นิพนธ์ต้นฉบับ

การศึกษาอาการทางคลินิกของระบบทางเดินปัสสาวะส่วนล่าง ในผู้ป่วยไตวายเรื้อรังที่ได้รับการผ่าตัดปลูกถ่ายไต ณ โรงพยาบาลราชวิถี

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บทคัดย่อ

วัตถุประสงค์ : เพื่อประเมินความสัมพันธ์ระหว่างอาการของระบบปัสสาวะส่วนล่าง และความจุของกระเพาะปัสสาวะในผู้ป่วยที่ได้รับการผ่าตัดเปลี่ยนไต ในโรงพยาบาลราชวิถี

ผู้ป่วยและวิธีการศึกษา : ทำการศึกษาข้อมูลพื้นฐาน และความจุของกระเพาะปัสสาวะก่อนผ่าตัดจากข้อมูลเวชระเบียน จำนวน 50 รายที่ได้รับการผ่าตัดเปลี่ยนไต ระหว่างสิงหาคม 2541 ถึงกันยายน 2554 (เพศชาย 26 ราย เพศหญิง 24 ราย และอายุเฉลี่ย 41 ปี) โดยใช้ AUA symptom score และ frequency voiding chart วิเคราะห์ความสัมพันธ์ระหว่างความจุกระเพาะปัสสาวะและอาการของระบบปัสสาวะส่วนล่าง

ผลการศึกษา : ความจุกระเพาะปัสสาวะเฉลี่ยก่อนผ่าตัดเปลี่ยนไต เท่ากับ 204 มิลลิลิตร และหลังเปลี่ยนไต เท่ากับ 371 มิลลิลิตร ภาวะ nocturia และ nocturnal polyuria พบร้อยละ 48 และ 50 ของผู้ป่วยทั้งหมด ในผู้ป่วยที่มีความจุกระเพาะปัสสาวะน้อยกว่า 200 มิลลิลิตร พบอาการเหล่านี้สูงกว่าอย่างมีนัยสำคัญทางสถิติ อย่างไรก็ตาม อาการ frequency, urgency, intermittency, incomplete emptying, weak stream และคะแนนประเมินคุณภาพชีวิต ไม่มีความสัมพันธ์กัน

สรุป : อาการ nocuturia และ nocturnal polyuria เป็นภาวะที่พบในผู้ป่วยหลังผ่าตัดเปลี่ยนไต โดยอาจมีสาเหตุจากการไม่มีน้ำปัสสาวะในกระเพาะปัสสาวะเป็นเวลานานระหว่างที่ผู้ป่วยทำ hemodialysis และขนาดกระเพาะปัสสาวะที่เล็กลง อย่างไรก็ตาม อาการเหล่านี้ไม่ส่งผลต่อคุณภาพชีวิตของผู้ป่วย โดยผลประเมิน symptom score พบว่าผู้ป่วยส่วนใหญ่มีคะแนนต่ำ

คำสำคัญ : อาการของระบบปัสสาวะส่วนล่าง nocturnal polyuria, การผ่าตัดเปลี่ยนไต ความจุของกระเพาะปัสสาวะ

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Original Article

Evaluation of lower urinary tract symptoms and clinical outcome after renal transplantation at Rajavithi Hospital

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Abstract

Objective: To evaluate lower urinary tract symptoms and the correlation between bladder capacity and lower urinary tract symptoms after renal transplantation at Rajavithi Hospital.

Patients and Methods: Demographic data and preoperative maximum bladder capacity were evaluated by retrospective analysis of the medical records of 50 patients (26 men and 24 women, the mean age was 41 years) who underwent renal transplantation between August 1998 and September 2011. AUA symptom score and the frequency voiding chart were investigated. The correlation between the preoperative maximum bladder capacity and lower urinary tract symptoms were analyzed.

Results: Mean maximum bladder capacity before transplantation was 204 ml. and mean maximum functional capacity after transplantation was 371 ml. Nocturia (≥ 2 voids during a night's sleep) and nocturnal polyuria occured in 48% and 50% of patients. These symptoms were found significantly in patients who had a bladder capacity of less than 200 ml (P = 0.04 and 0.03 respectively). However, the symptoms of frequency, urgency, intermittency, incomplete emptying, weak stream and quality of life scores were not significantly related to bladder capacity.

Conclusions: Nocturia and nocturnal polyuria are characteristics of lower urinary tract function after renal transplantation, which is probably associated with long term anuria during hemodialysis and small bladder capacity. Quality of life is not impacted by lower urinary tract symptoms due to a low symptom score in most patients.

Keywords: Lower urinary tract symptoms, nocturnal polyuria, renal transplantation, bladder capacity

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Introduction

Renal transplantation is considered the best treatment for end-stage renal disease (ESRD). An improvement in the patient's quality of life after renal transplantation is reported in various studies. However, some patients have lower urinary tract problems, leading to a low quality of life.

Lower urinary tract symptoms are classified as storage and voiding symptoms. Nocturia and daytime urinary frequency are found frequently in ESRD patients after renal transplantation. Marian J.A. Van der Weide et al[1] studied the role of the five potential causes of frequency and nocturia after transplantation, i.e., bladder capacity, bladder pain, urgency, dysfunctional voiding and urinary output.

Patients with end stage renal disease, who have undergone prolonged periods of hemodialysis show oliguria or anuria result in having a small bladder capacity. We hypothesized that small bladder capacity is associated significantly with lower urinary tract symptoms after renal transplantation with or without other causes.

Patients and Methods

Lower urinary tract symptoms and bladder capacity were assessed in 50 patients (26 men and 24 women) who had undergone renal transplantation at Rajavithi Hospital between August 1998 and September 2011, and who were followed up for 3 months or more after renal transplantation.

Patient demographic data and treatment were reviewed from medical records. The mean age was 41 years (ranging from 17-61) and the follow-up period after renal transplantation was from 4 to 155 months (mean: 58 months). The mean serum creatinine level in the last visit was 1.4 mg/dl (0.6-2.6 mg/dl). Pretransplant hemodialysis was carried out in 46 patients (92%) with a mean duration of 41 months (ranging from 12-240) and peritoneal dialysis in 4 patients (8%).

Preoperative maximum bladder capacity was recorded as maximum cystometric capacity during cystoscopy. Renal transplantation was performed by 4 surgeons at RajavithiHospital with extravesical ureteric reimplantation (Lich-Gregior technique)

To analyze lower urinary tract symptoms and quality of life, the authors used the American Urological Association Symptom Score (AUA-SS), including seven questions concerning weak stream, straining, frequency, intermittency, urgency, incomplete emptying and nocturia. Six scales for the QOL score, termed the 'bother score', pertain to the patients' perceived QOL relating to LUT symptoms.

The frequency voiding chart (FVC) was used to evaluate maximum functional capacity, daytime frequency, nocturia, 24 hours urine volume and nocturnal urine volume.

The correlations between bladder capacity and lower urinary tract symptoms, quality of life, 24-hour urine volume, nocturnal urine volume and serum creatinie were analyzed.

Patients were given information about the study, an informed consent form, a questionnaire, an FVC and a measuring cup. Data collection was performed on the next visit or by interview via telephone. Urine analysis and serum creatinine were collected on the next visit.

Patients who had a clinical urinary tract infection or pyuria, history of neurogenic bladder, diuretic used, diabetes mellitus and recent catheterization were excluded from this study.

Statistical analysis was performed using Student's t-test, the Chi-square test and Pearson's correlation. $P < 0.005$ was considered significant.

Results

The characteristics of the study group are presented in Table 1 andthe results of the frequency voiding chart (FVC) in Table 2.

The results from the frequency voiding chart show that daytime frequency (≥8 voids during waking hours) and nocturia (≥2 voids during a night's sleep) occurred in 12% and 48% of the patients, respectively. The mean 24-hour urine volume was 1,750 ml and the mean nocturnal urine volume was 391 ml. No polyuria (urine output ≥2.8 L/24 hr) was found in the study but nocturnal polyuria (urinary output at night > 20% (young adults) to 33% (>65 years) of the urinary output/24 hours) was found in 25 patients (50%).

Mean maximum bladder capacity before renal transplantation was 204 ml. and mean maximum functional capacity after renal transplantation was 371 ml, increasing capacity to 82% (P< 0.001).

Table 1. Patient characteristics

Variable	Mean (range) or n (%)
Age, years	41 (17-61)
Gender	
- Male	26 (52%)
- Female	24 (48%)
Mode of pre-transplant treatment	
- Hemodialysis	46 (92%)
- Peritoneal dialysis	3 (6%)
- Non	1 (2%)
Duration of dialysis before transplantation (month)	40 (0-240)
Time to follow up after transplantation (month)	58 (4-155)
Preoperative maximum bladder capacity (ml.)	204 (80-550)
Recent serum creatinine (mg/dl)	1.4 (0.6-2.6)

Table 2. Frequency voiding chart (FVC) of the patients

Variable	Mean (range) or n (%)
- Daytime frequency, n (%)	
3-7	44 (88%)
8 or more	6 (12%)
- Nocturia	
0	6 (12%)
1	20 (40%)
2 or more	24 (48%)
- 24 hours voided volume (ml.)	1750 (1200-2700)
- Nocturnal voided volume (ml.)	391 (0-800)
- Functional bladder capacity (ml.)	371 (250-650)

Table 3. Lower urinary tract symptom score (AUA-SS)

Variable	n (%)	Variable	n (%)
- Total		- Incomplete emptying	
Mild (0-7)	49(98%)	0	43 (86%)
Moderate (8-19)	1(2%)	1	6 (12%)
- Frequency		2	1 (2%)
0	39 (78%)	- Nocturia	
1	9 (18%)	0	4 (8%)
2	1 (2%)	1	20(40%)
5	1 (2%)	2	18 (36%)
- Intermittency		3	3 (6%)
0	49 (98%)	4	4 (8%)
1	1 (2%)	5	1 (2%)
- Urgency		- Weak stream	
0	45 (90%)	0	48 (95%)
1	5 (10%)	1	1 (2%)
- Straining		2	1 (2%)
0	45 (90%)	- Quality of life score	
1	5 (10%)	0-2	49 (98%)
		3 or more	1 (2%)

Table 4. Correlation between bladder capacity and lower urinary tract symptom

Variable	Maximum bladder capacity		P-value
	<200 ml.	>200 ml.	
Age, mean(year)	39	44	0.08
N(%)	28(56%)	22(44%)	1.0
- Male	15	11	
- Female	13	11	
Serum creatinine	1.37	1.41	0.85
Duration of dialysis(month)	44	35	0.43
Time to follow up after Transplantation (month)	53	63	0.43
FVC			
- 24 hours voided volume (ml.)	1824	1657	0.13
- Nocturnal voided volume (ml.)	452	314	0.03
- Daytime frequency, n(%)			0.15
0-7	23(82%)	21(95%)	
8 or more	5(12%)	1(5%)	
- Nocturia			0.05
0-1	11(39%)	15(68%)	
2 or more	17(61%)	7(32%)	

Table 4. Correlation between bladder capacity and lower urinary tract symptom *(cont.)*

Variable	Maximum bladder capacity		P-value
	<200 ml.	>200 ml.	
AUA-SS			
- Total			0.05
Mild (0-7)	27(96%)	22(100%)	
Moderate (8-19)	1(4%)	0	
- Frequency			0.09
0	21(75%)	18(81%)	
1	5(18%)	4(9%)	
2-5	2(7%)	0	
- Intermittency			0.38
0	27(96%)	22(100%)	
1	1(4%)	0	
- Urgency			0.26
0	24(86%)	21(95%)	
1	4(14%)	1(5%)	
- Straining			0.26
0	24(86%)	21(95%)	
1	4(14%)	1(5%)	
- Incomplete emptying			0.08
0	22(79%)	21(95%)	
1	5(18%)	1(5%)	
2	1(3%)	0	
- Nocturia			0.04
0	2(7%)	2(9%)	
1	8(29%)	12(55%)	
2-5	18(64%)	8(36%)	
- Weak stream			0.77
0	27(96%)	21(95%)	
1	0	1(5%)	
2	1(4%)	0	
- Quality of life score			0.88
0-2	27(96%)	22(100%)	
3 or more	1(4%)	0	

From Table 3, the AUA-symptom score shows that 49 (98%) patients had mild lower urinary tract symptoms and 1 (2%) patient had moderate lower urinary tract symptoms. Most patients had nocturia (≥1 voids during a night's sleep) and 52% had nocturia 2 voids or more per night. The symptoms of frequency, urgency, intermittency, straining, weak stream and incomplete emptying were found as no symptom or low symptom score.

Mean preoperative maximum bladder capacity was 204 ml. The authors hypothesized that small bladder capacity was important because of lower urinary tract symptoms after transplantation. Patients were categorized into a bladder capacity less than 200 ml group and a larger than 200 ml group. The correlation between bladder capacity and lower urinary tract symptoms, including quality of life score, were assessed.

Small bladder capacity was not associated with age or gender (P-value = 0.08 and 1.0 respectively). Prolonged periods of dialysis were found more frequently in the small bladder capacity group, but this result is not statistically significant (P-value = 0.43).

Nocturia, nocturnal polyuria and the total symptoms score were found more significantly in the bladder capacity less than 200 ml group (P-value = 0.04, 0.03 and 0.05 respectively). There was no difference in gender, age, time to follow up, duration of dialysis, and 24 hours urine volume between the two groups.

There was no difference in frequency, urgency, intermittency, straining, weak stream, incomplete emptying, and quality of life score between the two groups.

Discussion

Atchara Mahayosnondet et al[2] reported that in Thai patients who were diagnosed with end stage renal disease had a smaller bladder capacity than healthy population. J.M. Chun et al[3] studied clinical outcomes in patients undergoing kidney transplantation with a small bladder, in which post-transplantation achieved satisfactory bladder capacity without other procedures. In this study, mean preoperative maximum bladder capacity was 204 ml. The authors assumed post-transplantation bladder capacity from maximum functional capacity, which increased up to 371 ml.

Although bladder capacity returned to satisfactory capacity, persistent lower urinary tract symptoms were found after renal transplantation in many studies. Dirk-Henrik zermann et al[4] reported that voiding frequency and nocturia were the main lower urinary tract symptoms after renal transplantation, and that these symptoms were associated with small bladder capacity, bladder pain, high urine output, diuretic use and urinary tract infection (Van Der Weide et al[1]). In this study, we excluded urinary tract infection, diuretic use and underlying diseases which are a potential cause of neurogenic bladde, e.g., diabetesmellitus, nocturia and nocturnal polyuria were found significantly, but did not impact quality of life score.

Urodynamics were used to evaluate the lower urinary tract symptoms before and after renal transplantation in many studies. Bladder hypersensitivity (31%), poor bladder compliance (38%), detrusor instability (25%) and detrusor-sphincter dyssynergia (33%) were found after renal transplantation (Dirk-Henrik Zermann et al[5]). Although urodynamics are accurate, they are also invasive, and may cause infection in immunosuppressive patients. AUA symptom score and the frequency voiding chart are used to evaluate and follow up lower urinary tract symptoms as an easy and safe investigation after renal transplantation.

Conclusion

Nocturia and nocturnal polyuria are characteristics of lower urinary tract function after renal transplantation; they are probably associated with a longterm anuria during hemodialysis and small bladder capacity. Quality of life was not impacted by LUTS due to a low symptom score for most patients.

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