

Is Antibiotic Prophylaxis Necessary in Patients Undergoing Ureterolithotripsy?

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Abstract- Transurethral Ureterolithotripsy (TUL) is a frequently used procedure in urology departments. Many urologists perform TUL without antibiotic prophylaxis; however the use of chemoprophylaxis before TUL remains a controversial issue in urology. This study was carried out to assess the safety of omitting antibiotic prophylaxis prior to TUL. In a prospective randomized clinical trial from January 2005 to December 2007, 114 patients with ureteral stones were enrolled; Fifty seven had preoperative antibiotic prophylaxis administered before TUL and fifty seven patients underwent TUL without antibiotic prophylaxis. The rate of postoperative infectious complications (fever, positive blood culture, significant bacteriuria), the length of hospital stay and overall stone free rate were compared between the two groups. There was no statistically significant difference between two groups in the operation time, length of hospital stay, postoperative bacteriuria, positive urine culture, postoperative fever and overall success rate of TUL. It appears that the incidence of infectious complications does not increase in patients undergoing TUL without antibiotic prophylaxis if they have negative pre-operative urine culture and antiseptic technique have been performed thorough the procedure.

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Introduction

Ureteroscopic stones removal is one of frequently used procedures for treatment of ureteral stones needing surgical intervention (1). Although ureteroscopic devices and lithotripters have been improved, the possible complications of transurethral ureterolithotripsy (TUL) cannot be ignored. The major intra and postoperative complications are ureteral perforation, ureteral stricture, post-operative urethral discomfort, besides, urinary tract infection has also been reported (2-5).

The role of antibacterial prophylaxis in patients undergoing urologic procedures (specially TUL) remains controversial and no reliable data are available considering the use of preoperative antibiotic prophylaxis in ureterorenoscopic stone removal although use of antimicrobial prophylaxis is supported by a randomized trial by Knopf and colleagues (2003) in which prophylactic fluoroquinolone administration significantly reduced postprocedure UTIs in a healthy population of individuals with ureteral stones and

uninfected preoperative urine (3). Although a variety of prophylactic antibiotic regimens have been suggested, these recommendations are often based on anecdotal evidence or on data that is collected unscientifically (2-6). The present study is designed to assess the safety of omitting the antibiotic prophylaxis in patients who underwent TUL.

Materials and Methods

During a prospective randomized clinical trial from January 2005 to December 2007, regarding other closely related published studies (3), 141 consecutive patients that underwent TUL for ureteral stones at Sina Hospital (Tehran, Iran) were enrolled in our study and blindly randomized to receive or not to receive prophylactic antibiotics. The Review Board and Ethics Committee of Tehran University of Medical Sciences approved the study. All patients gave written informed consent before participation and they were consecutively randomized in two groups one by one. The diagnosis of ureteral calculi was done by X-ray film (KUB), excretory urography,

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and spiral non contrast enhanced abdominopelvic computed tomography (CT) images.

The patients with these criteria were included in our study: unilateral TUL, preoperative negative urine culture, no bacteriuria, negative history of diabetes mellitus and malignancy and patients with no requirement for endocarditis prophylaxis. The patients with the other concomitant operations (*e.g.* cystolitholapaxy), conditions that stones had been pushed up to the renal pelvis prior to lithotripsy (5), ureteral injury during procedure (4), patients who needed prolonged stent insertion (DJ stent) (10) and patients with recent history of antibiotic use (5) were excluded from the study. We ended up with a total of 114 patients enrolled in the study. Patients of two groups had negative urine culture preoperatively. Patients were randomly placed in two groups, according to odd and even file numbers, to receive 1 g cefazolin *i.v.* approximately 60 minutes prior to ureteroscopy (group I; n=57) or no antibiotic prophylaxis (group II; n=57). The standard technique for TUL was performed with the semi-rigid 8-9.8 fr R. Wolf ureteroscope and Calculi were crushed with a pneumatic Swiss Lithoclast lithotripter under direct vision. For all of patients, ureteral catheter was inserted after completion of TUL and removed on the post-operative day. Standard post-operative controls (physical examination, fever, tachycardia, post operation urine analysis & culture on 48 hours post-operation) were carried out; and if fever was detected, blood culture would also be requested. All patients were examined daily for signs of infectious complications and in the group of prophylaxis for possible side effects of antibiotics. A significant bacteriuria was considered 10^5 cfu/ml urine or more which would be treated as urinary tract infection and patient would be excluded—all bacteriuria mentioned in table 2 were non-significant (negative urine culture but bacteria were reported in urine analysis). We reviewed age, sex, size of ureteral calculi, side of stone, location of stone, operation time, microscopic examination of

urinary sediment and urinary culture pre-and post TUL, post-TUL fever, post-TUL additional antimicrobials administration, length of hospital stay and overall success rate of TUL in the two study groups. The Student's *t*-test and Pearson's Chi-square test were used for data analysis.

Results

In the first group that received preoperative antibiotic prophylaxis were 57 patients (median age 42.3 years, SD, \pm 14.7). 41 patients (71.9%) were men and 16 (28.1%) were women. The mean stone size was 1.3 cm² (range 0.8 to 2.1 cm²). The mean length of the procedure was 27 min (range 10–55 min). The overall success rate of TUL was 93%. None of the patients in this group had fever postoperatively. The mean hospital stay was 1.3 days (range 1-3) in this group.

In the second group were 57 patients (median age 38.2 years, SD, \pm 13.2). Forty patients (70.2%) were men and 17 (29.8%) were women. The overall success rate of TUL in second group was 91%. The mean stone size was 1.5 cm² (range 0.7 to 2.3 cm²). The mean length of the procedure was 20 min (range 17–50 min). The mean hospital stay was 1.1 (range 1-3) in this group.

One patient in the second group had fever and positive urine culture postoperatively (with negative blood culture), and it resolved 1 and 2 days postoperatively, respectively. Blood cultures in single febrile patient were negative. No serious condition was found in any of these patients. There were no statistically significant differences in the operative time, hospital stay, overall success of TUL, significant bacteriuria (colony count $>10^5$), positive urine culture, positive blood culture and postoperative fever between two groups ($P=0.315$), but rate of bacteriuria (35.1% vs 3.5%, $P<0.001$) and pyuria (49.1% vs 22.8%, $P=0.003$) were higher in the group without prophylaxis compared to patients who had antibiotic prophylaxis.

Table 1. Patient's characteristics

Characteristics	With AP	Without AP	P-value
Age	42.3 \pm 14.7	38.2 \pm 13.2	0.125
Sex (M/F)	40/17	41/16	0.832
Stone laterality (R/L)	35/22	37/20	0.95
Stone location (UU/MU/LU)	7/18/35	11/20/29	0.199
Average stone size (cm ²)	1.3 (0.8 to 2.1)	1.5 (0.7 to 2.3)	0.25

AP: Antibiotic prophylaxis UU: Upper Ureter MU: Mid ureter LU: Lower Ureter

Table 2. Postoperative U/A parameters

	With prophylaxis	Without prophylaxis	P-value
Post-op positive BC	0	0	0.315
Post-op positive UC	0	1	0.315
Post-op Pyuria (-/+ /++ /+++)	44/13/0/0	29/24/1/3	0.003
Post-op Bacteriuria (non significant)	2 (3.5%)	20 (35%)	0.001

Post-op: post-operation, UC: Urine Culture, BC: Blood Culture

Pyuria: -: 0-9 WBC in high power field (HPF)/ +: 10-29 WBC in HPF/ ++: 30-99 WBC in HPF/ +++: ≥ 100 WBC in HPF.

In the group without prophylaxis, odds ratio for post operation non-significant bacteriuria was 0.067 (CI=0.015-0.305), yielding that omitting prophylactic antibiotic is a risk factor for bacteriuria whereas odds ratio for pyuria was 0.306 (CI=0.1344, 0.6897), as a result omitting antibiotic is not a risk factor for pyuria, nevertheless due to lack of association between bacteriuria and pyuria with fever or symptomatic UTI, these findings may be consequence of manipulation of stones in the operation, so if aseptic technique have been performed completely, lack of administration of antibiotic prophylaxis should not result in clinical UTI.

No re-hospitalization occurred in any groups because of infectious complications. Other characteristics of two groups and U/A (pre and post operation) parameters are cited in table 1 and table 2.

Discussion

TUL is an effective surgical treatment for ureteral stones, especially those in the distal ureter. The incidence of complications in TUL is relatively low (1).

The role of antibacterial prophylaxis in patients undergoing urologic procedures (Especially TUL) remains controversial and no reliable data are available considering the use of preoperative antibiotic prophylaxis in ureterorenoscopic stone removal. Although a variety of prophylactic antibiotic regimens have been suggested, these recommendations are often based on anecdotal evidence or on data that is collected unscientifically (2-6). While the necessity of antibiotic therapy for preexisting symptomatic UTI in the cases of urolithiasis is undisputed, the question of preoperative antibiotic prophylaxis in patients without symptoms of infection facing an endoscopic intervention for urolithiasis remains open.

Furthermore, the importance of a postoperative bacteriuria is unknown yet and no reliable data is available regarding usefulness of perioperative antibiotic prophylaxis prior to ureteroscopic stone removal (6-8).

In 2003, Kpnof *et al.*, reviewed 113 patients with ureteral stone in a prospective randomized study. In 57

patients 250 mg oral levofloxacin was given approximately 60 minutes prior to ureteroscopy, 56 patients had no prophylaxis, they concluded that in the group without prophylaxis, the rate of postoperative significant bacteriuria was obviously higher than in the group with prophylaxis but rate of serious septic complications was not increased (3).

In a study by Lopez *et al.*, 449 patients undergoing endoscopic urologic surgery were included in the study. A considerable number of patients who underwent endoscopic surgery showed preoperative bacteriuria, responsible for postoperative bacteriuria in less than 25% of the cases. In this study, the length of surgery seemed to be the only related cause with sepsis of urinary origin (10). According to these studies it is possible to reduce the duration of prophylactic antibiotic (3) or just start with the endoscopic surgery, so we tried to omit the antibiotic prophylaxis in TUL and prospectively compared the incidence of febrile complications between two groups. Results showed that the incidence of postoperative fever in TUL was not significantly different between the two groups. In addition, in the patients with fever, its duration was relatively short, and no serious complications were recorded in these patients. The incidence of postoperative fever was 3.3% (2/57). The Postoperatively symptomatic urinary tract infections or inflammatory complications of the urogenital tract were found in neither of the two groups. In addition, the increased WBCs in urine just after operation are not solely indicator of urinary tract infection, because the patients had manipulation of urinary tract.

Hence, if no evidence of UTI is found preoperatively, the risk of postoperative symptomatic UTI due to ureteroscopic stone removal is considered to be very low. However, the postoperative bacteriuria may not present a risk factor for symptomatic UTI in contrast to the preoperative one. Therefore the question arises whether there is at all an indication for a perioperative antibiotic prophylaxis in these selected patients (3). In conclusion, it appears that if sterility principles have been performed completely, and patients had no positive

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urine culture or fever prior to the TUL, lack of administration of antibiotic does not cause clinical UTI. In conclusion incidence of postoperative complications (such as fever, UTI, etc) does not increase in patients undergoing TUL procedure without prophylaxis if they have negative preoperative urine culture and sterility principles have been performed completely.

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