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Clinical Study about Comparison Culture of Allograft Ureteral Stents with Urine Culture of Kidney Recipients

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Abstract

Background: Inserting ureteral stent for allograft ureter during anastomosing reduces complication of anastomosing and it is recommended by some experts but stent is foreign body and it may causes some complications in which infection may be one of them that we have investigated in this study. To determine the correlation between urine cultures (one week post transplantation at the time of Foley catheter removing and also four weeks post transplantation at the time of ureteral catheter removing) and ureteral stent bacteria in allograft kidney.

Methods: 61 recipients of kidney transplantation at our center between 2012 and 2015, 34 males and 27 females between age of 12 to 60 years, whom were operated by same team of transplant and same immunosuppressive and antibiotic medicines, all were included in this study. All the information with details of urine and stent cultures were collected prospectively and analyzed retrospectively. Four weeks post transplantation, ureter stent was removed and it was cultured. The result of stent culture was compared with urine culture which was sampled one week post transplantation (during removing urethral Foley catheter from bladder) and also with urine culture which was sampled before removing ureter stent four weeks post transplantation.

Results: Entirely, 61 patients (all during initial procedure) were sampled following transplantation (one and four week post transplantation). In 18 cases the ureter stent cultures were positive (7 female and 11 males), which from these, just only one (5.6%) case the result of urine culture before ureter stent discharge (four weeks post transplantation) was positive. In the rest of 43 cases, ureter stent cultures were negative. Hence, in sixty (98.4%) cases urine culture before stent removing were negative.

In 12(63.2%) cases the result of the urine cultures at the time of removing urethral Foley catheter (one week post transplantation) and ureter stent cultures were positive, and 18(29.5%) cases urine cultures at time of removing urethral Foley catheter (one week post transplantation) were positive (11 females and 7 males) but in 6 (14.3%) of them ureter stent cultures were negative.

Conclusion: Four weeks post kidney transplantation, three percent (3%) of ureteral stent cultures were positive but concordance urine cultures were negative, which means urine culture did not indicate bacteria of ureteral stent but there is correlation between urine culture during removing urethral Foley catheter from bladder and ureteral stent culture.

Keywords: Ureteral stent; Urine infection; Urethral catheter; Kidney transplantation

Introduction

The choice treatment for end-stage kidney disease is Kidney transplantation. But all of the kidney transplantations have risk of complications [1-3]. Alter and refinement in surgical techniques and presentation of new immunosuppressive protocols resulted in a considerably decreased incidence of urological complications from 20% in the 1970s to less than 5% in the 1990s [4-7]. Vesicoureteric complications present as urine leaks, ureteric stenosis or obstruction (major urological complications (MUC)) [8]. These urinary complications are common technical complications correlated with renal transplantation [1,9,10]. In the deprivation of technical complications, presumably major responsible of early ureteric complications post transplantation is ureteric ischemia. The other major complication is urinary leakage from Ureteroneocystostomy anastomosis [8]. Ureteroneocystostomy anastomotic leakage and/or strictures complicate 3-9% of all renal transplants [1-3]. In an intention to decrease the rate of urinary complications, multitudinous studies have addressed the issue of routine anastomotic stenting in renal transplantation but the controversy continues [9, 11-18]. With the aid of "double-J" stent (DJ), minor ureteric leak and obstruction successfully have been treated [19]. Stents are used to protect the ureter-bladder anastomosis in renal transplantation routinely or selectively [1,9,10,20,21]. A study suggests that Stent insertion does not eliminate the risk of complications, exclusively urinary leak but may contribute in approach to managing complications [22]. Routine anastomotic stenting is a common procedure recommended in order to avoid or reduce urological complications. But the risks of blood stream or urological infections in transplant patients received stent due to immunosuppression, are high [23-25]. Beside selectively stent insertion on the basis of clear indications, mostly difficult anastomosis or in some conditions in order to ureteric ischemia, the vesicoureteric viability may be compromised [12,13,16,17,26]. Major urological complications (MUCs) develop promptly after transplantation and participate in graft loss, morbidity and mortality of patients(within three months) [27,28]. It has been our policy to insert stent routinely in all cases. Bacterial colonization and stent associated bacteriuria significantly increases with indwelling time of stent [29].

The key question is how to predict and diagnose the incidence and increasing risk of urological complications, particularly urological infections in patients with stent inserted at transplantation and to determine if urine cultures are contributory and diagnostic in detecting bacterial contamination of ureteral stent in early post transplantation period or not.

Materials and Methods

61 recipients of kidney transplantation at the west and North West Transplant Centre, Emam Hospital, Tabriz between 2012 and 2015, 34 males and 27 females between age of 12 to 60 years, whom were operated by same team of transplant and same immunosuppressive and antibiotic medicines, were included in the study. The entire patient's data and information with details of urine and stent cultures were collected and entered prospectively into the computer database then analyzed retrospectively. Three immunosuppression medication comprised cyclosporine (Sand immune (3-5 mg/kg per day)), mycophenolate mofetil (Cellcept (1g twice per day)) and prednisolone (50-60 mg) with antibiotic prophylaxis (cotrimexazol) were included. In order to establish an internal drainage from the uretero-pelvic junction to the bladder, a 4-French ureteral stent (DJ) was inserted at surgery.

The duration of retention of routinely placed stents was decided to be 4 weeks. The stent was removed under local anesthetic by aide of cystoscopy 4 weeks post transplantation. A midstream specimen of urine was sampled from catheter by syringe at the time of removing urethral Foley catheter (one week post transplantation) and before ureter stent discharge (four weeks post transplantation) for culturing. Also a stent culture was provided in order to compare with both of a bove urine cultures. Four weeks post transplantation, ureter stent was removed and it was cultured. The result of stent culture was compared with urine culture which was sampled one week post transplantation (during removing urethral Foley catheter from bladder) and also with urine culture which was sampled before removing ureter stent four weeks post transplantation. The diagnosis of MUC was made on the basis of match able symptoms supported by microbiological urine culture. Relevant data including age, gender, date of transplant, date of urine (one and four week post transplantation) and stent cultures with all detailed results (Isolated bacteria species, colony count, sensitive and resistant antibiotics) were entered into information sheets. This data was then transferred to a Microsoft Excel worksheet and analyzed using SPSS 23® for Windows.

Statistical Analysis

One week post transplantation urine culture (before Foley catheter discharge (F/C)) and four week post transplantation urine culture (before DJ stent discharge (U/C)) were compared with DJ stent culture (S/C). Differences between cultures were tested by the $\chi 2$ statistic. A P-value of < 0.05 was taken as significant.

Results

In 61 kidney transplant recipients between age of 12 to 60 years comprising34 males with mean age 39.4 ± 1.0 years and 27 females with mean age 34.1 ± 1.0 years giving male to female ratio of 1.2:1, were sampled following transplantation (one and four week post transplantation).

In 18 cases the S/C was positive, which from these, just only in one case (5.6%), the result of U/C was also positive. In the rest of 43 cases, S/C was negative. Hence, in sixty (98.4%) cases U/C was negative. So the differences between U/C and S/C were not statistically significant (Pearson $\chi 2=2.429$; df=1; P=0.295) (Table 1).

Totally in 18 (29.5%) cases the result of F/C was positive. Among these in 12 (63.2%) cases, F/C and S/C both was positive. In other 6 (14.3%) cases, F/C was positive but S/C was negative, the differences between F/C and S/C was statistically significant (Pearson $\chi 2=12.260$; df=1; P=0.001) (Table 2).

		Stent culture		P value
		negative	positive	
Urine culture	negative	43(100%)	17(94.4%)	0.295
	positive	0(0.0%)	1(5.6%)	

Table 1: Comparison the results of urine culture before stent discharge and stent culture

		Stent culture		P value
		negative	positive	
Foley catheter culture	negative	36(85.7%)	7(36.8%)	0.001
	positive	6(14.3%)	12(63.2%)	

Table 2: Comparison the results of foley catheter and stent culture

Better to remark that the most isolated microorganisms were Gram negative bacilli such as *Enterobacter aerogenes*, *Pseudomonas aeruginosa* and *Escherichia coli* (in order of abundance).

Discussion

The key question in our study was: is it possible to determine bacterial contamination of ureteral stent by simple urine culture? In other words, does urine culture indicates ureter stent culture in allograft kidney?

Our findings in this study demonstrate that four weeks post kidney transplantation, three percent (3%) of S/C (DJ stent cultures) were positive but concordance U/C (urine cultures) were negative, which means urine culture did not indicate bacteria of ureteral stent but there is correlation between F/C (urine culture during removing urethral Foley catheter from bladder) and S/C. As Rahman MA et al. [29] says indwelling DJ stent carries a significant risk of stent colonization and bacteriuria and the sensitivity of urine culture to stent colonization is low which is correspond with our results. The result of our study including that sterile urine culture does not rule out colonization of ureteral stent is same with investigations of Kehinde EO et al. [25]. Although accuracy of laboratory and proficiency of its personnel were factors might influenced results of the cultures but our results suggest F/C could be a predictive, diagnostic and prognostic factor to predict and diagnose the incidence and increasing risk of urological complications (particularly urological infections) early post renal transplantation in patients with DJ stent inserted during transplantation. Also our study indicates that in kidney transplant recipients for removing stent, using prophylactic antibiotic may prevent sepsis in some cases but more studies recommended to be done in this field.

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