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Clinical Outcomes Associated with Robot-Assisted Radical Prostatectomy (RARP) Using the Extraperitoneal Approach in Japanese Men

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Abstract

Background: Robot-Assisted Radical Prostatectomy (RARP) has become a widely adopted procedure to treat localized Prostate Cancer (PCa). However, it is sometimes difficult to perform such a procedure using the typical Transperitoneal (TP) approach in those cases that have undergone prior abdominal operations. Herein, we performed RARP using the Extraperitoneal (EP) approach for Japanese PCa cases with prior abdominal operations to evaluate the feasibility and clinical outcomes associated with this procedure.

Material and Methods: Seven hundred eighty-eight Japanese PCa cases underwent RARP from August 2009 to March 2017; 15 cases that were operated on using the EP approach comprised the study cohort.

Results: The abdominal operations in the 15 cases were performed for the following reasons: three for nephrectomy, two for panperitonitis, two for appendectomy, and nine for other reasons, including overlap. There were no significant differences with respect to six factors (operation time, console time, estimated intraoperative blood loss volume, surgical margin positivity, postoperative catheterization time, and postoperative hospital length of stay) between the cases that underwent the procedure using the TP and EP approach, despite the total number of cases in each group being different.

Conclusions: We propose that RARP could be safely performed using the EP approach in Japanese PCa cases that have had prior abdominal operations.

Keywords: Prostate cancer; RARP; Extraperitoneal approach

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Introduction

Robot-Assisted Radical Prostatectomy (RARP) has become profoundly popular among urologists for the treatment of localized Prostate Cancer (PCa) due to the reasonable evidence that has amassed to suggest that RARP is a well-tolerated, safe, and efficacious intervention for the management of localized PCa [1,2]. The predominant technique of RARP is performed with Transperitoneal (TP) access; however, notably, it can be difficult to perform RARP using the TP approach in cases that have had prior abdominal operations.

Gettman et al. reported the first clinical cases of Extraperitoneal (EP) RARP (EP-RARP) in 2003, and several studies since have compared the oncological outcomes and complications of TP- versus EP-RARP [3]. Some studies have reported that EP-RARP may be similar or even superior to TP-RARP in terms of perioperative outcomes [4]. However, only a few reports have discussed the clinical outcomes of EP-RARP in Japanese cohorts. In the present study, we performed RARP using the EP approach on Japanese PCa cases that have undergone prior abdominal operations in order to evaluate the procedure's feasibility and associated clinical outcomes.

Methods

During the EP-RARP operation, the trocar was placed below the navel, and the retroperitoneal space was dilated using a balloon dilator. Each port was placed at locations approximately 1 cm, 2 cm more caudal than the positions used during TP-RARP (Figure 1). We maintained at least 6 cm of distance between each port, and the case was placed in a 10-degree head-down (Trendelenburg)

Table 1: Clinical characteristics of TP- or EP-RARP cases.

Baseline Patient Characteristics	TP	n=773					EP	n=15				p value
Age (y.o.)	Mean 65.1 (45-77)						Mean 67.7 (57-78)					0.088
Serum PSA level (ng/ml)	Mean 9.3 (1.6-158.3)						Mean 5.9 (4.3-10.7)					<0.05
T stage	cT1a	1	-0.10%									0.178
	cT1c	143	-18.50%									
	cT2a	220	-28.50%				cT2a		5			
	cT2b	226	-29.20%				cT2b		4			
	cT2c	147	-19%				cT2c		6			
	cT3a	35	-4.50%									
	cT3b	1	-0.10%									
Gleason score	≦6	239	-30.90%				≦6		5			0.511
	7	380	-49.20%				7		9			
	8~10	154	-19.90%				8~10		1			
D'Amico Risk classification	Low		141	-18.20%			Low			1		0.487
	Intermediate		323	-41.80%			Intermediate			8		
	High		309	-40%			High			6		
Neoadjuvant Treatment	Anti-androgen monotherapy				168	-21.70%	Anti-androgen monotherapy				3	0.407
	LHRH agonist alone				25	-3.20%						
	Combined Androgen Brockade				54	-7%	Combined Androgen Brockade				3	
	Others				22	-2.80%						
	None				504	-65.20%	None				9	

position.

All values are presented as mean ± SD, and a statistical comparison of the results was performed by Student's t-test, Mann-Whitney test, Chi-square test, or Fisher's exact test. In all statistical analyses, a p value < 0.05 was considered significant. All data were analyzed using IBM SPSS Statistics version 23 (SPSS Japan Inc, Tokyo, Japan).

Results

A total of 788 Japanese PCa cases underwent RARP from August 2009 to March 2017; 773 cases underwent TP-RARP, whereas 15 cases underwent EP-RARP. Clinical characteristics of these cases were shown in (Table 1). The mean age of the cases that underwent TP- and EP-RARP were 65.1 (45-77) years and 67.7 (57-78) years, respectively. The mean initial serum Prostate-Specific Antigen (PSA) level of each group was 9.3 (1.6-158.3) ng/ml and 5.9 (4.3-10.7) ng/ml. Information about clinical stage, Gleason score, and D'Amico risk classification is shown in (Tables 1). In the context of Neoadjuvant Treatment, 504 patients (65.2%) were not performed in TP-RARP cohort, while 9 patients (60%) not in EP-RARP cohort. In these six factors (Age, Serum PSA level, Gleason score, D'Amico Risk classification, and Neoadjuvant Treatment), only Serum PSA level showed a significant difference between the EP- and TP-RARP cohorts.

In the 15 EP-RARP cases, before RARP, nephrectomy was performed in three, panperitonitis in three, appendectomy in two, and other operations in nine, including overlap (Table 2).

The mean operation time and console time of EP-RARP cases were 173 (124-279) minutes and 116 (81-219) minutes, respectively. The mean estimated intraoperative blood loss was 227 (50-600) ml, and none of the cases required the conversion to open surgery or the use of intraoperative blood transfusions. The mean postoperative catheterization time and postoperative hospital length of stay were 7.2 (6-13) days and 10.7 (8-17) days, respectively (Figure 2). Postoperative complications included urinary retention (Clavien II) (one case), lymphocele (Clavien I) (one case), and anastomotic leak (Clavien I) (one case). Surgical margin positivity was 26.7%.

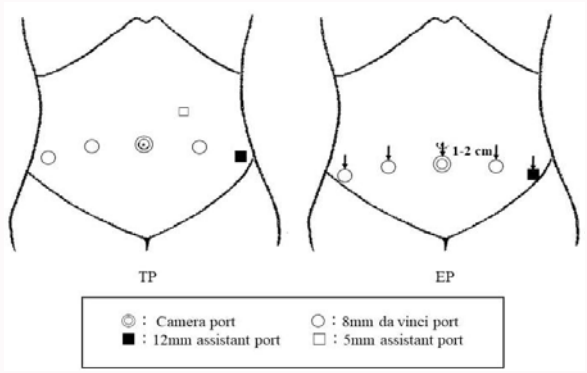

Figure 1: Port placement for TP- or EP-RARP.

In the 773 cases who underwent RARP using the TP approach during the same period, the mean operation time and console time were 169 (80-570) minutes and 130 (53-515) minutes, respectively, and the mean estimated intraoperative blood loss was 171 (10-1000) ml. The mean postoperative catheterization time and postoperative hospital length of stay were 6.5 (4-43) days and 9.7 (4-47) days, respectively. Surgical margin positivity was 20.2%.

There were no significant differences with respect to these six factors (including surgical margin positivity) between the cases that underwent the procedure using the TP and EP approach, despite the

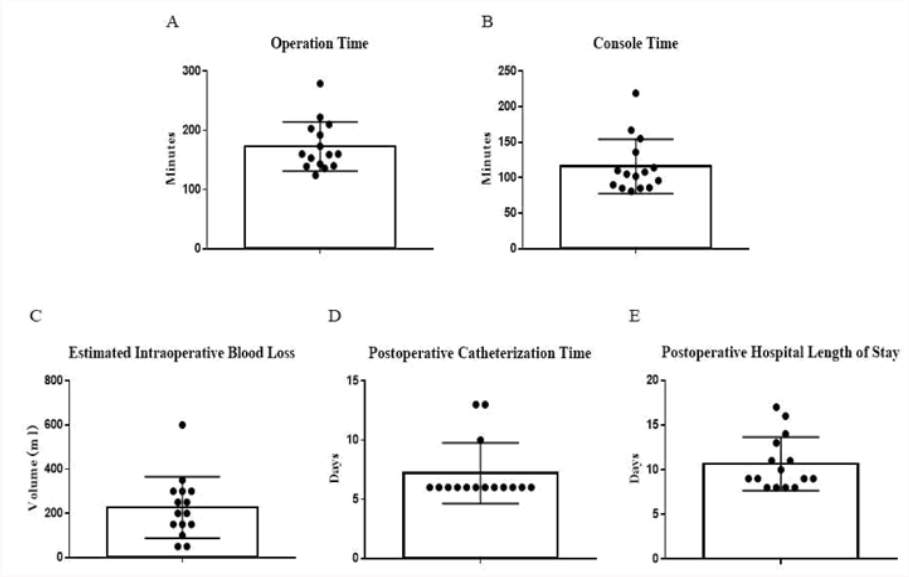

Figure 2: Clinical outcomes of EP-RARP cases. A: Operation Time, B: Console Time, C: Estimated Intraoperative Blood Loss, D: Postoperative Catheterization Time, E: Postoperative Hospital Length of Stay. Histograms represent each point and the mean with SD.

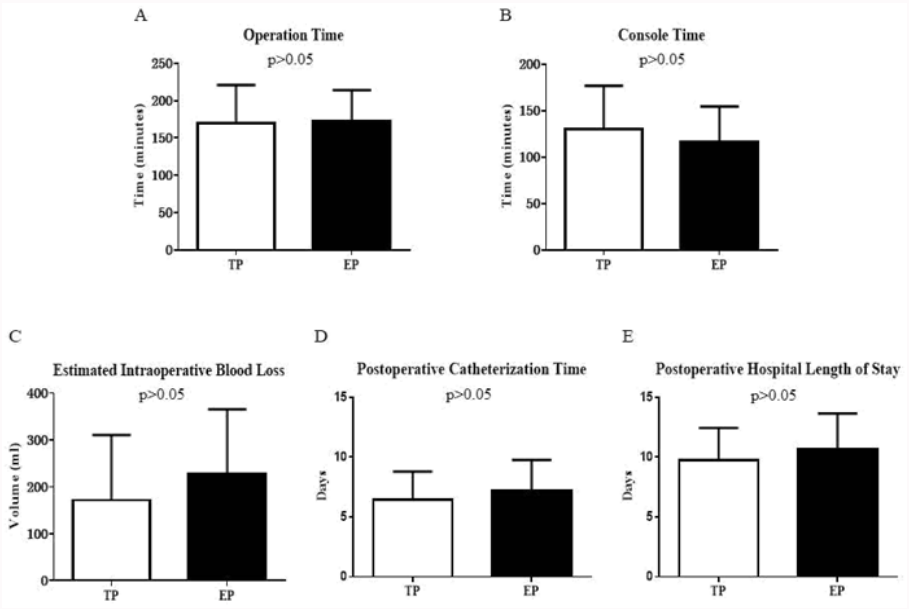

Figure 3: Clinical outcomes of TP- or EP-RARP cases. A: Operation Time, B: Console Time, C: Estimated Intraoperative Blood Loss, D: Postoperative Catheterization Time, E: Postoperative Hospital Length of Stay. Histograms represent the mean with SD.

total number of cases in each group being different (Figure 3). These results indicate that the EP-RARP procedure is similarly effective to the TP approach for managing cases with small pelvises, such as Japanese men.

Discussion

PCa is the most common cancer worldwide, and radical prostatectomy is the standard therapy for treating cases with localized PCa [5,6]. Retropubic Radical Prostatectomy (RRP), Perineal Radical Prostatectomy (PRP), Minimum-Incision Endoscopic Radical Prostatectomy (MIERP), and Laparoscopic Radical Prostatectomy (LRP) have also been performed; however, these procedures require the use of accurate methods of handling in the pelvis. Since the average pelvic cavity of a Japanese man is smaller than those of men in other countries, it could be difficult to perform RP on Japanese PCa cases. In Japan, RARP was introduced in 2006 [7], and the public health insurance program began to cover the cost of RARP in April 2012. Thereafter, the number of RARP operations has increased rapidly.

The RARP technique is predominantly performed with TP access; however, the TP approach is sometimes difficult to execute successfully in cases who have had previous abdominal surgery. As mentioned above, since the first report by Gettman et al. there have been several studies that have compared the oncological outcomes and complications of TP- versus EP-RARP. Lee et al. conducted a meta-analysis of studies that compared the TP versus the EP approach in RARP [8]. A study had demonstrated that operating room time was shorter with EP-RARP than with TP-RARP. This was

Table 2: Prior abdominal operations in the 15 EP-RARP cases.

EP-RARP cases	n=15	
Prior Abdominal Operations (including overlap)	Nephrectomy	3
	Panperitonitis	2
	Appendectomy	2
	Others	9

mainly achieved by the inclusion of a shorter console time in EP-RARP, because no further mobilization of the peritoneum and the bladder was necessary [9]. In this study, there were no significant differences in terms of operation time and console time between the TP and EP groups. For estimated blood loss and surgical margin positivity, Lee et al. indicated that there was no statistical difference between the EP- and TP-RARP cohorts using random-effects models, which is consistent with the result obtained in our study [8]. It could be difficult to analyze postoperative length of hospital stay because the average stay in two studies conducted in the United States was only one day [10,11], but there is also no discernable difference between the groups in our cohort with respect to this. Regarding the complications, Liatsikos et al. [12] indicated that, since the bowel is minimally manipulated and there is no leakage of intraperitoneal fluids, the peritoneum still works as a natural barrier before and after EP-RARP operation. Moreover, bowel injuries that infrequently occur during trocar insertion and dorsal dissection of the overlying rectum prostatic apex are considered less severe complications in the EP approach because the risk of generalized peritonitis is diminished with this approach [13]. In the 15 cases who underwent the EP-RARP procedure in this study, none of them had a Clavien-Dindo classification of or more.

In this study, we evaluated the procedural feasibility of EP-RARP and the associated clinical outcomes of 15 Japanese PCa cases that underwent this procedure and compared them with those of 773 PCa cases who underwent TP-RARP. Although the number of cases who underwent each procedure was different, the efficacy of EP-RARP for Japanese PCa cases was still evident.

In conclusion, the EP-RARP procedure could be a safe and effective treatment for Japanese PCa cases with prior abdominal operations.

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