

# Benefits and Complications of Removing Ureteral Stent Based on the Elapsed Time After Renal Transplantation Surgery

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## Abstract

**Background:** The most important surgical complications of renal transplantation are stenosis and obstruction of anastomosis of the ureter to the bladder. Although the routine use of the ureteral stents to prevent such complications seems rational, the optimal time to keep the ureteral stent is still controversial.

**Objectives:** This study presents the benefits and complications of removing the ureteral stent based on the elapsed time after the surgery.

**Patients and Methods:** All patients who underwent kidney transplantation between May 2011 and August 2014 in Modarres hospital, Tehran, Iran, were enrolled in the study. The patients were classified into three groups. The ureteral stent was removed 10, 20, and 30 days after the transplantation in these groups.

**Results:** A total of 529 patients underwent kidney transplant surgery in our center. Urologic complications among the three groups consisting of hydronephrosis, urinoma and collection did not have statistically significant differences.

**Conclusions:** Ureteral stent can be picked up with no increased risk of urologic complications at shorter intervals after the kidney transplantation surgery.

**Keywords:** Ureteral Stent, Renal Transplantation, Ureterovesical Anastomosis

## 1. Background

In recent decades, kidney transplantation surgery has increased dramatically (1). The urologic complications after the surgery are inevitable (1-5). These complications include urinary leakage from the ureteral anastomosis, fistula, stenosis, and obstruction of the urinary tract, especially at the ureteral anastomosis (1, 5, 6). The most important surgical complications are stenosis and obstruction of anastomosis of the ureter to the bladder which can occur in 2 - 7.5% of cases (1, 3). These complications increase morbidity, hospitalization time, and costs of subsequent treatment (1, 5). Therefore, the routine use of the ureteral stents as a prophylaxis for prevention of such complications in kidney transplantation seems rational (1, 5, 6).

The use of ureteral stents is associated with some complications (1, 2, 4, 6). The major complication during ureteral stenting includes increased rates of urinary tract infection (2-4). Other complications include stent migration, persistent hematuria, bladder irritation caused by stent, and the complications during the removal of the stent (2-4).

The removal of the ureteral stent is an endoscopic procedure. Therefore, ureteral stent placement for reduction of

surgical complications not only does not cause a significant increase in the costs (2), but also the postoperative antibiotic prophylaxis can prevent the increased chance of urinary tract infection after ureteral stent placement (1, 2, 4, 5).

Ureteral stent is usually removed four to six weeks after renal transplantation (7). It seems that early removal of ureteral stent after the surgery decreases some complications such as urinary tract infection, bladder irritation symptoms, and persistent hematuria. Furthermore, it reduces the risk of stent crusting and also leads easier stent removal. Removal of the ureteral stent shortly after the surgery reduces the hospitalization period and omits secondary admission of patient for removing the stent. However, the optimal time to remove the ureteral stent is still controversial and the exact time has not been determined so far (1, 7).

## 2. Objectives

This study presents the benefits and complications of removing the ureteral stent based on the elapsed time after the surgery.

### 3. Patients and Methods

All the patients who underwent a kidney transplant from May 2011 till August 2014 in Modarres hospital, Tehran, Iran, were enrolled in the study. The exclusion criteria were:

- 1) Previous history of kidney transplant rejection
- 2) Serum creatinine levels higher than 3 mg/dL before the removal of the ureteral stent
- 3) Significant hydronephrosis, urinoma or substantial collection around the graft in ultrasonography before removing the stent
- 4) Previous history of chemotherapy or radiotherapy to the pelvis
- 5) Patients who had undergone a kidney transplant from a cadaver.

Based on the inclusion and exclusion criteria, 529 eligible patients were enrolled in the study.

The following assessments were performed for all the patients prior to the removal of the ureteral stent:

- 1) Evaluation of serum creatinine levels
- 2) Urine culture
- 3) Renal ultrasonography for the assessment of hydronephrosis, collection and urinoma.

Afterwards, the patients were classified into three groups according to the random numbers tabulation. In the first, second, and third groups, the ureteral stent was removed 10, 20, and 30 days after the kidney transplantation, respectively. One month after the ureteral stent graft out, the patients were re-evaluated by the same as-

sessments performed before the removal of the stent. The acquired data was analyzed by SPSS 17 software.

### 4. Results

From May 2011 to March 2012, 529 renal transplantations were performed on 327 males and 202 females. These patients were randomized into three groups; group 1: the ureteral stent was removed 10 days after the transplant (n = 164); group 2: the ureteral stent was removed 20 days after the transplant (n = 162); and group 3: the ureteral stent was removed 30 days after the transplant (n = 112).

Gender breakdowns in the groups are shown in Table 1. There was no significant discrepancy in gender distribution among the groups (P = 0.266). The patients' mean age was 40.9 ± 13.8 years (range: 7 - 70 years). There was no significant difference between the mean age of the patients in the three groups (P = 0.494).

The results of urine cultures performed before and after the stent removal demonstrated that 7.9% and 3.2% of patients had urinary tract infection, respectively. The frequencies of urinary tract infections before and after the stent removal in the groups are presented in Table 1 (P = 0.019 and P = 0.013, respectively).

The ultrasonography findings before and one month after the stent removal revealed that urologic complications including hydronephrosis, urinoma, and collection around the graft were not significantly different between the groups (Table 2). No significant change was observed regarding the creatinine level before and one month after the stent removal among the groups (Table 2).

**Table 1.** Demographic Characteristics of the Patients<sup>a</sup>

Demographic Characteristics	Group 1	Group 2	Group 3	P Value
<b>Gender</b>				
Male	65.5 (127)	57.5 (111)	62.7 (89)	0.266
Female	34.5 (67)	42.5 (82)	37.3 (53)	0.266
<b>Age, mean ± SD</b>	40.5 ± 13.7	40.4 ± 13.5	41.9 ± 14.5	0.494

<sup>a</sup>Values are expressed as No. (%) unless otherwise indicated.

**Table 2.** Patients' Characteristics Before and After the Stent Removal<sup>a</sup>

Item	Before Stent Removal				After Stent Removal			
	Group 1	Group 2	Group 3	P Value	Group 1	Group 2	Group 3	P Value
<b>UTI</b>	11.9 (23)	4.1 (8)	7.7 (11)	0.019	6.2 (12)	1.6 (3)	1.4 (2)	0.013
<b>Hydronephrosis</b>	1 (2)	2.1 (4)	0.7 (1)	0.503	1.5 (3)	5.2 (10)	2.8 (4)	0.122
<b>Urinoma</b>	0.5 (1)	0.5 (1)	1.4 (2)	0.577	0.5 (1)	0.5 (1)	1.4 (2)	0.577
<b>Collection</b>	8.8 (17)	11.9 (23)	7.7 (11)	0.386	1.5 (3)	3.1 (6)	0.7 (1)	0.253
<b>Cr, mean ± SD</b>	1.31 ± 0.3	1.33 ± 0.3	1.31 ± 0.3	0.866	1.23 ± 0.3	1.24 ± 0.2	1.28 ± 0.2	0.093

UTI, urinary tract infection.

<sup>a</sup>Values are expressed as No. (%) unless otherwise indicated.

### 5. Discussion

Urologic complications following transplantation surgery can cause great morbidity (1-6). The major com-

plications are anastomotic stenosis of ureter to the urinary bladder and urinary leakage (6). The use of ureteral stents prophylaxis to prevent the complications during the transplant, as previously mentioned, has been proven in many studies (1-5). However, there is no consensus regarding the ideal time of stent removal (6, 7). In some experiments, the urinary stent is usually removed four to six weeks after the surgery (7). Although typically endoscopic procedures are performed to remove the stent (2, 5), in some studies an external stenting procedure is evaluated to remove the stent whenever the patient does not undergo cystoscopy.

As presented in this article, early removal of the ureteral stent is not associated with significant changes in the incidence of complications such as hydronephrosis, urinoma and collection around the graft. In group 1, the stent was removed at the time of administration in hospital and needed no readmission after the discharge, resulting in reduction of the treatment costs.

In a study by Bassiri et al. in 1995, the ureteral stent remained for six to eight weeks (8). It showed that the longer stay of the stent was associated with some side effects such as increased risk of urinary tract infection, hematuria, irritable bladder symptoms, and complications related to stent removal due to long-term remaining of the stent in place (1, 2, 4, 6). For example, urinary tract infection in patients with ureteral stents in Bassiri et al. study (8) was 33% and in a study by Verma et al. (9) it was 25%. However, in all the studies, particularly the study of Pleass, the increased risk of urinary tract infection in patients with ureteral stent was not observed (10).

The current study demonstrated that removal of the ureteral stent shortly after the surgery had statistically negligible impact on the rate of urinary tract infection. In Vrema et al. study, the ureteral stent was removed two and four weeks after the surgery. In this study, the rate of urinary infection was higher in the group in which the stent removal was performed after four weeks, but it was not statistically significant (9).

In conclusion, In spite of the routine use of ureteral stent during kidney transplant surgery, the ureteral stent can be

removed after the surgery with no increased risk of urologic complications at shorter intervals after renal transplantation. Ureteral stent removals at shorter intervals lead to no readmission after transplantation and was cost-effective.

## Footnote

**Authors' Contribution:**Farid Dadkhah, Majid Ali Asgari and Hassan Yari carried out the operations. Mohammad Hossein Fallahnezhad and Ali Tavoosian collected the information and Alireza Ghadian contributed to the analysis and writing of the manuscript.

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