

Ureteric Stenting in Kidney Transplants

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Abstract

The routine use of ureteric stents after a kidney transplant for prophylactic measures is debatable. Concerns have been raised regarding the potential complications and costs of routine stenting. Here, we review the literature based on studies in favor of and against the routine placement of ureteric stents in kidney transplant patients. Some studies have shown a benefit to patients who have routine stents placed, while others have not shown this benefit but have highlighted the associated financial implications. The decision to stent renal transplant patients will depend on robust multicenter, randomized controlled trials being carried out, as well as both short-term and long-term cost analyses.

Key words: Renal, Ureteric, Double J, Infection, Complication, Allograft

Introduction

Urologic complications after a renal transplant are a major cause of morbidity, and have an incidence rate of between 2% and 33%.¹⁻⁵ They occur in the form of urinary leakage or ureteric stenosis, with the use of stents in treating well-established complications.^{1,6,7} However, prophylactic or routine ureteric stenting

for kidney recipients after transplant remains controversial. There have been instances in which complications have been reported to decrease; other studies have reported the opposite. Therefore, varying practices of routine versus selective stenting have evolved. In this article, we review the arguments for and against routine stenting including in various transplant subgroups, the costs and risks, and the optimum duration of stent placement.

In favor of stenting

There is grade 1 evidence for prophylactic use stenting of kidney transplant recipients. A Cochrane review by Wilson and colleagues¹ showed that major urologic complications were fewer in the stented group of patients compared with those patients that did not have stents, incorporating all donor types (relative risk [RR] 0.24; 95% confidence interval [CI] 0.07-0.77). Similarly, a longitudinal study involving double J stents in living-related transplant recipients showed a decrease in ureteral complications in those patients with stents compared with those patients without stents ($P < .05$).⁸ These results have been replicated by several authors including a metaanalysis, which showed a significantly lower incidence of urologic complications in the stented group ($P < .0001$; odds ratio [OR] 0.24; 95% CI 0.10-0.57).^{4,7,9} Urologic complication rates greater than 30% are now reduced to about 5% in some centers.⁵

Against stenting

Prophylactic stenting causes concern for some surgeons because of stent-related complications. These include early complications (such as infection in an already immune-compromised patient and urinary tract infections), as these have been shown to be increased in patients with ureteric stents,¹⁰ with one study reporting a RR of 1.49 ($P = .03$; 95% CI 1.04-2.15).¹ Additionally, Tavakoli and associates¹¹

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Acknowledgements: This study was not supported by any grants, and the authors have no conflicts of interest to declare.

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Experimental and Clinical Transplantation (2013) 2: 109-111

demonstrated that there was a significantly increased risk of urinary tract infections in patients with stents in place longer than 30 days. Ranganathan and colleagues¹² also supported this, showing a significantly raised risk of urinary tract infections in stented patients ($P = .02$). The authors went on further to show an increased risk of infection after stent removal if patients had infections while the stent was in situ, compared with infection-free stented patients ($P = .04$). The one caveat with this study is that the 2 groups were different in size, which may have skewed their results. Other complications that cause concern for inserting stents include stent pain, bladder irritation, stent migration, hematuria, secondary obstruction, and stone formation. The risks associated with a further procedure to remove the stent in the case of double J stents also mitigate against the prophylactic insertion of stents in transplant patients.^{2,13,14}

Discussion

Many of these results are from studies in a heterogeneous transplant population, from live and deceased donors to adult and pediatric populations. Live-donor transplants had significantly lower complication rates following a 5-day routine stenting ($P = .03$), which was not replicated in a deceased-donor group.¹⁴ Thus, conclusions were made that a 5-day stenting protocol was inadequate after transplants from deceased donors. Another study also showed stenting was beneficial in patients that received organs from living-related donors.⁸ Conversely, no significant difference in the rate of urologic complications requiring percutaneous nephrostomy has been shown between stent and nonstent groups (87% vs 100%; $P = .71$). Furthermore, no difference has been seen in the reoperation rate between stent and nonstent groups (3% and 5%; $P = .43$) after live-donor transplants. Most importantly, one study showed no significant difference in 1-year (89% vs 90%; $P = .71$) and 3-year (84% vs 85%; $P = .96$) death-censored graft survival between the 2 transplant stenting categories.⁵ Zavos and associates¹⁵ compared the results in a stented group of patients, primarily with transplants from deceased donors according to the operating surgeon's preference. Those authors showed no significant difference in complication rates between the groups.

In pediatric populations, these results have not been replicated, with one study showing no significant difference between the stented and nonstented populations ($P = .48$).¹⁶ However, the authors did acknowledge a selection bias as children that were at greatest risk of complications were prophylactically stented, giving a lower than expected complication rate in the nonstent group. In a separate study, there was no significant difference between urologic complication rates between stented and nonstented transplant recipients ($P = .23$) and no significant difference in graft survival between the two groups ($P = .57$, log rank; $P = .77$).¹⁷ There also were increased rates of early urinary tract infections (within 30 days; $P = .04$), as well as increased risk of BK-virus-associated nephropathy (hazard ratio (HR) 4.07; $P = .24$). Though the risk of BK-virus-associated nephropathy was not significant, this should be taken into account as BK-virus-associated nephropathy may lead to accelerated graft loss, especially in pediatric populations with less-developed immune systems.

If a transplant center decided to routinely stent their patients, the effect on health care costs becomes an important consideration. Tavakoli and associates¹¹ showed in a prospective randomized controlled trial that there was an additional £150 spent on each patient in the nonstent group as compared with the stent group. These extra costs in the nonstented patients were associated with urologic complications and hospital readmissions. Similarly, the costs of routine stenting compared with the costs of treating urinary leakage in a single patient showed that the cost of treating one patient with urinary leakage was the equivalent of £12000, which was equivalent to 22 or 23 stents.¹⁸ Thus, the authors concluded that it was financially advantageous to routinely stent patients. These studies have made some attempt at a cost-benefit analysis, but there is no evidence that the cost of stent removal, anesthetic, and risks of further cystoscopy were factored into these calculations, and a more formal cost-benefit analysis would be required before any conclusions can be made.

In centers where patients are routinely stented after a renal transplant, there is no consensus on the optimal duration of stenting. This is an important consideration as stents are not without their risks (ie, urinary tract infections).¹¹ A 5-day stenting protocol with the ureterocystostomy stented externally draining, using an 8-French urinary catheter has been

reported to achieve good results in live-donor recipients, with a nonsignificant change in urinary tract infection rates ($P = .69$). Moreover, this did not require removal in an operating theatre, thereby reducing health care costs associated with double J stents.¹⁴ Similarly, a retrospective study showed no change in the urologic complication rates in patients that had stents in for 2 weeks, compared with those that had them removed at a later time. The 2-week stent group had a lower urinary tract infection rate (2% vs 35%).²

Conclusions

We have reviewed the evidence for and against routine, prophylactic stenting after a renal transplant. Studies have shown various results, with some showing benefit and others showing no difference in outcomes after the use of renal stents. The question remains: "Is stenting necessary?" The rate of urologic complications has greatly reduced with the improvement in surgical technique, both at the time of retrieval and implementation. Therefore, the argument for stenting must be balanced against the risks of stenting, the effect on the patient, and the costs of a universal routine stenting program. There is strong evidence that stenting is associated with an increased risk of urinary tract infections. Additionally, the effects of stenting on the patient can be significant, with some complications necessitating emergency procedures.

The few studies that have attempted a cost-benefit analysis have shown a universal stenting program can be financially beneficial, although there is a need for more thorough assessment of these costs. A key consideration would be: How to price the cost of a transplant organ in an era of limited donors and supply of organs, and whether or not any cost is too great to maintain the viability of the organ. There is continuing need for more results on the effect of routine stenting and a multicenter, randomized controlled trial with an adequate sample size will go a long way in clarifying the large variation in results. Furthermore, there is need for a more thorough cost-benefit analysis, as this is an area of uncertainty, as well as evaluation of results in various transplant groups. This should include pediatric populations, live-donor and deceased-donor transplant populations, and populations that

have previously received transplants, which are excluded from the analyses in most of the published papers we reviewed.

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