value of PSA levels 8 ng/ml divided the trifecta outcomes (87.4% in PSA level <8 ng/ml *versus* 74.5% in PSA level >8 ng/ml *p*=0.019) (Table VI). Comparison of pentafecta of RARP according to a PSA level ≥8 ng/ml revealed statistically significant differences in potency rate and trifecta (Table VII). The pentafecta rates between PSA levels less than or greater than 8 ng/ml were 65.9% *versus* 52.6%, *p*=0.058 (Table VI and VII).

Table V. *Comparison of five outcome parameters of achieved pentafecta versus failed pentafecta of robotic-assisted radical prostatectomy.*

Factor	Achieved pentafecta (n=139)	Failed pentafecta (n=91)	*p*-Value	Total
Continence	139 (100.0%)	87 (95.6%)	0.024	226 (98.3%)
Potency	139 (100.0%)	59 (64.8%)	<0.001	198 (86.1%)
BCR-free	139 (100.0%)	74 (81.3%)	<0.001	213 (92.6%)
Trifecta	139 (100.0%)	49 (53.8%)	<0.001	188 (81.7%)
Complication-free	139 (100.0%)	77 (84.6%)	<0.001	216 (93.9%)
Negative surgical margin	139 (100.0%)	38 (41.8%)	<0.001	177 (77.0%)
pT2/pT3	109 (78.4%)/ 30 (21.6%)	39 (42.9%)/ 52 (57.1%)	<0.001	148 (64.3%)/ 82 (35.7%)

BCR: Biochemical recurrence.

Table VII. *Pentafecta of robotic-assisted radical prostatectomy (RARP) in patients according to PSA level.*

Factors	PSA≤8 ng/ml	PSA >8 ng/ml	*p*-Value
Number of patients	135	95	
Mean age±SD, years	62.26±6.94	62.85±6.34	0.509
Mean PSA±SD, ng/ml	5.75±1.49	12.77±5.06	<0.001
Continence, n (%)	134 (99.3%)	92 (96.8%)	0.309
Potency, n (%)	122 (90.4%)	76 (80.0%)	0.041
BCR-free survival, n (%)	128 (94.8%)	85 (89.5%)	0.205
Trifecta, n (%)	118 (87.4%)	70 (73.7%)	0.013
Complication-free, n (%)	129 (95.6%)	87 (91.6%)	0.336
Negative surgical margin, n (%)	107 (79.3%)	70 (73.7%)	0.407
Pentafecta, n (%)	89 (65.9%)	50 (52.6%)	0.058

PSA: Prostate specific antigen; SD: standard deviation.

Table VI. *Trifecta and pentafecta of robotic-assisted radical prostatectomy (RARP) classified by PSA level.*

PSA level	Less than 5-8 ng/ml	More than 5-8 ng/ml	*p*-Value
Trifecta, 5 ng/ml	50 (86.2%)	138 (80.2%)	0.411
Pentafecta, 5ng/ml	39 (67.2%)	100 (58.1%)	0.284
Trifecta, 6 ng/ml	77 (88.5%)	111 (77.6%)	0.058
Pentafecta, 6 ng/ml	55 (63.2%)	84 (58.7%)	0.593
Trifecta, 7 ng/ml	104 (86.7%)	84 (76.4%)	0.064
Pentafecta, 7 ng/ml	76 (63.3%)	63 (57.3%)	0.421
Trifecta, 8 ng/ml	118 (87.4%)	70 (73.7%)	0.013
Pentafecta, 8 ng/ml	89 (65.9%)	50 (52.6%)	0.058

PSA: Prostate specific antigen.

Table VIII. Comparison of pentafecta outcomes of robotic-assisted radical prostatectomy (RARP) between Dr. Patel's series and Dr. Ou's series.

Series	Ou *et al*. N=230	Patel *et al*. N=332	*p*-Value
Mean age±SD, years	62.5±6.7	58.57±7.532	<0.001
Mea PSA (median), ng/ml	8.62±4.91 7.4 (5.29-10.01)	4.4 (3.4-5.9)	
Clinical T1/T2, n (%)	135 (58.7%)/ 95 (41.3%)	92.7%/7.3%	<0.001
Low/intermediate/ high risk, n (%)	125 (54.3%)/ 72 (31.3%)/ 3 (14.3%)	67.2%/ 28.9%/3.9%	<0.001
Continence, n (%)	226 (98.3%)	96.4%	0.291
Potency, n (%)	198 (86.1%)	89.8%	0.232
BCR-free survival, n (%)	213 (92.6%)	96.4%	0.072
Trifecta, n (%)	188 (81.7%)	83.1%	0.753
Complication-free, n (%)	216 (93.9%)	93.4%	0.935
Negative surgical margin, n (%)	177 (77.0%)	90.7%	<0.001
Pentafecta	139 (60.4%)	70.8%	0.014

BCR: Biochemical recurrence; PSA: prostate specific antigen; SD: standard deviation.

Discussion

The present study is the first in Asia to report pentafecta outcomes following 230 cases of RARP with bilateral NVB preservation performed by a single surgeon at a high-volume Center. The isolated continence, potency, and BCR-free rates were reached in 98.3%, 86.1% and 92.6% of patients, combined with trifecta rates achieved in 81.7%. In addition to the complication-free status (93.9%) and NSM (77%), the pentafecta rate was 60.4%. These findings are comparable to the results of our mentor, Dr. Patel (6). Side-by-side comparison of Dr. Patel's series and the present series is shown in Table VIII. Patients' in Dr. Patel's series had lower median PSA levels than in our series (4.4 *versus* 7.4 ng/ml). Statistically significant differences (all *p*<0.001) were found

in age (58.57±7.532 *versus* 62.5±6.7), clinical T1 stage and low-risk category in Dr. Patel's series *versus* ours. However, the continence, potency, BCR-free, trifecta and complication-free rate between the two series were similar. The NSM was significantly higher, resulting in a higher pentafecta rate in Dr. Patel's series than in ours (70.8% *versus* 60.4%, *p*<0.05). Among Patel's patients, some of those who were ideal candidates for RARP with bilateral NVB preservation would have undergone active surveillance (13). In Taiwan, where

Table IX. *Pentafecta outcomes of robotic-assisted radical prostatectomy (RARP) and laparoscopic radical prostatectomy (LRP) in world series.*

Author (Ref)	Number	Surgeon (procedure)	PSA, ng/ml	Clinical stage % (T1/T2)	Risk L/I/H(%)	Follow-up (months)	Continence (%)	Potency (%)	BCR-free(%)	Complication-free(%)	NSM(%)	Pentafecta (%)
Patel *et al*.(6)	332	1(RARP)	4.4	92.7/7.3	67.2/ 28.9/3.9	12	96.4	89.8	96.4	93.4	90.7	70.8
Good *et al*. (18)	335	Multiple (LRP)	<7.5	NA	NA	60	88	52	98	91.1	76.5	63
Anastasis *et al*. (21)	136	Multiple (RARP)	6.4	NA	NA	12	90.4	66.2	95.6	85.3	84.6	45.6
Anastasis et al. (21)	91	Multiple (LRP)	6	NA	NA	12	81.3	39.6	100	87.9	93.4	27.5
Si-Tu *et al*. (20)	170	1(LRP)	7.98	52.4/47.6	NA	60	97.1	75.3	89.4	94.7	94.7	72.9
Garate *et al*. (21)	100	Multiple (RARP)	5.4	NA	54.3/ 31.3/14.3	12	87.5	59.5	87.5	81.1	79.2	NA
Ou et al. (#)	230	1(RARP)	8.6	58.7/41.3	NA	28	98.3	86.1	92.6	93.9	77	60.4

BCR: Biochemical recurrence; PSA: prostate specific antigen; L/I/H: Low/intermediate/high risk; NSM: negative surgical margin.

there is no PSA screening program, more cases of prostate cancer are diagnosed at advanced disease and a large percentage (49.3%) of high-risk patients undergo RARP (1). In the present series, 14.3% of patient were considered at high risk, and RARP with bilateral NVB preservation can jeopardize surgical margins in these patients. In our previous study, the PSM rate increased from 43.9% in non-NVB preservation to 84.1% in NVB preservation among high-risk patients ($p<0.01$) (14). In other words, NVB preservation during RARP for the high-risk group increased PSMs. Srivastava *et al*. used a risk-stratified grade to adjust the nerve-sparing procedure during RARP (15). Similarly, von Bodman *et al*. advised that nerve-sparing techniques were performed during RARP according to intraoperative frozen section of the prostate to reduce the PSM rate (16). Among 904 patients undergoing RARP, Sooriakumaran *et al*. reported that unifocal PSMs of ≤3 mm were not significantly associated with BCR(5). However, those authors suggested that patients with >3 mm/multifocal PSMs may have a higher risk (2.84-fold) of BCR than those with unifocal PSMs of ≤3 mm, or NSMs, especially if they have lower-risk disease (5).

The course of progress made in learning RARP includes five parameters, out of which the first is no perioperative complications. Previously, we reported that experience of 150 cases are needed to reduce perioperative complications (9). The return to urinary continence can be better after the experience of 100 cases of RARP (17). The learning curve to achieve good potency and cancer control (NSM and BCR-free) is partially dependent on the patient cohort, including patients' age, PSA level and risk classification. Good *et al*. reported analysis of the pentafecta learning curve for LRP, including multiple learning curves for initial perioperative

outcomes (150 cases), oncological outcomes (150-200 cases), then continence (200-250 cases), and finally over 250 cases to stabilize the potency outcomes (18). Our data did not show differences in the pentafecta rates of RARP between group I and group II. The reasons may be that group I (115 cases) was selected from 375 cases, and we crossed the pentafecta learning curve during this period. The second reason is likely age differences, since group II had statistically significant older age than group I (63.4±7.1 years old *versus* 61.6±6.1 years old, $p=0.038$) (Table I). The failed pentafecta group was also statistically significantly older than the group achieving pentafecta (63.6±6.4 *versus* 61.8±6.8 years old, $p=0.041$). Likewise, Dr. Patel *et al*. reported that patient age proved to be the only parameter independently associated with pentafecta outcomes after RARP when analyzed using multivariable analysis (6). On univariable analysis, patient age and pathological stage were the two factors that influenced achieving the pentafecta (6). Our results showed that the ratio of pT2 to pT3 was 78.4% to 21.6% in the group achieving pentafecta and 42.9% to 57.1% in the failed pentafecta group ($p<0.001$). Our results revealed that the pathological stage is a factor associated with achieving pentafecta, which is compatible with Dr. Patel's comments. Undoubtedly, our data reflect 57.1% of pT3 and 58.2% of PSM in the failed pentafecta group. Ploussard *et al*. analyzed 1,504 consecutive men undergoing radical prostatectomy, of which 73.7% of patients with PSM *versus* 93.0% of patients with NSM ($p<0.001$) achieved 2-year BCR-free survival (19). PSM does not influence BCR in pT2 disease. In pT3 disease, PSM length (≥3 mm) and multifocality (≥3 sites) are significantly related to poorer outcomes (19). Si-Tu *et al*. also reported 170 cases of LRP

and noted that multivariable analysis revealed that patient age and pathological stage are two independent factors that can predict pentafecta (20).

Minimally-invasive surgery (*e.g.* LRP and RARP) is the trend of treatment forlocalized prostate cancer. Patients have high expectations for functional and oncological outcomes. Dr. Patel advocated the new concept of pentafecta outcome after RARP (6), which is a patient-oriented consideration. Pentafecta rates can depict postoperative patient satisfaction and provide a more comprehensive tool for counseling patients undergoing RARP (6). However, the new concept has not yet been widely adopted. In Table IX, we review pentafecta outcomes of four series of RARP and three of LRP in a world series (6, 18, 20-22). The case numbers ranged from 91 to 335. RARP was performed by multiple surgeons in two series, while one surgeon performed RARP in Dr. Patel's series and the present series. Briefly, in that comparison of series, the overall continence rate ranged from 81.3% to 98.3%, with LRP varying from 81.3%-97.1% and RARP having the higher rates (87.5%-98.3%). Moreover, the overall potency rate ranged from 39.6% to 89.8%, and similarly, LRP had greater variation (39.6%-75.3%), whereas RARP achieved 59%-89.8%. The overall BCR-free rate ranged from 87.5% to 100%, with LRP representing the high scale (89.4%-100%), followed by RARP (87.5%-96.4%). The complication-free rate ranged from 81.1% to 93.9%, including 81.1%-93.9% in the LRP series and 87.9%-94.7% in the RARP series.The NSM rate ranged from 76.5% to 90.7%, similarly in both LRP (75.6%-94.7%) and RARP (77%-90.7%). Lastly, the pentafecta rate ranged from 27.5% to 72.9.%, with 27.5%-72.9%in LRP and 45.6%-70.8% in RARP. Based on these data, we can illustrate the pentafecta rate for counseling patients before surgery. As in our previous publication, the major concerns for patients undergoing RARP were cancer control, followed by postoperative continence rate, then less pain, less blood loss and preservation of erectile function (23). Sometimes, preserving the neurovascular bundle can result in positive surgical margins and BCR development. Therefore, patient selection is a very important point, along with low-risk disease and younger age, which appear to achieve higher pentafecta based on our data.

This study has several limitations. The functional outcomes, including continence and potency, were mainly determined *via* physician assessment rather than by patient questionnaire. Using the continence definition of pad-free status, the correlation between patient-reported and physician-reported assessments was high (24). For potency evaluation, potency was defined as an erection sufficient for intercourse with (N=75) or without (N=123) PDE-5 inhibitors, achieved in 86.1% (198/230) of cases. In addition, the follow-up period was relatively short-term (mean=24 months), which should be extended to intermediate- and long-term follow-up in order to confirm functional results and BCR-free survival.

Conclusion

The results of the present study revealed a pentafecta rate of 60.4% following RARP with bilateral NVB preservation. RARP performed by a single surgeon at a high-volume center in Asia, eliminated bias for multiple surgeons and achieved fairly good experience levels. The results were based on a prospectively collected database to provide a reference for future physician consultation and patient counseling. Moreover, our study findings showed that the key to best pentafecta outcomes is patient selection and reducing positive surgical margins. Younger patients and low-risk disease helps to achieve high pentafecta rates.

Acknowledgements

Conflicts of Interest

The Authors declare that they have no conflicts of interest with regard to this study.

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