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Journal Policies

The Insight Urology is the official journal of the Thai Urological Association under the Royal Patronage. We accept interesting urological topics from physicians and all medical providers. The topics should not have been previously published.

Objectives

1. To enhance medical research in urology
2. To propose academic discussions in urology
3. To distribute dedicated works and research in urology

Our experts and native English speakers will review all chosen topics. All of the content and opinions in this journal belong solely to the authors, and do not express the opinions of the editors or the Thai Urological Association under the Royal Patronage.

Owner The Thai Urological Association under the Royal Patronage (TUA)

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Editorial

The Thai Journal of Urology (TJU) was born on May 1, 1976, and over the last 44 years has faced many challenges in its determination to mature into a useful, professional resource. The first Editor in Chief was Prof. Phaitun Gojaseni who ably managed the journal for 12 years before publication lapsed in 1989-1991. The TJU recommenced circulation in 1992 following the sterling efforts of Prof. Wachira Kochakarn the new Editor in Chief, who was succeeded by another four Editors in Chief. The focus has been to enhance the channels for accessing information in the journal via various standard search engine tools such as Google Scholar and Thai Journals Online (ThaiJO). The Journal was promoted to the first group in the Thai Citation Index (TCI)'s database on October 12, 2017.

To date, the TJU has recruited the Editorial Committee from every training urological institute in Thailand. We have been working together for 3 years to improve the quality of the journal. Developments include adaptation of the TJU into an English journal and the formulation of new guidance instructions for authors. Following these advances, in 2018, the TJU was accepted into the ASEAN Citation Index (ACI) database. The next goal was inclusion in the PubMed and Scopus databases. To achieve that, we invited many experts from abroad to contribute to the journal as international and English language editors. The updating of the publication demanded a new title and Insight Urology (ISU) was born. We have carefully selected articles for publication in this first issue of the ISU, our aspirations being that the journal will increase in recognition and receive manuscript submissions from across the world, improving the sharing of professional urological practices.

The Editorial Committees of ISU would like to express our heartfelt thanks to Assoc. Prof. Monthira Tanthanuch for her 8-years hard work as the Editor in Chief of TJU and her gracious acceptance of the post of Honorary Editor in Chief of ISU. We would like to thank the Former Editors in Chief, Managing Editor, Editorial Board, International Editors, Advisory Board, and Editorial Office Staff for their dedicated support so far. We also wish to express our appreciation to all the authors and members of the TUA for submission of manuscripts and detailed reviews. Together we will be a solid power behind the ISU to continue its growth into a high-quality international peer review journal.

No reserve, No retreat, No regret.

Assoc. Prof. Phitsanu Mahawong, M.D.
Editor in Chief of Insight Urology

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Original Article

Renal function after nephron-sparing surgery versus radical nephrectomy in localized renal cell carcinoma (T1)

Siros Jitpraphai, Chaiyong Nualyong, Tawatchai Taweemonkongsap, Sittiporn Srinualnad, Teerapon Amornwechsugich, Sunai Leewansangtong, Bansithi Chaiyaprasithi, Ekkarin Chotikawanich, Kittipong Phinthusophon, Chalairat Suk-ouichai, Varat Woranisaragul, Phanpon Leelahawong

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Keywords:
Renal function, radical nephrectomy, partial nephrectomy, renal cell carcinoma

Abstract

Objective: To evaluate renal function (GFR) after radical nephrectomy compared to partial nephrectomy in stage T1 renal cell carcinoma patients between 2005 and 2015.

Material and Method: Retrospective chart review of 409 patients who were diagnosed with renal cell carcinoma (T1) and treated with radical nephrectomy (RN) or partial nephrectomy (PN) between 2005 and 2015 (RN=136, PN=92); 228 patients with pathologically confirmed pT1 remained for analysis and were then evaluated for their estimated glomerular filtration rate (eGFR) after the surgery.

Results: There were a total of 228 (149 males and 79 females) T1 RCC patients; 136 patients were T1a with RN (57.8%) and 92 with PN (42.2%). Median follow-up was 58 months and 35 months for the RN and PN groups. From the analysis, post-operative eGFR of the RN group was decreased from 77.49 to 59.61 ml/min/1.73 m^2 and the PN group was decreased from 78.85 to 69.9 ml/min/1.73 m^2. The comparative eGFR between the 2 groups at 1 month had a significant difference (p-value<0.05). eGFR at 3 months (50.24 in RN vs 64.67 in PN), 6 months (47.98 vs 64.51), 3 years (48.79 vs 67.22) and 5 years (52.63 vs 73.59) were also significantly altered between the 2 groups. The tumor recurrence rate was not significantly different between RN and PN.

Conclusion: We found that patients treated with PN had superior post-operative renal function compared with RN. However, there was no difference in the tumor recurrence rate between the 2 groups after a follow-up of 10 years.

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Introduction

Renal cell carcinoma (RCC) is the 13th most common cancer in the world and 3rd cause of genitourinary cancers[1,2]. Radical nephrectomy (RN) has been the gold standard treatment for localized renal cortical tumors for nearly 4 decades. However, the surgical management of these tumors has evolved greatly in the past decade with the development of abdominal imaging, which can locate tumors with a great efficacy, making the surgery safer[3]. Partial nephrectomy (PN) has been introduced as the standard treatment for stage T1[4] for preserving renal function. After the operation, renal function can be assessed using serum creatinine[5,6] and the estimated glomerular filtration rate (eGFR) represents kidney damage.

According to research on renal function after nephron-sparing surgery versus radical nephrectomy: The European Organization for Research and Treatment of Cancer (EORTC) Randomized Trial 30904, the conclusion found that renal function after radical nephrectomy had decreased more than after partial surgery with a median follow-up time of 6.7 years[7].

This is the first study to report renal function data in Thailand. We investigated whether the effect of PN relative to RN on kidney function depends on baseline creatinine and oncologic outcome after surgery in stage T1 renal cell carcinoma in a series at Siriraj Hospital.

Material and Method

There was a total of 411 patients with renal cell carcinoma between 2005 and 2015; 228 patients were in stage T1 and underwent RN or PN in a single institution. The T1 RCC was divided into 2 groups. The first group was Radical with 136 patients (57.8%) and the second group was Partial with 92 patients (42.2%). The exclusion criteria were the other stages of renal cell carcinoma (T2-T4), lymph node or other distant metastasis, and a follow-up time of less than or equal 1 month.

Two outcomes for this study were collected. The primary outcome was renal function after surgery in the form of the glomerular filtration rate (eGFR). The secondary outcome was the associated factors which impacted renal function, disease-free survival (DFS), and overall survival rate.

Statistical analysis

For the characteristic data: Chi-square test and unpaired T test determined the continuous variable, and the T-test and Mann-Whitney U test were used for the single variable; multiple linear regression, Pearson correlation and unpaired T-test were used to identify associated factors influencing the differences in eGFR. All analyses were performed in SPSS V23 and p-value<0.05 was considered statistically significant.

Results

The retrospective review data had an average 58 months of monitoring time in RN and 35 months in PN. The minimum follow-up time was 1 month and the maximum 120 months in both groups; 228 patients with renal cell carcinoma in T1 were treated with elective PN (n=92) or RN (n=136). The other 183 patients were excluded from the study (Figure 1).

The preoperative characteristics of the 136 patients who underwent radical nephrectomy and the 92 patients for partial nephrectomy are provided in (Table 1). The mean patient age was 59.49±12.37 years in RN and 57.49±12.59 years in PN. The mean body mass index (BMI) was 24.98±4.27 kg/m^2 in RN and 24.86±4.088 kg/m^2 in PN. The mean tumor size was 4.4 cm and 2.9 cm from RN and PN, respectively. Patients in both groups were alike in comorbidities (ex. hypertension, diabetes mellitus (DM) type 2 or dyslipidemia). The most common histology was clear cell in 81.9% of patients, followed by papillary in 8% and the others were less than 10% (Figure 2)[9,10].

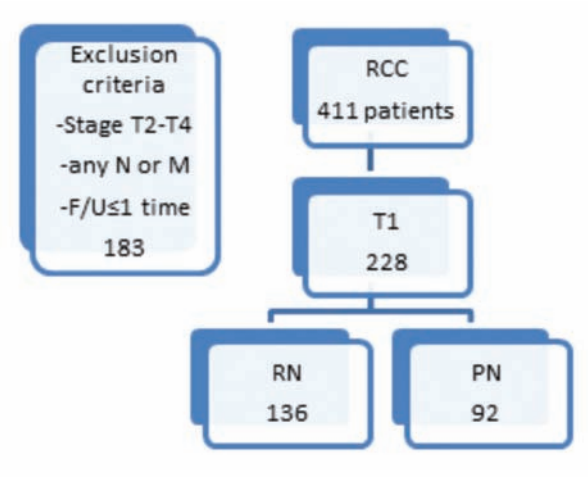

Figure 1. Consolidated standards of reporting trials diagram.

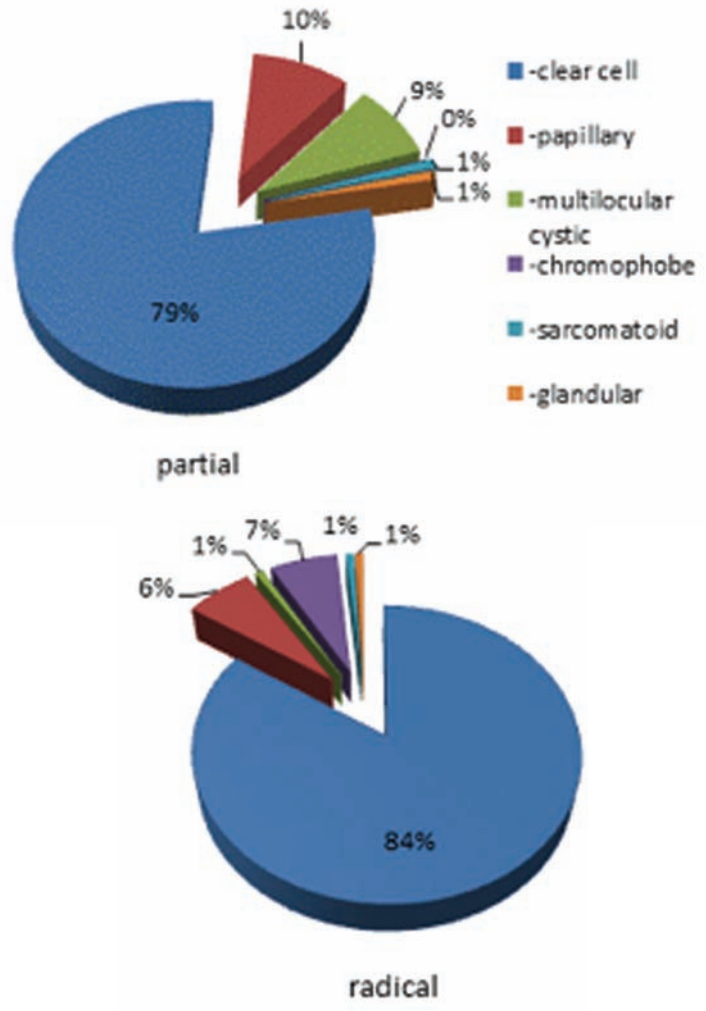

Figure 2. Pathologic cell type.

Table 1. Baseline characteristics of patients.

	Nephrectomy (N=228)		P-value
	Radical (%)	Partial (%)	
Gender			
• Male	84	65	0.166
• Female	52	27	
Chief complaint			
• Asymptomatic	84 (61.8)	70 (76.1)	
• Symptomatic	52 (38.2)	22 (23.9)	
Chronic disease			
• None	34 (25.0)	24 (26.1)	0.85
• Diabetes Mellitus	30 (22.1)	22 (23.9)	0.74
• Hypertension	83 (61.0)	50 (54.3)	0.31
• Dyslipidemia	28 (20.6)	19 (20.7)	0.99
Age (years)	59.49 ±12.37	57.49 ±12.59	0.67
Body mass index (kg/m^2)	24.98 ±4.27	24.86 ±4.088	0.96

The intraoperative and postoperative characteristics are listed in (Table 2). The mean operative time was 175 minutes in RN and 189 minutes in PN. The average blood loss was 200 ml in RN (range: 5-2300 ml) and 250 ml in PN (range: 2-2500 ml). There was no difference in time of hospitalization, average blood loss, and operative time. The mean preoperative eGFR from analysis was 77.4 ml/min/1.73 m^2 in RN and 78.8 ml/min/1.73 m^2 in PN.

There was no significant statistical difference between the groups. Post-operation: there were significant serial changes in mean eGFR at 1 month, 3 months (50.24 in RN vs 64.67 in PN), 6 months (47.98 vs 64.51), 3 years (48.79 vs 67.22) and 5 years (52.63 vs 73.59), respectively.

There were large differences in the estimated GFR between radical nephrectomy and partial that started from the 1st month (Figure 4). Time had no impact on the result; radical surgery still had a larger decrease in eGFR than partial surgery. Other associated factors found to have an effect on impaired renal function were age and DM ($p<0.05$). Hypertension, dyslipidemia and BMI do not affect post-operative GFR. Disease-free survival, from Kaplan Meier Curve, was the same between the groups, but radical surgery might be slightly better than partial surgery after 10 years of observation. We found 2 patients died from RCC out of 20 dead patients. The overall survival was 92% (Figure 5).

Complications from the operations were defined as intraoperative or post-operative within 30 days. We found complications in both groups, such as bleeding 11.8%, pleural injury 2.2%, intraabdominal organ injury 1.3% (ureteral injury, hepatic injury, small bowel injury) and arrhythmic event 1.3% (bradycardia, tachycardia, atrial fibrillation with rapid ventricular response), as shown in Table 3.

Table 2. Intraoperative and post-operative characteristics.

	Nephrectomy		P-value
	Radical	Partial	
Length of stay (days): mean±SD	7.66±2.53	7.61±2.99	0.85
Operative time (minutes): mean±SD	173.93±75.07	189.24±78.96	0.54
Estimated blood loss (ml): median (range)	200 (5-2300)	250 (2-2500)	0.15
Positive surgical margin	2 (1.5%)	1 (1.1%)	0.80
Tumor size (cm)	4.4	2.9	0.00

Table 3. Post-operative complications.

Variable	Nephrectomy		P-value
	Radical (n=122)	Partial (n=79)	
Bleeding*	14 (10.3%)	13 (14.1%)	0.379
Intraabdominal organ injury (ureter, small bowel, liver)	1 (0.7%)	2 (2.2%)	0.567
Arrhythmia event (tachycardia, bradycardia, atrial fibrillation with rapid ventricular response)	1 (0.7%)	2 (2.2%)	0.567
Pleural injury	0 (0%)	5 (5.4%)	0.006
Respiratory disease conditions	1 (0.7%)	2 (2.2%)	0.567
Fever	16 (11.8%)	14 (15.2%)	0.449

*bleeding defined as if patient receive blood transfusion.

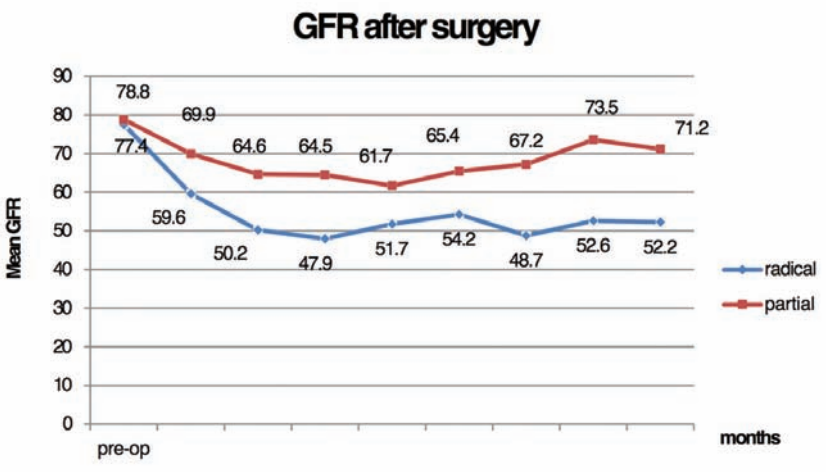

Figure 3.
Mean estimated glomerular filtration rate (eGFR) change after follow-up.

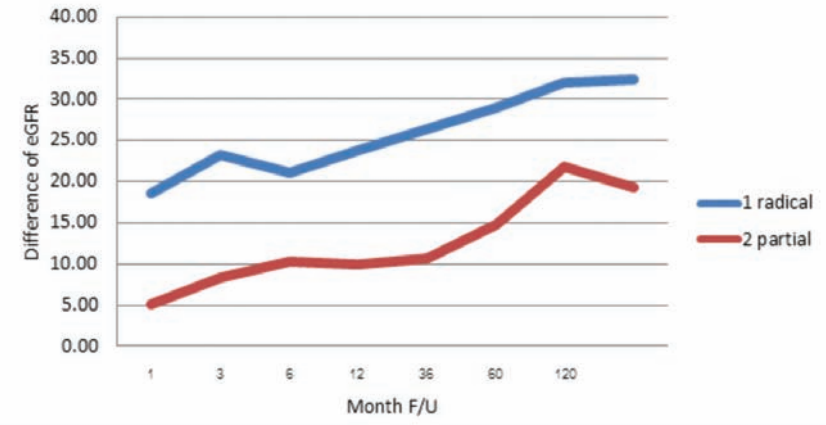

Figure 4.
Change of difference in estimated glomerular filtration rate (eGFR) between radical nephrectomy and partial nephrectomy.

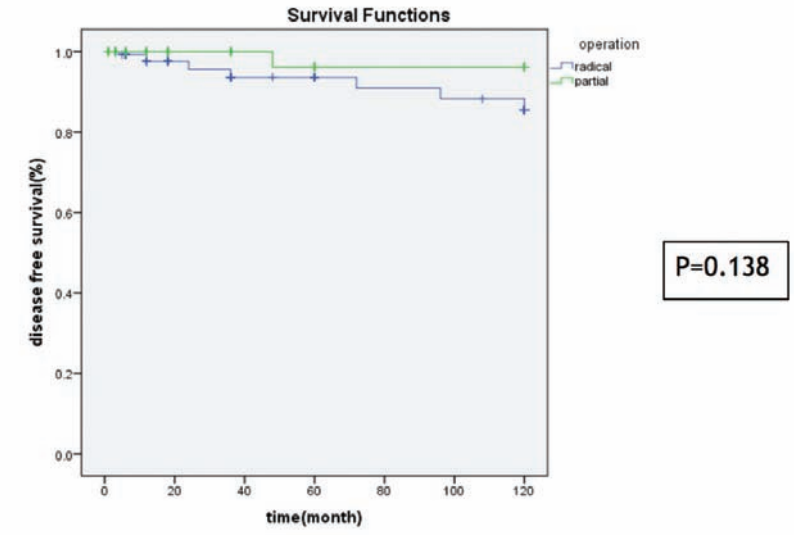

Figure 5.
Estimated disease-free survival after radical nephrectomy and partial nephrectomy by Kaplan-Meier and log rank test.

Discussion

The patient groups in our study demonstrated an average age that was around 5 decades, and greater than 70 percent of RCC were incidentally diagnosed, like in with the report from Luciani LG[8].

Nephron sparing surgery (NSS) by PN is the gold standard treatment for renal tumor T1a (<4 cm)[11] because it is the definitive surgical procedure associated with excellent oncologic and renal function outcome equal to RN[12,13]. PN is better than RN with less decrease in the postoperative glomerular infiltration rate (eGFR) and a lower incidence of CKD stage 3 or above[12]. Miller DC reported that only 20% of renal tumors 2 to 4 cm are treated with PN in the United States, and only 4% of all nephrectomies performed in England use a nephron sparing approach[14,15]. In our study about 40% underwent PN. We collected data from 2005 to 2015. There were 411 patients diagnosed with RCC and 228 patients were T1; we proceeded to operate on 136 using RN and 92 using PN (male 149, female 79).

Katsutoshi reported the time-dependent changes of eGFR after RN showed a plateau from the first postoperative day to the 60th postoperative month; PN had its lowest eGFR on postoperative day 1 and recovered to the preoperative level at 1 month[16]. Nidhi reported that GFR was 33.9% lower 3 days after PN and for the next 2-6 months was 19.7% lower than it was preoperatively[17]. Their results indicate that renal function is stable soon after RN and does not improve over the next 60 months, but that renal function improves slightly during the first month after PN. Our data: eGFR preoperative and postoperative surgery was gathered at 1 month, 3 months, 6 months, 12 months, 18 months, 3 years, 5 years, and 10 years.

Using mean eGFR calculated with the Cockcroft-Gault equation[18]. preoperative GFR was 78.8 in PN and 77.4 in RN. Postoperative at 1 month: mean eGFR decreased in both groups, from 78.8 to 69.9 in Partial and 77.4 to 59.6 in Radical. After 3 and 6 months: mean GFR also significantly decreased in Partial and Radical, and after 10 years of monitoring, we found that the mean GFR of Partial was decreased less significantly than in Radical surgery. The result of our research was the same as Dr. Katsutoshi from Japan in 2012 and Emil and Hendrik from EAU, 2013[7,16]. Also with the same change in the difference of eGFR between RN and PN, we found that in RN patients' renal function had immediately fallen after surgery at 1 month compared with PN.

Brian R. Lane indicated that the 10-year metastasis-free survival rate after PN for clinical T1a and T1b tumors was 95.2% and 90.0%, respectively; and, a minimum 5-year follow-up time was 96.9% for laparoscopic PN and 92.3% for open PN, indicating the oncologic efficacy of these 2 techniques in the hands of experienced surgeons. Although the recurrence rate was higher after OPN, these events appeared related to the greater oncologic potential of patients. This result agreed with our study's finding that the disease-free survival was 92% RN (median follow-up time 58 months) and 98% PN (median follow-up time 35 months)[19].

Historically, nephron-sparing surgery is considered to have greater morbidity than radical nephrectomy, due to the complexity of the surgery. This present study shows that there was no difference in morbidity and mortality between the 2 procedures, despite slightly higher complication rates. There was no statistically significant difference in post-operative mortality and morbidity complications between radical and partial nephrectomy. Only pleural injury was found to be higher in the Partial group.

This study has limitations due to its retrospective nature. Furthermore, it lacked randomization leading to possible selection bias of patients who underwent RN or PN. The other factor was the follow-up time: after 5yrs the number of patients decreased from loss to follow-up. The CKD equation, MDRD and serum creatinine levels are not very accurate tools for defining actual kidney function. More accurate tools are required in order to evaluate renal function,

such as 24 h creatinine clearance, serum cystatin-C or the CKD epidemiology equation (CKD-EPI)[20].

Conclusion

The serial changes in eGFR post PN were better than in RN over 10 years of monitoring. PN is the better procedure for preserving renal function in cases of small size renal cell carcinoma when compared with RN. However, they have equal efficacy for disease-free survival.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Correlation between hydronephrosis, tumor diameter, and pathologic T stage of upper tract transitional cell carcinoma after nephroureterectomy

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Keywords:
Hydronephrosis, tumor diameter, pathologic T stage, upper tract transitional cell carcinoma, nephroureterectomy

Abstract

Objective: To evaluate the correlation between hydronephrosis, tumor diameter, and pT stage of upper tract transitional cell carcinoma.

Material and Method: From October 2004 to December 2018, the medical records of 98 patients in Rajavithi Hospital who were diagnosed with renal pelvic (47 patients) and ureteral (51 patients) transitional cell carcinoma and treated with nephroureterectomy were retrospectively reviewed. Patient demographics, degree of hydronephrosis, tumor diameter from computed tomography, and pathologic report were collected. Data were analyzed to determine correlations.

Results: In renal pelvic tumor, higher degree of hydronephrosis correlated with higher pT stage (p=0.022) but no significant difference was shown in ureteral tumor (p=0.352). For tumor diameter in both renal pelvis and ureter, there were no correlations with pT stage (p=0.128 and p=0.625). For tumor location, higher pT stage was more common in renal pelvic tumors (p=0.001) and high tumor grade correlated with high pT stage (p=0.037).

Conclusion: In this study, there was significant correlation between the preoperative degree of hydronephrosis and pT stage in renal pelvic transitional cell carcinomas; however, none was found in ureteric tumors. The reason may be that smaller ureteric lumen caused early symptoms, which concerned patients.

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Introduction

Upper tract transitional cell carcinoma is a relatively rare disease, comprising 5% to 10% of all urothelial tumors[1]. The disease occurs in up to 2 per 10,000 per year in Western countries[2]. Most of these occur in the renal pelvis, followed by the ureter[3].

T stage, tumor grade, and lymphovascular invasion are thought to be prognostic factors for upper tract transitional cell carcinoma. Of these factors, the most important is pathologic T stage[4].

With computed tomography (CT), the sensitivity for detecting upper tract malignancy disease has been reported to approach 100%, with a specificity of 60% and a negative predictive value of 100%[5]. However, the accuracy of predicting T stage is not great. In one series, CT was accurate in predicting pathologic TNM stage in 60% of patients, with understaging at 16% and overstaging 24%. Making it difficult to predict the prognosis of patients with upper tract tumors[6].

Generally, upper tract transitional cell tumors originate intraluminally and cause obstructions. Various degrees of hydronephrosis and differences in tumor size were found in preoperative CT. This study aimed to correlate these findings with pathologic T stage. We also evaluated other data, which included correlating tumor grade with T stage and comparing T stage renal pelvic and ureteral tumors.

Material and method

From October 2004 to December 2018, the medical records of patients in Rajavithi Hospital who were diagnosed with renal pelvic and ureteral transitional cell carcinoma and treated with nephroureterectomy were retrospectively reviewed. This research was approved by the Rajavithi Hospital Ethics Committee.

Exclusion criteria:

1) Final pathology was not transitional cell carcinoma.
2) Patients received neoadjuvant chemotherapy before procedure.
3) Concomitant bladder tumor at ureteral orifice.

Demographic data of patients were recorded. Hydronephrotic status was assessed by the official preoperative CT, reported by the radiologist, and was classified into no hydronephrosis, mild, moderate and severe degree. Tumor diameter was measured on the transverse section of CT. According to a study by Kang Su Cho et al.[4], the measured diameter was classified into 3 groups: less than 1.5 cm, 1.5 cm or greater but less than 2.5 cm, and 2.5 cm or greater. In patients with multifocal tumors, the tumor diameter was determined from the largest lesion.

We also investigated the correlation of tumor grade and tumor location with T stage. Grade of tumor was classified into grade 1, 2, and 3. If the pathologic report was low grade, it would be arranged into grade 1, and if a high grade was reported, it would be grade 3.

Data were analyzed using SPSS version 17.0 (SPSS Inc., Chicago, Illinois, USA). Baseline characteristics were analyzed using descriptive statistics such as number, percentage, mean and standard deviation, minimum and maximum. Chi-square or Fisher Exact test were used to compare the categorical variables and frequency differences. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 130 patients underwent nephro-ureterectomy. After reviewing the pathologic reports, 32 patients were excluded. One case was sarcoma, 11 were renal cell carcinomas, 3 were papillomas, 10 were infections, 3 had concomitant bladder tumors at ureteral orifice, and 4 received neoadjuvant chemotherapy before procedure.

On the imaging studies, patients with no hydronephrosis, mild, moderate, and severe degrees were 12 (12%), 17 (17.3%), 36 (36.7%), and 33 (33.3%), respectively. Tumor diameter was less than 1.5 cm in 34 patients (34.7%), 1.5 cm or greater but less than 2.5 cm in 29 (29.6%), and 2.5 cm or greater in 35 (35.7%). Location of the tumor in the renal pelvis

was 47 (48%), and in the ureter 51 (52%). pT stage was T1, T2, T3, and T4 in 28 (28.6%), 32 (32.7%), 33 (33.7%), and 5 (5%) patients. And tumor grade 1, 2 and 3 were found in 14 (14.3%), 14 (14.3%), and 70 (71.4%) patients.

In renal pelvic tumor, high degree of hydronephrosis correlated with high pT stage (p=0.022). Non-organ-confined tumors (T3-T4) were found in 77.8% and 81.8% of total cases in the moderate and severe hydronephrosis groups, respectively. But no difference was shown in ureteral tumors (p=0.352). For tumor diameter in both renal pelvic and ureteral tumor: there was no correlation with pT stage (p=0.128 and p=0.625).

For tumor location, high pT stage was found more in renal pelvic tumors significantly (p=0.001). Also, there was no pT4 stage in ureteral tumors. Finally, high tumor grade correlated with high pT stage statistically (p=0.037). pT4 stage tumors were only found in the tumor grade 3 group.

Table 1. Demographic data of patients.

Data	Mean ± SD
Age (year)	67.82 ± 11.27
Body weight (kg)	61.28 ± 13.14
Body height (cm)	159.88 ± 8.20
Characteristic	**Number and Percentage**
Sex	
Male	58 (59.2)
Female	40 (40.8)
Concomitant bladder tumor	
Absent	67 (68.4)
Present	31 (31.6)
History of surgery	
None	86 (87.8)
Radical cystectomy	11 (11.2)
Partial cystectomy	1 (1.0)
Hydronephrosis	
No hydronephrosis	12 (12.0)
Mild hydronephrosis	17 (17.3)
Moderate hydronephrosis	36 (36.7)
Severe hydronephrosis	33 (33.3)
Tumor diameter (cm)	
<1.5	34 (34.7)
1.5-2.5	29 (29.6)
≥ 2.5	35 (35.7)
Tumor location	
Pelvis	47 (48)
Ureter	51 (52)

Table 1. Demographic data of patients. (ต่อ)

Multiplicity	
Single	65 (66.3)
Multiple	33 (33.7)
Operative detail	
Open surgery	66 (67.3)
Laparoscopic surgery	32 (32.7)
Other procedure performed in same setting	
None	66 (67.3)
Transurethral resection of bladder tumor	19 (19.4)
Radical cystectomy	10 (10.2)
Partial cystectomy	3 (3.1)
pT stage	
T1	28 (28.6)
T2	32 (32.7)
T3	33 (33.7)
T4	5 (5.0)
Margin	
Free margin	90 (91.8)
Positive margin	8 (8.2)
Tumor grade	
Grade 1	14 (14.3)
Grade 2	14 (14.3)
Grade 3	70 (71.4)
Lymphovascular invasion	
Absent	70 (71.4)
Present	28 (28.6)

Table 2. Correlation between hydronephrosis and pT stage (pelvic tumor).

pT stage	Hydronephrosis (%)				
	No	Mild	Moderate	Severe	Total
1	7 (58.3)	5 (33.3)	2 (22.2)	1 (9.1)	15 (31.9)
2	2 (16.7)	4 (26.7)	0 (0)	1 (9.1)	7 (14.9)
3	1 (8.3)	6 (40.0)	5 (55.6)	8 (72.7)	20 (42.6)
4	2 (16.7)	0 (0)	2 (22.2)	1 (9.1)	5 (10.6)
Total	12 (100)	15 (100)	9 (100)	11 (100)	47 (100)

Chi-Square Tests P = 0.022 (<0.05)

Table 3. Correlation between hydronephrosis and pT stage (ureteral tumor).

pT stage	Hydronephrosis (%)			
	Mild	Moderate	Severe	Total
1	2 (100)	6 (22.2)	5 (22.7)	13 (25.5)
2	0 (0)	14 (51.9)	11 (50.0)	25 (49.0)
3	0 (0)	7 (25.9)	6 (27.3)	13 (25.5)
Total	2 (100)	27 (100)	22 (100)	51 (100)

Chi-Square Tests P = 0.352

Table 4. Correlation between tumor diameter and pT stage (pelvic tumor).

pT stage	Tumor diameter (%)			
	< 1.5 cm	1.5-2.5 cm	≥ 2.5 cm	Total
1	4 (80.0)	5 (41.7)	6 (20.0)	15 (31.9)
2	0 (0)	3 (25.0)	4 (13.3)	7 (14.9)
3	1 (20.0)	4 (33.3)	15 (50.0)	20 (42.6)
4	0 (0)	0 (0)	5 (16.7)	5 (10.6)
Total	5 (100)	12 (100)	30 (100)	47 (100)

Chi-Square Tests P = 0.128

Table 5. Correlation between tumor diameter and pT stage (ureteral tumor).

pT stage	Tumor diameter (%)			
	< 1.5 cm	1.5-2.5 cm	≥ 2.5 cm	Total
1	7 (24.1)	6 (35.3)	0 (0)	13 (25.5)
2	14 (48.3)	7 (41.2)	4 (80.0)	25 (49.0)
3	8 (27.6)	4 (23.5)	1 (20.0)	13 (25.5)
Total	29 (100)	17 (100)	5 (100)	51 (100)

Chi-Square Tests P = 0.625

Table 6. Correlation between tumor location and pT stage.

pT stage	Tumor location (%)		
	Pelvis	Ureter	Total
1	15 (31.9)	13 (25.5)	28 (28.6)
2	7 (14.9)	25 (49.0)	32 (32.7)
3	20 (42.6)	13 (25.5)	33 (33.7)
4	5 (10.6)	0 (0)	5 (5.1)
Total	47 (100)	51 (100)	98 (100)

Chi-Square Tests P < 0.001

Table 7. Correlation between tumor grade and pT stage.

pT stage	Tumor grade (%)			
	1	2	3	Total
1	9 (64.3)	5 (35.7)	14 (20.0)	23 (28.6)
2	4 (28.6)	5 (35.7)	23 (32.9)	32 (32.7)
3	1 (7.1)	4 (28.6)	28 (40.0)	33 (33.7)
4	0 (0)	0 (0)	5 (7.1)	5 (5.1)
Total	14 (100)	14 (100)	70 (100)	98 (100)

Chi-Square Tests P = 0.037 (<0.05)

Discussion

Radical nephroureterectomy with excision of a bladder cuff is the gold standard for large, high-grade, suspected invasive tumors of the renal pelvis and proximal ureter. Radical surgery also retains a role in the treatment of low-grade, noninvasive tumors of the renal pelvis and upper ureter when they are large, multifocal, or rapidly recurring despite maximal efforts at conservative surgery[7].

The most commonly used staging system is the TNM system. Among these, stage is currently the most important predictor of survival in patients with upper tract transitional cell carcinoma[8]. A study by Ricardo L. et al. reported that pathologic stage was the only predictor for disease recurrence, and associated with worse cancer specific survival[9]. And research by Hall MC et al. also reported that actuarial 5-year disease-specific survival rates by primary tumor stage were 100% for Ta/cis, 91.7% for T1, 72.6% for T2, and 40.5% for T3. Patients with primary stage T4 tumors had a median survival of 6 months[10].

Computed tomography (CT) has a high sensitivity in detecting upper tract malignancy disease but its accuracy in predicting T stage is not great. In a study by Scolieri MJ et al., CT was accurate in predicting pathologic TNM stage in 60% of patients, with understaging in 16% and overstaging in 24%[6]. And in a review by Gerald AF et al., TCC confined to the organ (stage 0a-II) was correctly staged by CT in 96.6% of patients.

Stage III-IV tumors were correctly staged in 66.6%. Overall, CT was accurate in predicting pathologic TNM stage in upper urinary tract TCC in 87.8% of patients[11].

Generally, ureteral tumors cause gradual ureteral obstructions that result in the development of hydronephrosis. The continuous obstruction causes renal function impairment. Consequently, the degree of obstruction and T stage might correlate[12]. A study by Kang Su Cho et al. found that in ureteral tumors, grade of hydronephrosis and tumor diameter correlated with the T stage. Invasive tumors were found 86% within grade 3 to 4 hydronephrosis and with a tumor diameter of 1.5 cm or greater. In addition, the grade of hydronephrosis and the tumor diameter had a significant influence on disease-specific survival[4]. Another study from Yujiro et al. also found that high-grade hydronephrosis predicted high pathological stage (T3 or greater), high-grade tumor, and positive lymphovascular invasion[13].

For tumor grade and T stage, Gordon A. et al. retrospectively determined that tumor grade from endoscopic biopsy correlated with T stage from nephroureterectomy and concluded that this information could be used to counsel patients before surgery, as well as to identify patients for whom neoadjuvant chemotherapy would be most beneficial[14].

In our study, we found a correlation between hydronephrosis and T stage only in renal pelvic tumors. All cases of ureteral tumor had hydronephrosis. Smaller luminal size of the ureter may cause more obstructive symptoms.

We found no correlation between tumor diameter and pT stage in both renal pelvic and ureteral tumors. But renal pelvic tumors usually present in larger sizes and at a higher pT stage than ureteral tumors. The reason might be the same as mentioned: the tumors in the renal pelvis must be large and progressive enough to cause obvious obstructive symptoms.

Finally, most of the upper tract transitional cell carcinomas were high-grade lesions, and correlated with a high pT stage. This information supports the treatment of high-grade tumors with radical surgery more than nephron sparing procedures.

Conclusion

In this study, there was significant correlation between preoperative hydronephrosis and pT stage in renal pelvic transitional cell carcinomas; however, none was found in ureteral tumors. There was no correlation between tumor diameters in both locations with pT stage. In the studied groups, renal pelvic tumors had an overall higher pT stage than ureteral tumors. Early symptoms in ureteral lesions might be the cause.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Correlation evaluation of the international prostate symptom score (IPSS), visual prostate symptom score (VPSS), and modified visual prostate symptom score (mVPSS) in Thai males with benign prostatic hyperplasia

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Keywords:
International prostate symptom score (IPSS), visual prostate symptom score (VPSS), modified visual prostate symptom score (mVPSS), benign prostatic hyperplasia

Abstract

Objective: To study the correlation between the modified visual prostate symptom score (mVPSS), the visual prostate symptom score (VPSS) and the international prostate symptom score (IPSS) in Thai males who were diagnosed with benign prostatic hyperplasia (BPH) and lower urinary tract symptoms (LUTS).

Material and Method: One hundred and ten Thai males who were diagnosed with BPH and LUTS by urologists were enrolled onto the study between 1st March and 31st July 2019. They were divided into 2 different groups by simple random sampling. The first group was requested to complete the A questionnaire which was composed of IPSS and VPSS and the second group was assigned to finish the B questionnaire which consisted of IPSS and mVPSS. Both groups had to complete their personal data, including age, education level, monthly income, and duration of treatment for BPH, and they also were classified as high or low educated groups. The correlations between the scores of mVPSS, VPSS, and IPSS in the high or low educated groups were assessed using Pearson's correlation coefficient with IBM SPSS statistics 22.0.

Results: There were statistically significant correlations between mVPSS, VPSS, and IPSS ($P<0.05$) in total and individual scores, which consisted of quality of life, voiding symptom score, storage symptom score, frequency score and nocturia score. According to this study, it was found that the mVPSS and VPSS questionnaires took less time to complete and were easier than the IPSS. However, in high-educated patients, there was no statistically significant rate to complete the mVPSS, VPSS and IPSS questionnaire by themselves. In addition, this study showed a strong positive correlation between the IPSS versus mVPSS and VPSS in the high-educated groups ($r=0.935$ and $r=0.898$, respectively). In contrast, in the low-educated patient group, there was no statistically significant correlation

between the VPSS and IPSS questionnaires in frequency score. However, this study found a positive correlation of frequency score between the mVPSS and IPSS questionnaires in all educated groups. Moreover, most patients felt that the mVPSS and VPSS questionnaires were easier to understand and complete than the IPSS questionnaire.

Conclusion: The mVPSS shows a statistically significant correlation to the IPSS standard questionnaire, which means that the IPSS can be replaced by the mVPSS in order to evaluate Thai males with BPH and LUTS, because the mVPSS can be used with all educated groups and the patients are able to understand and complete the questionnaire more quickly. For these reasons, the mVPSS is an excellent choice to replace the VPSS and IPSS, which still have many limitations with varieties of patients.

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Introduction

Benign prostatic hyperplasia (BPH) is a common urological problem in male patients with lower urinary tract symptoms (LUTS). Incidence of BPH in the USA was estimated to be 8%, 50% and 80% of men over 40, 60 and 90 years old, respectively, in an autopsy study[1]. In Thailand, an epidemiologic study showed that the number of Thai men with BPH were found increasingly to be 116.38, 130.80 and 141.95 per 100,000 Thai men in 2007-2009 consecutively[2].

The international prostate symptom score (IPSS) is the standard questionnaire, first published in 1992[3], to evaluate the severity of BPH with LUTS, for example, voiding symptoms, storage symptoms, frequency, nocturia and quality of life[4]. It is useful and worldwide but has some limitations for evaluation, especially in illiterate patients or low-educated patients.

In 2011, the visual prostate symptom score (VPSS) was established and launched by Dr. Adam E. Groeneveld, et al. It showed that the VPSS could evaluate and replace IPSS, especially in low-educated patients[5]. On the other hand, in Thailand, Pim-pon Hongthong found that the VPSS was statistically significantly related to the IPSS only in high-educated Thai patients[6]. Moreover, Vasun Setthawong, et al. showed that the VPSS was statistically significantly related to the IPSS and uroflowmetry parameters but surprisingly low-educated patients felt that the IPSS was easier than the VPSS[7]. For these reasons, the modified visual prostate symptom score (mVPSS) was created by this study according to the VPSS. This study applied some Thai sentences to be read, which were simple and easy to understand in each of the mVPSS questionnaires.

The objectives of this study have two endpoints. The first endpoint is to study the correlation of the IPSS, VPSS and mVPSS in Thai men. The second endpoint is to assess the correlation of the self-completion rate in the 2 groups of patients, low-educated and high-educated patients in the IPSS, VPSS and mVPSS questionnaires.

Material and Method

The institutional ethics committee of Nakhon Pathom Hospital approved this simple random sampling study. This study was conducted at Nakhon Pathom Hospital in Nakhon Pathom Province, Thailand from 1st March to 31st July 2019. The inclusion criteria were consenting Thai male patients over 40 years old who visited the urological department and were diagnosed with BPH and LUTS. The exclusion criteria were patients who were diagnosed with urinary tract infection, urethral stricture, prostate cancer, history of prostate gland surgery, history of chemotherapy or radiation treatment in the pelvic area and abnormal urination due to neurological disease.

One hundred and ten Thai male patients were divided into 2 different groups and required to fill out the questionnaires independently. If they could not complete the questionnaire by themselves, they needed to ask for assistance before being helped.

The first group (group A), 55 patients, was requested to complete the A questionnaire which was composed of demographical details, the IPSS and VPSS, respectively. Demographical details consisted of education level: low-educated group (≤ primary school) and high-educated group (≥ high school), monthly income, and duration of treatment for BPH. The VPSS contained 4 questions: Q1: force of urine stream; Q2: frequency; Q3: nocturia; and Q4: quality of life.

The second group (group B), 55 patients, was assigned to finish the B questionnaire which consisted of demographical details, IPSS and mVPSS consecutively. Demographical details and the IPSS had the same questions as the A questionnaire but the mVPSS questions were added in the Thai language: Q1: force of urine stream; Q2: frequency; Q3: nocturia; and Q4: quality of life in the Thai language, as shown in the appendix. After finishing the questionnaire, all the patients were asked, "Which questionnaire do you feel is easier to complete and understand, in the first group: the IPSS or VPSS and in the second group: the IPSS or mVPSS?"

The correlations between the mVPSS, VPSS and IPSS scores and the correlations of low and high educated groups in both A and B questionnaires were assessed using Pearson's correlation coefficient with IBM SPSS statistics 22.0.

Results

A total of 110 men who were diagnosed with BPH and LUTS were evaluated from 1st March to 31st July 2019. The mean age, literacy level, monthly income, duration of treatment for BPH, time to complete, number of requirements for questionnaire assistance and questionnaire preference of the study subjects are shown in Table 1.

The first group (group A), patients spent less time to complete the VPSS questionnaire than the IPSS questionnaire 2.67 and 5.00 minutes, respectively (p=0.00). Five of 55 patients (9.09%) required assistance to complete the VPSS and 18 of 55 (32.73%) needed assistance to complete the IPSS; 52.7% of the patients preferred to do the VPSS and 47.3% preferred the IPSS.

Table 1. Demographic characteristics, time, assistance, questionnaire preference of patients in completing the questionnaire.

	All patients (N=110)	Group A (IPSS and VPSS) (N=55)	Group B (IPSS and mVPSS) (N=55)
Age (yrs ± SD)	68.23 ± 9.56	69.13 ± 10.24	67.33 ± 8.84
Education (n, %)			
Low education (No education and Primary school)	74 (67.3)	42 (76.4)	32 (58.2)
High education (High school, Vocational education and Bachelor degree or higher)	36 (32.7)	13 (23.6)	23 (41.8)
Monthly income (baht ± SD)	5,5927.27 ± 0.95	3,621.82 ± 5,816.28	7,572.73 ± 10,514.42
Duration of treatment for BPH (yrs)	3.75 ± 4.11	4.28 ± 4,78	3.23 ± 3.30
Time to complete the questionnaire (mins)			
IPSS		5.00	4.58
VPSS/mVPSS		2.67	1.93
Assistance to complete the questionnaire (n, %)			
IPSS		18 (32.73)	18 (32.73)
VPSS/mVPSS		5 (9.09)	6 (10.91)
Questionnaire preference (n, %)			
IPSS		26 (47.3)	11 (18.2)
VPSS/mVPSS		29 (52.7)	44 (81.8)

IPSS = international prostate symptom score; VPSS = visual prostate symptom score; mVPSS = modified visual prostate symptom score.

The second group (group B), the mVPSS questionnaire required less time to be completed than the IPSS questionnaire 1.93 and 4.58 minutes consecutively (p=0.001). The number of patients who wanted assistance answering the mVPSS and IPSS questionnaire were 6 (10.91%) and 18 (32.73%), respectively (p=0.005). Moreover, patients preferred to answer the mVPSS by 81.8% more than the IPSS by 18.2%.

The results of the group A study were a statistically significant positive correlation between total score (p=0.00) and each of the questions of the IPSS and VPSS (p=0.00): quality of life, voiding symptom score, storage symptom score, frequency score and nocturia score. Moreover, group B was found to have the same results as group A in total score and individual scores of the IPSS and mVPSS; quality of life, voiding symptom score, storage symptom score, and frequency score had a statistically significantly positive correlation, especially in nocturia score (p=0.00, r=+0.931) (Table 2).

In high-educated patients, there were statistically significant positive correlations to both group A (the IPSS vs VPSS) and group B (the IPSS vs mVPSS) ($p<0.05$), especially in nocturia score (group A; r=+0.898, p=0.00) (group B; r=+0.935, p=0.00) in Table 3. In contrast, this study had no correlation of high-educated patients who required assistance to fill out the A questionnaire (p=0.337) by 4 for the IPSS (30.77%) versus 2 for the VPSS (15.38%), and the B questionnaire (p=0.328) by 2 for the IPSS (8.70%) versus 1 for the mVPSS (4.35%).

Table 2. Mean total score, symptom subscore of the patients and correlation coefficient of group A and group B.

Symptom score	Group A (IPSS and VPSS)				GroupB (IPSS and mVPSS)			
	Mean IPSS	Mean VPSS	Pearson Correlation	P-value	Mean IPSS	Mean mVPSS	Pearson Correlation	P-value
Total Score	12.89	9.86	0.651	0.00	13.38	9.93	0.724	0.00
Quality of life	2.13	2.44	0.724	0.00	2.09	2.27	0.762	0.00
Voiding score (IPSS Q1, 3, 5, 6 vs mVPSS Q1)	6.71	3.18	0.548	0.00	7.32	2.96	0.501	0.00
Storage score (IPSS Q2, 4, 7 vs mVPSS Q2, 3)	6.18	6.67	0.66	0.00	6.05	6.96	0.703	0.00
Frequency score (IPSS Q2 vs mVPSS Q2)	1.82	3.53	0.52	0.00	1.78	4.30	0.458	0.00
Nocturia score (IPSS Q7 vs mVPSS Q3)	2.98	3.15	0.784	0.00	2.55	2.67	0.931	0.00

IPSS = international prostate symptom score; VPSS = visual prostate symptom score;
mVPSS = modified visual prostate symptom score.

Table 3. The analysis of correlation to group A and group B in high-educated patients.

Symptom score	Group A (IPSS and VPSS)				GroupB (IPSS and mVPSS)			
	Mean IPSS	Mean VPSS	Pearson Correlation	P-value	Mean IPSS	Mean mVPSS	Pearson Correlation	P-value
Total Score	10.46	8.84	0.631	0.021	14.74	10.43	0.791	0.000
Quality of life	2.00	1.31	0.686	0.010	2.39	2.91	0.726	0.000
Voiding score (IPSS Q1, 3, 5, 6 vs mVPSS Q1)	2.69	5.31	0.688	0.009	7.87	3.17	0.458	0.028
Storage score (IPSS Q2, 4, 7 vs mVPSS Q2, 3)	6.15	5.15	0.674	0.011	6.87	7.26	0.809	0.000
Frequency score (IPSS Q2 vs mVPSS Q2)	1.38	3.54	0.571	0.042	2.00	4.43	0.690	0.000
Nocturia score (IPSS Q7 vs mVPSS Q3)	2.62	2.38	0.898	0.000	2.83	2.83	0.935	0.000

IPSS = international prostate symptom score; VPSS = visual prostate symptom score; mVPSS = modified visual prostate symptom score.

In low-educated patients, there was a statistically significantly positive correlation to group A ($p<0.05$) in total score, quality of life, voiding symptom score, storage symptom score and nocturia score, but group A had no significant correlation in frequency score ($p=0.151$). On the other hand, in group B, a statistically significantly positive correlation in symptom subscore of the patients was found (Table 4). Moreover, low-educated patients who were assigned to fill in the A questionnaire needed more assistance to complete the IPSS (73.81%) than the VPSS (57.14%), which had a positive correlation ($p=0.001$) compared with the B questionnaire by 50% for the IPSS and 15.63% for the mVPSS, which had the same positive correlation ($p=0.001$).

Discussion

This study showed a statistically significant correlation between the IPSS, VPSS and mVPSS that was consistent with the "Correlation Evaluation of a New Visual Prostate Symptom Score and the International Prostate Symptom Score in Thai Men with Lower Urinary Tract Symptoms", a study by Pim-pon Hongthong and Apirak Santingamkun[6]. They found that the VPSS and IPSS had a good correlation in high-educated patients, which was similar to our study, particularly in nocturia score, which had a high correlation coefficient from high-educated patients by 0.935 for the mVPSS and 0.898 for the VPSS.

Table 4. The analysis of correlation to group A and group B in low-educated patients.

Symptom score	Group A (IPSS and VPSS)				GroupB (IPSS and mVPSS)			
	Mean IPSS	Mean VPSS	Pearson Correlation	P-value	Mean IPSS	Mean mVPSS	Pearson Correlation	P-value
Total Score	13.64	10.17	0.636	0.00	12.41	9.56	0.660	0.000
Quality of life	2.57	2.38	0.722	0.00	1.87	1.81	0.825	0.000
Voiding score (IPSS Q1, 3, 5, 6 vs mVPSS Q1)	3.33	7.14	0.494	0.001	6.94	2.81	0.532	0.002
Storage score (IPSS Q2, 4, 7 vs mVPSS Q2, 3)	6.83	6.50	0.647	0.00	5.47	6.75	0.617	0.000
Frequency score (IPSS Q2 vs mVPSS Q2)	1.625	4.19	0.260	0.151	3.52	1.95	0.512	0.001
Nocturia score (IPSS Q7 vs mVPSS Q3)	3.31	3.17	0.737	0.00	2.34	2.56	0.933	0.000

IPSS = international prostate symptom score; VPSS = visual prostate symptom score; mVPSS = modified visual prostate symptom score.

In the other direction, this research had no correlation to frequency score between the IPSS and VPSS in the low-educated group, but the study showed a significant correlation to frequency score between the IPSS and mVPSS in all patients, which is the same as the previous research, "To investigate the correlation between the visual prostate symptom score, the international prostate symptom score, and uroflowmetry parameters in adult Thai males of different educational levels," a study by Setthawong, V. et al.[7]. In addition, we found out that the low-educated group required more assistance to complete the IPSS, VPSS and mVPSS questionnaires than the high-educated group, and most patients mentioned that the mVPSS was easier to understand and needed less time to be completed.

In the study by MacDiarmid, SA. et al., "Evaluation of 'Visual prostate symptom score' in men with benign enlargement of prostate in a tertiary care center in midwestern Nepal,"8 it was revealed that patients with a low-education level thought that the VPSS was easier and spent less time to complete than IPSS; this study had a concordant result that the VPSS and mVPSS took less time to be completed than the IPSS questionnaire.

As a result of the mVPSS questionnaire there was a significant correlation with the IPSS in all educated groups; it was convenient, reliable and quick to assess symptom severity. Thus, the mVPSS is a new alternative tool to use instead of the IPSS and VPSS that have some limitations in the evaluation of Thai patients with BPH and LUTS.

However, some patients could not answer the questions by themselves and asked for assistance. They might have difficulty in interpreting and understanding the questions, especially in the IPSS. For example, the sensation of not emptying your bladder and the feeling about urinary condition could be interpreted to have different meanings by different patients. In addition, the pictogram of frequent urination during the day from the VPSS and mVPSS may be misinterpreted or overestimated, because if patients answered that they urinated 5-6 times/day as the healthy people in the question do, they would get higher scores, indicating more severe symptoms.

Conclusion

The mVPSS and VPSS correlated significantly with the IPSS as regards the overall score and the individual scores. Moreover, patients spent less time and required less assistance to complete the mVPSS and VPSS than the IPSS, especially in high-educated patients, which had a strong correlation to nocturia score. In contrast, in low-educated patients in this study there was no correlation between IPSS and VPSS in frequency scores because they might not have understood the IPSS questions or VPSS pictogram clearly.

As a result of this study, the mVPSS is a new alternative questionnaire that can be used with patients of all educational levels because they can understand it easily, spend less time completing it, and not require assistance compared with the IPSS and VPSS.

Acknowledgements

The pictograms were created by Carol Lochner, visual artist at the University of Stellenbosch. The VPSS was distributed with the permission of Professor A. Van der Merwe.

Conflict of interest

The authors declare no conflict of interest.

วันที่ .....

ชุด A
แบบสอบถามข้อมูลผู้ป่วยต่อมลูกหมากโต

1. อายุ ..... ปี

2. การศึกษา
   - ❑ ไม่ได้ศึกษา ❑ ประถมศึกษา ❑ มัธยมศึกษา
   - ❑ อาชีวศึกษา ❑ ปริญญาตรี หรือ สูงกว่า ❑ อื่นๆ ระบุ.....

3. รายได้ ..... บาท/เดือน

4. ระยะเวลาตั้งแต่เริ่มรับการรักษาภาวะต่อมลูกหมากโต ..... ปี

แบบสอบถามมาตรฐานเดิม

(International Prostate Symptom Score; IPSS)

เวลาเริ่มทำแบบสอบถาม..... เวลาทำแบบสอบถามเสร็จ..... ❑ ผู้ช่วยเหลือ

คำถามเกี่ยวกับอาการ	ไม่มีเลย	น้อยครั้ง นับได้ น้อยกว่า หนึ่งในห้า	มีบ้าง นับได้ น้อยกว่า ครึ่ง	มี บ่อยครั้ง ประมาณ ครึ่งหนึ่ง	บ่อยมาก นับได้ มากกว่า ครึ่ง	แทบ ทุกครั้ง
1. ในหนึ่งเดือนที่ผ่านมา หลังจากท่านปัสสาวะเสร็จแล้ว บ่อยครั้งแค่ไหนที่ท่านมีความรู้สึกว่าถ่ายปัสสาวะไม่สุด	0	1	2	3	4	5
2. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านต้องปัสสาวะอีก ทั้งๆ ที่เพิ่งจะถ่ายไปครั้งหนึ่งแล้วก่อนหน้านั้นไม่ถึง 2 ชั่วโมง	0	1	2	3	4	5
3. ในหนึ่งเดือนที่ผ่านมา ขณะที่กำลังปัสสาวะ ท่านต้องหยุดและเริ่มปัสสาวะใหม่หลายๆ ครั้ง บ่อยแค่ไหน	0	1	2	3	4	5
4. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านต้องรีบปัสสาวะอย่างเร่งด่วน	0	1	2	3	4	5
5. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านสังเกตว่าลำปัสสาวะไม่พุ่งแรงอย่างที่คาดหวัง	0	1	2	3	4	5
6. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านต้องเบ่งช่วยเมื่อเริ่มถ่ายปัสสาวะ	0	1	2	3	4	5
7. ในหนึ่งเดือนที่ผ่านมาโดยเฉลี่ยแล้วท่านต้องตื่นมาถ่ายปัสสาวะกี่ครั้งหลังจากที่ท่านได้นอนหลับไปแล้ว	0 ไม่เลย	1 หนึ่งครั้ง	2 สองครั้ง	3 สามครั้ง	4 สี่ครั้ง	5 >ห้าครั้ง

รวม = การแปลผล : 0-7 = อาการน้อย, 8-18 = อาการปานกลาง, 19-35 = อาการมาก

คุณภาพชีวิตอันเนื่องจากภาวะการปัสสาวะ

คุณจะรู้สึกอย่างไรถ้าคุณต้องมีชีวิตอยู่กับภาวะการปัสสาวะอย่างที่เป็นอยู่ในขณะนี้	สบาย มาก	อยู่ได้ สบายๆ	พอใจคิด ว่าอยู่ได้	ไม่แน่ใจ	ค่อนข้าง ไม่พอใจ	ไม่พอใจ	แย่มากอยู่ ไม่ได้แน่ๆ
คะแนน	0	1	2	3	4	5	6

แบบสอบถามชนิดรูปภาพ

(Visual Prostate Symptom Score; VPSS)

เวลาเริ่มทำแบบสอบถาม..... เวลาทำแบบสอบถามเสร็จ..... ❑ ผู้ช่วยเหลือ

❑ ชอบ IPSS ❑ ชอบ VPSS

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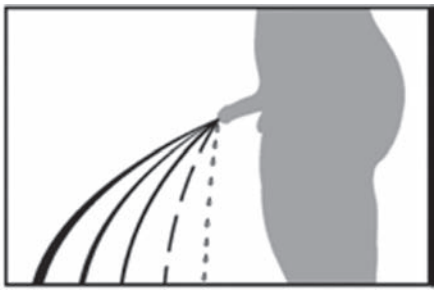

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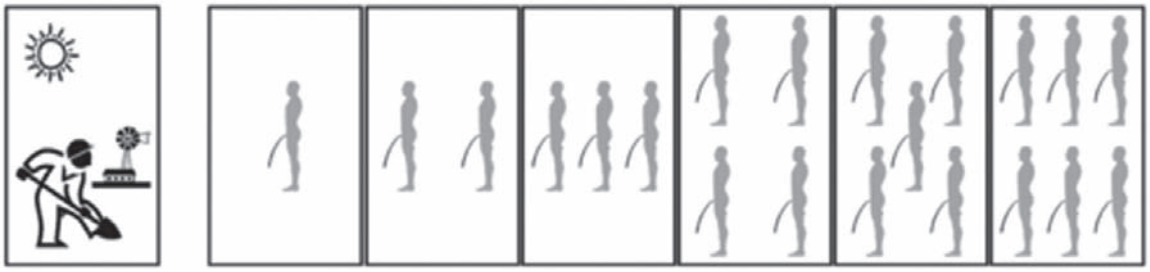

ค.

รวม = การแปลผล : 0-6 = อาการน้อย, 7-13 = อาการปานกลาง, 14-17 = อาการมาก

ง.

From: van der Walt CL, Heyns CF, Groeneveld AE, Edlin RS, van Vuuren SP. Prospective comparison of a new visual prostate symptom score versus the international prostate symptom score in men with lower urinary tract symptoms. Urology 2011;78:17-20.

วันที่ .....

ชุด B

แบบสอบถามข้อมูลผู้ป่วยต่อมลูกหมากโต

1. อายุ ..... ปี

2. การศึกษา

❑ ไม่ได้ศึกษา ❑ ประถมศึกษา ❑ มัธยมศึกษา

❑ อาชีวศึกษา ❑ ปริญญาตรี หรือ สูงกว่า ❑ อื่นๆ ระบุ.....

3. รายได้ ..... บาท/เดือน

4. ระยะเวลาตั้งแต่เริ่มรับการรักษาภาวะต่อมลูกหมากโต ..... ปี

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แบบสอบถามมาตรฐานเดิม

(International Prostate Symptom Score; IPSS)

เวลาเริ่มทำแบบสอบถาม..... เวลาทำแบบสอบถามเสร็จ..... ❑ ผู้ช่วยเหลือ

คำถามเกี่ยวกับอาการ	ไม่มีเลย	น้อยครั้ง นับได้ น้อยกว่า หนึ่งในห้า	มีบ้าง นับได้ น้อยกว่า ครึ่ง	มี บ่อยครั้ง ประมาณ ครึ่งหนึ่ง	บ่อยมาก นับได้ มากกว่า ครึ่ง	แทบ ทุกครั้ง
1. ในหนึ่งเดือนที่ผ่านมา หลังจากท่านปัสสาวะเสร็จแล้ว บ่อยครั้งแค่ไหนที่ท่านมีความรู้สึกว่าถ่ายปัสสาวะไม่สุด	0	1	2	3	4	5
2. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านต้องปัสสาวะอีก ทั้งๆ ที่เพิ่งจะถ่ายไปครั้งหนึ่งแล้วก่อนหน้านั้นไม่ถึง 2 ชั่วโมง	0	1	2	3	4	5
3. ในหนึ่งเดือนที่ผ่านมา ขณะที่กำลังปัสสาวะ ท่านต้องหยุดและเริ่มปัสสาวะใหม่หลายๆ ครั้ง บ่อยแค่ไหน	0	1	2	3	4	5
4. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านต้องรีบปัสสาวะอย่างเร่งด่วน	0	1	2	3	4	5
5. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านสังเกตว่าลำปัสสาวะไม่พุ่งแรงอย่างที่คาดหวัง	0	1	2	3	4	5
6. ในหนึ่งเดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านต้องเบ่งช่วยเมื่อเริ่มถ่ายปัสสาวะ	0	1	2	3	4	5
7. ในหนึ่งเดือนที่ผ่านมาโดยเฉลี่ยแล้วท่านต้องตื่นมาถ่ายปัสสาวะกี่ครั้งหลังจากที่ท่านได้นอนหลับไปแล้ว	0 ไม่เลย	1 หนึ่งครั้ง	2 สองครั้ง	3 สามครั้ง	4 สี่ครั้ง	5 >ห้าครั้ง

รวม = การแปลผล : 0-7 = อาการน้อย, 8-18 = อาการปานกลาง, 19-35 = อาการมาก

คุณภาพชีวิตอันเนื่องจากภาวะการปัสสาวะ

คุณจะรู้สึกอย่างไรถ้าคุณต้องมีชีวิตอยู่กับภาวะการปัสสาวะอย่างที่เป็นอยู่ในขณะนี้	สบาย มาก	อยู่ได้ สบายๆ	พอใจคิด ว่าอยู่ได้	ไม่แน่ใจ	ค่อนข้าง ไม่พอใจ	ไม่พอใจ	แย่มากอยู่ ไม่ได้แน่ๆ
คะแนน	0	1	2	3	4	5	6

Original Article

Patient survival rate and graft survival rate of kidney transplant recipients in Rajavithi Hospital

Siwat Paisankit, Nattapong Wongwattanasatien, Vorapot Choonhaklai, Somkiat Pumpaisanchai, Tanet Thaidumrong, Chawawat Kosrisirikul, Sermsin Sinthubodee, Matchima Huabkong

Division of Urology, Department of Surgery, Rajavithi Hospital, Bangkok, Thailand

Keywords:
Kidney transplant, patient survival rate, graft survival rate

Abstract

Objective: To report the outcomes and complications of transplant activity and the survival data of kidney transplant patients and grafts.

Material and Method: We conducted a retrospective analysis of patients who received a kidney transplant at our institution, and reported the donor, recipient, and transplant characteristics from January 2012 to September 2019.

The primary outcome was patient survival and graft survival at 1, 3, and 5 years.

Results: A total of 136 kidney transplants were performed from January 2012 to September 2019; 29% (37) and 71% (89) were living and deceased donor transplants. Patient survival rates were 96.8%, 96%, and 96% at 1, 3, and 5 years, respectively. Graft survival rates were 95.2%, 94.4%, and 92.9% at 1, 3, and 5 years, respectively. Traffic accident was the most common cause of death in the brain-dead donors. The most common cause of end-stage renal disease was biopsy proved IgA nephropathy. The most common early and late complications after transplant were delayed graft function and renal vascular complication, respectively. Infection was the most common cause of death in kidney transplant recipients.

Conclusion: We have reported the total number, the graft and the patient survival data of kidney transplant recipients in Rajavithi Hospital from 2012 to 2019. Although the number of patients is lower than in other institutions in Thailand, and also in developed countries, the patient and the graft survival rates are comparable. Better outcomes were found in living donor transplants.

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Introduction

Nowadays, there are many people suffering from end-stage renal disease (ESRD). There are several approaches for treating this illness: peritoneal dialysis, hemodialysis, and kidney transplant. Peritoneal dialysis and hemodialysis are ways of removing waste products from a patient's body when their kidneys are nonfunctional.

Kidney transplantation provides a new kidney and life to the patient. But kidney transplantations are insufficient for total ESRD patients and are major operations which need to be prudent and risk averse. The aim of this research was to find useful information that might help decrease the failure rate of kidney transplants in the future.

Material and Method

This research was a retrospective cross-sectional study approved by Rajavithi Hospital Ethics Committee. Data were collected from the medical records of end-stage renal disease patients who underwent kidney transplant in Rajavithi Hospital from 1st January 2012 to 30th March 2019, and who had data recorded until 30th September 2019. Exclusion criteria were incomplete medical records.

Statistical analysis was performed using SPSS version 17. Comparison of categorical data was performed using the Chi-square test. Analysis of survival rate was performed using the Kaplan-Meier estimator. Relative risks were reported with Odds Ratio (OR) (95% CI), and all tests were based on a statistically significant level at a p-value lower than 0.05.

Results

From 1st January 2012 to 30th March 2019, there were 136 patients who underwent kidney transplant in Rajavithi Hospital. After sorting out patients based on the exclusion criteria, there remained 126 patients (89 deceased donor transplants, 37 living donor transplants). Twenty-four (64.9%) were male recipients and 13 (35.1%) were female recipients for living donor transplants; 52 (58.4%) were male recipients and 37 (41.6%) were female recipients for deceased donor transplants. Sixteen (43.2%) were male donors and 21 (56.8%) were female donor for living donor transplants; 71 (79.8%) were male donors and 18 (20.2%) were female donors for deceased donor transplants.

Mean ages were 37.3±11.5 years for recipients and 40.9±11.8 for donors in living donor transplants; 42.7±9.5 years for recipients and 37.6±13.0 years for donors in deceased donor transplants. Body mass index (BMI) was 22.3±3.9 kg/m^2 for living donor transplants and 22.9±4.0 for deceased donor transplants. Average warm ischemic time was 7 minutes in living donor transplants. Average cold ischemic time was 16 hours 27 minutes in deceased donor transplants. Average operative times were 5 hours 35 minutes in living donor transplants and 4 hours 36 minutes in deceased donor transplants (Table 1).

The most common cause of brain death among deceased donors was traffic accident (75 patients, 84.3%), followed by cerebrovascular accident (13 patients, 14.6%).

The overall patient survival was 96.8, 96, 96, 95.2% at 1, 3, 5, and 7 years, respectively; 100, 100, 100, 97.3% for the patient survival rate in living donor transplants and 95.5, 94.4, 94.4, 94.4% in deceased donor transplants at 1, 3, 5, and 7 years, respectively (Figure 1, 2).

The overall graft survival was 95.2, 94.4, 92.9, 92.1% at 1, 3, 5, and 7 years, respectively; 100, 100, 100, 97.3% for the patient survival rate in living donor transplants and 93.3, 92.1, 89.9, 89.9% in deceased donor transplants at 1, 3, 5, and 7 years, respectively (Figure 3, 4).

The most common early complications were delayed graft function (38.1%), followed by bacterial infection (16.7%) and other complications (15.1% such as upper gastrointestinal hemorrhage, new-onset diabetes mellitus after transplantation, transaminitis) (Figure 5, 6).

Table 1. Characteristics of recipient, donor, and transplant procedures.

	Living donor transplants (n=37)	Deceased donor transplants (n=89)	All transplants (n=126)
Male gender (%)			
- Recipient	24 (64.9)	52 (58.4)	76 (60%)
- Donor	16 (43.2)	71 (79.8)	87 (69%)
Female gender (%)			
- Recipient	13 (35.1)	37 (41.6)	50 (40%)
- Donor	21 (56.8)	18 (20.2)	39 (31)
Age (years), mean ± SD			
- Recipient	37.3 ± 11.5	42.7 ± 9.5	41.1 ± 10.4
- Donor	40.9 ± 11.8	37.6 ± 13.0	38.6 ± 12.6
BMI (kg/m^2), mean+/-SD	22.3 ± 3.9	22.9 ± 4.0	22.7 ± 3.9
Dialysis modality (%)			
- Hemodialysis	29 (78.4)	86 (96.6)	115 (91.3)
- Peritoneal dialysis	8 (21.6)	3 (3.4)	11 (8.7)
Comorbidities (%)			
- Hypertension	37 (100)	89 (100)	126 (100)
- Diabetic mellitus	2 (5.4)	13 (14.6)	15 (11.9)
- Dyslipidemia	12 (32.4)	48 (53.9)	60 (47.6)
- Ischemic heart disease	4 (10.8%)	8 (9.0%)	12 (9.5%)
- Gout	2 (5.4)	5 (5.6)	7 (5.6)
- Hyperparathyroidism	8 (21.6)	34 (38.2)	42 (33.3)
- Cerebrovascular disease	0 (0)	4 (4.5)	4 (3.2)
- Other	9 (24.3)	17 (19.1)	26 (20.6)
Cause of ESRD (%)			
- IgA nephropathy	9 (24.3)	9 (10.1)	18 (14.3)
- FSGS	3 (8.1)	4 (4.5)	7 (5.6)
- ADPKD	2 (5.4)	4 (4.5)	6 (4.8)
- Other	3 (8.1)	12 (13.5)	15 (11.9)
- Unknown/no biopsy	20 (54.1)	60 (67.4)	80 (63.4)

BMI = body mass index; ESRD = end-stage renal disease; FSGS = focal segmental glomerulosclerosis; ADPKD = autosomal dominant polycystic kidney disease.

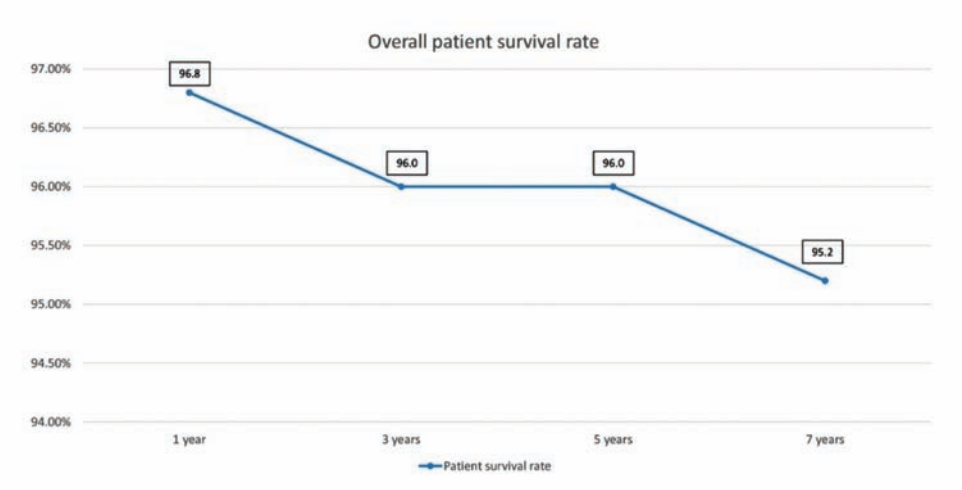

Figure 1.
Overall patient survival rate.

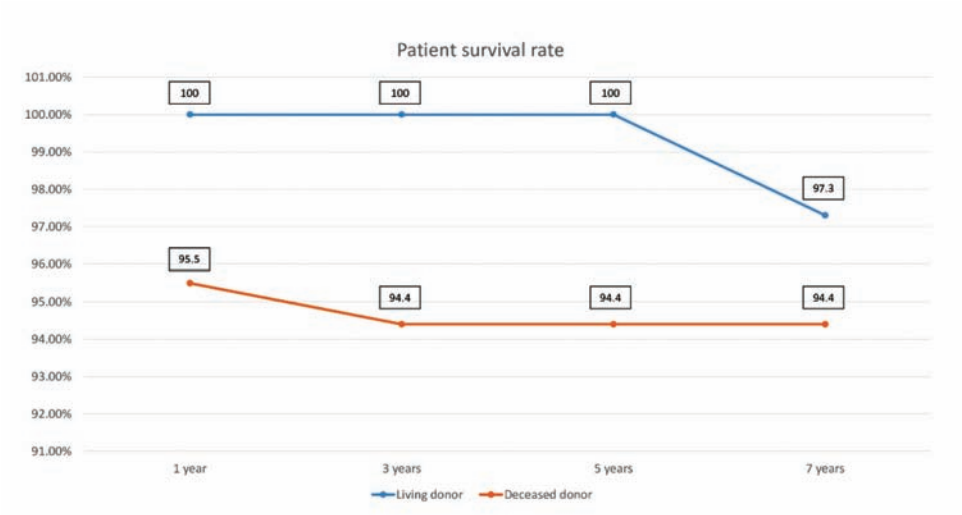

Figure 2.
Patient survival rate.

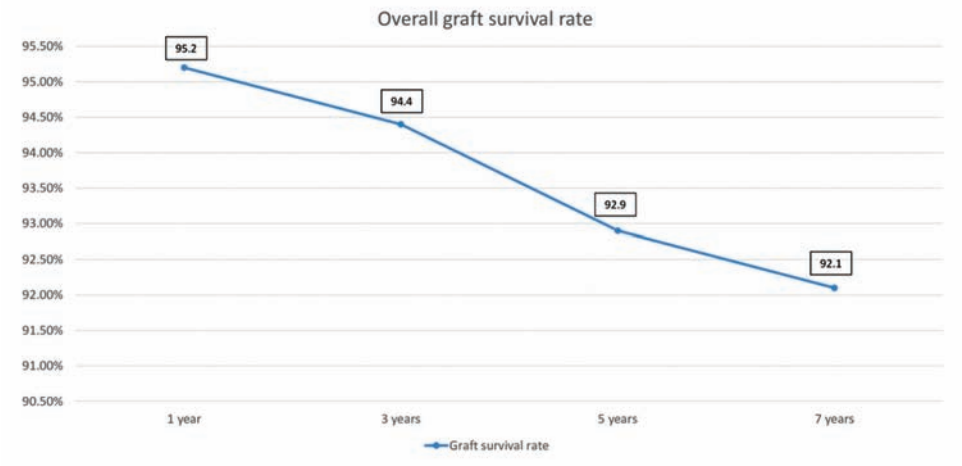

Figure 3.
Overall graft survival rate.

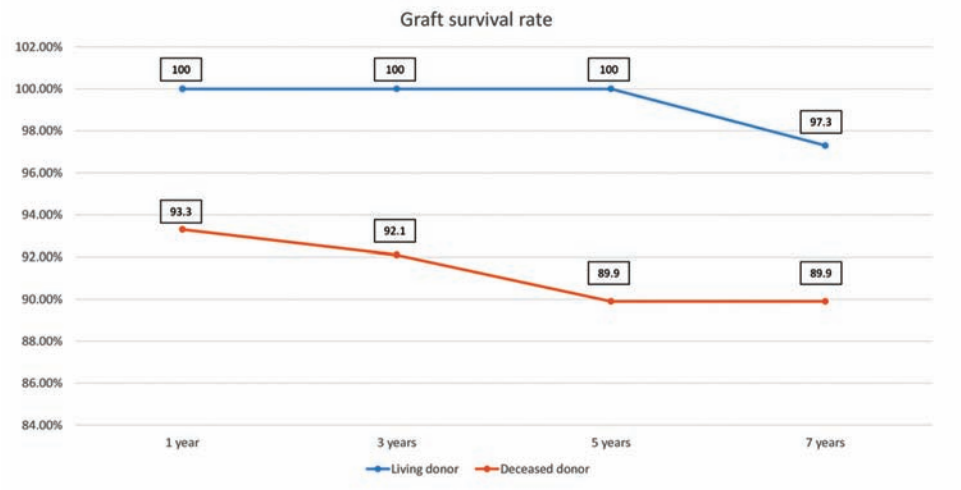

Figure 4.
Graft survival rate.

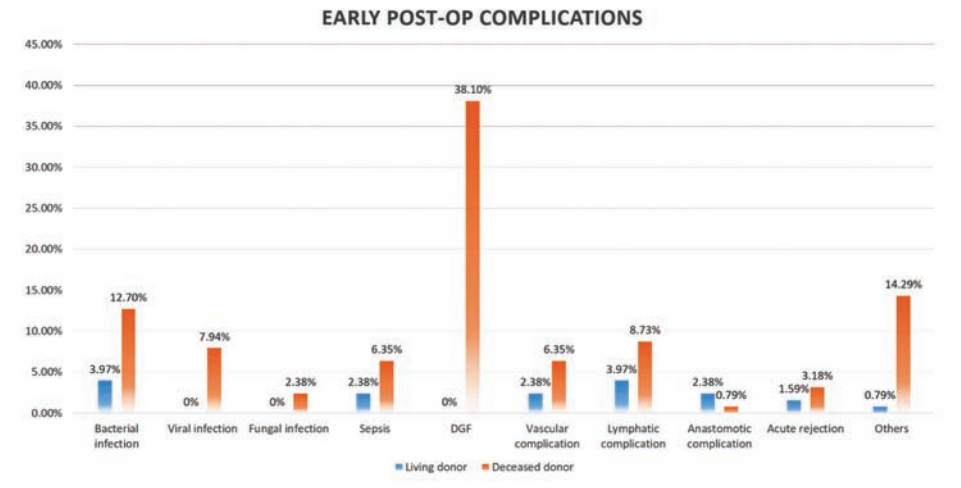

Figure 5.
Early post-op complications.

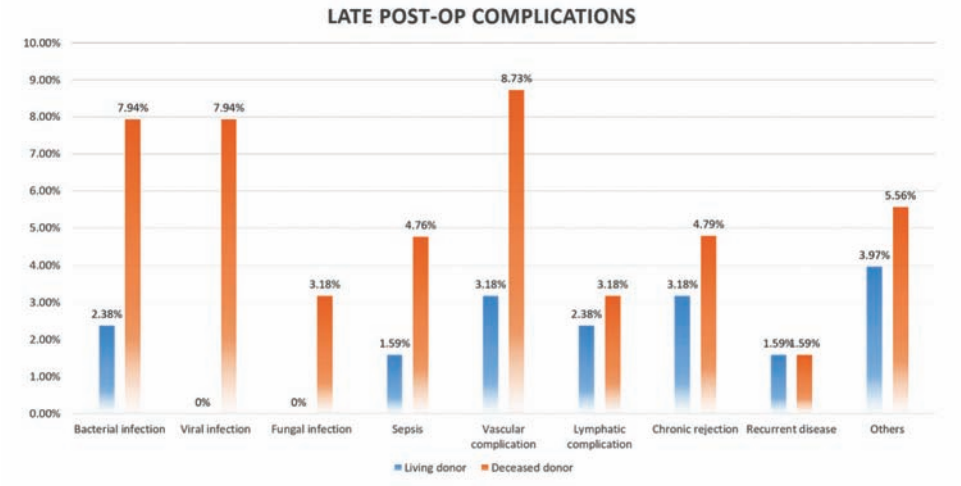

Figure 6.
Late post-op complications.

The most common late complications were transplant renal artery stenosis (11.9%), followed by bacterial infection (10.3%) and other complications (9.5% such as incisional hernia, lower gastrointestinal hemorrhage, urinary tract calculi) (Figure 6).

The most common cause of death in transplant recipients was bacterial septic shock (50%: urinary tract infection 33.33%, pneumonia 16.67%), followed by fungal septic shock (16.67%), acute coronary syndrome (16.67%), and cancer (16.67%) (Figure 7).

Discussion

Kidney transplantation is a surgical procedure to place a healthy kidney from a living or deceased donor into a person whose kidneys no longer function properly[1,2].

The kidney transplant in Thailand has a long history and was first successfully performed in 1972. However, Thailand is a developing and resource limited country. The number of kidney transplants performed each year is much lower than the number of patients on the waiting list as there were approximately 5,500 ESRD patients waiting for a deceased donor kidney in 2015[3].

The most common cause of ESRD in transplant recipients in Thailand is diabetic nephropathy, followed by hypertensive nephropathy and obstructive nephropathy[3,4]. The most common cause of brain death among deceased donors is traffic accident (49.7%), followed by cerebrovascular accident (11.2%) and other causes (13.9%)[5].

Several studies have reported on survival outcome following kidney transplants. In our study, the graft and patient survival rates are comparable to other registries.

Noppakun K and colleagues conducted a retrospective study on kidney transplant activity and survival data from 1987 to 2012 in the Thai Transplant Registry. They reported that patient survival at 1 and 5 years were respectively, 98.6% and 96.6% in living donor transplants, and 96.3% and 93.1% in deceased donor transplants. Delayed graft function (DGF) developed in 11.2% of the recipients who had received a living donor transplant and 32.4% among the recipients of deceased donor transplants. The most common cause of death in transplant recipients was infection (52.0%), followed by cardiovascular disease (17.5%)[5].

In their retrospective cohort study of 30,207 patients who underwent kidney transplant from 1990 to 2011, McAdams-DeMarco MA and colleagues found that the patient survival rate of the kidney transplant recipients at 1, 3, and 5 years were 93, 90, and 85% in living donor transplants and 94, 82, and 67% in deceased donor transplants, respectively[6].

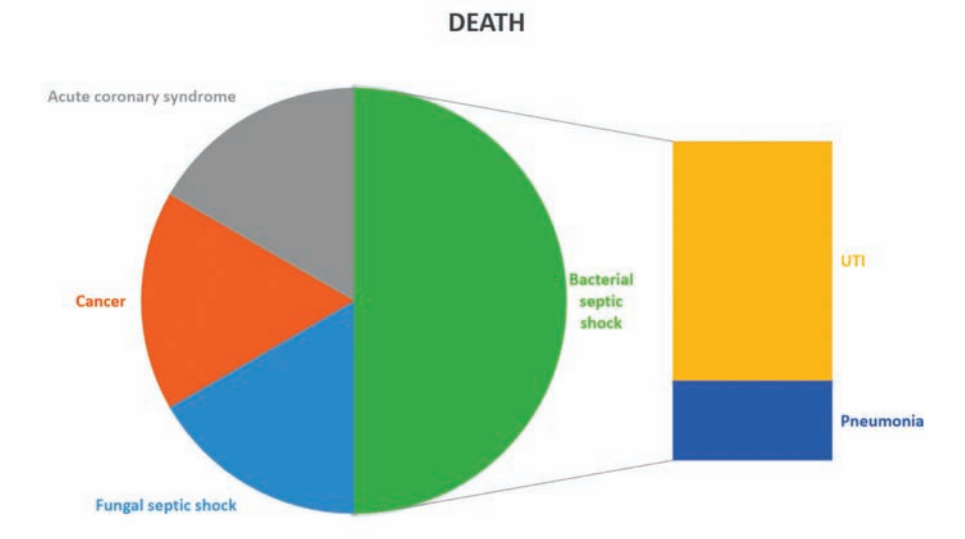

Figure 7.
Causes of death.

Van Arendonk KJ and colleagues have reported the patient survival of the kidney transplant recipients under 18 years old from the Scientific Registry of Transplant Recipients in the United States of America, 1987 to 2012 at 1, 5, and 10 years were 97, 77.9, and 60.2%, respectively[7].

With regard to transplant-associated complications, in our study delayed graft function was found in 38.1%, compared to 2.3% in living donor transplants and 31% in deceased donor transplants from the Annual Report 2018 Organ Transplantation in Thailand[4]. Lohéac C, et al. have reported that the most common cause of graft loss was antibody-mediated rejection (31.69%), followed by thrombosis (25.55%), and medical intercurrent disease (14.62%)[8]. Similarly, Ingsathit A, et al. found that the most common cause of graft loss was chronic allograft nephropathy (53%), followed by acute rejection (15%), and transplant renal artery diseases (7%)[9].

There are some limitations in this study. First, it comprised only a small number of patients. Second, the missing data could have introduced significant bias. We should be careful when attempting to interpret data where there is missing information. Third, there was no systematic audition system for the data collection.

Conclusion

We have reported the number of kidney transplants performed in Thailand. The graft and patient survival rates are comparable to other registries and have improved significantly. Hypertensive nephropathy is the most common cause of ESRD and bacterial infection is the most common cause of death in transplant recipients.

For the future direction of the registry, we are planning on reporting long-term patient outcomes, including cardiovascular and metabolic complications, and malignancy.

Conflict of Interest

The authors declare no conflict of interest.

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Original Article

A randomized placebo controlled trial comparison of pre-incision infiltration of a local anaesthetic drug to reduce postoperative pain after laparoscopic adrenalectomy

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Keywords:
Pre-incision infiltration, local anaesthetic, post-operative pain, laparoscopic adrenalectomy

Abstract

Objective: To study the efficacy of pre-incision infiltration of a local anaesthetic drug in postoperative pain following laparoscopic adrenalectomy.

Material and Method: In a randomized placebo controlled study, 52 patients listed for unilateral laparoscopic adrenalectomy were randomized into 2 groups. Group I (n=26) received subcuticular pre-incision infiltration with 0.5% bupivacaine and group II (n=26) received normal saline as a placebo; all the operations were performed with the same technique by only one experienced laparoscopic urologist. Postoperative pain was assessed using the Visual Analogue Scale at the 4^{th}, 8^{th}, 12^{th}, 24^{th}, and 48th hour postoperatively as primary outcomes. The secondary outcomes were the total postoperative analgesic consumption and time to the first analgesic demand.

Results: The average pain scores were significantly different at the 4^{th}, 12^{th}, 24^{th}, and 48^{th} hour postoperatively (p=0.00, 0.00, 0.001, 0.00), but insignificantly different at the 8^{th} hour (p=0.311). There was no significant difference in nausea/vomiting, bruising score and wound infection (p=0.223, 0.298, 0.313). Postoperative analgesic consumption was significantly lower in the bupivacaine group, but time to the first analgesic demand was not significantly longer in this study.

Conclusion: Our study demonstrated that pre-incision infiltration of a local anaesthetic drug is highly effective for relief of postoperative pain after laparoscopic adrenalectomy in terms of pain perception and intravenous postoperative analgesic consumption without any effects on nausea/vomiting, bruising, and wound infection.

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Introduction

Even though laparoscopic adrenalectomy is made in order to reduce any injury to the surrounding tissue, blood loss, post-operative pain, and length of stay compare to open adrenalectomy in unilateral benign adrenal disease, such as pheochromocytoma, aldosterone-producing adenoma, Cushing's syndrome and non-functional adrenal tumor[1-4].

But postoperative pain is still a minor complication that concerns the author. Optimizing postoperative pain control is an important aspect in peri-operative patient care. Currently, there are many techniques to reduce post-operative pain. One of them is pre-emptive analgesic by pre-incision infiltration of a local anaesthesic drug[5].

The author studied the efficacy of pre-incision infiltration of a local anaesthetic drug (using 0.5% bupivacaine) in postoperative pain following laparoscopic adrenalectomy.

Material and Method

In this randomized placebo controlled study that was conducted in Rajavithi Hospital from January 2015 to September 2018, a total of 60 patients who underwent unilateral laparoscopic adrenalectomy were recruited. In 6 patients the diagnosis was changed; patients with other analgesic modality or who were converted to open surgery were excluded from this study. Fifty-two patients were randomized into 2 groups. Group I (n=26) received a subcuticular pre-incision infiltration with 0.5% bupivacaine, and group II (n=26) received normal saline as a placebo in the control group.

After general anaesthesia was administered, in the patients of group I (bupivacaine group), the 24-gauge with 10 ml of 0.5% bupivacaine syringe was infiltrated into the subcuticular layer of the area of the camera and the other working port before the incision. Group II (placebo group) received 10 ml of normal saline instead with the same method. All the operations were performed with the same technique by only one experienced laparoscopic urologist.

The demographic and clinical characteristics of the patients were recorded at the time of enrollment. Postoperative pain was assessed by medical officers in the urology department using the Visual Analogue Scale (VAS) at the 4^{th}, 8^{th}, 12^{th}, 24^{th} and 48^{th} hour postoperatively as primary outcomes. The "0" on the scale meant no pain and the "10" meant very severe pain. The secondary outcomes were the total postoperative analgesic consumption, time to the first analgesic demand, and adverse effects. Intravenous morphine 3 mg was used in case of pain, at the request of the patient.

Statistical analysis

Statistical analysis was performed using SPSS version 17. Continuous variables were compared using the t-test for 2 independent samples. Categorical variables were compared using the Chi-square analysis. p-value <0.05 was considered to be statistically significant.

All patients provided written informed consent. Ethical approval was obtained from the Ethics and Research Committee of Rajavithi Hospital.

Results

Patient demographic data are shown in Table 1. The mean age of the bupivacaine group was 46.7 years old, whereas the placebo group was 48.7 years old. Most patients were female. The main diagnosis of adrenal disease in both groups was aldosterone-producing adenoma. The average tumor size was 2.0 and 2.1 cm, respectively. There were no significant differences between the 2 groups in age, underlying disease, sex, diagnosis, side and size of the tumor, operative time, number of working ports, placement of the drain, and blood loss.

Postoperative pain as the primary outcome evaluated using the VAS score is shown in Figure 1 and Table 2. The average VAS score at the 4^{th}, 12^{th}, 24^{th}, and 48^{th} hour post-operatively in the bupivacaine

group was 0.88 ± 1.84, 2.08 ± 1.77, 2.19 ± 1.50, and 1.04 ± 1.76, which was significantly lower compared with 5.31 ± 3.46, 4.50 ± 2.23, 4.00 ± 2.20 and 3.12 ± 2.07 in the placebo group (p-value=0.000, 0.001, 0.001, and 0.000), respectively. The postoperative VAS scores at the 8th hour post-operatively were not significantly different between the 2 groups.

Total intravenous analgesic (IV) consumption using morphine to control postoperative pain was 1.04 ± 1.89 mg in the bupivacaine group and 5.27 ± 4.18 mg in the placebo group (p-value=0.000). The first analgesic demand was not significantly different between the 2 groups (271.73 ± 918.21 minutes vs 164.42 ± 270.94 minutes, p-value=0.570), as shown in Table 3.

There were no statistical differences in nausea/vomiting, bruising wound and infected wound, as shown in Table 4.

Table 1. Demographic data.

Characteristic	0.5% Bupivacaine	0.9% NaCl	P-value
Age (years) ± SD	46.69 ± 10.87	48.65 ± 11.66	0.533
Gender			
- Male	4 (15.4%)	6 (23.1%)	0.482
- Female	22 (84.6%)	20 (76.9%)	
Underlying disease			
- Diabetes mellitus	4 (15.4%)	3 (11.5%)	0.685
- Hypertension	24 (92.3%)	24 (92.3%)	1.000
- Dyslipidemia	4 (15.4%)	3 (11.5%)	0.685
Diagnosis			
- Pheochromocytoma	3 (11.5%)	2 (7.7%)	
- Aldosterone-producing adenoma	19 (73.1%)	20 (76.9%)	0.859
- Cushing's syndrome	2 (7.7%)	3 (11.5%)	
- Non-functional tumor	2 (7.7%)	1 (3.8%)	
Side of adrenal gland			
- Left	17 (65.4%)	20 (76.9%)	0.358
- Right	9 (34.6%)	6 (23.1%)	
Diameter of tumor (cm) ± SD	2.07 ± 0.92	2.18 ± 1.05	0.676
Operative time (min) ± SD	137.50 ± 41.33	133.85 ± 32.10	0.723
Number of Port ± SD	3.12 ± 0.33	3.04 ± 0.53	0.530
Place of drain	17 (60.7%)	11 (30.3%)	0.095
Blood loss (ml) ± SD	26.15 ± 21.74	35.00 ± 34.67	0.276

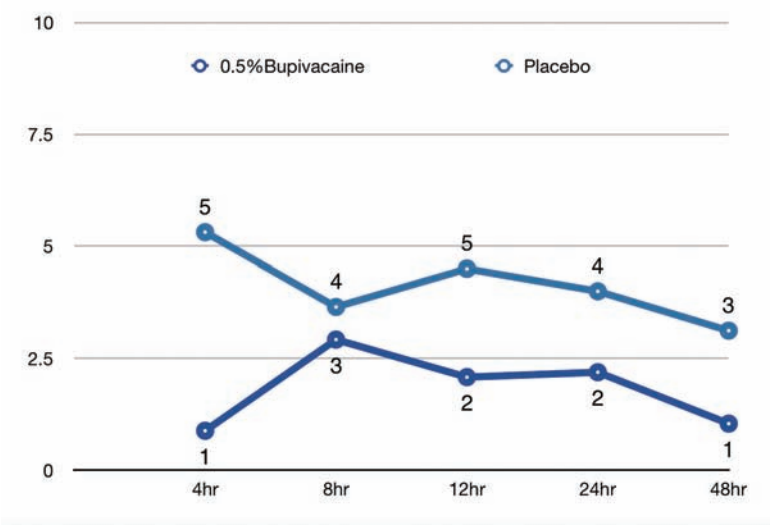

Figure 1.
Visual Analogue Scale at 4th, 8th, 12th, 24th, and 48th hour post-operatively.

Table 2. Visual Analogue Scale at 4th, 8th, 12th, 24th and 48th hour post-operatively.

Visual Analog Scale (VAS)	0.5% Bupivacaine	0.9% NaCl	P-value
VAS at 4th hour	0.88 ± 1.84	5.31 ± 3.46	0.000
VAS at 8th hour	2.92 ± 2.58	3.65 ± 2.58	0.311
VAS at 12th hour	2.08 ± 1.77	4.50 ± 2.23	0.000
VAS at 24th hour	2.19 ± 1.50	4.00 ± 2.20	0.001
VAS at 48th hour	1.04 ± 1.76	3.12 ± 2.07	0.000

Table 3. Total intravenous analgesic consumption and time to first analgesic demand.

Characteristic	0.5% Bupivacaine	0.9% NaCl	P-value
Total intravenous analgesic consumption - morphine (mg)	1.04 ± 1.89	5.27 ± 4.18	0.000
Time to first analgesic demand (min)	271.73 ± 918.21	164.42 ± 270.94	0.570

Table 4. Adverse effect.

Adverse effect	0.5% Bupivacaine	Placebo	P-value
Nausea and vomiting	2 (7.6%)	5 (19.2%)	0.223
Bruising wound	1 (3.8%)	3 (11.5%)	0.298
Infected wound	0 (0%)	1 (3.8%)	0.313

Discussion

When the tissue is injured, it will send the nociceptive signal via the peripheral nerve (a fiber and polymodal C fiber nociceptors) to the central nervous system called "central sensitization," which causes persistent post-injury change in the central nervous system, resulting in pain hypersensitivity[6]. "Pre-emptive analgesia" by infiltration of a local anesthetic drug before incision, which blocks the sodium channel, can reduce the signal from the peripheral nerve, resulting in a decrease in central sensitization and a decrease in post-operative pain[5].

Bupivacaine (trading name "Marcaine") is a local anaesthetic drug that is a commonly used peri-operative; it can be used in both peripheral nerve block and epidural nerve block. The mechanism of action is sodium-channel blockers, which prevent Na+ influx, resulting in a decrease in depolarisation, a decrease in nociceptive signal, and a decrease in central sensitization[7].

The benefit of pre-incision infiltration of a local anaesthetic drug was demonstrated in previous studies of oto-rhino-laryngology, general surgery, and gynecology, such as thyroid surgery, laparoscopic cholecystectomy, and hysterectomy where bupivacaine was used as an anaesthetic agent.

A. Bagul et al.[8] (2005) conducted a prospective randomized study on the efficacy of pre-incision infiltration of 0.5% bupivacaine in 39 patients; 19 patients were included in the bupivacaine group (10 ml of 0.5% bupivacaine infiltration) and 20 patients in the control group (normal saline infiltration). Pain scores (as linear analogue scores 0-100) were significantly different at 6 hours post-operatively (p-value=0.0341), with mean scores in the bupivacaine group = 33 and the control group = 50, but this difference disappeared at 24 hours. No patients received IV morphine in the bupivacaine group compared to 5 patients (25%) in the control group. There was no significant difference in the mean bruising scores (p-value=0.8864) and mean cosmetic scores (p-value=0.3339) at discharge.

F. Cantore. et al.[9] (2008) reported on 50 patients who underwent laparoscopic cholecystectomy; 25 patients were randomized into pre I group (pre-incision infiltration of levobupivacaine) and 25 patients into post I group (post-operative infiltration). The results showed different analgesic consumption between the 2 groups: In pre I group, the mean intravenous dose of ketorolac post-operative used was 124 mg while in the post I group it was 339 mg. The mean VAS was 10.7 in the post I group while in the pre I group it was 5.1, which also was statistically significant.

Minoo Yaghmaei, et al.[10] (2013) reported on 60 patients with ASA class I or II scheduled for abdominal hysterectomy. The patients were randomly assigned to receive pre-incision skin infiltration of either lidocaine or normal saline. Patients in the saline group complained of more pain than the lidocaine group in the recovery room (p-value<0.001). However, the patients were similar with respect to their post-operative pain scores and analgesic requirements. They were also similar regarding satisfaction rates during the first 24 hours post-operatively.

Presently there is an absence of studies in laparoscopic adrenalectomy or any urologic procedure. Our study has shown the benefit and safety of pre-incision infiltration of a local anaesthetic drug in relieving postoperative pain, leading to lower consumption of an IV analgesic drug (morphine). However, time to the first analgesic demand was not different between the 2 groups.

From subgroup analysis: There was not any significant difference at the 8th hour post-operatively. Figure 1 shows the decreasing pain score at the 8th hour post-operatively in the placebo group. The author suggests that the reason may be the result of the placebo group receiving an IV analgesic drug (morphine) on demand at 164 minutes (4th hour post-operatively), as shown in Table 2. The effect of the morphine was still involved at the 8th hour post-operatively, resulting in temporary pain relief.

Conclusion

Our study demonstrated that pre-incision infiltration of a local anaesthetic drug is effective for relief of postoperative pain after laparoscopic adrenalectomy in terms of pain perception and reducing intravenous postoperative analgesic consumption without any effects on nausea/vomiting, bruising or wound infection. However, time to the first analgesic demand was not significantly longer in this study. A larger study is needed in order to assess the efficacy of this technique.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Presentation and treatment of arteriovenous fistula, arteriovenous malformation, and pseudoaneurysm of the kidney in Ramathibodi Hospital

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Keywords:
Renal arteriovenous fistula, renal arteriovenous malformation, renal pseudoaneurysm, embolization

Abstract

Objective: To review the presentation, predisposing factors, treatment and outcome of renal vascular malformation, including arteriovenous malformation (AVM), arteriovenous fistula (AVF) and pseudoaneurysm of the kidney in Ramathibodi Hospital.

Material and Method: In-patient medical records from January 2007 to January 2017 were retrospectively reviewed. Patients admitted and diagnosed with any type of vascular malformation of the kidney, comprising AVM, AVF and pseudoaneurysm in Ramathibodi Hospital were included in the study. Baseline characteristics of the patients, including gender, age at diagnosis, and underlying disease were recorded. Vascular malformation, clinical presentation, imaging data, predisposing factors of the disease, treatment and the outcome of patients were summarized and reported.

Results: Seventeen patients were diagnosed with vascular malformation; 9 patients were males and 8 females. The most common comorbidity was hypertension, followed by chronic kidney disease. Nine patients had AVF (52.94%), 3 had AVM (17.65%), 2 had pseudoaneurysm (11.76%), and 3 had AVF with pseudoaneurysm (17.65%). Common presentations were gross hematuria, flank pain, anemia, and hypovolemic shock. Previous surgery and history of renal biopsy were mutual predisposing factors. Embolization was the most common treatment option. All patients were asymptomatic on follow-up visit with a median follow-up of 90 days.

Conclusion: Vascular malformation of the kidney is not a common condition. The history of previous kidney surgery and renal biopsy may help for diagnostic suspicion. Renal embolization was the proper management with a high success rate.

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Introduction

Renal vascular malformation is a rare disease. AVFs are the most common type of renal vascular malformation, comprising 70-80% of renal arteriovenous abnormalities, which can be divided into acquired and congenital types. Congenital renal AVMs are uncommon, with a prevalence of less than 1% in the general population[1]. Of the acquired disease, 70-80% is caused by kidney injury due to accident, kidney biopsy, history of kidney surgery, cancer, and inflammation in the kidneys[2]. Most patients present with hematuria and flank pain. Physical examination demonstrates abnormal blood flow around the flanks. Furthermore, some patients present with disease consequences, such as high blood pressure, enlarged left ventricular or congestive heart failure[3].

The gold standard for diagnosis is renal angiography, which is a precise and effective method. However, it is the initial laboratory tests, such as urinalysis, kidney function test, Doppler ultrasonography, and computed tomography (CT) imaging[3], which guide diagnosis.

Compiling data from previous studies, renal vascular disease is not the priority for differential diagnosis in patients who presented with hematuria. On the other hand, these conditions tend to be considered last. Therefore, the diagnosis might be delayed until after serious complications, such as hypotensive anemia from blood loss or renal failure, have occurred[4-8], resulting in an increase in the duration of treatment, and thus a higher cost of treatment than necessary. As a result, patients will have higher morbidity, increased length of hospital stay, and higher costs for treatment. The aim of this study was to review the etiology, symptoms and signs, and treatment of renal AVF, AVM and pseudoaneurysm in Ramathibodi Hospital.

Material and Method

This study was approved by the Human Research Ethics Committee, Faculty of Medicine Ramathibodi Hospital, Mahidol University. In-patient medical records from January 2007 to January 2017 were retrospectively reviewed. Patients admitted and diagnosed with any type of vascular malformation of the kidney, comprising arteriovenous malformation (AVM), arteriovenous fistula (AVF), and pseudoaneurysm were included into the study. Computed tomography and renal angiogram were reviewed. Patients with incomplete medical records and radiography were excluded from the study. Baseline characteristics of the patients, including gender, age at diagnosis, and underlying disease were recorded. Vascular malformation, clinical presentation, imaging data, predisposing factors of the disease, the treatment and the outcome of patients were explored and reported. Statistical analysis: continuous data are presented as mean and SD. Categorical data are reported as frequency and percentage.

Results

We retrospectively reviewed medical records from January 2007 until January 2017. Seventeen patients were diagnosed with vascular malformation and admitted to the hospital; 9 patients were males (52.94%) and 8 females (47.06%). Mean ± SD age of the patients was 46.65 ± 19.70 years old; 41.22 ± 21.82 in males and 52.75 ± 16.12 in females. Of the 17 patients: hypertension was found in 11 (64.71%), diabetes mellitus was found in 5 (29.41%), chronic kidney disease was found in 6 (35.29%), and history of kidney transplantation in 4 (23.53%). Two patients (11.76%) had no underlying disease. The details of patient characteristics are shown in Table 1.

Table 1. Patient characteristics.

Characteristic	No. (%) or mean±SD
Age (years)	46.65±19.70
• Male	41.22±21.82
• Female	52.75±16.12
Gender	
• Male	9 (52.94)
• Female	8 (47.06)
Comorbidities	
• Hypertension	11 (64.71)
• Diabetic mellitus	5 (29.41)
• Chronic kidney disease	6 (35.29)
• History of kidney transplantation	4 (23.53)
• No underlying disease	2 (11.76)

Regarding the type of vascular malformation, 9 had AVF (52.94%), 3 had AVM (17.65%), 2 had pseudoaneurysm (11.76%), and 3 had AVF with pseudoaneurysm (17.65%). For the patients with a transplanted kidney, 3 patients had AVF and another patient had AVF with pseudoaneurysm. Eleven patients presented to the hospital in the emergency department with the presentation of gross hematuria (8 patients, 47.06%), flank (1 patient, 5.88%), and anemia (2 patients, 11.76%). Hypovolemic shock was found in 1 patient (5.88%). Among the asymptomatic patients, 5 underwent ultrasound for renal disease surveillance. Predisposing factors: previous surgery was found in 4 patients (23.53%), comprising 2 percutaneous nephrolithotomy (PCNL) and partial nephrectomy for renal cell carcinoma. Six patients (35.29%) had a history of renal biopsy. On the other hand, the rest of the patients had no history of prior procedure (Table 2). Embolization was the most common treatment for vascular malformation (12 patients, 70.59%). However, unsuccessful embolization was found in 2 patients because of the vasospasm and dissection of the segmental branch. Two patients had persistent hematuria and underwent a second embolization during the same admission. Median follow-up was 90 days (range: 9-3,285). All patients were asymptomatic on their last visit.

Discussion

Renal vascular malformations are abnormal communications between the arteries and veins in the kidneys. Generally, 2 types are described. Renal AVMs are congenital and represent a developmental abnormality wherein the artery and the vein communicate through a network of abnormal vessels. AVF is defined as a single direct communication between a renal artery and an adjacent vein. Acquired AVFs are more common than congenital AVFs and usually result from a penetrating trauma, percutaneous biopsy, surgery, malignancy, or inflammation. About 39% of AVFs are symptomatic, and the majority resolve spontaneously (87%). Only 13% require treatment[9]. Cho et al. studied a series of 9,500 angiograms of the renal artery and found only 4 cases of congenital origin. Acquired renal AVF is more common and occurs secondary to trauma, inflammation, renal surgery, renal angioplasty, or percutaneous biopsy[10].

Table 2. Disease characteristics and treatments.

	No. (%)
Type of vascular malformation	
• Arteriovenous fistula (AVF)	9 (52.94)
• Arteriovenous malformation (AVM)	3 (17.65)
• Pseudoaneurysm	2 (11.76)
• AVF with pseudoaneurysm	3 (17.65)
Clinical presentation	
• Gross hematuria	8 (47.06)
• Flank pain	1 (5.88)
• Anemia	2 (11.76)
• Hypovolemic shock	1 (5.88)
• Asymptomatic	5 (29.4)
Predisposing factor	
• Previous surgery	4 (23.53)
• Renal biopsy	6 (35.29)
• No history of prior procedure	7 (41.18)
Treatment	
• Embolization	12 (70.59)
• Partial nephrectomy	1 (5.88)
• Nephrectomy	1 (5.88)
• Conservative	3 (17.65)

The clinical manifestations of vascular lesions of the kidney vary widely, from asymptomatic presentation, flank pain, hematuria, perinephric hematoma, abdominal mass, flank bruit, and high output heart failure to hypertension. An AVM is usually symptomatic with gross hematuria due to a rupture of the small venules into the calyces from abnormally increased intravascular pressure. Patients may present with flank pain from an obstruction of the renal collecting system by blood clots or with hypertension due to the stimulation of the renin-angiotensin pathway, or with cardiac failure due to a high-output state[9].

The diagnosis of congenital renal AVM relies on clinical manifestation, ultrasonography, CT, magnetic resonance imaging, and angiography. Small AVM may escape recognition on ultrasonography and CT scans[8]. Sonography is the preferred initial diagnostic method for evaluation of the kidneys, and color doppler ultrasound is low cost and widely available. CT imaging of renal vascular malformations are characterized by masses of vascular density with dilated draining renal veins. Contrast-enhanced CT angiography can depict the presence of numerous feeding vessels and abnormal tortuous vessels in a vascular tangle with early opacification of the draining veins. Magnetic resonance imaging (MRI) demonstrates flow-related signal voids within the lesion, and prominent draining veins. Catheter angiography remains the gold standard in demonstrating detailed vascular anatomy of renal vascular malformation.

As a minimally invasive nonsurgical treatment, transarterial embolization (TAE) is a treatment for hematuria that was first reported in 1973, and it has been used widely to control hematuria and preserve the kidney since[11]. Zhang et al. performed a brief review of TAE in the treatment of hematuria secondary to congenital renal AVM from 1973 to 2012, and demonstrated that the primary and secondary success rates of TAE were 73.7 and 94.7%, respectively[8]. Eom et al. reported on TAE of renal AVM safety and efficacy in 24 patients with follow-up to evaluate the efficacy and safety of renal artery embolization (RAE) for renal AVM. They found that the clinical success rate after the initial RAE was 67%. The overall clinical success rate, including multi-session RAE, was 88%. However, 3 underwent a second session of RAE to achieve clinical success, and 3 patients underwent nephrectomy due to recurrence[12]. Traditional treatment options for renal AVF are open partial or total nephrectomy. This treatment is less popular compared with embolization because of its higher morbidity[7,8,13].

In this study, we found 11 patients (64.71%) had hypertension. Pathophysiology of hypertension followed renal vascular malformation due to the stimulation of the renin-angiotensin pathway[9]. In addition, we found 6 patients with a history of chronic kidney disease, 4 in 6 patients had kidney transplantation. Post kidney transplantation: the patients had rising serum creatinine and suspected graft rejected. After which, the patients underwent kidney biopsy and turned to transplant kidney vascular malformation afterwards. Although percutaneous renal biopsy is the gold standard for diagnosing renal disease, AVF formation is a potential complication which occurs in up to 15% of patients. Most fistulae resolve spontaneously, but some enlarge and become clinically apparent and symptomatic in the first weeks or months after biopsy[14,15].

In patients with previous renal surgery, 2 had partial nephrectomy due to RCC and turned to renal vascular malformation at the surgical site. Two other patients had a PCNL procedure and renal vascular injury then AVF and pseudoaneurysm was formed. Most of our patients had successful embolization. Only 2 patients were reported as having undergone an unsuccessful procedure due to vasospasm and dissection of the segmental branch. In the group of embolization, 2 patients had persistent hematuria and underwent a second embolization during the same admission and ended up with a favorable outcome. For the clinical outcome: all patients were asymptomatic on their last visit.

Conclusion

Vascular malformations of the kidney represent an important group of entities for diagnostic consideration, and understanding the natural history of the disease, vascular anatomy, and hemodynamics of these vascular lesions help in guiding proper treatment. Renal angiography and embolization should be recommended as the first choice to treat gross hematuria secondary to renal vascular malformation.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Study of urinary stone composition in a university-based hospital

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Keywords:
Stone analysis, infrared spectroscopy, stone composition

Abstract

Objective: Knowing the composition of a urinary stone is valuable in its treatment, helping to define stone etiology, guide management, and prevent stone recurrence. This study aims to identify the incidence of various stone compositions in a university-based, tertiary care hospital.

Material and Method: This retrospective study was conducted at King Chulalongkorn Memorial Hospital. Data of stone composition by infrared spectroscopy were collected from all patients undergoing upper urinary tract stone removal surgery from January 2015 to December 2018. Demographic data including age, gender, comorbidities, and stone characteristics were also collected.

Results: A total of 173 stone analyses were included in this study. The main stone composition was calcium oxalate monohydrate (whewellite 49.7%), calcium carbonate apatite (dahllite 34.1%), calcium oxalate dihydrate (weddellite 5.2%), magnesium ammonium phosphate (struvite 4%), and ammonium hydrogen urate (2.9%). A small proportion of uric acid (1.7%), cystine (1.7%), and calcium phosphate (brushite 0.6%) was also found. No correlation was found between stone composition and age, gender or occupation. Multivariate analysis revealed that calcium oxalate stones were more common in males than females (odds ratio=2.21, 95%CI: 1.91-4.12; p-value=0.01). Phosphate-containing stones (struvite, dahllite and brushite) were more common in patients with a history of urinary tract infection (odds ratio=3.06, 95%CI: 1.18-7.92; p-value=0.02).

Conclusion: Calcium oxalate and calcium carbonate apatite were the most common stone compositions found in this study. Male gender was a risk factor for oxalate stone, and a history of urinary tract infection was a risk factor for phosphate-containing stones.

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Introduction

Urinary tract stone is a common urological problem. One study from the United States revealed that a lifetime incidence of stone disease was more than 12% in males and more than 6% in females, and approximately one-third of patients had recurrence within 5 years[1]. The peak incidence of stone disease occurs in the sixth decade of life[2,3]. There is an association between stone prevalence and geographic area, which is demonstrated by the increased incidence in the southern and eastern regions of the United States[4]. Moreover, stone disease also correlates with body mass index (BMI), diabetes mellitus type 2 (T2DM), metabolic syndrome, and cardiovascular disease[5].

Various chemical compositions are found in an upper urinary tract stone. They include calcium oxalate, calcium phosphate, magnesium ammonium phosphate, and uric acid[6]. Knowing the stone composition is valuable for patient management, either with medical or surgical intervention. Additionally, stone composition helps imply the etiology and prevent stone recurrence[7]. Identification of stone composition can be accomplished through various methods, including urine crystal analysis and chemical analysis of the stone fragments. Nevertheless, stone analysis with Fourier-Transform Infrared Spectroscopy (FTIR) is the most accurate method[8]. In Thailand, however, stone analysis is not commonly performed, and the data of stone composition are still lacking. Thus, we proposed this study in order to examine the composition of the stones available from the upper urinary tract and explore whether there is any association between stone composition and clinical characteristics.

Material and Method

This was a retrospective study performed in a tertiary care, university-based hospital. We included all upper urinary tract stone patients who underwent stone removal surgery or passed the stone spontaneously from January 2015 to December 2018. Patient demographics and clinical data were collected, including age, gender, nationality, BMI, occupation, region of residence, comorbidities, clinical presentation, and stone removal operation. Stone characteristics were reviewed from imaging and included stone location, laterality, and configuration. Stone composition was determined using FTIR In short, the stone specimens derived from the patients were broken into small pieces by mortar, and the pure stone was analyzed by FTIR without potassium bromide (KBr). Stone composition was classified into 4 categories: calcium oxalate stone (calcium oxalate monohydrate - whewellite and calcium oxalate dihydrate - weddellite), phosphate - containing stone (calcium phosphate - brushite, calcium carbonate apatite - dahllite and magnesium ammonium phosphate - struvite), uric acid stone, and other stone types.

Data analysis was performed using Stata version 15.1 (College Station, TX, USA) and presented with median and interquartile range (IQR). Patient characteristics and clinical presentation were analyzed with the chi-square test for qualitative variables and the Kruskal Wallis test for quantitative variables. The association between clinical factors and stone composition was analyzed with logistic regression. Factors with p-value < 0.15 were subsequently included in a multivariate analysis model, and significance was indicated at p-value < 0.05.

Results

During the study period, 168 stone specimens from the upper urinary tract were collected. Males (58.3%) slightly predominated females (41.7%). The mean age was 56 years, and the most common age range of the patients was 45-55 years old (27.2%). Most patients were Thai (96.4%), with a small proportion of other nationalities, including Cambodian, Burmese, Guinean and Italian. Most of the Thais resided in the central region (79.6%), followed by the northern region (6.8%). Data of comorbidities revealed hypertension

in 47.6%, diabetes mellitus in 27.4%, dyslipidemia in 22%, chronic kidney disease in 11.3%, coronary artery disease in 3.6%, cerebrovascular disease in 3.6% and gout in 3% of all patients. According to univariate analysis, stone composition did not correlate to age group, nationality, region of residence or comorbidities. The details of patient characteristics and stone composition are presented in Table 1.

Table 1. Patient characteristics.

	Total (N=168)	Oxalate (N=94)	Phosphate (N=63)	Uric (N=8)	Others (N=3)	P-value
Median (IQR) Age in years	56 (48-66)	57 (49-66)	55 (48-68) (36.5-63.5)	53 (45-63)	48.5	0.58
Sex, N (%)						0.02
• Female	70 (41.7)	30 (31.9)	33 (52.4)	7 (87.5)	0 (0)	
• Male	98 (58.3)	64 (68.1)	30 (47.6)	1 (12.5)	3 (100)	
Race, N (%)						0.90
• Non-Thai	6 (3.6)	4 (4.3)	2 (3.2)	0 (0)	0 (0)	
• Thai	162 (96.4)	90 (95.7)	61 (96.8)	8 (100)	3 (100)	
Region of Thai patients, N (%)			0.23			
• Non central	33 (20.4)	15 (16.7)	15 (24.6)	2 (25)	1 (33.3)	
• Central	129 (79.6)	75 (83.3)	46 (75.4)	6 (75)	2 (66.7)	
Median (IQR) BMI (kg/m^2)	25.2 (22.6-28.1)	25 (22.5-27.4)	26.1 (23.9-29.7)	22.9 (22.9-22.9)	20 (18.5-21.5)	0.09
Body mass index group, N (%)						0.28
• < 25 kg/m^2	24 (51)	14 (50)	7 (29.1)	2 (8.3)	1 (4.2)	
• ≥ 25 kg/m^2	23 (49)	14 (50)	9 (39.1)	0 (0)	0 (0)	
Diabetes mellitus, N (%)	46 (27.4)	29 (30.9)	13 (20.6)	4 (50)	0 (0)	0.38
Hypertension, N (%)	80 (47.6)	48 (51.1)	27 (42.9)	5 (62.5)	2 (66.7)	0.30
Gout, N (%)	5 (3.0)	3 (3.2)	2 (3.2)	0 (0)	0 (0)	0.95
Dyslipidemia, N (%)	37 (22.0)	24 (25.5)	11 (17.5)	2 (25)	0 (0)	0.61
Coronary artery disease, N (%)	6 (3.6)	5 (5.3)	1 (1.6)	0 (0)	0 (0)	0.60
Cerebrovascular disease, N (%)	6 (3.6)	3 (3.2)	3 (4.5)	0 (0)	0 (0)	0.79
Chronic kidney disease, N (%)	19 (11.3)	9 (9.6)	8 (12.7)	2 (25)	0 (0)	0.37
History of urinary tract infection, N (%)	22 (13.1)	7 (7.4)	14 (22.2)	1 (12.5)	0 (0)	0.04
Visible stone from film plain KUB, N (%)	137 (81.5)	76 (80.9)	53 (84.1)	5 (62.5)	3 (100)	0.31

The most common clinical presentation was flank pain (48.8%), followed by incidental findings (23.2%), and gross hematuria (20.8%). Renal stones were found in 54.2% and ureteral stones were found in 45.8% of all cases. Stone removal procedures included ureteroscopy (URS, 45.8%), percutaneous nephrolithotomy (PCNL, 30.6%), shockwave lithotripsy (SWL, 6.9%), open stone surgery (4.2%) and nephrectomy (3.6%). Spontaneous stone passage, with or without medical expulsive therapy, was found in 7.7% of all patients. Clinical presentations and stone removal procedures are summarized in Table 2.

Table 2. Clinical presentation, stone characteristics, and operation performed for stone removal.

	Total (N=168)	Oxalate (N=94)	Phosphate (N=63)	Uric (N=8)	Cystine (N=3)	P-value
Presentation, N (%)						
• Flank pain	82 (48.8)	46 (48.9)	32 (50.8)	3 (37.5)	1 (33.3)	0.52
• Urinary tract infection	22 (13.1)	7 (7.4)	13 (20.6)	0 (0)	2 (66.7)	0.04
• Lower urinary tract symptoms	2 (1.2)	2 (2.1)	0 (0)	0 (0)	0 (0)	0.79
• Microscopic hematuria	5 (3.0)	2 (2.1)	2 (3.2)	0 (0)	1 (33.3)	0.40
• Gross hematuria	35 (20.8)	22 (23.4)	12 (19.0)	0 (0)	1 (33.3)	0.78
• Incidental finding	39 (23.2)	24 (25.5)	12 (19.0)	4 (50)	0 (0)	0.18
• Passing stone	14 (8.3)	7 (7.4)	6 (9.5)	1 (12.5)	0 (0)	0.38
Staghorn, N (%)	27 (16.1)	8 (8.5)	16 (25.4)	0 (0)	3 (100)	0.01
Location, N (%)			0.19			
• Renal calculi	91 (54.2)	46 (48.9)	37 (58.7)	5 (62.5)	3 (100)	
• Ureteral calculi	77 (45.8)	48 (51.1)	26 (41.3)	3 (37.5)	0 (0)	
Side, N (%)						0.10
• Left	87 (51.8)	53 (56.4)	32 (50.8)	2 (25)	0 (0)	
• Right	72 (42.9)	38 (40.4)	25 (39.7)	6 (75)	3 (100)	
• Unknown	7 (4.2)	2 (2.1)	5 (7.9)	0 (0)	0 (0)	
Operation, N (%)						0.63
• Percutaneous nephrolithotomy	53 (31.5)	26 (27.7)	22 (34.9)	2 (25)	3 (100)	
• Ureteroscopy with lithotripsy	77 (45.8)	47 (50)	25 (39.7)	5 (62.5)	0 (0)	
• Passing stone	13 (7.7)	10 (10.6)	3 (4.8)	0 (0)	0 (0)	
• Extracorporeal shock wave lithotripsy	12 (7.1)	5 (5.3)	6 (9.5)	1 (12.5)	0 (0)	
• Open stone surgery	7 (4.2)	6 (3.6)	4 (4.26)	2 (2.13)	3 (4.8)	
• Nephrectomy	4 (6.3)	0 (0)	0 (0)	0 (0)	0 (0)	

The main stone compositions were calcium oxalate monohydrate (whewellite 50.6%), calcium carbonate apatite (dahllite 32.7%), calcium oxalate dihydrate (weddellite 5.4%), magnesium ammonium phosphate (struvite 4.2%), and ammonium hydrogen urate (3.0%). A small proportion of uric acid (1.8%), cystine (1.8%) and calcium phosphate (brushite 0.6%) was also found. All data are presented in Table 3 and Figure 1.

Interestingly, calcium oxalate stones were significantly more common in males than females with an odds ratio of 2.28 (95% CI: 1.23-4.24; p-value= 0.01). This difference was still statistically significant from the multivariate analysis, controlling for the coronary artery disease factor (odds ratio=2.21, 95% CI: 1.91-4.12; p-value=0.01). Moreover, the incidence of phosphate-containing stones (struvite, dahllite and brushite) was more common in patients with a history of urinary tract infection (odds ratio=3.06, 95%CI: 1.18-7.92; p-value=0.02), after controlling for the gender factor in the multivariate analysis (Tables 5, 6).

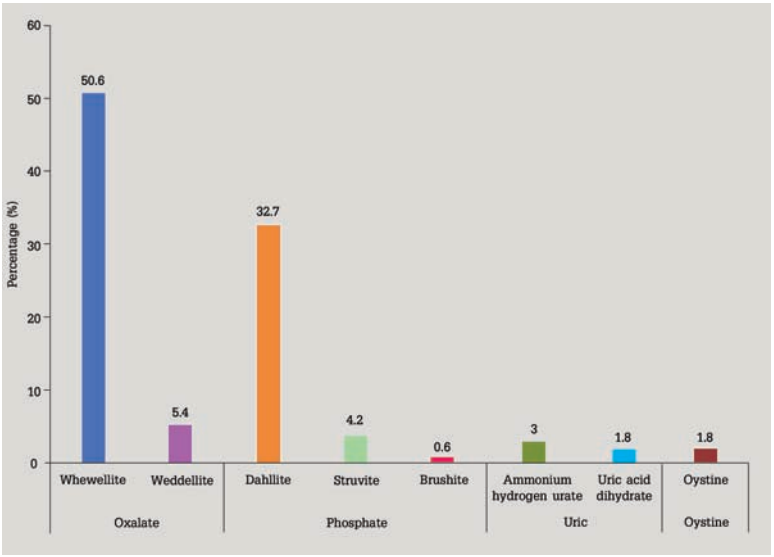

Figure 1.
Percentage of stone composition by group.

Table 3. Stone composition.

	N (Total 168)	%
Oxalate		
• Whewellite	85	50.6
• Weddellite	9	5.4
Phosphate		
• Dahllite	55	32.7
• Struvite	7	4.2
• Brushite	1	0.6
Uric		
• Ammonium hydrogen urate	5	3.0
• Uric acid dihydrate	3	1.8
Cystine		
• Cystine	3	1.8

Table 4. Age and incidence of stones.

Age group (years)	Total (N=168)	Oxalate (N=94)	Phosphate (N=63)	Uric (N=3)	Others (N=8)
<35	12 (7.1)	4 (4.3)	6 (9.5)	0 (0)	2 (25)
35-45	24 (14.3)	12 (12.8)	9 (14.3)	1 (33.3)	2 (25)
46-55	45 (26.8)	25 (26.6)	18 (28.6)	1 (33.3)	1 (12.5)
56-65	42 (25.0)	28 (29.8)	12 (19.0)	1 (33.3)	1 (12.5)
66-75	35 (20.8)	19 (20.2)	14 (22.2)	0 (0)	2 (25)
>75	10 (6.0)	6 (6.4)	4 (6.3)	0 (0)	0 (0)

Table 5. Factors associated with oxalate stone.

	Univariate		Multivariate	
	OR (95%CI)	P-value	aOR (95%CI)	P-value
Age in years				
• < 45	Ref			
• 46-55	1.55 (0.65-3.71)	0.33		
• 56-65	2.19 (0.89-5.38)	0.19		
• > 65	1.49 (0.62-3.58)	0.37		
Sex				
• Female	Ref		Ref	
• Male	2.28 (1.23-4.24)	0.01	2.21 (1.19-4.12)	0.01
Race				
• Non-Thai	Ref			
• Thai	0.6 (0.11-3.36)	0.56		
Region				
• Non-Central	Ref			
• Central	1.38 (0.68-2.79)	0.37		
Body mass index > 25kg/m^2	0.91 (0.29-2.82)	0.87		
Diabetes melitus	1.58 (0.79-3.15)	0.20		
Hypertension	1.2 (0.66-2.19)	0.55		
Gout	1.24 (0.2-7.61)	0.82		
Dyslipidemia	1.55 (0.74-3.24)	0.25		
Ischemic heart disease	4.28 (0.49-37.41)	0.14	3.61 (0.40-32.24)	0.25
Stroke	0.82 (0.16-4.16)	0.81		
Chronic kidney disease	0.71 (0.27-1.85)	0.49		

OR = Odds ratio; aOR = adjusted odds ratio; 95%CI = 95% confidence interval.

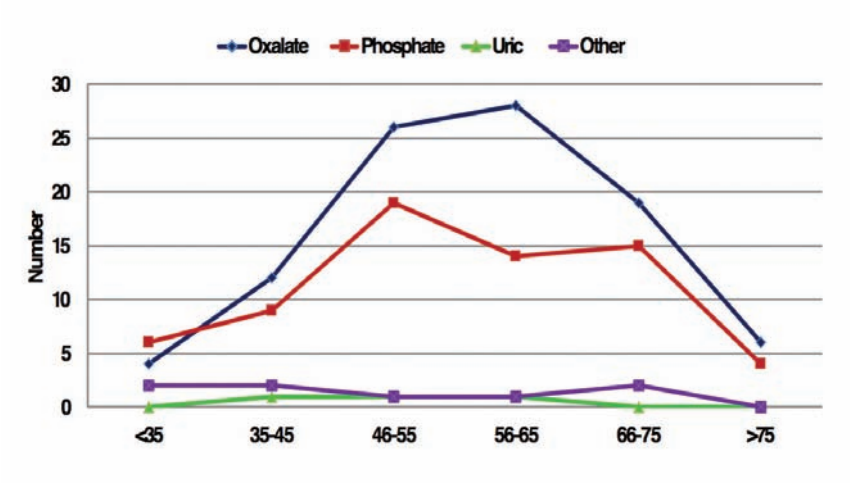

Figure 2.
Incidence of stones in different age groups.

Table 6. Factors associated with phosphate-containing stones.

	Univariate		Multivariate	
	OR (95%CI)	P-value	aOR (95%CI)	P-value
Age in years				
• < 45	Ref			
• 46-55	0.95 (0.39-2.3)	0.91		
• 56-65	0.65 (0.26-1.64)	0.36		
• >65	0.99 (0.41-2.39)	0.97		
Sex				
• Male	Ref		Ref	
• Female	1.81 (0.97-3.38)	0.06	1.48 (0.77-2.86)	0.23
Race				
• Non-Thai	Ref			
• Thai	1.27 (0.23-7.16)	0.78		
Region				
• Non-Central	Ref			
• Central	0.75 (0.37-1.54)	0.44		
Body mass index > 25 kg/m^2	1.91 (0.58-6.23)	0.28		
Diabetes Mellitus	0.53 (0.26-1.11)	0.19		
Hypertension	0.69 (0.37-1.28)	0.24		
Gout	1.06 (0.17-6.49)	0.95		
Dyslipidemia	0.67 (0.31-1.44)	0.31		
Ischemic heart disease	0.31 (0.03-2.68)	0.29		
Stroke	1.61 (0.32-8.22)	0.57		
Chronic kidney disease	1.17 (0.45-3.08)	0.75		
History of urinary tract infection	3.53 (1.41-8.88)	0.01	3.06 (1.18-7.92)	0.02

OR = Odds ratio; aOR = adjusted odds ratio; 95%CI = 95% confidence interval.

Discussion

The data of urinary stone composition in Thai patients are limited because the FTIR machine is available only in tertiary or university-based hospitals, and stone analysis is not commonly performed. Our institution, however, has a designated specialized stone clinic which has been routinely analyzing stone composition since January 2015. During a four-year study period, calcium oxalate and phosphate-containing stones were predominantly found in nephrolithiasis patients. This finding was similar to others. Tanthanuch et al. showed that calcium oxalate and phosphate-containing stones were predominant in southern Thai patients[9]. However, our study found a larger ratio of phosphate-containing stones (38%) compared to their study (19%). In contrast, the incidence of uric acid stones was less common in ours (5%) compared to the southern Thais (27%).

In addition, our study found that urinary stones were more common in males than females with a peak incidence between 45 and 55 years, which is similar to other studies. There was no correlation between the incidence of stone and region of residence, BMI, and patient comorbidities. However, this negative finding may have been caused by the relatively small number of patients included in this study and its single-institution research design.

Our study demonstrated that phosphate-containing stones were more common in patients with a history of urinary tract infection. Similarly, Holmgren et al. reported an association between phosphate-containing stones in patients and *E. coli* urinary tract infection, and between magnesium ammonium phosphate stones and Proteus infection10. Miano et al. hypothesized that these stone compositions were related to infections with urease-producing pathogens[11]. Urease hydrolyzes urea in the urine, and products of this reaction are ammonium ions and bicarbonate, which subsequently lead to urine alkalization and stone formation[11].

We also found a significant epidemiological correlation between the male gender and calcium oxalate stones. An earlier study showed that the amount of oxalate required to initiate crystallization was lower in healthy males than in females[12]. However, there are various factors involved in the pathogenesis of urinary stone formation. Further studies should be conducted in order to support this finding.

Conclusion

Calcium oxalate and phosphate-containing stones were the most common stone compositions found in this study. Male gender was associated with oxalate stones, and a history of urinary tract infection was associated with phosphate-containing stones. Further studies should be conducted to verify the findings on a larger scale.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Treatment of renal stones by standard percutaneous nephrolithotomy versus modified mini percutaneous nephrolithotomy in Yala Hospital: A comparative study

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Keywords:
Renal stone, percutaneous nephrolithotomy

Abstract

Objective: The aim of this study was to compare the postoperative outcomes of patients receiving standard percutaneous nephrolithotomy (S-PCNL) and modified mini percutaneous nephrolithotomy (MM-PCNL) in Yala Hospital.

Material and Method: We collected data from 117 patients who underwent S-PCNL or MM-PCNL from 2013-2018. We compared the data of patient characteristics, laboratory results, and postoperative outcomes, such as operative times, duration of catheter, blood transfusion rate, duration of hospitalization, stone free rate and complication rate between the S-PCNL and MM-PCNL groups.

Results: There were no significant differences in operative time, blood transfusion rate, stone free rate and complication rate between the 2 groups. However, the duration of catheter and hospitalization in the MM-PCNL group was significantly shorter than in the S-PCNL group.

Conclusion: Hence, we confirmed that MM-PCNL could be used as an alternative procedure to Mini-PCNL for the management of renal stones in other tertiary hospitals which already have the equipment for S-PCNL by modifying that equipment, as we have shown.

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Introduction

Renal stones are one of the most common urinary diseases found worldwide. In 2019, there were 55,957 Thai patients with renal stones[1]. Thus, it is a major condition and healthcare systems should be concerned. There are several ways to treat renal stones, such as open surgery, endoscopy, and percutaneous nephrolithotomy (PCNL)[2].

Since 1977, PCNL has gained popularity as a renal stone surgery by virtue of it being less invasive. Various PCNL techniques have been invented and the most important difference between them is the size of renal access, which leads to a variety of outcomes and complications. PCNL can be categorized into 4 main groups: Standard PCNL, Mini-PCNL, Ultra-Mini-PCNL and Micro-PCNL using the Amplatz sheath in the sizes of 24-30 Fr, 18-22 Fr, 11-13 Fr and 4.8 Fr, respectively[3] Despite numerous renal access sizes, it has been determined that the smaller sizes are safer during surgery[4].

Yala Hospital has been using Standard PCNL to treat renal stones since 1999, but when the Mini-PCNL was introduced, our team tried to put it into action. However, changing from Standard PCNL to Mini-PCNL leads to changes in all the equipment required for the surgery. Instead of buying new equipment, we attempted to modify what we already had by using the 22 Fr Amplatz sheath with the other equipment of Standard PCNL (S-PCNL), including nephroscope, to perform Mini-PCNL, which we call "Modified Mini-PCNL (MM-PCNL)".

The aim of this study was to evaluate and compare the effectiveness and advantages between S-PCNL and Modified MM-PCNL in terms of operative times, duration of catheter, blood transfusion needed, duration of hospitalization, and stone free rate.

Material and Method

The medical records of 127 patients, diagnosed with renal stones, who underwent standard S-PCN and MM-PCNL from 2013 to 2018 were reviewed retrospectively. Patients were excluded when their medical records, such as radiographic data or operative finding, were incomplete. Thus, this study was conducted on a total of 117 patients. The study was approved by the Institutional Ethics Committee of Yala Hospital.

Before the procedures were carried out, renal function, hemostasis, and radiographic finding of the kidney were evaluated. The surgeries were conducted under general anesthesia. In the supine position, a 6 Fr ureteral catheter was placed and contrast media was ejected. The patient was then turned prone; punctures were performed at the desired calyx under fluoroscopic guidance. All upper calyx accesses were performed below the 12th rib through the retroperitoneum during full expiration. A guide wire was inserted into the collecting system. For the Standard PCNL group, tract dilatation was performed using a telescopic metal dilator size 10 Fr to 30 Fr followed by the 30 Fr Amplatz sheath and the operation was performed with a standard 26 Fr nephroscope. The stone was disintegrated and removed via ultrasonic or pneumatic lithotripsy. At the end of the surgery, the collecting system was examined. A 20 Fr nephrostomy catheter was inserted and kept postoperatively till hematuria recovered. Postoperative chest x-ray was obtained in case of upper calyx access for the assessment of any pulmonary complications[5].

For the MM-PCNL group, the same procedure as S-PCNL was performed with some changes in tract dilatation and nephroscope. Tract dilatation was performed using a telescopic metal dilator size 10 Fr to 22 Fr followed by the 22 Fr Amplatz sheath and the operation was done with a standard 26 Fr nephroscope with outer sheath removal (Figure 1).

Statistical Analysis

Statistical analyses were conducted using program R. We used the independent sample t-test and the Mann-Whitney U test for comparison of

quantitative variables. Chi-square test and Fisher's exact test were used for qualitative variables. A P-value of less than 0.05 was considered statistically significant.

Results

A total of 127 patients were considered for inclusion in the study. Ten were excluded due to inadequate clinical data, leaving 117 patients.The patients were divided into 2 groups following their treatments: 63 patients in S-PCNL and 54 patients in MM-PCNL. Mean age of the patients was 56.87 ± 12.7 years; half (55.60%) were women. Mean stone size was 3.41 ± 1.61 cm. Stone size ranged from 1-8 cm.

The details of clinical and demographic characteristics of the patients are shown in Table 1. The 2 treatment groups were similar with regard to baseline characteristics, with the exception of stone position. The S-PCNL group had more staghorn stones (p=0.01) and puncture sites, in which upper pole punctures were obviously more frequent in the S-PCNL group (p<0.05).

There was no significant difference in operative time between the 2 groups (p=0.15). The blood transfusion rates were 12.70% and 5.56% in the S-PCNL and MM-PCNL groups, respectively. The stone free rate in the MM-PCNL was higher than in the S-PCNL with no significant statistical difference (p=0.35). The complication rate in the MM-PCNL group was lower than in the S-PCNL group with no significant statistical difference (p=0.19). However, the durations of catheter and hospitalization in the MM-PCNL group were significantly shorter than in the S-PCNL group (Table 2).

Discussion

Several studies have been conducted in order to compare S-PCNL and Mini-PCNL. Most have reported that Mini-PCNL was safer than S-PCNL, yet had equal efficacy rates in renal stone management[6-8]. Many studies have shown that M-PCNL had a significant advantage over standard PCNL, such as reduced hospital stay[10].

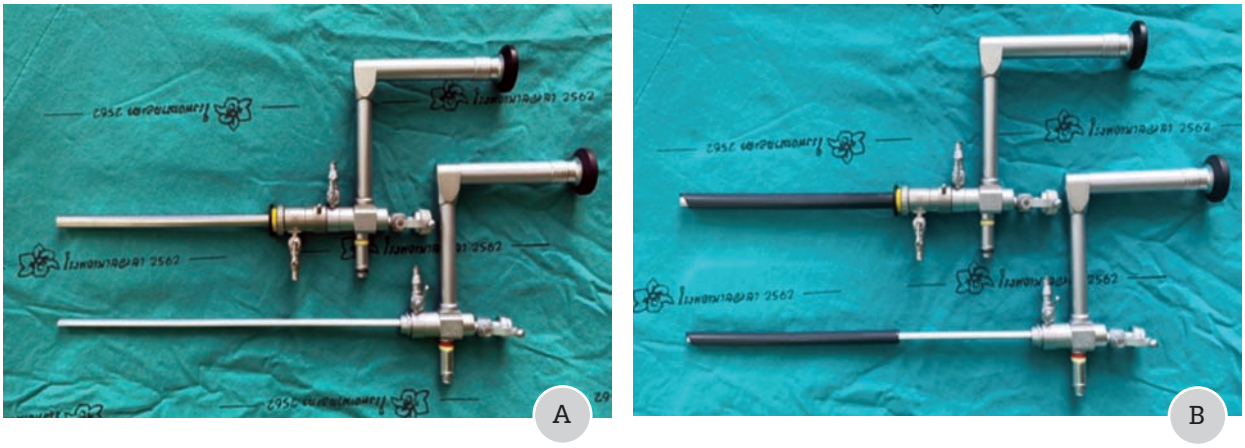

Figure 1. A. Standard 26 Fr nephroscope for S-PCNL technique (above) and standard 26 Fr nephroscope with an outer sheath removal for MM-PCNL (below).
B. S-PCNL nephroscope with 30 Fr Amplatz sheath (above) and MM-PCNL nephroscope with 22 Fr Amplatz sheath (below).

Table 1. Baseline characteristics of the standard percutaneous nephrolithotomy (S-PCNL) and modified mini percutaneous nephrolithotomy (MM-PCNL) groups.

	S-PCNL (N=63)	MM-PCNL (N=54)	P-value
Sex			0.35
Male	31 (49.21)	21 (38.89)	
Female	32 (50.79)	33 (61.11)	
Age (years)	56.67 ± 11.60	57.11 ± 13.98	0.85
Hematocrit level (%)	39.10 ± 4.93	38.68 ± 4.88	0.65
Creatinine level (mg/dl)	1 (0.80,1.20)	1 (0.80,1.21)	0.87
Hydronephrosis			0.33
Nil	3 (4.76)	0 (0.00)	
Mild	22 (34.92)	24 (44.44)	
Moderate	29 (46.03)	25 (46.30)	
Severe	9 (14.29)	5 (9.26)	
Stone size (cm)	3 (2.20,4.68)	2.75 (2.00,4.85)	0.48
Stone side			1.00
Left	28 (44.44)	24 (44.44)	
Right	35 (55.56)	30 (55.56)	
Stone number			0.43
Single	44 (69.84)	33 (61.11)	
Multiple	19 (30.16)	21 (38.89)	
Stone position			0.01
Upper	0 (0.00)	1 (1.85)	
Middle	1 (1.59)	1 (1.85)	
Pelvic	26 (41.27)	23 (42.59)	
Lower	9 (14.28)	9 (16.67)	
Staghorn	27 (42.86)	19 (35.19)	
Multiple	0 (0.00)	1 (1.85)	
Puncture site			<0.05
Upper pole	18 (28.57)	4 (7.41)	
Middle pole	12 (19.05)	6 (11.11)	
Lower pole	32 (50.79)	43 (79.63)	
>1 site	1 (1.59)	1 (1.85)	

Table 2. Treatment outcomes compared between standard percutaneous nephrolithotomy (S-PCNL) and modified mini percutaneous nephrolithotomy (MM-PCNL).

Variables	S-PCNL	MM-PCNL	P-value
Operative times (minutes)	120 (97.50,147.50)	120 (81.25,140.25)	0.15
Duration of catheter (days)	4 (3,4)	4 (4,4)	0.03
Blood transfusion rate (%)	8 (12.70)	3 (5.56)	0.32
Duration of hospitalization (days)	8 (6.5,9)	7 (6,8)	<0.05
Stone free rate (%)	47 (74.60)	45 (83.33)	0.35
Complication rate (%)	18 (28.57)	9 (16.67)	0.19

In this study, we evaluated the postoperative outcomes of patients receiving S-PCNL and MM-PCNL. There were no statistical significant differences in total operative time, blood transfusion rate, stone free rate and complication rate between S-PCNL and MM-PCNL, which is similar to a result from the study by Thapa et al[6], whose meta-analysis compared S-PCNL and mini-PCNL. However, the duration of catheter and duration of hospitalization in the MM-PCNL group were significantly shorter than in the S-PCNL group. These results are supported by Kader et al and Yun et al, which reported that duration of hospitalization could be reduced by applying a small diameter catheter[10,11].

The overall stone free rate of renal stone patients in Yala Hospital was 78.60%. In our study, 74.60% of patients in the S-PCNL group were stone free. Compared with other studies, a 54.80% stone free rate in Thailand (S-PCNL) was reported in a study by Ketsuwan et al (2019)[12]. In Korea, the stone free rate was 73.33% (S-PCNL)[10]. On the other hand, we reported an 83.33% stone free rate in patients in the MM-PCNL group. Comparing our results with Mini-PCNL by other authors, our result showed the same trend as the study by Güler et al (SFR=76.5%)[13].

Overall complications did not differ between mini-PCNL and S-PCNL[6]. The same result was found in this study. We reported bleeding and ureteric obstruction from stone migration as major intraoperative and postoperative complications in our study, respectively. However, we found that the complication rate in MM-PCNL was less than in S-PCNL (16.67% vs 28.57%). Furthermore, we did not find embolization, which is considered a severe complication in any MM-PCNL case.

Conclusion

The results of the present study showed that MM-PCNL procedures did not differ greatly from S-PCNL in effectiveness and safety. However, MM-PCNL might be superior in terms of reducing hospital stay and complications, while it did not lengthen operative times. Hence, we confirmed that MM-PCNL could be used as an alternative procedure to Mini-PCNL for the management of renal stones in other tertiary hospitals which already have the equipment for S-PCNL by modifying that equipment, as we have shown.

Conflict of interest

The author declares no conflict of interest.

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Original Article

The impact of surgical experience on outcomes of retrograde intrarenal surgery for kidney stones

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Keywords:
retrograde intrarenal surgery,
kidney stone,
surgical experience

Abstract

Objective: To evaluate the impact of surgical experience on the outcomes of retrograde intrarenal surgery (RIRS) to treat kidney stones.

Material and Method: Retrospective chart review of patients who underwent RIRS between November 1st, 2014 and January 11th, 2017; the outcomes were divided into 2 groups. Group 1 was the less experienced surgeons (fewer than 30 cases for each surgeon) whereas group 2 was the highly experienced surgeon (more than 300 cases). The surgical outcomes, including operative time, stone-free rates, complications and scope damage, were compared between the 2 groups.

Results: There were 6 surgeons in group 1 and a single surgeon in group 2. Seventy-four procedures were performed by group 1. Group 2 included the first 30 procedures after the surgeon had passed the learning curve. Patient demographic data, including age, sex and location of the stone, were not different between group 1 and group 2. Group 1 had a smaller stone size than group 2 (1.59 cm vs. 2.34 cm; p=0.006). The outcomes of group 2 were better than group 1, including operative time (80.48 minutes vs. 43.50 minutes; p<0.001) and stone-free rates (52.05% vs. 90%; p<0.001). Serious complications were determined to be sepsis or a high degree of ureter injury that required surgical correction. Sepsis occurred in 6 patients in group 1 (8.10%), whereas no sepsis was found in group 2 (p=0.013). There was no high degree of ureteric injury in either group. Three scopes were damaged in group 1 whereas no scope damage occurred in group 2 (p=0.045).

Conclusion: RIRS is a popular procedure for the treatment of kidney stones. Surgical experience is mandatory to achieve excellent outcomes.

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Introduction

Nowadays, retrograde intrarenal surgery (RIRS) is a popular treatment for kidney stones. It is a less invasive procedure compared with percutaneous nephrolithotomy (PCNL). However, due to the small instruments, RIRS is not as suitable for large kidney stones as PCNL, but it is still useful in selected cases[1]. Other disadvantages of this procedure are the ureteroscopes can be easily damaged and the high cost of the instruments. Furthermore, the procedure requires a steep learning curve. Berardinelli et al. reported that surgical experience (<100 procedures vs. >400 procedures) had an impact on operative time and complications. However, there was no significance in stone-free rates (SFR) and no data about damage to the ureteroscope[2]. Therefore, this study was conducted in order to evaluate the impact of surgical experience in our center on the outcomes of RIRS for the treatment of kidney stones in terms of patient outcomes and instrument breakage.

Material and Method

Patient Data

This was a retrospective study; patient charts were reviewed. The study was approved by Siriraj SIRB No 118/2560 (EC2). Patients aged 18 years and older who underwent RIRS for kidney stone at Siriraj Hospital between November 1st, 2014 and January 11th, 2017 were included in the study. Patients who were stented without an operation or pregnant, and had undergone simultaneous bilateral ureterorenoscopy were excluded. There were 6 surgeons in group 1, and these surgeons had little experience for RIRS (fewer than 30 cases for each surgeon). In group 2, there was a single surgeon with significant experience for this procedure (more than 300 cases).

Surgical Steps for RIRS

Intravenous antibiotic was given 30-60 minutes before the administration of general anesthesia. The patient was positioned in the dorsal lithotomy position. Careful cystoscopy was performed. Ureteric orifice was examined. Safety guidewire was inserted under the fluoroscopy. Double lumen catheter was passed over the safety guidewire (0.038-in PTFE-Nitinol guidewire with hydrophilic tip, Boston Scientific, Natik, MA, USA) using a railroad technique, then stiffwire (Cook Medical, Bloomington, IN, USA) was placed in order to facilitate insertion of a ureteral access sheath in all cases. An appropriate ureteral access sheath (diameter 11/13 F or 12/14 F and length 36 cm or 46 cm, Cook Medical, Bloomington, IN, USA) was chosen and deployed just below the ureteropelvic junction. Patients with ureteric stricture or narrow ureter were stented for 2 to 4 weeks before the procedure.

A flexible ureteroscope (URF-V model, Olympus Europe, Germany) was passed through the sheath. A systematic inspection of the pelvicalyceal system to reach the targeted stones was performed using pressurized saline irrigation. For lower pole stones, we used a zero-tipped nitinol basket (Cook Medical, Bloomington, IN, USA) and relocated stones into the more accessible calyx. For Holmium laser lithotripsy (VersaPulse, LumenisTM, Santa Clara, CA, USA): dusting effect using a high frequency and low power setting was applied for the stone surface; fragmenting effect using a low frequency and high power setting was applied for lithotripsy of the stone core. At the end of the procedure, ureteral access sheath was withdrawn gradually along with ureteroscope. The ureter was examined for degree of injury and classified as low grade (mucosal petechiae or erosion) or high grade (smooth muscle injury, perforation or ureteral avulsion)[3]. A double J ureteral stent 6 or 7 F was placed according to the degree of injury and surgeon preference.

Outcome Measurements

Patient demographic data, including age, sex, stone size, and stone site, were collected. The surgical outcomes were operative time, SFR, complications, and scope damage. Stone size and location were evaluated using the preoperatively existing plain film,

ultrasonography or computed tomography scan of the urinary system, and measured by the longest diameter. Operative time was calculated from insertion of the endoscope into the urethra till the completion of the operation. Stone-free status was determined as absence or having residual stone fragments less than 4 mm in diameter using plain film or ultrasonography evaluated at 1 month after the procedure.

Significant complication was determined according to the modified Clavien-Dindo classification grade II to IV[4]. For example, the septic complication which required prolonged intravenous antibiotic was defined as grade II; high degree of ureteral injury which required another surgical intervention was defined as grade III. Low degree of ureteral injury, that which did not require surgical intervention, was not included in the significant complications. Scope damage was defined as the need for repair. Scopes were inspected and tested for leakage after every procedure, and thus this can establish which procedure damaged the scope. These outcomes were collected and compared between the 2 groups.

Statistical Analysis

To assess the surgical outcomes, Berardinelli et al. reported that there was no significant difference of SFR between the low and high experienced groups; thus, the sample size calculation was based on the difference in operative time between the 2 groups (76.3 ± 35.6 minutes vs. 53.1 ± 26.5minutes)[2], with a 2-sided level of significance of 0.05, power of 90% and the ratio 2:1. Expecting group 1 to include 53 procedures and 27 procedures for group 2, we initially planned to include all 74 procedures performed by the surgeons in group 1 during that period; each surgeon performed RIRS ranging from 7-25 procedures and the first 30 procedures in group 2 after the surgeon has passed the learning curve.

Statistical analysis was conducted using SPSS Statistics for Windows, version 16.0 (SPSS Inc., Chicago, Ill., USA). For patient demographic data: categorical variables were presented in frequencies and percentages and continuous variables were presented in mean and range. Characteristics: surgical outcomes and complications were compared using the Chi-squared for categorical data and t-test for continuous data. Statistical significance was set at a p-value less than 0.05.

Result

Patient demographic data, including age, sex, and location of the stone (lower calyx), were not different between group 1 and group 2; see Table 1. Group 1 had a smaller stone size than group 2 (1.59 cm vs. 2.34 cm; p=0.006). The outcomes of group 2 were better than group 1, including operative time (group 1=80.48 minutes vs. group 2=43.50 minutes; p<0.001) and the stone-free rate (group 1=52.05% vs. group 2=90%; p<0.001). The serious complication was sepsis. There was no major degree of ureteral injury. Sepsis occurred in 6 patients in group 1 (8.10%) while no sepsis was found in group 2 (p=0.013). There were 3 scopes damaged in group 1 while no scope damage occurred in group 2 (p=0.045); see Table 2.

Table 1. Patient demographic data and stone characteristics

Variable	Group 1 (n=74)	Group 2 (n=30)	p-value
Sex (Male: Female)	30: 44	13: 17	
Age (year, mean; min-max)	(57.9; 26-84)	(59.9; 40-89)	0.465
Stone size (cm, mean)	1.59	2.34	0.006
Stone site (% of lower calyx)	43.24%	36.66%	0.542

Table 2. Surgical outcomes and complications

Variable	Group 1	Group 2	p-value
Time (minutes)	80.48	43.50	<0.001
Stone-free rates (%)	52.05	90.00	<0.001
Complication (%)	8.10	0	0.013
Scope damage (number of repair)	3	0	0.045

Discussion

This study revealed the impact of surgical experience on the outcomes of RIRS for the treatment of kidney stones. There was a difference in many parameters in the outcomes between the 2 groups of surgeons. Operative time of the surgeon who had high experience (group 2) was shorter than in the group of surgeons who had low experience (group 1), even though the stone size in group 2 was larger (2.34 cm vs. 1.51 cm; p=0.006). According to the procedure, there were two major steps that could affect the operative time: Orientation of endoscopy to find the targeted stones, and using the laser to do lithotripsy. In the low experience group, more time was needed to do the orientation inside the kidney. A shorter time will be achieved after doing more cases, especially for access to the lower calyx.

Laser lithotripsy is mandatory for the procedure and the laser setting for each type of stone is usually important. To have the appropriate laser setting for each situation requires more experience. There were various laser settings in this study; however, the group 2 surgeon used 0.5 Joules and 20 Hertz for soft stones and 1 Joules and 20 Hertz for hard stones. Stone-free status is a goal for stone treatment. There was higher SFR in group 2 than group1, with statistical significance (90% vs. 52.05%; p<0.001). To have high SFR requires good skill in order to access all the calices after doing lithotripsy. The irrigating fluid usually makes the fragments migrate into other calices while doing laser lithotripsy. Therefore, access to all calices after that is essential in order to determine whether there are any large residual fragments remaining in any of the calyx.

Complications in this procedure were not uncommon, but serious ones seldom occurred[5,6]. This study did not have a high grade of ureteral injury, according to the surgeons. However, a low grade of ureteral injury that could be managed with a retaining ureteral stent was reported by some surgeons. Therefore, low-grade ureteral injury was not included in the significant complications. Sepsis was the most serious complication in the study. Operative time is one of the risk factors for sepsis. Prolonged duration of the procedure enhanced absorption of the irrigating fluid and infective substance[7]. Thus less operative time may have less sepsis.

The most interesting issue for RIRS is the expensive and delicate instruments required, especially the flexible ureteroscope. For the low experience surgeons, 3 scopes were broken in 74 procedures. This was calculated to 24.6 procedures for repair. In group 2, the surgeon could use the scope for 30 procedures without repair. However, this study could not reveal how many procedures could be performed for one repair in group 2.

Berardinelli et al. reported surgical experience can affect the operative time and complications[2], while it had similar SFR. Low surgical experience in their study was defined as a surgeon who had less than 100 cases of RIRS, while in our study it was defined

as less than 30 cases. The limitation of our study is that no matched pair analysis on stone size was conducted. Nonetheless, compared to their study, our study had less SFR in the group with low experience (52.05% vs. 70%), but higher SFR in the group with high surgical experience (90% vs. 77.9%), even though the stone size was significantly larger. Finally, further studies should be conducted in order to address how many procedures are necessary to reach the plateau in terms of stable outcomes.

Conclusion

RIRS is a popular procedure for the treatment of kidney stones. Surgical experience is mandatory to achieve excellent outcomes.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Prophylactic ureteric catheterization before pelvic surgery in Rajavithi Hospital

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Keywords:
Ureteric catheterization, pelvic surgery

Abstract

Objective: To evaluate the incidence and the correlation between the risk factors of ureteric injury and complications in patients who underwent prophylactic ureteric catheterization before pelvic surgeries.

Material and Method: From October 2015 to December 2018, the medical records of 130 patients in Rajavithi Hospital who underwent pelvic surgeries and prophylactic ureteric catheterization were retrospectively reviewed. Information included age, history of previous pelvic surgeries, pelvic radiation, presence of hydronephrosis, pathology, stage of cancer, injury of ureters, and complications.

Results: Incidence of ureteric injury was 4.6% (n=6). The significant risk of injury was location of the tumor at the ovary (p=0.034); borderline significant risk was malignant pathology (p=0.057). After the procedure, 16.2% (n=21) of the patients had gross hematuria and 14.6% (n=19) of the patients had a urinary tract infection. Average time of catheterization was 20.95 minutes. Significant risk of gross hematuria was older age (p<0.001) and malignant pathology (p=0.006).

Conclusion: From this study, ureteric injury may be significantly higher in cases of malignancy at the ovary and may not prevent injury in high-risk patients. Ureteric catheterization should be carefully considered in elderly patients because of the higher rate of complications.

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Introduction

Surgical injury to the ureter is an uncommon but potentially serious complication of pelvic surgeries. Unrecognized ureteral injuries may cause prolonged postoperative morbidity, such as fistula formation, sepsis, or renal loss. Gynecologic and colorectal procedures account for most of these injuries[1,2]. The incidence of ureteral injury during gynecologic surgery ranges from 0.1-2.5%[3-6] and 0.2-4.5%[7] for colorectal surgery.

The uses of prophylactic ureteric stents or catheter placement are controversial for preventing ureteric injury. Occasionally, prophylactic ureteric catheters are associated with significant complications, such as hematuria, reflux anuria, urinary tract infection. The procedure also consumes more time, instruments, and costs more.

The aim of this study was to find the incidence of ureteric injury in patients who underwent prophylactic ureteric catheterization before pelvic surgeries. Secondary outcomes were the correlations between the risk factors of ureteric injury and complications.

Material and Method

Data were collected by reviewing the medical records of patients who underwent prophylactic ureteric catherization before pelvic surgery by a gynecologist and colorectal surgeon from October 2015 to December 2018 in Rajavithi Hospital.

On all patients a cystoscopy was used with 19 Fr outer sheath and 30 degree angulation telescope. After filling the bladder with normal saline, 5 Fr open end ureteric catheter was inserted into bilateral ureteric orifices gently at a 25 cm depth from the orifices or less if it could not advance more (Figure 1). For difficult cases, hydrophilic guide wire was used to help with the advancement of the ureteric catheter. After ureteric catheter insertion was complete, the patients were transferred to the operative room within 1 hour before starting the operation.

A total of 140 medical records were collected; 10 were excluded due to being incomplete. Thus, 130 medical records were retrospectively reviewed for demographic data, which included age, history of previous pelvic surgery, pelvic radiation, presence of hydronephrosis, pathology, stage of the cancer, incidence of ureteric injuries, treatments, and complications of ureteric catheterization.

Statistical analysis was performed using SPSS version 17. Comparison of categorical data was performed by Chi-square test with $p<0.05$ considered as significant.

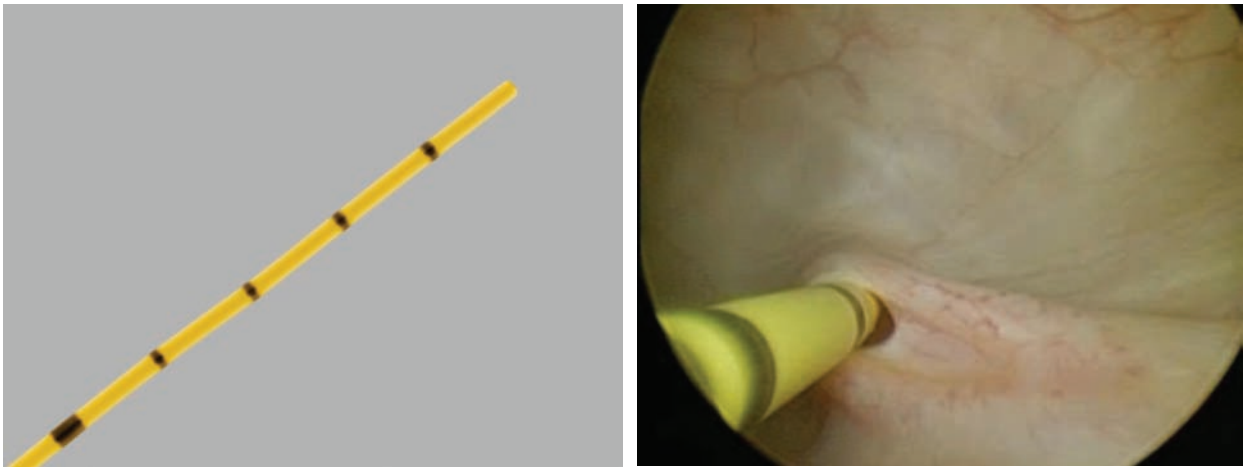

Figure 1. Insertion of 5 Fr open end ureteric catheter into both ureteric orifices at 25 cm depth.

Results

A total of 130 medical records were reviewed. Patient characteristics are shown in Table 1. The mean age of patients was 48.25 years. Most patients were females (94.6%) from the gynecologic department. Most of the patients had hydronephrosis before the surgery (61.5%); 6.2% of patients had a history of pelvic radiation and 30% had prior pelvic surgery. Pathology was benign in 56.2% and malignant in 43.8%. Mean time of ureteric catheterization was 20.95 minutes. There were 6 (4.6%) patients who had ureteric injury. All of the injuries were detected intraoperatively. Two patients had reimplantation with psoas hitch, and 2 patients had reimplantation; 1 patient had a simple repair and 1 patient had a uretero-ureterostomy.

Two patients with ureteric injury had ovarian disease (Figure 3), with a significant correlation between injury (p=0.034). Correlation between the pathology and injury were shown nearly significant risk in the malignancy group (p=0.057) (Figure 2).

Correlation between patient characteristics and complications are shown in Table 3 and 4. Significant risk of UTI was advanced age (p<0.001) and malignant disease (p=0.006).

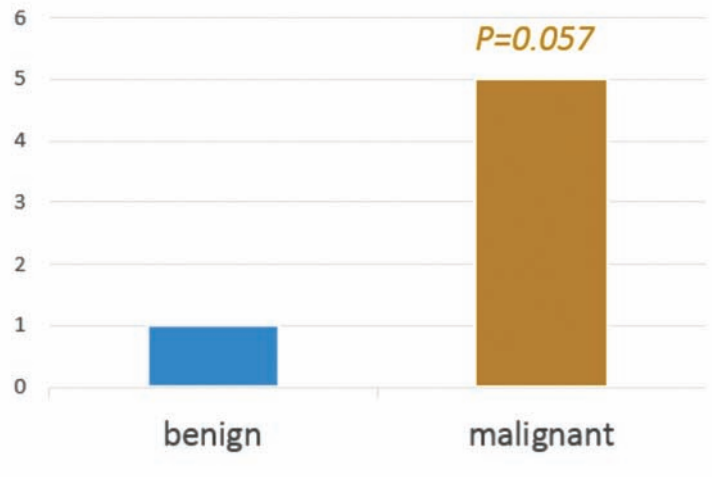

Figure 2.
Correlation between pathology and injury.

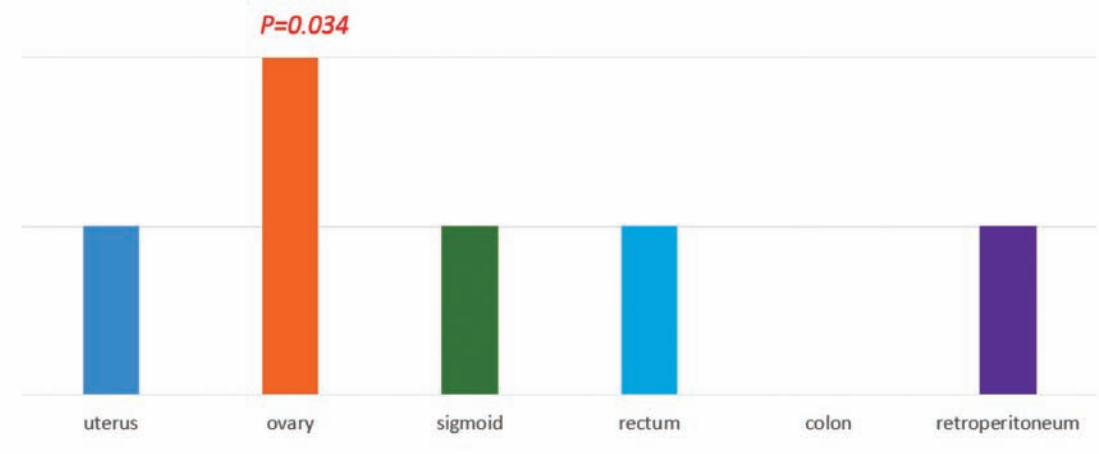

Figure 3. Correlation between disease location and injury.

Table 1. Patient characteristics.

Characteristics	Number of patients/Percent (%)
Age (mean ± SD)	48.25 ± 12.9
Sex	
Male	7 (5.4%)
Female	123 (94.6%)
Pelvic radiation	8 (6.2%)
Previous pelvic surgery	39 (30%)
Hydronephrosis	80 (61.5%)
Pathology	
Benign	73 (56.2%)
Malignant	57 (43.8%)
Time (minutes)	20.95 ± 5.56
Number of stent	
Bilateral	101 (77.7%)
Unilateral	28 (21.5%)
Fail bilateral	1 (0.8%)
Ureter injury	6 (4.6%)
Complication	
Hematuria	21 (16.2%)
Urinary tract infection	19 (14.6%)
Anuria	0
Hematuria and urinary tract infection	5 (3.8%)

Table 2. Correlation between patient characteristics and injury.

Characteristics	No injury	Injury	P-value
Mean age (years)	48.02	53.00	0.358
Pelvic radiation	7 (5.6%)	1 (16.7%)	0.322
Previous pelvic surgery	35 (28.2%)	4 (66.7%)	0.066
Hydronephrosis	75 (60.5%)	5 (83.3%)	0.252

Table 3. Correlation between patient characteristics and hematuria.

Characteristics		No hematuria	Hematuria	P-value
Mean age (years)		47.40	52.67	0.087
Radiation		7 (6.4%)	1 (4.8%)	0.619
Pelvic surgery		34 (31.2%)	5 (23.8%)	0.609
Hydronephrosis		66 (60.6%)	14 (66.7%)	0.635
Pathology	Benign	60 (55.0%)	13 (61.9%)	
	Malignant	49 (45.0%)	8 (38.1%)	0.636
Time (minutes)		20.63	22.57	1.816
Number of Catheter	1	25 (22.9%)	3 (14.3%)	
	2	83 (76.1%)	18 (85.7%)	0.634
	0	1 (0.9%)	0	

Table 4. Correlation between patient characteristics and urinary tract infection.

Characteristics		No urinary tract infection	Urinary tract infection	P-value
Mean age (years)		46.63	57.74	<0.001
Radiation		6 (5.4%)	2 (10.5%)	0.331
Pelvic surgery		36 (32.4%)	3 (15.8%)	0.128
Hydronephrosis		67 (60.4%)	13 (68.4%)	0.614
Pathology	Benign	68 (61.3%)	5 (26.3%)	
	Malignant	43 (38.7%)	14 (73.7%)	0.006
Time (minutes)		20.74	22.16	0.306
Number of Catheter	1	24 (21.6%)	4 (21.1%)	
	2	86 (77.5%)	15 (78.9%)	1.000
	0	1 (0.9%)	0	

Discussion

The incidence of ureteric injury during gynecologic and colorectal surgeries ranges from 0.1-4.5%[1-7]. The uses of prophylactic ureteric stents or catheter placement are controversial for preventing ureteric injury. Preoperative ureteric stenting can be used to ease the identification of the ureter in high-risk cases. However, published data in gynecologic and colectomy populations show that it may increase intraoperative recognition of ureteric injuries, but may not actually decrease ureteric injuries[8-10]. One study showed that stents might even increase rather than reduce the chance for intraoperative injury[1].

In a study by Jeong Hyun Park[11] on ureteral injury in gynecologic surgery, it was reported that a laparoscopic case was 1.1% similar to laparotomy (1.2%).

Increasing the rate of injury in high-risk conditions (2.7%) included endometriosis, retroperitoneal fibrosis, pelvic inflammatory disease with direct tumor invasion, previous pelvic surgery, broad ligament fibroids, history of pelvic radiation, and congenital abnormalities. In high-risk patients, the stenting group had a lower rate of ureteric injury than the non-stenting group. Peter Andersen[12] reported that the risk of ureteric injury in colorectal cancer surgery was higher in laparoscopic surgery. Age, gender, preoperative chemo-radiation, previous pelvic surgery, and tumor stage did not increase the rate of injury.

Ureteric catheterization sometimes might not be successful. A stent cannot be placed on one side in 13% of cases and failure bilaterally can occur in 2%[9]. Ureteric stent placement also reported complications. Fadi Chahin[13] reported the complication rate of ureteric stent placement in patients who underwent colorectal surgery: Hematuria 98.4%, Anuria 6.1%, UTI 6.1%. Unilateral stenting had a lower complication rate than bilateral.

In this study, the incidence of ureteric injury was 4.6%. There was a significant risk of injury when the location of the tumor was at the ovary. Nearly significant risk was malignant pathology and previous pelvic surgery. There was a significant risk of urinary tract infection when the patient was older and had a malignant pathology; advanced age may increase the risk of hematuria. For nearly significant parameters may significant if more sample size.

Limitations of this study are its retrospective nature, and its nonrandomized and small sample size. Any further studies should be randomized with an increased sample size in order to reduce any confounding factors.

Conclusion

From this study, ureteric injury was higher in cases located at the ovary, and may have been higher in cases of malignancy and previous pelvic surgery. Preoperative ureteric catheterization may not prevent injury in high-risk patients, and should be carefully considered in elderly patients because of its higher rate of complications.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Extended 14-core schematic diagram mapping prostate biopsy increases both the cancer detection rate and the accuracy of Gleason Score

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Keywords:
Extended 14-core schematic diagram mapping, prostate biopsy increases, cancer detection rate

Abstract

Objective: To evaluate the effectiveness of extended 14-core schematic diagram mapping prostate biopsy for improving the cancer detection rate (CDR) and accuracy of Gleason score.

Material and Method: This study included 184 patients who underwent transrectal ultrasound (TRUS)-guided lateral sextant biopsy (group I) and 196 patients who underwent extended 14-core biopsy (group II). Inclusion criteria for prostate biopsy were elevated serum prostate-specific antigen (PSA) levels (>4.0 ng/ml) and/or suspicious digital rectal examination (DRE).

Results: Median patient age was 69.68 years (±7.89) and 70.07 years (±8.83) for group I and II, respectively. Median pre-biopsy PSA was 18.04 (range: 8.42-22.35) and 15.83 ng/ml (range: 6.54-21.72) for group I and II. Out of the first group, 65 (35.3%) patients had prostate cancer, whereas 78 (40.0%) patients of group II had cancers. The overall cancer detection rate was significantly higher in group II (40.0%) than group I (35.3%), p=0.034, and in particular showed a significant increase in the cancer detection rate in the subgroup with PSA level between 4-10 ng/ml. Moreover, rising Gleason sum after radical prostatectomy was 1 in 3 (11.1%) patients and 2 in 1 (3.7%) patient.

Conclusion: Extended 14-core schematic diagram mapping prostate biopsy significantly increased the cancer detection rate of prostate cancer and increased the accuracy of biopsy Gleason score. Thus, schematic diagram mapping prostate biopsy should be the standard ultrasound guided prostate biopsy in our institute for increasing the cancer detection rate and also for planning treatments.

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Introduction

Extensive use of the prostate-specific antigen (PSA) and transrectal ultrasound (TRUS) - needle biopsy suggests a greatly increased detection rate of early prostate cancer[1,2]. The extended TRUS prostate biopsy technique has become the gold standard method for diagnosing prostate cancer. Generally, traditional prostate biopsy specimens were reported as left or right lobe prostate cancer, even if all the pieces were pathologically studied[3]. Additionally, for some prostate cancer treatment, such as cryoablation and high intensity focal ultrasound (HIFU), schematic diagram mapping prostate biopsy is particularly needed and useful before treatment[4]. Schematic diagram mapping biopsy in which all the pieces are labeled would remind urologists about sampling through the whole prostate gland, and the specimens could be reported separately. Recently, there have been several reports showing that sextant biopsies cannot detect meaningful cancer[3-5] and more cores would improve the detection rate. Gleason sum is an important predictor of the outcome of treatment for prostate cancer[6]. Therefore, the grade must help determine the right treatment. However, the accuracy of Gleason sum received from the prostate biopsy is poorly correlated with the Gleason sum of radical prostatectomy[7]. Recently, it was reported that expanded needle biopsy can improve consistency with the Gleason sum obtained from radical prostatectomy[8,9].

In this study, we evaluated the effectiveness of extended 14-core schematic diagram mapping prostate biopsy in order to determine whether it improves the cancer detection rate (CDR) and accuracy of Gleason score.

Material and Method

This study was conducted on 2 groups of patients suspected of having prostate cancer who underwent transrectal ultrasound guided biopsy. The first group included 184 patients who underwent laterally directed prostate biopsy between January 2015 and October 2016. The second group included 196 patients who underwent extended 14-core schematic diagram mapping prostate biopsy between November 2016 and February 2018. Inclusion criteria for biopsy were elevated serum PSA (above 4.0 ng/ml) and/or suspicious DRE. None of our patients who had been previously exposed to TRUS-biopsy were included in the study. PSA was measured by the Chemiluminescence Technique (DPC, NJ, USA) using Immulite Autoanalyser. All the specimens were processed within 3 hours of collection and assayed within 12 hours.

Previously, in accordance with the standard biopsy procedure of Vajira Hospital, most physicians would cut for needle cores of 12 pieces, then separate the left and right sides by 6 pieces each. Later, the physician would be able to choose the side of the nerve sparing in the case of only one cancer. However, nowadays the number of cuts has been increased to 14 specimens. In cases in which abnormal nodule was detected by rectal digital examination or some hypoechoic lesions were found by ultrasound, those lesions would be added to the extended pieces (e.g., No.15, No.16).

In addition, the randomization of the pieces is also done in a pattern to get all the pieces distributed throughout the whole prostate gland, as shown Figure 1.

All prostate specimens were examined through referral. The uro-pathologist (M.K.) was blinded to the cases. The chi-square test (x^2-test) was used for comparisons between qualitative variables. Fisher's exact test was used for comparing the 2 qualitative variables whenever the chi-square test was not appropriate (if the expected value of 25% of the cell was less than 5); $p<0.05$ was considered statistically significant.

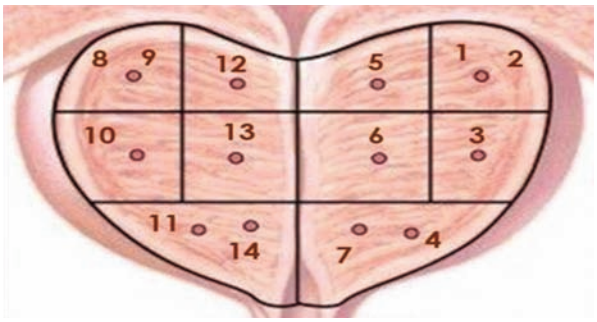

Figure 1. Extended 14-core Prostate biopsy pattern.

1. Left lateral base
2. Left lateral base
3. Left lateral mid
4. Left apex
5. Left middle base
6. Left middle mid
7. Left apex
8. Right lateral base
9. Right lateral base
10. Right lateral mid
11. Right apex
12. Right middle base
13. Right middle mid
14. Right apex
15. Suspected nodule

Results

Median patient age was 69.68 years (±7.89) and 70.07 years (±8.83) for group I and II, respectively. Median pre-biopsy PSA was 18.04 (range: 8.42-22.35) and 15.83 ng/ ml (range: 6.54-21.72) for group I and II, respectively; see Table 1. Out of the first group, 65 (35.3%) patients had prostate cancer, whereas 78 (40.0%) patients in group II had cancers. This demographic data showed no difference in age group and PSA level between the 2 study groups. The overall cancer detection rate was significantly higher in group II (40.0%) than group I (35.3%), p = 0.034 (Table 2), and in particular showed a significant increase in the cancer detection rate in the subgroup in which PSA level was between 4-10 ng/ml. Moreover, Gleason sum was 1 in 3 (11.1%) patients and 2 in 1 (3.7%) patient (Table 3).

Regarding Figure 2, this picture shows the incidence of positive cores from the group 2 schematic diagram mapping prostate biopsy. We were surprised that the left apex had high positive cores following the left apex and right middle base. Moreover, it was found in the study that the highest incidence of prostate cancer was approximately 18 percent at the pure apex zone, 12 percent at the pure middle zone and the intersection area between the three zone was 17.3 percent, as shown in Figure 3.

Table 1. Clinical data of patients undergoing laterally directed biopsy and extended 14-core schematic diagram mapping prostate biopsy.

Characteristic	Group I	Group II	P-value
Mean age (years)	69.68 (±7.89)	70.07 (±8.83)	0.636
Mean PSA level (ng/ml)	18.04 (8.42-22.35)	15.83 (6.54-21.72)	0.760

Table 2. The cancer detection rate in patients undergoing laterally directed biopsy and extended 14-core schematic diagram mapping prostate biopsy.

Cancer detection rate	Group I	Group II	P-value
Overall	65/184 (35.3%)	78/196 (40.0%)	0.034
PSA 4-10 ng/ml	31/122 (25.4%)	33/114 (28.9%)	<0.001

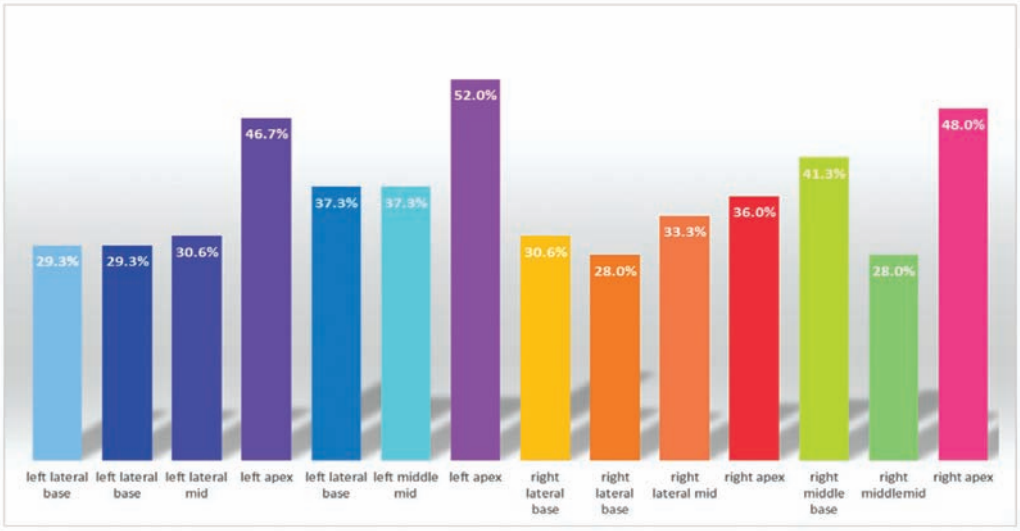

Figure 2. Extended 14-core schematic diagram mapping prostate biopsy.

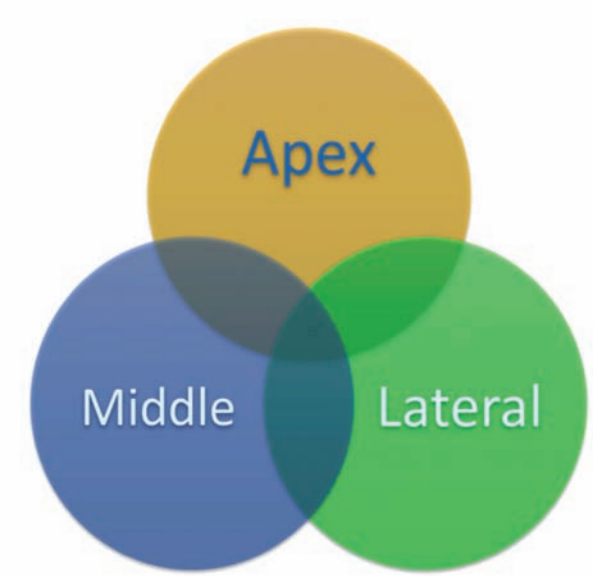

Figure 3.
Extended 14-core schematic diagram mapping prostate biopsy.

Table 3. Gleason score at biopsy and agreement with radical prostatectomy in both groups.

Biopsy	Radical prostatectomy (Group I)					Radical prostatectomy (Group II)				
	1	2	3	4	5	1	2	3	4	5
1 (3+3)	6	7	2			9	6			
2 (3+4)		6		2		2	9			
3 (4+3)			2	1		3	3	2		
4 (4+4, 3+5, 5+3)				2	2				5	
5 (4+5, 5+4, 5+5)					1		1		1	

N.B. Higher Gleason sums at radical prostatectomy are highlighted and underlined

Discussion

The extended TRUS prostate biopsy is still a standard test for early stage prostate cancer diagnosis. The sextant biopsy technique suggested by Hodge has become standard and shows that it is more effective than the direct cutting of meat. However, there are many studies that show that the cutting of parasitic flesh provides for the use of unsafe materials to detect cancer that is important enough8. However, despite this modification, a recent report has shown that cutting one side of the piece of meat may miss the clinical prostate cancer detected in men up to 34%[5]. And there should be more central cores in order to have a better cancer detection rate. A variety of studies have consistently shown that in the case of cancer focus in a small biopsy, less than 10% of patients have small cancers in the prostate gland and more than 90% are cancerous. The size is generally considered meaningful[9,10]. Invariably, increasing the number of biopsies has seemed the best and most logical way to decrease the sampling error and therefore increase the capacity of biopsy sets to predict cancer. In our study, the extended 12-core biopsy significantly increased the cancer detection rate compared to the sextant biopsy. This series shows the clear advantage of 12-core biopsy over sextant biopsy.

Tahir Qayyum and others[11] have studied the pathological relationship between the amount of meat cut using TRUS biopsy method. The results showed that the amount of cutting by TRUS biopsy results in Gleason, prostatic intraepithelial neoplasia (PIN) and perineural invasion (PNI) differences with statistically significant prostate surgery ($p<0.001$, $p<0.001$ And $p<0.001$, respectively), with the average Gleason score on the amount of 11-14 core cutting with the prostate surgery specimen. There is no difference. It can be concluded that the cutting of the 11-14 core material provides the accuracy of the high Gleason score that is suitable for further treatment plans. Similarly, Muhammad A. and others[12] have studied the pathological relationship between biopsy by TRUS biopsy and specimens in prostate cancer patients. Their study found that in the bilateral disease, there was a 34 percent positive margin with 66 percent of the unilateral disease group having the bilateral disease in the final pathologic specimen examination, while the unilateral disease group had a 7 percent positive margin, differing significantly ($p<0.001$).

The level of prostate cancer is the strongest predictor of clinical courses. It usually depends on the needle biopsy projections and this is the important reason for under grading in sampling error. This prostate cancer is usually different, consisting mainly of different tumors, generally with a high level of cancer. The focus of these high-level cancers is easily missed by cutting meat[9]. In the case of prostate cancer in biopsy, under grading occurs more often than over grading. In addition, prostate cancer is a disease with many factors and multiple tumors can be detected in more than half of the radical prostatectomy sample[13,14].

There is a tendency to seriously treat tumors that are thought to be small and different. This trend can be dangerous because tumors that are thought to be small and different in biopsy may become bigger and different, not due to sampling errors. Our data show that increasing the number of tissues leads to an increase in the rate of cancer detection and increased tumor prediction efficiency in RP samples. In summary, the 14-core prostate biopsy extension increased both the detection rate of prostate cancer in patients and the assessment of Gleason score disorders.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Fully perfused laparoscopic partial nephrectomy: surgical technique and outcomes

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Keywords:
Full perfusion, partial nephrectomy, laparoscopic surgery

Abstract

Objective: To present a surgical technique and outcome of fully perfused laparoscopic partial nephrectomy (LPN).

Material and Method: Fifteen patients underwent fully perfused LPN between January 2014 and January 2018 for renal masses. We studied a subgroup of patients who underwent fully perfused LPN (non-clamp). Our technique was utilized for exophytic, non-hilar masses that had a diameter of less than 2 cm. We developed our technique to avoid ischemia reperfusion renal injury while minimizing bleeding.

Results: We reviewed 15 cases of fully perfused LPN. Utilizing a non-clamp procedure resulted in an average blood loss of 100 ml, 2 days of hospital stay, and minimal change in serum creatinine.

Conclusion: Fully perfused LPN is a feasible procedure for the treatment of renal masses. Benefits of this procedure are its minimal invasiveness and prevention of ischemic reperfusion kidney injury.

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Introduction

Nephron sparing surgery (NSS) for renal cell carcinoma has been increasingly appreciated due to its excellent oncologic outcome and preservation of kidney function[1]. Lower wound morbidity, shorter hospital stay, and better cosmetic outcome have made for the acceptance of laparoscopic partial nephrectomy (LPN)[2].

The safety and feasibility of LPN depend on the surgeon's experience and the size and position of the mass. Although LPN has become an established treatment for small renal masses, multiple studies have demonstrated a negative impact of warm ischemic time (WIT) on renal function[3]. Patel and Eggener proved that a warm ischemic minute has an addictive effect in the development of acute kidney injury and deterioration of renal function[3]. The 3 main variables contributing to renal function after partial nephrectomy are: the baseline renal function preoperatively, the length of WIT, and the amount of remaining parenchyma left postoperatively[4]. From this result, establishing a zero ischemic time technique for LPN can eliminate any potential harmful effects of warm ischemia during the procedure[5]. Nevertheless, there is no consensus on the length of WIT that usually does not lead to the deterioration of the renal function after partial nephrectomy. It was reported by multiple studies that up to 40 minutes of WIT is safe and sufficient for the resection of the mass, and performing renorrhaphy[6,7]. There are multiple ways to assess function of the kidney, and each technique has some advantages and disadvantages. Measurement of serum creatinine and renal scan are the most commonly utilized investigations to assess renal function[8]. On the other hand, other studies have used the glomerular filtration rate (GFR) to measure renal function[2,8].

Spending more days at the hospital postoperatively does not only increase the cost of health care, but it also carries the risk of developing other medical complications, such as lung problems and deep vein thrombosis (DVT). Prolonged hospital stay is usually indicated when patients get big wounds that generate pain, hinder movement, and require additional care. Therefore, the earlier the patients are discharged home in a comfortable status, the better they will be. Blood transfusion in the setting of losing large amounts of blood during the surgeries carries certain hazards to the patients like cross reactions and infections with blood-borne organisms[9].

We performed the fully perfused technique, whenever that was possible, to minimize renal ischemic injury and prevent some of the incidents related to hilar dissection and clamping during LPN. In our study, we present our experience with fully perfused laparoscopic partial nephrectomy and demonstrate the selection criteria and the outcome of this technique.

Material and Method

After Institutional Review Board approval, we reviewed the medical records of 15 patients who underwent LPN with the fully perfused technique at Phramongkutklao Hospital between January 2014 and January 2018. All cases were performed by the same surgeon. Patient demographics, main outcome variables (preoperative and postoperative serum creatinine values, estimated blood loss (EBL), length of hospital stay), and tumor histopathological results, size, site, side, and grade were collected. Serum creatinine, as a renal function indication, was measured 3 times: preoperative, immediately (within 48 hours) postoperative, and long-term postoperative (3-6 months). The fully perfused technique was utilized in patients who had exophytic, solid masses with a maximum base diameter of 2 cm or less and were suspicious for malignancy (more than 15 Hounsfield unit enhanced from contrasted computerized tomography), as seen in Figure 1.

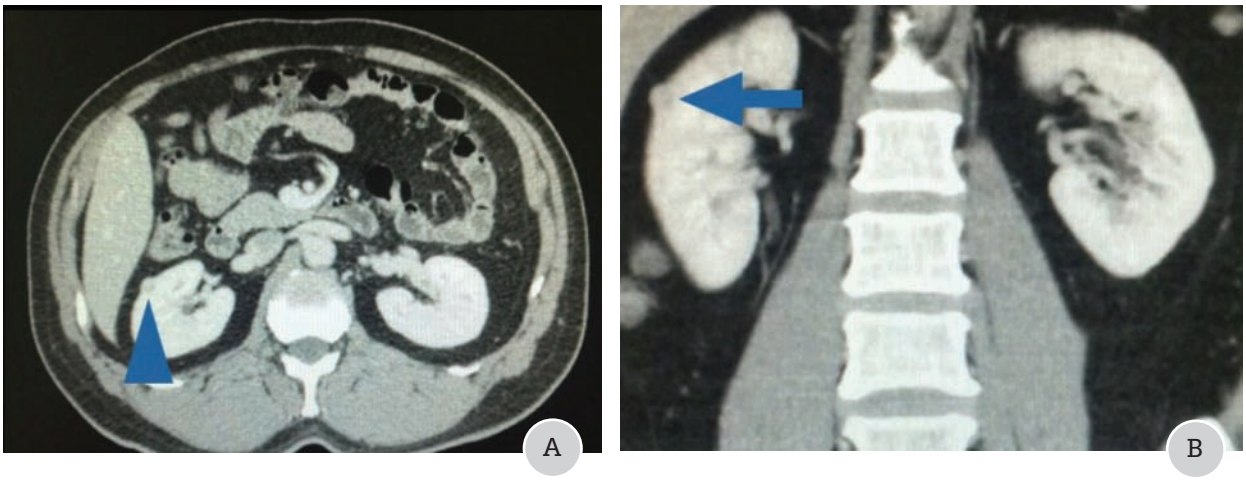

Figure 1. Computerized tomography present small and exophytic renal mass that proper for fully perfused LPN (arrow)

Surgical technique

After the mobilization of the white line of Toldt, Gerota fascia was identified and opened in only the area above the mass, as seen in Figure 2. When Gerota fascia was removed, the tumor was exposed, as seen in Figure 3. The kidney was mobilized as necessary to expose the tumor. Laparoscopic Metzenbaum scissors was used in the coagulation mode for marking the location around the mass, as seen in Figure 4. Resection was done with Metzenbaum scissors using the wedge resection technique, as seen in Figure 5. Bleeding during resection was stopped by the coagulation mode via Metzenbaum scissors. No 1 Vicryl stitches were introduced into the tumor bed under vision in the continuous locked fashion (by M sized laparoscopic plastic clip), as seen in Figure 6. No hemostatic agents were used in our procedure. Bleeding was checked again; then Jackson-Pratt silicone No 10 (flat type) was placed at the surgical site before laparoscopic port removal and abdominal closing.

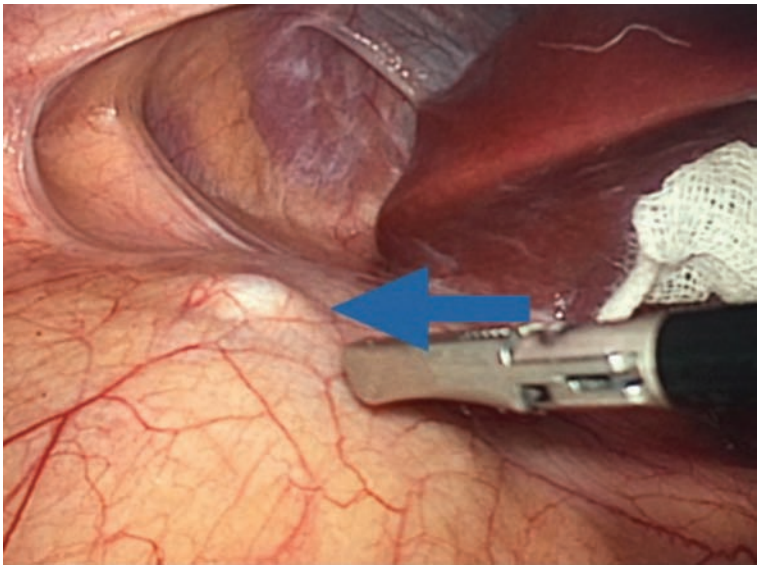

Figure 2.
Exophytic mass is identified after mobilization of white line of Toldt.

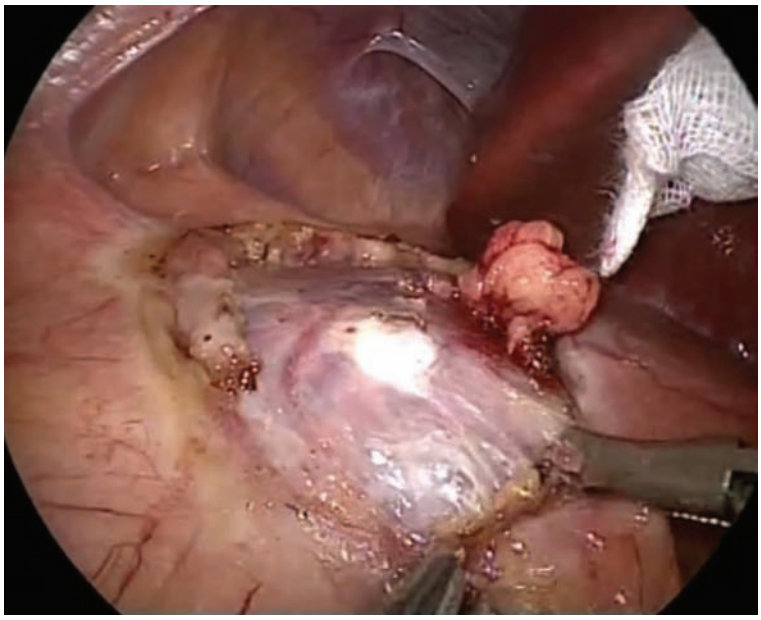

Figure 3.
Gerota fascia is opened only around area of protruded mass.

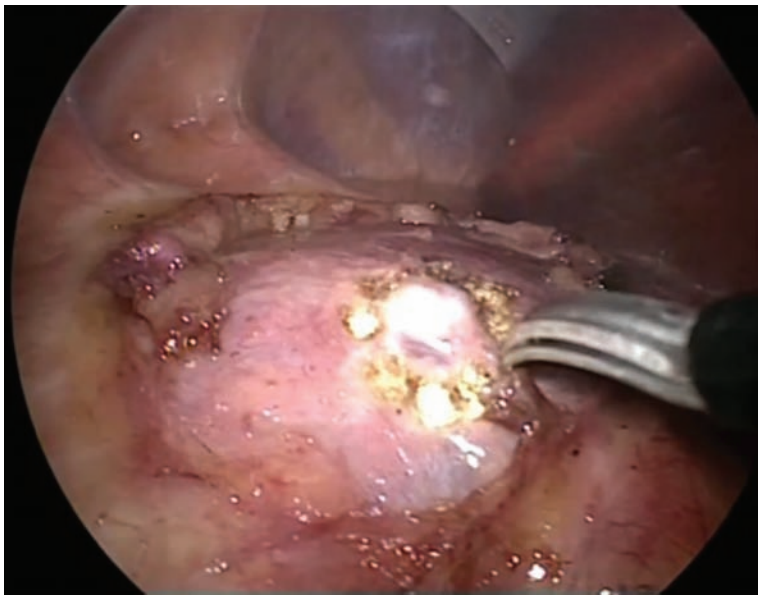

Figure 4.
Metzenbaum is used for marking area of dissection.

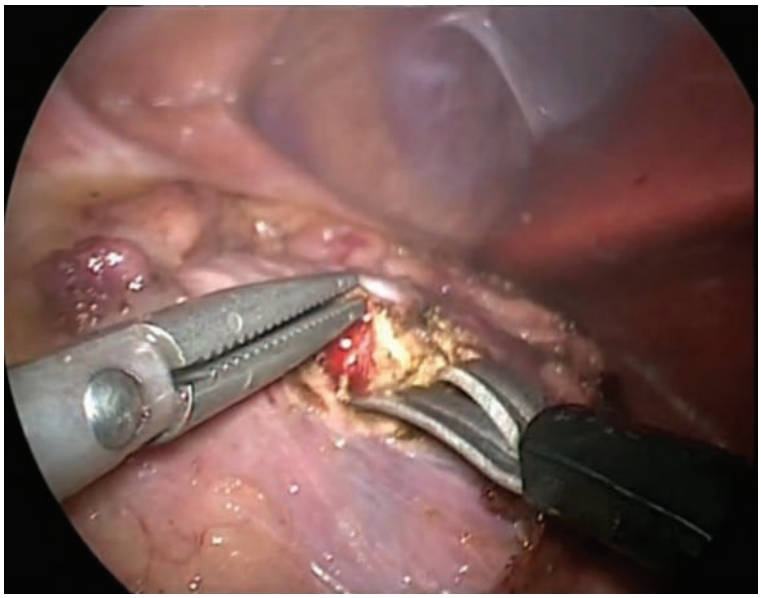

Figure 5.
Wedge resection is technique in our procedure for tumor removal.

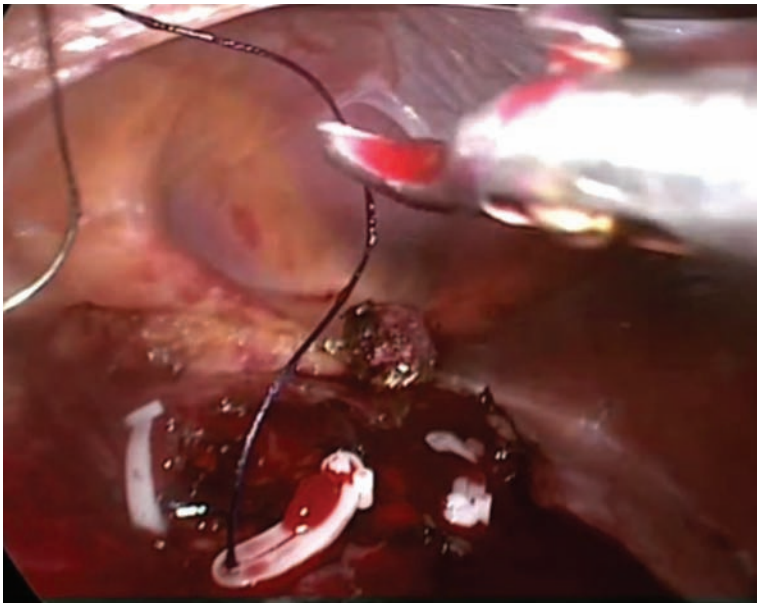

Figure 6.
No 1 Vicryl is used for closing the defect with continuous with locked fashion.

Results

Patient demographics

A total of 15 patients participated in our study; the mean patient age was 55.4 years (range: 31-82). Nine from 15 patients were males (60%).

Lesions characteristics

Histopathology clear cell renal cell carcinoma (n=12, 80%), small cell carcinoma (n=1, 6.67%), angiomyolipoma (n=1, 6.67%), and benign complex cyst (n=1, 6.67%).

Tumor location

Eight tumors were on the right side (53.33%); the remaining 7 (46.67%) were in the left kidney. The average tumor size was 1.5 cm (range: 0.8-2.0). The tumor was located on the lower pole in 10 patients (66.67%), on the middle pole in 1 patient (6.67%), on the lower pole in 4 patients (26.67%), and 100% of masses were on the anterior aspect of the kidney.

Surgical outcome

All patients had negative surgical margins, and no recurrence was observed during the average follow-up of 20 months (range 4-40). Mean preoperative serum creatinine was 0.83 mg/dl (range 0.44-2.3 mg/dl), and mean early postoperative serum creatinine was 1.03 mg/dl (range 0.42-2.4 mg/dl). The short-term postoperative was 0.97 mg/dl (range 0.4-2.7 mg/dl). The average blood loss was 100 ml (range 50-400 ml) and no transfusion was needed. The average hospital stay was 2 days (range 1-4 days). We found that all the study variables, age, gender, and tumor characteristics, such as type, size, and grade of tumor had no significant association with the estimated intraoperative blood loss and the length of hospital stay. There were no delayed complications, such as urine leak or delayed bleeding. There was no need to convert any of the cases to the clamped technique or to open surgery. Additionally, no recurrence was encountered during the follow-up period, ranging from 4 to 40 months (average 20 months).

Discussion

LPN is a minimally invasive nephron sparing surgery that has become a favored option by many surgeons and many patients, as it has shown good oncologic outcome while at the same time maintaining good kidney function10. This study concluded that fully perfused LPN is a feasible and safe approach for certain solid small renal masses up to 2 cm in size. Furthermore, fully perfused LPN is a practical approach for selected patients with a wide variety of both benign and renal cancer.

Thompson and colleagues have shown that the off-clamp technique in partial nephrectomy can reduce the hazards of both acute and chronic renal disease7. This paper is supported by other studies which have shown that warm ischemia can be avoided in many cases of partial nephrectomy, and should be implemented when possible[11,12].

A clamped time of 28-40 minutes was reported by different studies to be safe and sufficient for the resection of the mass and performing renorrhaphy[6,7]. On the other hand, some studies have shown that LPN under warm ischemia had less blood loss than the off-clamp one[13], no difference in hospital stay[11], and better renal function[11,13]. Thompson and colleagues concluded that 2 percent of their off-clamp cohort group developed excessive blood loss in comparison to 5% in the hilar clamping group[11]. In addition, they found that urinary leakage was higher in the hilar clamping group (5%) in comparison with the non-clamp group (1%)[13]. The little change in renal function was due to avoiding ischemia and a minimal proportion of the resection of the renal parenchyma along with the tumor.

Lower pole mass is easier for this technique in accession and mobilization. We don't recommend our technique in an upper pole mass or mass located near the renal hilar. It is easier for fully perfused LPN in small renal masses, especially less than 2 cm in diameter. Smaller masses also tend to have less blood supply and less renal tissue attachment, contributing to the minimal bleeding we experienced.

Four years of fully perfused LPN in Phramongkutklao Hospital supports this feasible technique which has a good oncologic outcome for certain mass sizes in certain locations. It combines the advantages of the minimally invasive technique with the objectives of partial nephrectomy, such as nephron sparing and tumor control. Minimally invasive surgery was clearly demonstrated through the significant change in kidney function, short hospital stay, and less blood loss. The implemented technique for fully perfused LPN was used in cases of exophytic masses less than 2 cm in diameter. After the tumor is excised, the suture (No 1 Vicryl) can be tightened quickly and continuously in a locked fashion (V loc plastic clip size M is used in every stitches) to prevent any potential bleeding.

Our study was retrospective and utilized creatinine levels instead of GFR. Serum creatinine levels can be affected by different factors, such as medications, protein intake, hydration status, and renal tubular absorption and secretion. However, serum creatinine has been used to calculate the renal function in many studies, and deemed sufficient[1,7].

Conflict of interest

The authors declare no conflict of interest.

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Original Article

Factors affecting the durability of flexible ureteroscopes: An academic center review

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Keywords:
Flexible ureteroscopes, durability, URF-V, holmium laser

Abstract

Objective: To analyze the factors which affect the durability of the flexible ureteroscope and the causes of scope damage in a single academic center.

Material and Method: Between March 2014 and August 2017, 479 flexible ureteroscopic procedures, using 6 flexible ureteroscopes (Olympus model URF-V), were systematically reviewed. Data including indication for procedures, auxiliary device usage, the characteristics of scope damage, and the number of times a scope was used before requiring major repair were gathered. Fisher exact test and Chi-square test were used to evaluate the factors which caused the damage.

Results: The major flexible ureteroscopic procedure performed was treatment of renal calculi (81%). The most common auxiliary device used was the Holmium laser (70%). The most common cause of damage requiring repair was working channel leakage (93%). The factor that affected the durability of flexible ureteroscopes was the size of laser fiber. Utilizing laser fiber 200 nm decreased scope damage significantly compared to various other sizes (p-value=0.002 and p-value<0.001). However, the usage of nitinol basket and ureteral access sheath did not affect the durability of flexible ureteroscopes.

Conclusion: Large laser fibers are a risk factor for flexible ureteroscope damage. Utilizing small laser fibers during flexible ureteroscopy can decrease scope damage significantly.

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Introduction

Ureteroscopy is widely used to inspect the ureter, renal pelvis, and upper collecting system. The first ureteroscopy was performed in 1956. After fiber-optic technology was developed, the first flexible ureteroscopy was performed in 1964 by Marshall[1]. The development of specification in the working channel, the deflection capability, and the decrease in the diameter of the flexible ureteroscopy have all increased the capabilities of diagnostic and therapeutic management in the upper collection system.

Flexible ureteroscopy plays a number of roles in diagnostic management, such as determining the cause of gross hematuria, pathology in the ureter caused by hydronephrosis, biopsy, and selective ureteral sampling for cytology. The other is the therapeutic management, such as tumor ablation and stone management[2,3].

However, the high cost of the administration and maintenance of flexible ureteroscopy should be a concern and thus the durability of the flexible ureteroscope is an important factor for its utility. Durability varies depending on the model and manufacturer, operative procedure, the use of auxiliary equipment, and operator experience[4,5].

In this study we analyzed the factors which affected the durability of the flexible ureteroscope and the causes of scope damage in Siriraj Hospital.

Material and Method

We retrospectively reviewed 479 procedures performed by 13 experienced urologists with 6 flexible ureteroscope URF-V models from Olympus between March 2014 and August 2017 in Siriraj Hospital. Intraoperative details included the indication for procedure, therapeutic and diagnostic details, auxiliary device usage, the characteristics of flexible ureteroscope damages, and the number of times a ureteroscope was used before major repairs were recorded. After repair, the flexible ureteroscope was checked and analysed for the cause of damage by the manufacturer before usage. We excluded 30 flexible ureteroscope records which were prepared but not used in any procedures. A total of 449 procedures were analyzed. The auxiliary devices used in the procedures were the nitinol basket (1.9 Fr, Zero tip) from Boston, the ureteral access sheath (Navigator HD 11/13Fr, 12/14 Fr) from Boston, and laser fiber size 200, 365 and 550 micron from Luminis. All the equipment was used with standard instructions and specifications. The procedures performed before January 2016 used the various sizes of laser fiber (200, 365, 550 micron). However, after January 2016, we changed the protocol by using the laser fiber 200 nm. These 2 periods were compared. The Fisher exact test and Chi-square test were used to assess for the factors which affected the number of times a flexible ureteroscope was used before being damaged. The cause of ureteroscopic damage was recorded.

Results

In this study we performed flexible ureteroscopic procedures 449 times with 6 flexible ureteroscopes which required 15 major repairs. The average number of procedures before a major repair was 31.9 times.

The major indication for flexible ureteroscopic procedure was renal and ureteral calculi in 81.06% of cases, with laser lithotripsy performed 82.69% of the time and diagnostic procedures in 14.28% of cases.

Flexible ureteroscopic procedure for an upper tract tumor was performed in 18.9% of cases, with diagnostic procedures 72.94%, tumor ablation 11.76% and tumor biopsy in 14.11% of cases (Table 1).

It was during the study that we found the protocol for laser fiber usage was altered after January 2016. Before January 2016, we had used various sizes of laser fiber (200, 365, 550 micron) in procedures, and after January 2016 we used only laser fiber 200 micron. Comparison between these 2 periods: Scope

Number 3, in 5 there was an increase in usage before major repairs with statistical significance (p=0.002 and p<0.001) (Table 2). In contrast, the ureteral access sheath was used in most procedures (88%) and the nitinol basket was only used in a few cases (14%). Thus, there was no difference in damage concerning the usage of the nitinol basket and ureteral access sheath (Table 3).

The major cause of scope damage as determined from manufacturing reports was working channel leakage; the other cause was deflection components. One scope had damage caused by a fracture to the laser fiber tip (Table 4). None of the scope damage occurred during the cleansing and sterilization process.

Table 1. Indication and flexible ureteroscopic procedure.

Scope Number	Number of times	Indication for flexible ureteroscopy		Procedure				
		Stone	Tumor	Diagnostic	Ablation	Laser	Biopsy	Basketing
I	127	106 (83.46%)	21 (16.54%)	33	1	92	1	0
II	27	21 (77.78%)	6 (22.22%)	8	0	18	1	0
III	64	37 (57.81%)	27 (43.19%)	26	8	27	0	3
IV	100	83 (83%)	17 (17%)	23	1	69	5	2
V	84	69 (62.14%)	15 (17.86%)	16	1	61	4	2
VI	47	42 (89.36%)	5 (10.64%)	8	0	34	1	4

Table 1. Comparison of the number of times a scope was used before repair between the various laser fiber group and the 200 micron laser fiber group.

Scope Number	Total laser usage	Various size laser fiber usage	200 micron laser fiber usage	P-value
I	94	26	68	0.116
II	19	19	0	N/A
III	34	14	20	0.002
IV	73	3	70	0.502
V	62	3	59	0.000
VI	34	18	16	0.312

Table 3. Auxiliary device usage.

Scope Number	Number of times used	Ureteral access sheath	Basket	Laser
I	127	118 (92.91%)	12 (9.45%)	94 (74.02 %)
II	27	27 (100%)	2 (7.4%)	19 (70.37%)
III	64	50 (78.13%)	11 (17.19%)	34 (53.13%)
IV	100	87 (87%)	19 (19%)	73 (73%)
V	84	70 (83.33%)	6 (7.14%)	62 (73.81%)
VI	47	45 (95.74%)	12 (25.53%)	34 (72.34%)

Table 4. Cause of flexible ureteroscope damage before major repair.

Scope Number	Repair Number	Number of times used	Cause of damage
I	1	25	instrument channel has leak
	2	14	instrument channel has leak
	3	58	instrument channel has leak, angulation wire has cut
	4	30	distal-end burnt, imaging problem
II	1	27	instrument channel has leak, bending unit has leaked
III	1	33	instrument channel has leak, bending unit has misshapen
	2	5	instrument channel has leak
	3	26	instrument channel has leak LASER fiber tip was broken
IV	1	4	instrument channel has leak
	2	17	instrument channel has leak
	3	79	instrument channel has leak
V	1	12	instrument channel has leak
	2	72	instrument channel has leak, bending unit has leaked, angulation wire has cut
VI	1	27	instrument channel has leak, bending unit has misshapen
	2	20	bending unit has leaked, insert tube has misshapen, imaging problem

Discussion

Nowadays, the flexible ureteroscope plays an important role in retrograde intrarenal surgery. It is used as both diagnostic and therapeutic equipment for upper urinary tract pathology. Due to advances in technology, the new model has a smaller diameter, more deflection angle, and greater durability.

The durability of flexible ureteroscopes depends on multiple factors, such as surgeon experience, type of usage, the auxiliary device, and model specification[6,7]. There were guidelines for flexible ureteroscopic usage in previous studies in order to prevent the damage proposed by Koraolides and colleagues, which increased scope usage before repair from 11 to 22 times[8]. Routine use of the ureteral access sheath was proposed in many studies for the benefits of decreasing intrarenal pressure, decreasing the operative time, more simple ureteral re-entry, and decreasing ureteral injury. In our center, the ureteral access sheath was used in most cases.

In our study, we found 2 flexible ureteroscopes that statistically increased the number of times a scope could be used before requiring repair when used with a small laser fiber in the procedure. We think that this result is related to the laser fiber specification (Table 5). The small size laser fiber 200 micron has a radius that bends less which causes more deflection than the larger fiber (Figure 1). However, with the small laser fiber there is a risk of fiber fracture which leads to ureteroscopic damage. We should be concerned about the specification of each piece of equipment before usage in order to avoid damage.

Table 5. Laser fiber specification.

Fiber specification	200 micron	365 micron	550 micron
Core diameter (nm)	272	365	550
Maximum outer diameter (nm)	450	580	780
Minimum working channel diameter (Fr)	1.65	2.05	2.65
Fiber bending radius (mm)	12	14	20
Recommended number of uses	10	10	10
Maximum input energy (J)	1.5 J	6.0 J	6.0 J
Maximum input power (W)	45 W	120 W	120 W

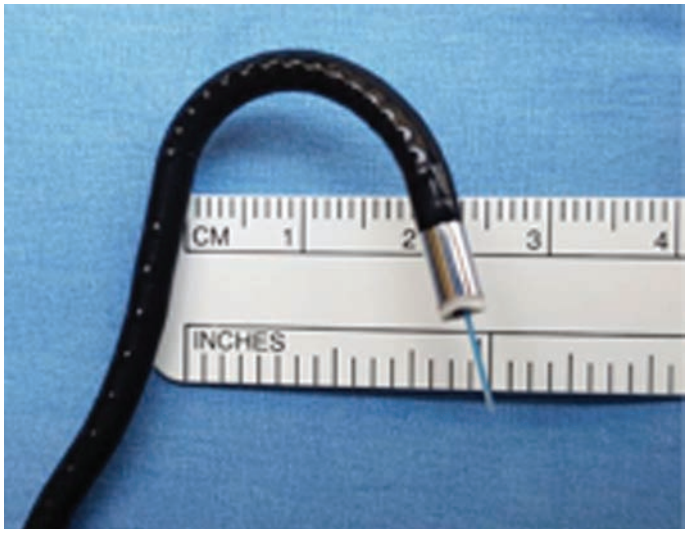

Figure 1.
Flexible ureteroscope with laser fiber have less deflection degree.

The analysis determined that the main cause of scope damage in this study was working channel leakage. This finding is in accordance with a previous study by Sung9, which found that the most damaged part of the flexible ureteroscope was the distal working channel. The mechanism of damage is initiated with over-angulated deflection while using the laser fiber. Then the working channel is burned and leaks at the maximum deflection point causing damage to the deflection wire. The irrigant leak causes internal scope damage (Figure 2).

From the study by Carey, it was suggested that previous scope damage leads to more damage occurring frequently10. In our study, we didn't compare the number of damaged scopes. A prospective study should be conducted to investigate this point.

The cleansing and sterilization process are factors that affected the durability of the equipment. In a previous study in our center we had a well-trained team that completed the sterilization process and preparation of all equipment before an operation. Nevertheless, the previous study proposed that most damage occurs during the operation.

Limitations

There are several limitations in this study owing to its retrospective nature. Some data could not be collected accurately, such as ureteroscopic time, number of scope passages in each procedure, and the deflection angles which indicate a difficult case. Thus, a prospective study should focus more on intraoperative details.

Conclusion

In this study we concluded that large laser fibers are a risk factor for flexible ureteroscope damage. Utilizing small laser fibers during flexible ureteroscopy can decrease scope damage significantly. The most common cause of damage is the unsuitable usage of equipment. Urologists should recognize and follow the instructions for flexible ureteroscope usage and the auxiliary devices in order to avoid the damage responsible for the high cost of maintenance.

Conflict of interest

The authors declare no conflict of interest.

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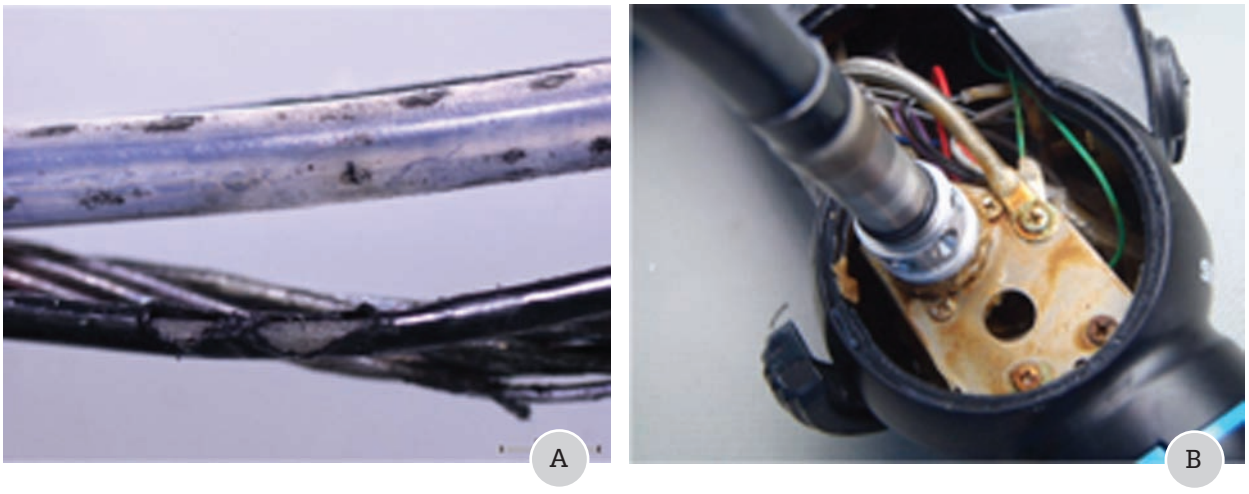

Figure 2. The deflection wire was damaged from a working channel leakage and internal scope damage.

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Case Report

Penile prosthesis implantation after paraffinoma excision

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Keywords:
Circulatory tumor cells, urothelial cancer

Abstract

This case report presents an erectile dysfunctional man who requested implantation treatment after paraffinoma excision and reconstruction with scrotal flap. Our special concern was that the deformed anatomy and thick scar might cause unusual events during surgery, resulting in an unsatisfactory outcome.

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Introduction

One reason for seeking penile enlargement may be from penile dysmorphophobia by, ie, underestimating one's own penis size while overestimating the average penis size. Another reason is that some men may want a larger penis to enhance their sex lives, even if their penis is average or above average in size already. Many legal and illegal techniques have been tried. Injections with mineral oils, liquid silicone, or paraffin may give devastating results. Treatment often requires extensive penile reconstructive surgery which involves complete excision of foreign bodies along with the associated reaction followed by primary closure if possible[1].

First introduced in 1973, penile prosthesis is the gold standard for erectile dysfunction (ED) for medically refractory ED. Ongoing advancements have greatly improved all outcome measurements, with contemporary studies reporting consistently high satisfaction and lower complication rates. Prosthesis implantation after paraffinoma excision is reported.

Case Report

Penile augmentation with mineral oils, paraffin or liquid silicone is common in Thailand, due to a lack of knowledge and sequelae[2]. A granulomatous reaction causes tumor like deformity. This results in inflammation, pain, and loss of elasticity of the prepuce skin. The swelling also begins to extend into the suprapubic region at the base of the penis, which is also tender.

A 54-year-old man with poor control of diabetes and ischemic heart disease status post percutaneous coronary intervention was injected with mineral oils for the purpose of penile augmentation for 2 years. He presented with pain and a deformed penis. Furthermore, he also had erectile dysfunction grade I which did not respond to PDE-5 inhibitors, although he still had sexual desire.

General physical examination was normal. The entire penile skin was indurated with ulcerations. There was no residual normal penile skin. The suprapubic mass at the base of the penis measured about 5 cm. However, both testes and scrotal skin were uninvolved. Routine laboratory investigations were normal. There was no contraindication for surgery.

The patient's first desire was to remove the indurated skin and pain relief. The operative plan was to remove all indurated prepuce and mass at the suprapubic area. Scrotal skin flap was designed to cover the penile shaft. Tension at the suprapubic area was relieved with V-Y flap. The operation was a success without unusual event.

On follow-up the patient was satisfied with the result but requested a solution for erectile dysfunction issues, due to poor vascular status and relative contraindication for PDE5 inhibitor. We offered him the penile prosthesis implant. After a discussion about general considerations concerning the implant: Types of implant, preparation for the procedure, advantages and disadvantages, he elected to have the surgery. Due to penile and suprapubic scar, we recommended a malleable implant. The most concerning issue was about the scarred tissue, which could possibly retract, causing the penis not to move into the upright position after implantation.

The operation was executed 1 month after the paraffinoma excision. Pre-operative preparation followed implantation guidelines. Prophylaxis antibiotics were injected (Amoxiklav and Cephalosporin). Scrotal wash and shower with Chlorhexidine. Hair was clipped. Operative field was painted with Duraprep® and draped with Ioban®. Foley catheter was indwelled. Subcoronal approach was chosen due to the thick scrotal scar. After the incision was made, dissection continued to identify corporal bodies. Due to the thick scrotal flap at the penile shaft, the urethra was accidentally torn. We noticed a small amount of blood per urethral meatus. To confirm, we pushed the NSS via meatus and noticed leakage from the incisional site. Incision was dissected wider to locate the urethral injury; 0.5 cm injury site was located and repaired. NSS was irrigated to confirm no leakage.

Dissection continued until the corporal body was identified without overlying dartos. After corporotomy was made, dilatation of the corpora was performed with Brooks dilators. Serial dilatation proximal and distal corpora without resistance were undertaken. Corporal was measured with Furlow dilator. After both corporas were dilated, NSS was irrigated proximally and distally to confirm no urethral injury. Brooks dilators was placed in both corporas simultaneously to confirm no crossover.

Total length was 18 cm and dilated to 14 mm diameter. We selected a Coloplast Genesis® 13 mm diameter and 17 cm length. Implants were placed into both corporas. Penis can become erect straight up, proving the rigidity and girth of the implant could overcome any tension from the scar. Corporotomies were closed. Subcutaneous tissue overlying was closed and the skin approximated.

He was admitted for a night and discharged the next day with Foley catheter. Catheter was placed for 5 days (usually only one day but due to urethral injury). On the 5th day, he attended a clinic for follow-up; catheter was removed. There was no sign of infection. He was satisfied with the girth and rigidity.

Discussion

Penile prosthesis implantation in special circumstances requires a careful strategy. General care for implantation: remain infection free, maintain penile length and girth, and ongoing patient satisfaction. In this case, implanters must prepare for unusual events during the operation, and make correct decisions in order to achieve surgical goals. Aesthetic manipulations in the penis are becoming increasingly popular, and both its terminology and its medical implications should be known by urologists and andrologists[3].

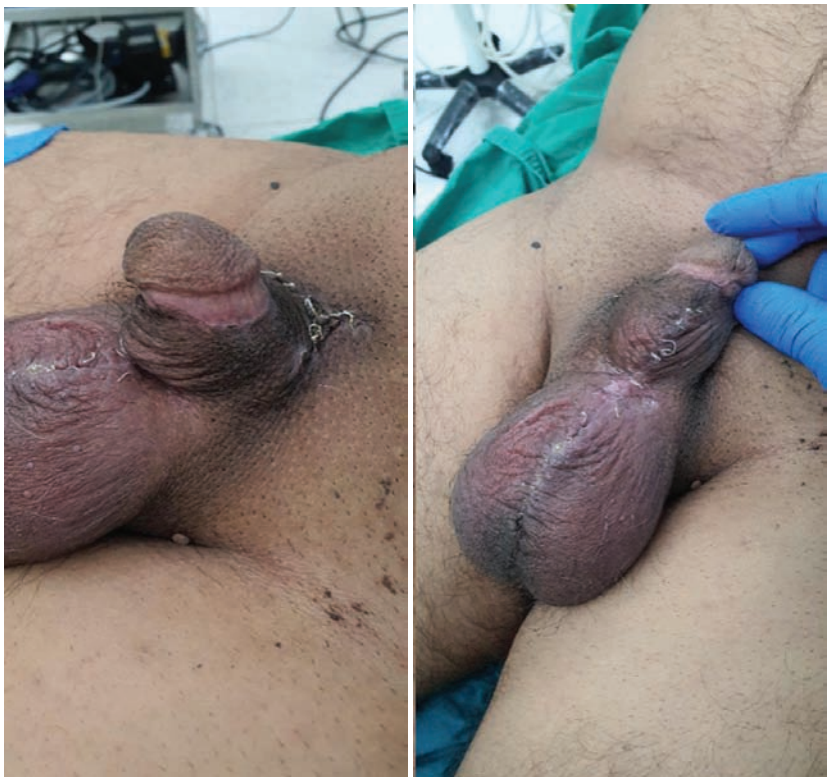

Figure 1. The genitalia before penile prosthesis implantation.

Figure 2. The genitalia after penile prosthesis implantation.

Conflict of interest

The authors declare no conflict of interest.

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2. Svensøy JN, Travers V, Osther PJ. Complications of penile self-injections: investigation of 680 patients with complications following penile self-injections with mineral oil. World J Urol 2018;36:135-43.
3. Chinchilla RM, González AC, Alcaina LR, Nicolás AG, Asurmendi PV, Acevedo MD, et al. Urological and psychological approach of secondary complications to penile aesthetic modifications. Rev Int Androl 2019;17:101-9.

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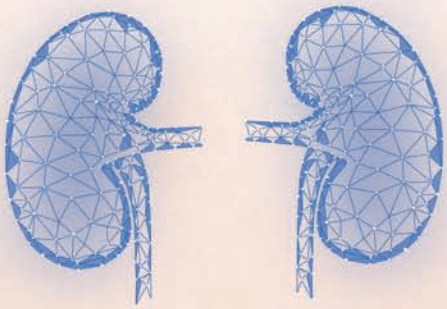

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