

Incidence, Risk Factors, and Outcomes of Rectal Injury in Radical Prostatectomy

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Background: Radical prostatectomy is a standard treatment option for localized prostate cancer. Rectal injury is one of the serious specific complications for this operation. Although its occurrence is rare in the literature, it contains significant morbidity.

Objective: To report incidence, risk factors, and outcomes of patients with rectal injury associated with radical prostatectomy.

Materials and Methods: Patients demographic data, operative data, and complications data were collected. Risk factors for rectal injury were analyzed. The treatment method of rectal injury and the outcomes of treatment were also described.

Results: Between July 1, 2011 and July 31, 2017, the authors' institute had performed 535 radical prostatectomy procedures. There were seven (1.3%) rectal injuries in the series. Possible risk factors for rectal injury are intermediate-risk and high-risk patients. Minimally invasive methods had a significant lower risk of rectal injury. The seven rectal injuries were successfully repaired by multilayers closure without colostomy or the need for further reoperation.

Conclusion: Rectal injury is a rare but serious complication in radical prostatectomy procedures. Risk factors are difficult to identify because of the low incidence of this condition. Meticulous repair can reduce the morbidity from the complication.

Keywords: Radical prostatectomy, Prostate cancer, Rectal injury, Rectal complication

J Med Assoc Thai 2019;102(6): 668-72

Website: <http://www.jmatonline.com>

Received 10 Apr 2018 | Revised 7 Jun 2018 | Accepted 14 Jun 2018

Prostate cancer is considered one of the most common non-skin cancers in men, with an incidence rate of 33 per 100,000 per year worldwide and 10 per 100,000 per year in Asia-Pacific⁽¹⁾.

Radical prostatectomy is one of the standard treatment options in localized prostate cancer⁽²⁾. Although radical prostatectomy provides an excellent cancer control outcome⁽³⁾, it leads to some morbidities. Specific complications in this procedure include urinary incontinence and impotence⁽⁴⁾. Another serious complication reported in the literature for this procedure is rectal injury, which can seriously reduce a patient's quality of life⁽⁵⁾. Various treatment methods

have been described in the literature⁽⁵⁾.

At Ramathibodi Hospital, the surgical treatment for prostate cancer is radical prostatectomy in all approaches, including open radical prostatectomy (ORP), laparoscopic radical prostatectomy (LRP), and robotic assisted laparoscopic radical prostatectomy (RALRP).

The present study aimed to report the incidence and risk factors of rectal injury in patients with prostate cancer that underwent radical prostatectomy at the authors' institute, and also described management and outcomes of the patients with rectal injury.

Materials and Methods

Between July 1, 2011 and July 31, 2017, the authors' institute performed 535 radical prostatectomies. Patients' demographic data were collected, including age, height, body weight, body mass index (BMI), underlying diseases, pre-operative prostate specific antigen (PSA), pre-operative pathologic report, and pre-operative staging. Operative details were

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How to cite this article: Lumbiganon S, Sirisopana K, Kochakarn W, Leenanupunth C, Kijvikai K, Sangkum P, et al. Incidence, Risk Factors, and Outcomes of Rectal Injury in Radical Prostatectomy. J Med Assoc Thai 2019;102:668-72.

Table 1. Demographic data

	Rectal injury patients n (%)	Non-rectal injury patients n (%)	p-value
Number of patients	7	528	
Age (years), Mean±SD	62.43±6.83	67.19±7.66	0.097
BMI (kg/m ²), Mean±SD	26.46±2.20	24.82±3.51	0.102
PSA (ng/ml), Median (IQR)	22.25 (48.63)	11.14 (13.30)	0.222
Operative time (minutes), Mean±SD	192.86±68.37	205.22±72.36	0.980
EBL (ml), Median (IQR)	2,000 (3,050)	400 (450)	0.006
Hospital stay (days), Median (IQR)	9 (3)	6 (3)	0.016
T stage (missing=4)			0.157
T2a	0 (0.0)	46 (8.8)	
T2b	0 (0.0)	13 (2.5)	
T2c	2 (28.6)	231(44.1)	
T3a	2 (28.6)	118 (22.5)	
T3b	3 (42.8)	116 (22.1)	
Gleason grade group (missing=5)			0.361
1	1 (14.3)	83 (15.9)	
2	2 (28.6)	185 (35.4)	
3	1 (14.3)	112 (21.4)	
4	1 (14.3)	47 (8.9)	
5	2 (28.6)	96 (18.4)	

SD=standard deviation; IQR=interquartile range; BMI=body mass index; PSA=prostate specific antigen; EBL=estimate blood loss

also collected, including method of operation (ORP, LRP, and RALRP), operative time, estimate blood loss (EBL), blood transfusion, peri-operative complications, presence of rectal injury, and method of treatment. In addition, post-operative data were collected, including length of hospital stay, post-operative pathologic report, and post-operative PSA. The details of treatment and the outcomes of patients with rectal injury were also described.

Incidence and risk factors of rectal injury were analyzed using descriptive (mean, median) and analytic statistics (chi-square test) with SPSS version 19. A p-value of less than 0.05 indicates statistical significance.

Results

Seven (1.3%) rectal injuries occurred during radical prostatectomy. Table 1 shows the differences in demographic data between patients with rectal injury and patients without rectal injury. There were no statistical significant differences in age, BMI, operative time, or preoperative PSA between the two

groups. There were significant more instances of EBL and longer hospital stays for patients with rectal injury.

Patients were categorized into the following risk groups, low risk (Gleason score ≤6, PSA <10 ng/mL, T stage: T2a and below); intermediate risk (Gleason score 3+4 or 4+3, PSA between 10 ng/mL and 20 ng/mL, T stage: T2b or T2c), and high risk (Gleason score 8 to 10, PSA ≥20 ng/mL, T stage: T3a and above). Table 2 shows the number of patients with and without rectal injury according to risk group. There was no statistical significant difference in rectal injury in the high-risk group compared to the low- and intermediate-risk groups combined. Minimally invasive methods of radical prostatectomy (LRP and RALRP) had significant lower rectal injury rates compared to ORP, as shown in Table 3. Methods of operation and risk groups were subcategorized, as shown in Table 4.

Patients with rectal injury were managed by immediate repair of the injury. All rectal injuries in patients receiving ORP were repaired with two layers of PDS 4-0 interrupted stitches. Rectal injuries in

Table 2. Number of patients in each risk group

Risk (missing=4)	Rectal injury n (%)		No rectal injury n (%)		p-value
Low	0 (0.0)	total=2 (28.6)	22 (4.2)	total=215 (41.0)	0.78
Intermediate	2 (28.6)		193 (36.8)		
High	5 (71.4)		309 (59.0)		

Table 3. Number of patients in each method of operation

Operation method	Rectal injury n (%)		No rectal injury n (%)		p-value
Open	4 (57.2)		82 (15.5)		0.014
Laparoscopic	3 (42.8)	total=3 (42.8)	151 (28.6)	total=446 (84.5)	
Robotic assisted	0 (0.0)		295 (55.9)		

Table 4. Number of patients subcategorized in to each method of operation and risk group

Method of operation and risk	Rectal injury n (%)	No rectal injury n (%)	Total
Open			
Low risk	0 (0.0)	4 (0.8)	4 (0.8)
Intermediate risk	2 (28.6)	30 (5.7)	32 (6.0)
High risk	2 (28.6)	46 (8.8)	48 (9.0)
Total open (missing=2)	4 (57.1)	80 (15.3)	84 (15.8)
Laparoscopic			
Low risk	0 (0.0)	9 (1.7)	9 (1.7)
Intermediate risk	0 (0.0)	58 (11.1)	58 (10.9)
High risk	3 (42.8)	84 (16.0)	87 (16.4)
Total laparoscopic	3 (42.8)	151 (28.8)	154 (29.0)
Robotic assisted			
Low risk	0 (0.0)	9 (1.7)	9 (1.7)
Intermediate risk	0 (0.0)	105 (20.0)	105 (19.8)
High risk	0 (0.0)	179 (34.2)	179 (33.7)
Total robotic assisted (missing=2)	0 (0.0)	293 (55.9)	293 (55.2)
Total			
Low risk	0 (0.0)	22 (4.2)	22 (4.1)
Intermediate risk	2 (28.6)	193 (36.8)	195 (36.7)
High risk	5 (71.4)	309 (58.9)	314 (59.1)
Total (missing=4)	7 (100)	524 (100)	531 (100)

patients receiving LRP were also repaired by two layers of absorbable suture, typically Maxon 3-0. Fibrin glue and fat tissue interposition were also used in one patient. The average urinary catheter duration

was 14 days. All patients underwent cystography before catheter removal.

One patient had been suspected of having a rectovesical fistula because of a small amount

of gastrointestinal content in his urine. He was conservatively treated by total parenteral nutrition for two weeks and a Foley catheterization for four weeks. Cystography was performed four weeks post-operatively before his catheter was removed, and no rectovesical fistula was identified. He still had no clinical suspicions for rectovesical fistula after follow-up at one year.

All other patients recovered well. No colostomy or reoperation was needed in the present series. No patients developed rectovesical fistula after at least 1-year follow-up period. One patient who had received ORP developed a short segment stricture at urethrovesical anastomosis requiring a single transurethral incision procedure.

Discussion

The authors institute reported a 1.3% incidence rate of rectal injury during radical prostatectomy procedures, which is comparable to 0.47% to 1.7% from previous reports^(6,7). According to the present study, possible risk factors for rectal injury include intermediate-risk and high-risk patients; however, the authors failed to show its significance from the analysis because the present study had no case of rectal injury in the low-risk patient. Minimally invasive methods (LRP and RALRP) had significant lower rectal injury rates in the present series. Carlsson et al⁽⁸⁾ reported a significantly lower rectal injury rate in RALRP compared to ORP, but the present study was unable to perform subgroup analysis into ORP, LRP, and RALRP since we had no rectal injury in 295 patients in RALRP group.

There was no statistical significant risk of rectal injury when analyzed method of treatment with subgroups of patient risk.

Some risk factors of rectal injury identified from previous studies⁽⁶⁾ included salvage radical prostatectomy, PSA, tumor stage, Gleason grading and lymph node status were unable to be demonstrated by the present series. Even a study with more than 6,000 radical prostatectomies was unable to identify risk factors for this event⁽⁹⁾.

The authors performed interrupted 2-layer repairs of the rectum. Only one patient required fat interposition for the repaired defect. None of the rectal injured patients required further major operations. By contrast, Mandel et al⁽⁶⁾ reported that 12% (13/109) of patients required a diverting colostomy. In the present study, no recto-anastomosis fistula (RAF) formation occurred during at least a 1-year follow-up period, whereas in a report from Robert et al⁽¹⁰⁾, the RAF rate

was 12.5% after well-vascularized tissue interposition.

The present study recruited all radical prostatectomy methods (ORP, LRP, and RALRP) from the same period, which is rarely seen in reported articles. One large recent study had no ORP series after 2001 to compare⁽⁶⁾.

Risk factors for this complication were difficult to identify, which could be the result of low incidence rate and small number of rectal injury cases. In addition, some data were missing from the retrospective setting.

The present study report's course of treatment for patients with rectal injury includes method of treatment, duration of treatment, and final outcome of the patient, which would be useful in pre-operative counseling before a radical prostatectomy procedure.

Conclusion

Rectal injury is a rare but serious complication that can occur in radical prostatectomy procedures, yet risk factors are difficult to identify because of the low incidence rate. Minimally invasive procedures tend to decrease the complication, and meticulous repair can reduce morbidity from this injury. Patients should be informed about this complication before the procedure.

What is already known on this topic?

Incidence of rectal injury is rare. Risk factors of this complications are difficult to identify due to the low incidence.

What this study adds?

The present study is one of the largest series of rectal injury in radical prostatectomy in Thailand. It also compared rectal injury incidence rate in all method of surgery and included open, laparoscopic, and robotic assisted in the same period, which is rarely seen in recent study.

Acknowledgement

The authors would like to thank Ramathibodi Hospital for contribution in medical record access.

Conflicts of interest

The authors declare no conflict of interest.

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