LOWER URINARY TRACT SYMPTOMS IN ANURIA AND NON-ANURIA PATIENTS AFTER RENAL TRANSPLANTATION: A COMPARATIVE STUDY

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ABSTRACT

Objective: *The purpose of this study is to examine the difference of lower urinary tract (LUT) symptoms in anuric and non-anuric individuals after renal transplantation (RT).* ***Material & Methods:*** *LUT function and symptoms were assessed in subjects who had undergone RT at Cipto Mangunkusumo General Hospital, Jakarta, from November 2016 to June 2017. Subjects were divided into anuric and non-anuric groups. We excluded patients with surgical complications that could not undergo uroflowmetry.* ***Results:*** *Thirty-two (21 male, 11 female) subjects were recruited in this study. The anuric subjects were younger than the non-anuric ones (47 ± 12.82 vs. 51.31 ± 16.33, p < 0.001). There were no significant differences in the International Prostate Symptoms Score (IPSS) (6.5 ± 3.67 vs. 6.25 ± 2.95, p = 0.567), Overactive Bladder Symptoms Score (OABSS) (4.06 ± 2.01 vs 4.12 ± 2.39, p = 1.000), maximum urinary flow rate (Qmax) (20.32 ± 9.04 vs. 22.32 ± 10.31, p = 0.956), post-void residual (PVR) (41.12 ± 37.63 vs. 47.62 ± 38.63, p = 0.361) and voided volume (227.88 ± 112.30 vs 251.06 ± 126.75, p = 0.588) between anuric and non-anuric subjects, respectively. IPSS-voiding symptom, IPSS-storage symptom, and OAB symptom did not differ significantly between both groups (p > 0.05). Thirteen (13/16) and seven (7/16) subjects of the anuric and non-anuric groups were both pleased with their quality of life, respectively.* ***Conclusion:*** *LUT symptoms do not differ between anuric and non-anuric patients.*

Keywords: *Lower urinary tract symptoms, renal transplantation, anuria.*

ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk melihat perbedaan gejala saluran kemih bagian bawah pada pasien anuria dan non-anuria setelah menjalani renal transplantation (RT).* ***Bahan & Cara:*** *Fungsi dan gejala saluran kemih bagian bawah diperiksa pada pasien yang sudah menjalani RT di Rumah Sakit Cipto Mangunkusumo Jakarta, mulai dari bulan November 2016 sampai Juni 2017. Subyek penelitian dibagi menjadi kelompok anuria dan non-anuria. Kriteria eksklusi pada penelitian ini adalah pasien dengan komplikasi pembedahan sehingga tidak dapat melakukan pemeriksaan uroflowmetri.* ***Hasil:*** *Tiga puluh dua (21 pria, 11 wanita) subyek dilibatkan dalam penelitian ini. Subyek yang mengalami anuria berusia lebih muda dibandingkan dengan subyek non-anuria (47 ± 12.82 vs. 51.31 ± 16.33, p < 0.001). Tidak terdapat perbedaan signifikan pada International Prostate Symptoms Score (IPSS) (6.5 ± 3.67 vs. 6.25 ± 2.95, p = 0.567), Overactive Bladder Symptoms Score (OABSS) (4.06 ± 2.01 vs 4.12 ± 2.39, p = 1.000), kecepatan aliran urin maksimal (Qmax) (20.32 ± 9.04 vs. 22.32 ± 10.31, p= 0.956), residu pasca berkemih (post-void residual, PVR) (41.12 ± 37.63 vs. 47.62 ± 38.63, p = 0.361) and volume berkemih (227.88 ± 112.30 vs 251.06 ± 126.75, p = 0.588) antara masing-masing kelompok anuria dan non-anuria. Gejala berkemih-IPSS, gejala penyimpanan-IPSS and gejala OAB tidaak berbeda secara signifikan pada kedua kelompok (p > 0.05). Tiga belas (13/16) orang subyek dari kelompok anuria and tujuh (7/16) orang subyek dari kelompok non-anuria menyatakan kepuasan terhadap kualitas hidup mereka.* ***Simpulan:*** *Tidak terdapat perbedaan gejala saluran kemih bagian bawah pada kelompok anuria dan kelompok non-anuria.*

Kata Kunci: *Gejala saluran kemih bagian bawah, renal transplantation, anuria.*

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INTRODUCTION

Renal transplantation (RT), the gold standard therapy for end-stage renal disease (ESRD), has become a routinely performed surgical procedure as the result of newly developed immunosuppressive agents and antibiotics, improved quality of intensive care follow-up, advancing surgical techniques, and increased in experience.[1-2] LUT dysfunction is evident in approximately 20% of patients who had undergone RT as a treatment for congenital urologic abnormalities, such as posterior urethral valves and neurogenic bladder.[3-4] The effects of RT on ESRD of the patients with a nephrology condition; without any apparent LUT dysfunction, have been observed extensively.[5-6]

Available studies suggest the possibility of developing LUT symptoms in the patients, particularly increased urinary frequency and nocturia.[7-8] Patients with LUT symptoms pose a higher risk of urinary tract infections (UTIs) and graft deterioration.[9] After a successful RT procedure, the urine production shall immediately be restored and LUT has to adapt to variable urine volume after RT.[10] According to previous studies, the adaption of the LUT usually occurs within six months after RT,11 several studies have also revealed that LUT dysfunction and LUT symptoms might persist in long-term.[10]

After RT, during the early periods, the patients were instructed to take sample amounts of fluid to preserve their renal function. However, there is a lack of attention given to LUT functions and symptoms after RT to date.[10] A critical subset of patients who are undergoing RT without the evidence of LUT dysfunction, including those anuric before RT are presented as subjects in this study. The condition of the bladder before transplant would have a significant effect on developing condition post-transplant; dysfunctional bladder before transplant are associated with reduced bladder capacity and compliance. Due to the higher possibility of complication, therefore, preoperative evaluation included urodynamic assessment and bladder recycling are recommended for these patients.[12-13] To this date, studies comparing LUTS between anuric and non-anuric patients are scarce.

OBJECTIVE

This study aims to examine the difference of lower urinary tract (LUT) symptoms in anuric and non-anuric individuals after renal transplantation (RT).

MATERIAL & METHODS

The LUT function and symptoms in subjects who had undergone RT at Cipto Mangunkusumo Hospital Jakarta, from November 2016 to June 2017, were assessed. Subjects were divided into anuric and non-anuric groups. We excluded patients with surgical complications that could not undergo uroflowmetry. Variables including gender, age, International Prostate Symptoms Score (IPSS), Overactive Bladder Symptoms Score (OABSS), maximum urinary flow rate (Qmax), post-void residual (PVR), and voided volume were recorded. All statistical analyses were done using SPSS 23 for Mac. Numerical variables were analyzed using Independent T-test or Mann-Whitney U test.

RESULTS

A total of 32 subjects were recruited for this study. Twenty-one (65.6%) subjects were male. Comparison of characteristics between the anuric and non-anuric groups is presented in table 1. The anuric subjects were younger than the non-anuric ones (47 ± 12.82 vs. 51.31 ± 16.33, $p < 0.001$).

Table 1. Comparison of characteristics in the anuric and non-anuric groups.

	Anuric group (n =16)	Non anuric group (n=16)	P-value
Gender (N%)			
Male	11 (52.4%)	10 (47.6%)	0.710[a]
Female	5 (45.5%)	6 (54.5%)	
Age (mean ± SD)	47 ± 12.82	51.31 ± 16.33	< 0.001[b]

[a]Chi-Square [b]Independent T-test

Table 2. Comparison of IPSS, OABSS, Qmax, PVR, and voided volume between both groups.

	Anuric group (n = 16)	Non anuric group (n= 16)	P-value
IPSS (mean ± SD)	6.5 ± 3.67	6.25 ± 2.95	0.567[a]
OABSS (mean ± SD)	4.06 ± 2.01	4.12 ± 2.39	1.000[b]
Qmax (mean ± SD)	20.32 ± 9.04	22.32 ± 10.31	0.956[b]
PVR (mean ± SD)	41.12 ± 37.63	47.62 ± 38.63	0.361[b]
Voided volume	227.88 ± 112.30	251.06 ± 126.75	0.588[a]

IPSS = International Prostate Symptom Score, OABSS = Overactive Bladder Symptom Score (OABSS), Qmax = maximum urinary flow rate, PVR = Post-Void Residual
[a]Independent T-test [b]Mann-Whitney U Test

Table 3. IPSS-voiding and –storage symptoms.

	Anuric group (n = 16)	Non anuric group (n=16)	P-value*
Incomplete emptying	0.5 ± 1.32	0.13 ± 0.34	0.724
Frequency	0.75 ± 1.39	0.69 ± 0.95	0.809
Intermittency	0.13 ± 0.34	0.06 ± 0.25	0.780
Urgency	0.13 ± 0.34	0	0.564
Weak stream	2.5 ± 1.21	2.5 ± 1.41	0.696
Straining	0.13 ± 0.34	0	0.941
Nocturia	2.5 ± 1.21	2.5 ± 1.41	0.696

*Mann-Whitney U test

There were no significant differences in the International Prostate Symptoms Score (IPSS) (6.5 ± 3.67 vs. 6.25 ± 2.95, p = 0.567), Overactive Bladder Symptoms Score (OABSS) (4.06 ± 2.01 vs 4.12 ± 2.39, p = 1.000), maximum urinary flow rate (Qmax) (20.32 ± 9.04 vs. 22.32 ± 10.31, p = 0.956), post-void residual (PVR) (41.12 ± 37.63 vs. 47.62 ± 38.63, p = 0.361) and voided volume (227.88 ± 112.30 vs 251.06 ± 126.75, p = 0.588) between anuric and non-anuric subjects, respectively (Table 2). IPSS-voiding symptom, IPSS-storage symptom and OAB symptom did not differ significantly between both groups (p > 0.05) (Table 3). In this study, both groups had four (25%) subjects with OAB.

DISCUSSION

Based on the data obtained and observation, there is a significant difference in the quantity of urine excreted in ESRD, varying from normal volumes to none. Concerning that, numbers of patients will use their LUT inconsistently during the often lengthy waiting period. This condition is considered common after surgical procedure knowing that organ systems, including smooth muscle tissue, are prone to atrophy after a period of time of disuse. Hypothetically, disuse atrophy might occur within the bladder wall during ESRD due to long-term dysfunctional degenerative processes.[12]

Muscle atrophy is characterized by the reduction of muscle volume as well as its strength, and the urinary bladder is a hollow muscular organ.[7] The two utmost important functions of the urinary bladder, which are urinary storage and urinary evacuation, can be compromised if the organ becomes atrophic.[7,14] The urine production is expected to restore within a short period after a successful RT. The bladder was first drained using an indwelling catheter to protect the anastomosis between the ureter and bladder. Then the catheter was removed after six days, the bladder is expected to regain function in its ability to store and evacuate urine; assuming that those problems can occur after the catheter removal. The hypothesis was that more LUT symptoms would develop in patients with limited or non-functioning bladder compared to the normal functioning kidney. The risk of LUT symptoms after RT was also expected to increase for a longer period of bladder dysfunction.[7,14]

Several studies have assessed the progression of LUT symptoms in those who had undergone RT. A longitudinal study was conducted by Van der Weide et al., the study consisted of 53 subjects who had undergone RT, and the control group consisted of 74 subjects with nonurological complaints. Those groups then had a follow-up for three consecutive years post-RT.[15]

The study by Van der Weide et al. concluded that the incidence of nocturia among RT subjects is fairly persistent, and is greater than the number of incidence in controls.[15] A study by Chun et al. analyzing 340 ESRD subjects, found a progressive-linear connection among bladder capacity as well as compliance and the total years of dialysis years.[16] The development of post-transplant LUT symptoms, high-pressure bladder contraction, and possible graft damage might be caused by reduced bladder capacity and compliance. Chun et al. also demonstrated that the risk of developing LUT symptoms are higher for those with a bladder of capacity less than 100 ml.[16] This is caused by the notion that the bladder function will unlikely recover completely.

In the present study, there is no significant difference in LUT symptoms between both groups. This is possibly caused by the limited number of subjects and the cross-sectional nature of the study.

Some studies have assessed LUT symptoms in anuric patients who had undergone RT. Castagnetti et al. found that there is a great number of anuric patients without any evidence of LUT damage who still experience long-term LUT, particularly nocturia.[6] Castagnetti et al. also found that LUT symptoms tend to not improve over time, even after RT.[6] However, the study was limited to only a selected group of subjects with nephrology problems as the etiology of the ESRD, particularly those who had been anuric for at least six months before undergoing RT.

There is a rising concern on anuria as the cause of the development of poorly compliant, a low bladder that would lead to LUT symptoms after RT. A study by Errando et al. discovered that patients with a dysfunctional bladder would have the significantly lower cystometric capacity and bladder compliance compared to the ones with a well-functioning bladder.[14] According to these studies, it is recommended by some authors to conduct a urodynamic study and bladder recycling before RT in anuric patients.[14-15] On the other hand, the study by Martin et al. discovered that large numbers of patients who underwent renal transplants have regained bladder capacity, contractility, and function.[17] Serrano et al.[15] did study on previously anuric patients who underwent urodynamic patients has confirmed the discovery of Martin et al.[17] The study by Serrano et al. demonstrated that bladder capacity may go back to its normal values (300 ml) after RT even in patients with a bladder capacity of 100 ml prior to RT.[12] Other authors have also confirmed a similar improvement of LUT symptoms even at 6 years after RT.[14]

CONCLUSION

LUT symptoms do not differ between anuric and non-anuric patients. Further studies with prospective design are required to investigate the changes in LUT function and symptoms in anuric and non-anuric patients after renal transplantation.

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