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Original Research Article

Role of Selective Double-J Stenting in Renal Transplantation

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Abstract: Prophylactic insertion of Double-J(DJ) stent remains controversial in renal transplantation. Recent studies regarding DJ stenting concluded that their routine use improved outcomes. But they also lead to adverse complications, leading to advocation of stenting in selected situations. The objective is toanalyze the potential benefit and drawbacks of selective DJ stenting across a ureteroneocystostomy in renal transplant recipients at a single centre. A total of 81 patients were operated and followed up in our study. 39 patients (Group 1) had a Double-J stent placed because of various factors while it was not placed in 42 patients (Group 2). Urological complications like leaks, obstruction, urinary tract infection were compared between these 2 groups. In group 1, 14 out of 39 (35.89%) and in group 2, 6 out of 42 (14.28%) developed urinary tract infection, which is statistically significant (P=0.024). There was no occurrence of urinary leaks or collecting system obstruction in either group. The mean serum creatinine at discharge was 1.14±0.26 mg% and 1.05±0.22 mg% in groups 1 and 2, respectively (*P=0.94*). There was one case of forgotten Double-J stent, which was later removed. Our results demonstrate that many patients can be successfully transplanted without the use of Double-J stent. Double-J stent insertion increases the incidence of urinary tract infection. So routine Double-J stenting should be avoided as much as possible unless otherwise indicated.
Keywords: Renal transplantation, Double-J (DJ) stenting, ureterovesical anastomosis.

INTRODUCTION

Kidney transplantation is the treatment of choice for end-stage kidney disease (ESKD). The routine use of prophylactic ureteral stenting in renal transplantation remains controversial.

The benefits of stents include simplifying the creation of a watertight ureterovesical anastomosis, protection from ureteral narrowing and reduction of anatomical kinking [1-3] while disadvantages are an increase in the number of urinary tract infections (UTI), stent breakage, encrustation, migration and complications like urinary tract infection during removal [4–6]. In this prospective study, we analyzed the potential benefit and drawbacks of selective stenting across a ureteroneocystostomy in renal transplant recipients performed in our institute.

MATERIALS/PATIENTS AND METHODS

Recipients of kidney transplantation at our institute between January 2014 and December 2015 were included in the study. Pediatric recipients younger than 18 years, patients with urinary diversion and recipients of more than 1 previous transplant were excluded from the study.

Patients were managed according to the standard transplant protocol of our institute.All our patients were assessed preoperatively by a multidisciplinary team consisting of a transplant surgeon, nephrologist, anesthesiologist and surgical clearances were obtained from other physicians like a cardiologist, gastroenterologist, gynecologist etc.Our patients received kidneys from living donors only, most of them were related to the patient. Surgery was performed by our transplant surgeons team, who grafted the kidneys extraperitonealy, frequently in the right iliac fossa. At surgery, a 5.5-French, 18 cm, Double-J(DJ)

ureteral stent was inserted at the discretion of the operating surgeon to establish internal drainage from the ureteropelvic junction to the bladder using extravesical Lich-Gregoir technique. In Lich-Gergoir technique after dissecting the bladder mucosa from the bladder muscle layer i.e. detrusor muscle, the ureter is spatulated and is then circumferentially sewn by 5-0 PDS continuous sutures to urinary bladder mucosa. Following this, the bladder muscular layer is re-approximated over the anastomoses and the ureter to produce an anti-reflux mechanism. Stents were inserted if, there was suspicion of damage to ureteral blood supply, if there was unhealthy urinary bladder mucosa, if there was history of prior urinary bladder surgery, in those with anatomic variations in ureters like duplication of ureter, in donors with multiple renal arteries and in those with renal arterial injuries during harvesting procedure . Post-operative foleys catheter was removed on day 5. A midstream specimen of urine, for urine routine examination and urine culture, was sent on postoperative day 5 and 48 hrs prior to removal of the stent and this was repeated if the patient was symptomatic. Doppler ultrasonography was done in all recipients on postoperative day 5 to assess the vascular integrity of the graft, resistive index of graft, any hydronephrosis, and perigraft fluid collection. The stent was removed after 2-3 weeks by rigid cystoscopy under local anesthetic on a day care basis.

Immunosuppression comprised of anti-thymocyte globulin (induction), tacrolimus (0.1 mg/kg per day), mycophenolic acid (2 g/d) and prednisolone. Antibiotic prophylaxis included a single intravenous dose of augmentin 1.2 g at anestheticinduction, continued 5 days post transplant. A daily dose of co-trimoxazole 480 mg for three months was subsequently started post transplantation.

The diagnosis of UTI was made on the basis of compatible symptoms supported by urinalysis and/or microbiological culture. Major urological infections (MUIs) included complicated UTI, pyelonephritis, and urosepsis with or without bacteremia. Delayed graft function (DGF) was defined as requirement for dialysis within the first week of transplantation. Primary non-function (PNF) was defined as a graft that never worked or that never allowed the recipient to come off dialysis.

Obstruction was defined as impaired renal transplant function with an ultrasound finding of pelvicalyceal dilatation. Urine leakage was defined as drainage or accumulation of urine around the graft or in the operative wound. Patients were regularly followed up every 3 months.

Demographic and non-parametric outcome variables between groups were assessed using $\chi 2$ and Fisher's exact tests. Unpaired *Student's t*-test was used for comparison of parametric data between the two groups. A $p<0.05$ was considered statistically significant. We used Statistical Package for Social Science (SPSS, version 20, IBM Corporation, NY, USA).

RESULTS

Eighty one renal transplant recipient patients were included in this study.

There were 39 with DJ stent (Group 1) and 42 without a DJ stent (Group 2).Table 1 shows the demographic characteristics of patients in our study. Fourteen patients underwent ureteral stenting for a questionable blood supply to the ureter, six patients for an unhealthy appearing urinary bladder , six with history of prior urinary bladder surgery, one with duplication of ureter and twelve with multiple renal arteries in transplanted kidney. The mean age ± SD of recipients in group 1 is 31.76 ± 7.97 yrs and in group 2 is 33.64 ± 9.10 yrs. The mean age ± SD of donors was 44.39 ± 9.28 yrs in group 1 and 46.76 ± 8.63 yrs in group 2. Cold ischemia time was 30.4 ± 10.6 minutes in group 1 and 32.6 ± 11.3 minutes in group 2. Warm ischemia time was 2.6 ± 0.2 minutes in group 1 and 3.1 ± 0.3 minutes in group 2.

In group 1 there were 31 male and 8 female recipients. In group 2, there were 35 male and 7 female recipients. Therewere 11 laparoscopic and 28 open donor nephrectomies in group 1 and 23 laparoscopic and 19 open donor nephrectomies in group 2.

In group1, 14 (14/39) patients developed UTI's while in group 2, 6 (6/42) patients developed UTI's. After applying statistical analysis via a chi-squaretest, the p-value came out as 0.024 which is statistically significant. UTI was diagnosed in total 20 recipients in both groups-Klebsiella pneumoniaein 8, Escherichia coli in 6, Pseudomonas aeruginosasin 2, Enterobacter sp. in 1, Staphylococcus epidermidisin 2, and Proteus mirabilis in 1 patient. This was successfully treated promptly with parenteral antibiotics until the urine culture was negative.

There was no renal transplant recipient in either group which developed postoperative urinary leakage or obstruction. Hospital stay was similar in both groups. The mean postoperative serum creatinine at discharge was 1.148 mg/dl in group 1 and 1.059 mg/dl in group 2. After applying student t-test, the P value was calculated as 0.944 which is statistically insignificant. The patient follow up was for a mean of 8.6 ± 2.4 months for group 1 and 7.8 ± 3 months for group 2.

There was one case of a forgotten DJ stent in our study, in a recipient who had received a kidney with duplex ureter where 2 DJ stents were inserted. One was removed cystoscopically while one was left behind. This was removed 5 months postoperatively, when on the investigation of the patient for repeated episodes of

urinary tract infection a DJ stent was discovered on imaging.

Three patients developed delayed graft function in group 2 and eight patients in group 1. No patient in either group had primary non-functioninggraft or rejection. There was no patient mortality in either group.

Comparison of both groups showed that there was a significant increase in the incidence of UTI's in stented as compared to non-stented patients, which was statistically significant.

Table-1: Demographic characteristics of patients in our study

	GROUP 1 (With DJ Stent)	**GROUP 2 (No DJ Stent)**	**P Value**
Number	39	42	
Recipient Age(yrs)	31.76±7.97yrs	33.64±9.10yrs	0.79
Donor Age(yrs)	44.39±9.28 yrs	46.76±8.63 yrs	0.32
Male/Female	31/8	35/7	
Hypertensive	39	42	
Diabetic	7	5	0.44
Cold Ischemia Time(min)	30.4±10.6 min	32.6±11.3 min	0.37
UTI Present(%)	14/39 (35.89%)	6/42 (14.28%)	0.02
Mean Serum Creatinine (mg/dl)	1.148 ± 0.26 mg/dl	1.059 ± 0.22 mg/dl	0.94
Urinary Leakage	0	0	
Urinary Obstruction	0	0	

Table 2. Randomized controlled trials comparing stenting versus no stenting in renal transplantation

Investigators	**Patients(n)**	**UTI(%)**	**Ureteral complications(%)**
Pleass *et al*[12]			
Stented	150	7.3	0
Non stented	150	7.3	17
Benoit *et al*[9]			
Stented	97	32	1
Non stented	97	33	10.3
Kumar *et al*[2]			
Stented	57	35	0
Non stented	43	30	7
Bassiri *et al*[10]			
Stented	35	33	0
Non stented	37	5	5
Dominguez *et al*[11]			
Stented	143	-	3.5
Non stented	137	-	6.5
Osman *et al*[13]			
Stented	48	39.6	4.1
Non stented	50	18	0
Present study (2016)			
Stented	39	35.89	0
Non Stented	42	14.28	0

DISCUSSION

Conventionally, native ureteric repairs over stents are accepted to have a better outcome as compared to without stenting [6].Stents have been successfully used in ureterovesical reconstruction, pyeloplasty and in the management of stone disease[7], however, their routine insertion in renal transplantation is still controversial. This is because of stent-related complications, especially in an immunocompromised patient like stent breakage, proximal or distal stent migration, infections, have been all considered good reasons against routine ureteric stent utilization[8]. Moreover, a second procedure for cystoscopic stent removal is required postoperatively. But stents are advantageous in that prevent early obstruction secondary to anastomotic edema, they prevent urinary leakage due to disruption of the ureterovesical anastomosis, it allows easy anastomosis, prevents high pressure in the renal pelvis and avoids ureteral bending[2,9].

On reviewing the literature, six randomized controlled trials [2,9-13] comparing stenting versus no stenting in renal transplantation were identified (Table 2). Three found that using DJ stent helps in reducing post-operative urological complications [2,9,12] while three found increased morbidity with their use[10,11,13] mainly in the form of increased urinary tract infection. This difference may occur due to different techniques of ureteroneocystostomy used in different studies, differences in donor and recipient characteristics in different studies like some used only living donors while some used cadaveric and living both.

Osman *et al*[13] and Bassiri *et al*[10] reported increased incidence of UTI's with the use of stents in renal transplantation. Osman *et al*[13] found female sex and stents to be independent predictors of postoperative UTI's. Also, he used only living donors and Lich-Gregoir type of ureterovesical anastomosis in his study. Similarly in our study too we have used only living donors and Lich-Gregoir ureterovesical anastomosis. In our study also there is a statistically significant increased incidence of UTI's in stented (35.89%) as compared to non-stented (14.28%) patients (p=0.024).

In our study, the postoperativemean serum creatinine was similar in both the groups with no statistical difference (p>0.05). A study by Osman *et al*[13] also found that mean postoperative serum creatinine was not statistically different between stented and non-stented groups (1.2±0.3 mg% and 1.2±0.4 mg%,*p*> 0.2).

Osman *et al*[13] did not note any impact of routine ureteral stenting on the rate of vesicoureteral leakage or obstruction [13]. Similarly, Dominguez *et al*[11] found no significant decrease in urological complication rates with stenting in their trial in 280 patients. Similarly in our study too there was no difference between urological complication rate between stented and non-stented patients. In a recent review, Wilson *et al*[14] concluded that the routine prophylactic stenting decreases the incidence of major urological complications.

In the case of selective stent placement, a careful record of stented patients should be maintained along with contact details of patients, so that they are called for DJ stent removal to avoid complications resulting from a forgotten stent. This unfortunate occurrence was seen in one of our patients, but this is well recognized in the literature [15–18].

So we can conclude that routine DJ stenting increases patient morbidity in renal transplant recipients. DJ stents can be avoided in vast majority of kidney transplant patients, particularly those who receive anatomically normal kidneys without suspicion of damaged ureteral blood supply and who have no evidence of bladder dysfunction.

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