

Urologic Laparoscopic Surgeries in Elderly: Analysis of Pre-Operative Risk Factors and Postoperative Complications*

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ABSTRACT

Purpose: The aging of the population leads to increases in the prevalence of symptomatic urologic diseases. The aim of this study is the analysis of pre-operative risk factors and postoperative complications in patients over the age of 60 years undergoing elective laparoscopic urologic surgery. **Patients and Methods:** A retrospective study was conducted of 113 patients 60 years of age or older who underwent urologic laparoscopic surgery by a single surgeon (SP). The pre-operative physical status and systemic complications, operation time, postoperative complications, postoperative hospital stay and other clinical features of the patients were reviewed. Complications were classified according to the recently revised Clavien classification system. Statistical analysis was done using Univariate analysis and the Fisher Exact test. **Results:** Laparoscopic urologic surgery was performed on 113 patients 60 years old and over, with an average age of 69.6 years. Associated diseases were found in 92% of them. Pelvic surgery (65; 57.5%) was the main reason for surgery. There were 5 (4.4%) conversions to open surgery and 0% mortality. The overall complication rate was 10 patients (8.8%). Among 9 (7.96%) patients with post-operative complications; Grade I, II, IIIa, IIIb and IV complications were observed in 1.77%, 12.8%, 3.53%, 0.88% and 0.88% of cases, respectively. Sex with male, operative time ≥ 250 min and cancer had high risk ratio (2.76, 2.11 and 3.02, respectively); however the correlations of all of preoperative risk factors and postoperative complications showed no statistically significant differences. **Conclusions:** Laparoscopic surgical treatment of urologic disease in elderly patients performed is feasible and well tolerated, with low perioperative morbidity and a good overall survival rate. Pre-operative risk factors may not influence postoperative complications in patients over the age of 60 years undergoing elective laparoscopic urologic surgery.

Keywords: Urologic; Laparoscopic Surgery; Elderly; Complications; Risk Factors; Clavien Classification System

1. Introduction

As the life-span of humans has increased, the prevalence of urologic disease has also increased with age. The estimated population of Thai elderly (60 and over) at the midyear of 2009 was 7,274,000 and life expectancy at sixty for males and females was 19.4 and 21.9, respectively [1]. As a result, the number of elderly patients requiring urologic surgical procedures, particularly laparoscopic surgical procedures, is increasing [2]. During the last decade, laparoscopic procedures have increasingly become part of the standard surgical armamentarium in many urological centers and new applications for laparo-

scopy continue to be reported [3]. Despite lack of elucidation of full-risk profiles, Efron *et al.* suggested that laparoscopic approaches should be considered regardless of a patient's age [4]. Therefore, it is important to analyze and continue updating laparoscopic surgical treatment in the elderly.

To our knowledge, there are many reports of laparoscopic nephrectomy in elderly patients [5-8]. Nevertheless, the current role of laparoscopic urologic surgery in older patients, especially in pelvic surgeries, has not been reported. To evaluate pre-operative risk factors and postoperative complications, we reported our experience of laparoscopic urologic surgery, early postoperative morbidity and analysis of pre-operative risk factors and postoperative complications in patients over the age of 60

*Conflict of interest: None declared.

years undergoing elective laparoscopic urologic surgery.

2. Patients and Methods

We performed a retrospective review of a cohort of 113 consecutive patients who were aged at least 60 years at the time of undergoing laparoscopic urologic procedures, between July 2006 and December 2012 by a single surgeon (SP). This study was approved by Faculty of Medicine, Ramathibodi hospital, Mahidol University Review Board. Parameters examined included patient demographics, preoperative physical status and co-morbidities, complications, estimated blood loss (EBL), operative time, the American Society of Anesthesiologists score (ASA) class, and length of hospitalization were taken from hospital and outpatient records.

Complications were defined as in previous reports [9-12]: death was defined as any death that occurred within 30 days or any death at all related to the surgical procedure within 90 days. In addition, all complications were classified according to the Clavien classification system revised by Dindo *et al.* [13]. The original classification system consisted of four severity grades. The recently revised system emphasizes the risk and invasiveness of the therapy used to treat a complication and comprises mainly four important modifications: 1) life-threatening complications were differentiated from complications treated in the ward; 2) CNS complications were included in the same category (Grade IV); 3) the length of hospital stay is no longer considered in the ranking; and 4) complications that can potentially lead to long-lasting disability are highlighted by a suffix "d" (for "disability"). Consequently the new classification system comprises five severity grades.

Age, BMI and operative time are expressed as mean (\pm SD). Hospital stay, creatinine and EBL are shown as median and range (min-max), because of non-normal distribution, and the categorical variables as percentage. Univariate analysis with Risk ratio (95% confidence interval; CI) were performed to analyze the correlation of sex, age, body mass index, ASA score, hospital stay, creatinine, type of surgery, operative time, blood transfusion, estimated blood loss and cancer with complications. Fisher's exact test was performed to analyze the correlation of age and operative time, estimated blood loss or hospital stay. A p-value < 0.05 was considered statistically significant.

3. Results

The characteristics of patients were listed in **Table 1**. The majority of laparoscopic urologic surgeries on the elderly in this series are on men (84; 74.3%). The mean patient age was 69.6 yrs (60 - 91 yrs) and the mean body mass index (BMI) was 24.4 kg/m [2] (17.6 - 32.8). Asso-

ciated diseases were found in 92% of the patients; the main diseases being hypertension (76; 67.25%) dyslipidemia (33; 29.2%) and diabetes mellitus type II (29; 25.67%).

All cases were done by transperitoneal incision and admitted electively. (**Table 2**) Non-pelvic surgery (39; 43.5%), pelvic surgery (65; 57.5 %) and both non-pelvic and pelvic simultaneously (9; 7.96%) were undertaken. For non pelvic surgery (39), we performed 17 nephroureterectomies (43.6%), 8 nephrectomies (20.5%) and 7 renal cyst ablations (17.95%). Laparoscopic radical prostatectomy (48; 73.85%) and laparoscopic radical cystectomy with ileal conduit (9; 13.85%) respectively were the main pelvic surgeries (65).

The mean operative time was 250.8 min (100 - 540 min) and the mean blood loss was 568.7 ml (50 - 3500 ml). Blood transfusion treatment was given to 37 patients (32.7%). The main reasons for conversion to open surgery (5; 44%) were technical difficulty and lack of progress with the operation. The overall complication rate was 8.8% (10/113); 1 (0.88%) patient with intraoperative complications included rectal injury. Among 9 (7.96%) patients with post-operative complications; Grade I, II, IIIa, IIIb and IV complications were observed in 1.77%, 12.8%, 3.53%, 0.88% and 0.88% of cases, respectively. Lumbosacral plexopathy [1] and anastomotic urine leakage were included in Grade I. Grade II included cases of deep vein thrombosis [1]. Urinoma [2], anastomotic strictures [1] and postoperative wound infections requiring secondary suture [1] were included in the Grade IIIa category. Grade IIIb included incisional hernia [1]. Sepsis requiring ICU management in one patient was of Grade IV.

Complications were shown sex with male (RR 2.76, 95% CI 0.36 to 21.14, p-value 0.328), operative time \geq 250 min (RR 2.1, 95% CI 0.6 to 7.44, p-value 0.201), and cancer (RR 3.02, 95% CI 0.39 to 23.19, p-value 0.234) had high risk ratio. However, the correlations of none of the preoperative risk factors or postoperative complications were statistically significant different (**Table 3**). When stratified by age < 70 and \geq 70 years old, no statistically significant difference was found in operative time, estimated blood loss or hospital stay (**Table 4**). The mortality rate in our series was 0%. The mean hospital stay was 6 (1 - 60) days.

4. Discussion

Laparoscopic surgery has proved to be a secure and feasible technique in the treatment of benign renal pathology in pediatric patients with satisfactory results [14-16]. Actually the indications are expanding to reconstructive procedures, with promising results, and selected oncologic procedures. In contrast, several aspects of laparo-

Table 1. Patient characteristics.

Characteristics	Number	%
Sex		
Male	84	74.3
Female	29	25.7
Age, year, mean (\pm SD)	113	69.6 (6.9)
BMI, mean (\pm SD)	113	24.4 (3.1)
ASA score		
Level 2	37	32.7
Level 3	67	59.3
Level 4	9	8.0
Hospital stay, median (range)	113	6 (1.60)
Hb, mean (\pm SD)	113	12.7 (1.9)
Cr, median (range)	112	1.0 (0.1, 5.3)
Pelvic surgery		
Pelvic & mix	9	7.96
Pelvic alone	65	57.5
Non-pelvic	39	34.5
Operative time, mean (\pm SD)	113	250.8 (97.9)
Blood transfusion		
Yes	37	32.7
No	76	67.3
Estimated blood loss, median (range)	113	568.7 (0.3500)
Cancer		
Yes	82	72.6
No	31	27.4
Complication		
Yes	9	7.9
No	104	92.1

Table 2. Postoperative complication for each procedure of laparoscopic urologic surgery.

Procedures	No. (%)	Open conversion	Postoperative complication
Laparoscopic non-pelvic surgery	39 (34.5%)	2 (1.76%)	3 (2.65%)
1) adrenalectomy	1	-	-
2) nephrectomy	8*	-	-
3) renal tumor ablation	3	-	Urinoma (Grade II)
4) renal cystic decortication	7*	-	-
5) pyeloplasty	0	-	-
6) ureterolithotomy	2	-	-
7) nephroureterectomy	17	2	Incisional hernia (Grade IIIb)
8) partial Nx	1	-	Urinoma (Grade II)
Laparoscopic pelvic surgery	65 (57.5%)	3 (2.65%)	6 (5.3%)
1) radical prostatectomy	48	2	Anastomotic urine leakage (Grade I), deep vein thrombosis (Grade II), Anastomotic strictures (Grade II), postoperative wound infections Requiring secondary suture (Grade IIIa)
2) urachal cyst removal	2	-	-
3) reimplantation ureter	1	-	-
4) assisted simple cystectomy	1	-	-
5) partial cystectomy	2	-	-
6) radical cystectomy with ileal conduit	9	-	Lumbosacral pexopathy (Grade I), Sepsis requiring ICU management (Grade IV)
7) ileal conduit	1	1	-
8) iliac LN dissection	1	-	-
9) uretectomy	1	-	-
Laparoscopic pelvic-non pelvic surgery (simultaneous)	9 (7.96%)	0	0
1) laparoscopic nephroureterectomy with bladder cuff	9	0	
Total	113	5 (4.4%)	9 (7.96%)

*Laparoendoscopic single site surgery.

Table 3. Univariate analysis of preoperative risk factors and postoperative complications in the patients over the age of 60 years undergoing elective laparoscopic urologic surgery.

Factor	N	Complication		Risk ratio	95% CI	p-value
		Yes	No			
Sex						
Male	84	8 (9.5)	76 (90.5)	2.76	0.36, 21.14	0.328
Female	29	1 (3.4)	28 (95.6)	1		
Age						
≥70	56	5 (8.9)	51 (91.1)	1.27	0.36, 4.50	0.489
<70	57	4 (7.0)	53 (93.0)	1		
BMI						
≥25	47	4 (8.5)	43 (91.5)	1.12	0.32, 3.96	0.561
<25	66	5 (7.6)	61 (92.4)	1		
ASA score						
Level 2	37	4 (10.8)	33 (89.2)	0.61	0.17, 2.13	0.331
Level 3 and Level 4	76	5 (6.6)	71 (93.4)	1		
Hospital stay, mean (SD)	113	14.3 (6.1)	6.5 (0.4)	1.05	1.04, 1.07	0.258
Hb						
<11	17	0 (0)	17 (100.0)	0.28	0.02, 4.66	0.217
≥11	96	9 (9.4)	87 (90.6)	1		
Cr, mean (SD)	113	1.1 (0.1)	1.2 (0.1)	0.52	0.10, 2.74	0.441
Pelvic Sx						
Pelvic & mix	9	0 (0)	9 (100.0)	0.03*	-1.42, 1.48	0.967
Pelvic alone	65	6 (9.3)	59 (90.7)	1		
Non-pelvic	39	3 (8.6)	36 (91.4)	1		
Operative time						
≥250 min	42	5 (11.9)	37 (88.1)	2.11	0.60, 7.44	0.201
<250 min	71	4 (5.6)	67 (94.4)	1		
Blood transfusion						
Yes	37	3 (8.1)	34 (91.9)	1.03	0.27, 3.88	0.615
No	76	6 (7.9)	70 (62.1)	1		
Estimated blood loss						
≥570 ml	35	3 (8.6)	32 (91.4)	1.11	0.30, 4.20	0.569
<570 ml	78	6 (7.7)	72 (92.3)	1		
Cancer						
Yes	82	8 (9.8)	74 (90.2)	3.02	0.39, 23.19	0.234
No	31	1 (3.2)	30 (96.8)	1		

*Risk ratio is combine pelvic & mix and pelvic alone.

Table 4. Subgroup analysis, age of patients (Fisher's exact test).

Factor	N	Age (yr)		p-value
		<70	≥70	
Operative time				
<250 min	71	34 (47.9)	37 (52.1)	0.305
≥250 min	42	23 (54.8)	19 (45.2)	
Estimated blood loss				
<570 ml	78	36 (46.2)	42 (53.8)	0.123
≥570 ml	35	21 (60.0)	14 (40.0)	
Hospital stay (days), median (range)	113	5 (2.24)	6 (1.60)	0.298

scopy impose unique physiologic stresses and, as such, may alter surgical risk to the geriatric patient [17-19]. The incidence of hypertension, atherosclerosis, and chronic pulmonary complications are all elevated in patients aged 65 and older [20,21]. Hypertension is among the diseases that are most significantly increased in our report. Therefore, patients should be carefully selected for one of the surgical treatments according to their health, fitness, wishes and the experience of the referred centre. Advanced age is not an absolute contraindication for many laparoscopic procedures. To our knowledge, a lot of cohort studies [2,8] report only non pelvic urologic surgeries in elderly patients. Varkarakis *et al.* [8] and Lai *et al.* [7] described outcomes in patients aged 75 years or older undergoing laparoscopic nephrectomy which showed no differences in the complication rates, blood loss and operative times [9].

Evaluation of the pre-operative risk factors and post-operative complications are important factors in selecting surgical treatment for elderly patients. Despite the higher percentage of underlying disease in our series, urologic laparoscopy with elderly patients presenting with urinary problems is a safe modality in a university hospital, with no evidence of increased morbidity and mortality. In the current report most of the postoperative complications were Grade II (12.8%) as minor complications. There was only one Grade IV (0.88%) case; which is similar to many reports [22-24].

According to Zhao *et al.*'s reports [2], overall, there was no statistically significant increase in perioperative complications related to age and patients 75 and older, but they had a significantly longer stay than patients between 65 and 74 years. Our report demonstrated that sex with male, operative time ≥ 250 min and cancer had high risk ratio (2.76, 2.11 and 3.02, respectively). Nevertheless, there was no correlation of sex, age, body mass index, ASA score, hospital stay, creatinine, type of surgery, operative time, blood transfusion, estimated blood loss and cancer with complications in these studies.

Procedures involving pelvic anatomy (urachus, bladder and prostate bladder) necessitate that the patient is in the Trendelenburg position which will affect cerebrovascular, respiratory and hemodynamic homeostasis [4, 25]. The complications of laparoscopic pelvic surgery (65; 57.5%) seem to be more than those of laparoscopic non-pelvic surgery in the current report.

A major reason for converting to an open procedure, or choosing to perform an open procedure in the first place, is presence of inflammation [4] due to complicated disease. This reason should well explain why the operation was technically difficulty and did not progress in our conversion cases. Conversion should never be regarded as a failure, but as a decision to perform the safest, most-appropriate procedure for a patient, especially for older

patients at the highest risk of complications.

Our report demonstrated that age has minimal impact on the outcome for elderly patients who undergo laparoscopic surgery for urologic disease. When stratified by age < 70 and ≥ 70 years old, no statistically significant difference was found in operative time, estimated blood loss or hospital stay. There are limitations with regard to the small sample, but this study is the first report of laparoscopic urologic surgery in elderly patients that specifies the type of surgeries as pelvic and non-pelvic surgeries.

5. Conclusion

Laparoscopic surgery is a safe and accepted procedure in patients over 60 years of age with urologic disease. There was no significant increase in perioperative complications related to age, and pre-operative risk factors may not influence postoperative complications in patients over the age of 60 years undergoing elective laparoscopic urologic surgery.

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