



The Study of Urinary Tract Infection in Relation to Bladder Catheterization and Stenting in Renal Transplant Recipients

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ABSTRACT

Objective: To study the incidence of urinary tract infection (UTI) in relation to the number of catheter days and its relation to prophylactic stenting in renal transplant recipient.

Methods: A retrospective case-control study was conducted in Department of Nephrology, Madras Medical College, Chennai for 1 year from May 2012 to April 2013.

Result: The total number of patients included in the study was 141. The number of male patients was 110. The mean age in male cohort was 33.70±8.77. The number of female patients was 31. The mean age in the female cohort was 30.18±10.54. UTI occurred in 58 patients. In patients with indwelling bladder catheterization less than 7 days duration, urinary infection occurred in 13 out of 57 (23%) patients. In those with indwelling catheterization for more than 10 days, urinary tract infection occurred in 20 out of 26 (75%) patients. 50 patients out of 141 underwent prophylactic stenting in the study group. Urinary tract infection occurred in 21 out of 50 patients with prophylactic stenting. UTI occurred in 37 out of 91 patients without stenting. There was no correlation between stenting and UTI in renal transplant recipient (P=1).

Conclusion: Bladder catheterization more than 7 days increases the incidence of UTI. Prophylactic stenting did not increase the incidence of UTI.

KEYWORDS : Bladder Catheterization, Stenting, Urinary Infection.

Introduction

The best form of renal replacement therapy is renal transplantation. In renal transplant, vesicoureteral anastomosis is done by end-to-side extravesical implantation of the ureter into the anterior wall of the bladder, by modified Lich-Gregoire technique¹. Bladder catheterization with continuous bladder drainage is being done for healing of ureteroneocystostomy. Urinary catheter is an important predisposing factor for nosocomial UTI. Double-J stent is a straight tube with anchoring J loops at the end. Prophylactic stenting of the ureter is being done to avoid major urological complication originating from vesicoureteral junction anastomosis². The use of trimethoprim-sulphamethoxazole for three months to life time is used for prophylaxis of urinary tract infection and PCP pneumonia³. Even with prophylaxis, urinary tract infection (UTI) is a common infection in the post transplant period.

Objectives: To study the incidence of urinary tract infection in relation to the number of catheter days and its relation to prophylactic stenting in renal transplant recipient.

Materials and methods

Study design is retrospective case-control study. Records of patients who underwent renal transplant in Madras Medical College and those attending renal transplant clinic and those admitted in renal transplant ward, Department of Nephrology, Madras Medical College, from May 2012 to April 2013, with fever or urinary symptoms in the form of dysuria, frequency, urgency suprapubic pain or pain over graft, or fever of unknown origin were included in the study.

All patients underwent urine analysis, complete haemogram, blood urea, serum creatinine, urine gram stain and culture and sensitivity including fungal, blood culture and sensitivity for enteric and non enteric organism, Ultra sonogram abdomen including kidney, ureter and bladder. When complication was suspected, selected patient underwent CT abdomen. **Specimen collection-** Urine specimens for culture were obtained prior to starting antimicrobial therapy for suspected catheter associated UTI, because of the wide spectrum of the possible infecting organism. Specimens for culture are obtained by sampling through the catheter port or if the port was not present, puncturing catheter tubing with syringe and needle.

Result

The total number of patients included in the study was 141. The

number of male patients was 110. The mean age in male cohort was 33.70±8.77. The number of female patients was 31. The mean age in the female cohort was 30.18±10.54. The number of patients who received live related transplant was 100. The patients who had at least one episode of urinary tract infection were 58. Stenting was done in 50 patients. Urinary infection occurred in 21 patients with stenting.

Catheter days and UTI

Catheterization of bladder is a usual procedure in post renal transplant to favour healing of neo-cystourethroostomy. Mean number of catheter days in those with urinary tract infection was 9.69±2.74. The mean number of catheter days in those without urinary tract infection was 8±1.79. There was no correlation between the duration of indwelling bladder catheterization and the incidence of urinary tract infection (P>1.0).

In subgroup analysis there was a correlation between catheter days and urinary infection.

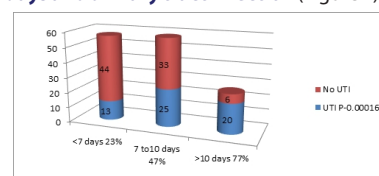
Table 1.

Catheter days	Urinary tract infection	Without urinary tract infection	Total number	Percent
< 7days	13	44	57	23%
7-10 days	25	33	58	47%
>10days	20	6	26	77%

P-value 0.00016

In patients with indwelling bladder catheterization less than 7 days duration, urinary infection occurred in 13 out of 57 (23%) patients. In those with indwelling catheterization for more than 10 days, urinary tract infection occurred in 20 out of 26 (75%) patients. There was a significant correlation between the duration of indwelling bladder catheterization and the incidence urinary tract infection (Table 1).

Catheter days and urinary tract infection (Figure 1)



Stenting and urinary tract infection

50 patients out of 141 underwent prophylactic stenting in the study group. Urinary tract infection occurred in 21 out of 50 patients with prophylactic stenting. UTI occurred in 37 out of 91 patients without stenting. There was no correlation with stenting and UTI in renal transplant recipient ($P=1$).

Mean number of days of stenting in those without urinary tract infection was 47.45 ± 13.58 . The mean number of days of stenting in those with urinary tract infection was 43.30 ± 6.42 . There was no correlation between the duration of stenting and the incidence of urinary tract infection ($P=0.21$).

Table 2 – Stenting and UTI

Donor	Urinary tract infection	No urinary tract infection
Deceased donor	15	26
Live donor	6	3

P-value 0.14

In those patients who underwent prophylactic stenting 15 out of 41 (36.6%) recipients of deceased donor kidney had urinary tract infection. In the recipients of live donor kidney, those who underwent prophylactic stenting 6 out of 9 (66.7%) developed urinary tract infection. There was no correlation between donor status and the incidence of UTI ($P=0.14$), even though there was a trend towards more urinary infection in live donor recipient with stenting (Table 2).

Discussion

Vesicoureteral anastomosis initially was done by transvesical approach (Lead better politano technique). Now the technique is end-to-side extravascular implantation of the ureter into the anterior wall of the bladder, by modified Lich-Gregoire technique¹. The anastomosis was made between the spatulated distal donor ureter and a small bladder mucosal nick. The complications of anastomosis occur during the early post transplant period mostly in the first three months. The complications include obstruction, urinary leak, necrosis, stenosis and vesicoureteral reflux². The ureteric obstruction can also be caused by intraluminal obstruction, such as calculi, blood clots, or extra luminal compression of blood and lymphatic fluid^{4,5}. The urological complication arises as a result of distal transplant ureteral ischemia or due to surgical factors like ureteroneocystostomy techniques and poor graft harvesting. These complications cause delayed graft function, increased morbidity and may cause graft or patient loss⁶. Prophylactic stenting of the ureter is being done to avoid major urological complication originating from vesicoureteral junction anastomosis. Stenting is preferred by most transplant surgeons, when the healing process is either expected to be delayed or there is an increased risk of urine leak after transplantation. Benefits of stenting are simplifying the creation of water tight anastomosis and reduced incidence of anatomical kinking.

Complications of stenting are stent migration, irritative bladder symptoms like post operative pain and stone formation in the graft kidney after transplantation, persistent hematuria, encrustation, breakage, complication during removal, forgotten stents, erosion of lumen and importantly post operative urinary tract infection⁷. Stent can also exacerbate long-term stricturing of the ureter⁸. The incidence of UTI is increased not only during stenting period, but also after removal of the stents. Stenting can convert what may be a simple urinary tract infection to complicated pyelonephritis, and can act as a focus for bacterial persistence⁹. Stenting predisposes not only to urinary tract infection but also to the formation of biofilm on the surface similar to that occurring in bladder catheterisation, predisposing to the formation of multi drug resistant organism.

According to Tanweer Iqbal, there was a significant correlation between the number of catheter days and urinary tract infection,

with more urinary tract infection, whenever the catheter was retained for prolonged periods¹⁰. In our study also there was a strong linear correlation with the number of days of catheterisation and occurrence of urinary tract infection.

In patients, in whom the catheter was retained for less than 7 days, 23% developed UTI. In those patients in whom the catheter was retained for 7 to 10 days, 47% developed UTI. When catheter was retained for more than 10 days, about 77% of patients developed UTI in the post transplant period.

Urinary catheterization was done in the immediate post-transplant period and continuous bladder drainage was being maintained to avoid the early urological complication like urine leak. Whenever the drain volume is more than 30ml and, if the operating surgeon is in doubt of urological complication, will retain the bladder catheter for some more days. With every additional day of catheterization, there is progressive increase in the percentage of patients developing colonization of the urinary tract, which commonly arise through the peri-urethral route¹¹. The organisms causing urinary tract infection in those with indwelling catheterization frequently originate from the hospital environment, and due to biofilm formation have resistance to multiple antimicrobials¹¹. The surgeon should balance the risk of urological complication from early catheter removal, which compromises the neo-ureterocystostomy and the risk of UTI from retaining the catheter for a long period.

In routine urological procedure the diseased ureter is anastomosed to the diseased bladder making the anastomosis at risk of compromise when it is not supported by continuous bladder drainage². In renal transplant surgery the anastomosis is made between the healthy donor ureter and usually healthy recipient bladder making the risk of anastomosis complication less likely, so that early removal of catheter can reduce the incidence of catheter associated urinary tract infection in the profoundly immunosuppressed recipient in the early post transplant period²⁹.

According to Mathe Z, et al, there was no increased incidence of urinary tract infection in those with stenting when compared to those without stenting¹². According to Osman Y, et al, there was increased incidence of UTI in those with prophylactic stenting in live donor recipient¹³. In our study, there was no correlation between prophylactic stenting and the incidence of UTI.

In our study, stent was kept for an average of more than 6 weeks and there was also more urinary tract infection in live-related transplant when compared to deceased donor transplant with urinary stenting. This may be due to the fact, in deceased donor transplant routine prophylactic stenting is being followed, since there is prolonged ischemic time and there is every chance for no urine output after clamp release, so ensuring water tight anastomosis may not be possible. In live donor transplant, the indication for stenting may be abnormal bladder¹³, which may be a risk factor for urinary tract infection by itself and our study population with stenting in live related transplant is too small to make any comment regarding increased urinary infection in those with stenting.

Conclusion

Urinary tract infection was increased in accordance with the number of days of bladder catheterization, with more incidence of urinary tract infection with increased number of catheter days. The incidence of urinary tract infection was not increased in those with prophylactic stenting, but stenting is to be used judiciously and the duration of stenting should be minimized to 4 weeks. There should be close surveillance for infection after stent removal.

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