Cadaveric renal transplant recipients can safely tolerate removal of bladder catheters within 48 h of transplant

Evan S Glazer MD MPH¹, Mohammad Akhavanheidari MD¹, Kelly Benedict MD¹, Sam James MD¹, Ernesto Molmenti MD PhD MBA FICA²

ES Glazer, M Akhavanheidari, K Benedict, S James, E Molmenti. Cadaveric renal transplant recipients can safely tolerate removal of bladder catheters within 48 h of transplant. *Int J Angiol* 2009;18(2):69-70.

The ideal time to remove urinary catheters after renal transplantation has not been thoroughly established. It remains unclear whether the anastomosis is actually protected with prolonged bladder catheterization. In addition, the incidence of urinary tract infections may increase with

prolonged catheterization. A series of 57 consecutive deceased donor renal transplants was retrospectively reviewed for outcomes associated with duration of bladder catheterization. Removing urinary catheters within 48 h post-transplant showed no increase in undesirable outcomes, and very likely improved patient satisfaction.

Key Words: Cadaver; Catheter; Deceased; Donor; Foley; Infection; Kidney; Satisfaction; Transplant; Urinary

Bladder catheterization during renal transplant provides multiple benefits. Postoperative bladder decompression is the most obvious. It also allows for sterile irrigation just before the anastomosis. However, there are risks to catheterization. Urinary catheters are a major source of nosocomial infections in the transplant population. Furthermore, approximately 60% of bacteremias originate in the urinary tract (1,2). The purpose of the present study was to evaluate potential risks and benefits associated with early removal of invasive bladder catheters in the immediate post-transplant period.

METHODS

Fifty-seven consecutive cadaveric kidney transplant recipients were prospectively enrolled in a clinical database. The same surgeon performed all transplants. Postoperative follow-up was shared between the abdominal transplant service and the nephrology service.

The standard technique involved performing arterial and venous anastomosis and reperfusion of the kidney. Subsequently, the urinary bladder was filled with 120 mL of an iodine-containing solution and then incised. The ureter was trimmed and spatulated. A tension-free anastomosis with a nipple valve antireflux mechanism was constructed with full-thickness Maxon sutures of both ureter and bladder. No stents were used. Ultrasound examinations performed in the immediate postoperative period allowed for baseline evaluation of allograft perfusion and absence of hydronephrosis.

Routine urinalyses were obtained at the time of removal of bladder catheters. A urinary tract infection (UTI) was defined as a culture with greater than 10,000 colony-forming units, a clinical examination with a urinalysis consistent with infection, or an uncontaminated urinalysis with pyuria and bacteria that subsequently grew in culture.

End points of the present study were hospital stay, duration of bladder catheterization, delayed graft function or post-transplant dialysis, warm and cold ischemic times, UTIs and acute tubular necrosis (as diagnosed by nuclear imaging). Any day or fraction of a day in which a catheter was in place was considered to be a whole day. Due to the very small number of patients with catheters in place for more than six days ($n=7$), the group was considered to have catheters in place for seven days for calculations and analyses.

The present study received institutional review board approval. Statistical analysis was performed in Excel 2008 (Microsoft Corp, USA) and Prism 5 (GraphPad Software Inc, USA). Statistical significance was defined as $P<0.05$.

RESULTS

There were 57 consecutive recipients of deceased donor allografts. Mean recipient age was 53.2 years (range 15 to 72 years), with 35 men (61.4%) and 22 women (38.6%). Mean donor age was 37.8 years (range 14 to 67 years).

Cold ischemic time ranged from 4 h to 30 h, with a mean of 14.9 h. Warm ischemic time ranged from 18 min to 54 min, with a mean of 32 min (Table 1). Multiple linear regression models did not yield any variables that could predict catheter duration with information known at the time of transplant (Table 1).

There was a 15.8% (nine of 57; Table 1) incidence of UTIs. The OR for developing a UTI while having a bladder catheter in place for more than three days was 1.48 (95% CI 0.35 to 6.19, $P=0.72$) based on Fisher's exact test. There was a trend toward decreased duration of catheterization with decreased length of stay by linear regression analysis ($r^2=0.41$, $P=0.174$; Table 1). There was minimal linear correlation ($r^2=0.28$, $P=0.281$) between postoperative UTI for all patients based on duration of bladder catheterization.

¹Department of Surgery, The University of Arizona, Tucson, Arizona; ²Department of Surgery, North Shore University Hospital, Manhasset, New York, USA

Correspondence: Dr Ernesto Molmenti, Department of Surgery, North Shore University Hospital, 300 Community Drive, Manhasset, New York 11030, USA. Telephone 516-562-3152, fax 516-562-1523, e-mail emolment@nshs.edu

TABLE 1
Characteristics and outcomes of deceased donor kidney transplant recipients (n=57)

Catheter duration, days		2	3	4	5	6	7 or more	P
Patients, n		11	19	15	7	2	3	
Age, years	Mean	54.5	51.1	53	58.6	68.5	53	0.409*
	Minimum	15	16	30	31	67	34	
	Maximum	65	72	71	71	70	68	
Gender, n (%)	Male	7 (64)	12 (63)	7 (47)	5 (71)	1 (50)	3 (100)	0.355*
	Female	4 (36)	7 (37)	8 (53)	2 (29)	1 (50)	0 (0)	
Donor age, years	Mean	30.5	36.2	37.1	47.9	63.5	43	0.114*
	Minimum	14	15	14	32	60	35	
	Maximum	61	67	56	60	67	51	
Cold ischemic time, h	Mean	15.5	15.1	15.1	15.6	12	13.5	0.118*
	Minimum	11	4	5	12	6	8.5	
	Maximum	26.5	30	25.5	27	18	21	
Warm ischemic time, min	Mean	30	30	30	36	24	36	0.685*
	Minimum	18	24	30	30	18	24	
	Maximum	48	42	54	42	30	48	
Pretransplant dialysis, n (%)		10 (91)	19 (100)	15 (100)	7 (100)	2 (100)	3 (100)	0.158*
Post-transplant dialysis, n (%)		2 (18.2)	1 (5.3)	7 (46.7)	4 (57)	0 (0)	1 (33.3)	0.757**
Acute tubular necrosis, n (%)		2 (18.2)	1 (5.3)	2 (13.3)	6 (85.7)	0 (0)	2 (66.7)	0.373**
Urinary tract infection, n (%)		2 (18.2)	2 (10.5)	3 (20.0)	2 (28.6)	0 (0)	0 (0)	0.281**
Length of stay, days	Mean	5	5	7	10	23	9.7	0.174**
	Minimum	3	4	5	6	8	5	
	Maximum	9	10	10	17	37	12	

P values are from multiple linear regression models to predict bladder catheter duration based on variables known at the time of operation (*) or discharge (**)

No urinary leaks, stricture development or other anastomosis-related complications occurred. Dialysis post-transplant occurred in 15 patients (26.3%), while 13 patients developed acute tubular necrosis (22.8%) based on nuclear imaging.

DISCUSSION

There does not seem to be a consensus on the optimal duration of bladder catheterization after transplantation (3-5). The rate of UTI in transplant recipients is reported to range from 8% to 14% (3). We believe this is an underestimate. A rate of nearly 16% is likely to be more accurate, as exemplified in our series in which stringent definition criteria were applied. Furthermore, all patients received urinalysis without antibiotic prophylaxis, likely increasing the rate of occult, minor infections in the present series. The potential drawbacks of short catheterization time, such as urinary leaks and fistulas (4), were not observed in our study.

Fortunately, the natural defenses of the lower urinary tract remain relatively intact despite the increased risk of infection associated with immunosuppression (2,4). The patients in the present series received prophylaxis for cytomegalovirus and *Pneumocystis jiroveci* pneumonia as part of a tacrolimus-based immunosuppression protocol. Many risk factors classically associated with the development of UTIs, such as female gender, history of chronic UTIs, and diabetes mellitus (4), are not modifiable. Early discontinuation of the bladder catheter is a simple, useful way to decrease the risk of UTIs in this patient population.

CONCLUSION

Evidence-based surgical practice requires that even previously widely accepted practices be subject to review. Catheter removal after two days is a safe option in the management of routine renal transplant recipients. We did not encounter any undesirable outcomes associated with early catheter removal. Furthermore, we believe that such an approach is likely more comfortable for patients.

ACKNOWLEDGEMENT: There is no conflict of interest.

REFERENCES

1. Dantas SR, Kuboyama RH, Mazzali M, et al. Nosocomial infections in renal transplant patients: Risk factors and treatment implications associated with urinary tract and surgical site infections. *J Hosp Infect* 2006;63:117-23.
2. de Oliveira LC, Lucon AM, Nahas WC, Ianhez LE, Arap S. Catheter-associated urinary infection in kidney post-transplant patients. *Sao Paulo Med J* 2001;119:165-8.
3. Rabkin DG, Stifelman MD, Birkhoff J, et al. Early catheter removal decreases incidence of urinary tract infection in renal transplant recipients. *Transplant Proc* 1998;30:4314-6.
4. Maraha B, Bonten H, van Hooff H, et al. Infectious complications and antibiotic use in renal transplant recipients during a 1-year follow-up. *Clin Microbiol Infect* 2001;7:619-25.
5. Cole T, Hakim J, Shapiro R, et al. Early urethral (Foley) catheter removal positively affects length of stay after renal transplantation. *Transplantation* 2007;83:995-6.