DOUBLE J STENTS AND ANTIBIOTICS IN MINIMALLY INVASIVE UROSURGERY: PERI-INTERVENTIONAL VS. CONTINUOUS LOW-DOSE: A SINGLE CENTRE EXPERIENCE

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ABSTRACT

OBJECTIVE
Ureteral stents are the basic and the most frequently used agents in the area of urology. The specialty has bloomed after its invention. A ureteric stent is a specially designed hollow tube, made of a flexible plastic material that is placed in the ureter. Its length varies from 24 to 30 cm. Additionally, they come in different diameters to fit different size ureters. Over the last two decades, different types of stents have been used, all of them serve the same purpose i.e., urinary diversion, ureteral obstruction relief, and postoperative drainage, thus issues related to their use have also increased. Peri-interventional antibiotic prophylaxis is recommended by the European Association of Urology for prevention of urinary tract infections, but there is no adequate evidence supporting the role of low-dose empiric antibiotics with respect to the time of indwelling. Drugs and doses are catered to each patient with the conception that it will have a positive effect on controlling SRS; this is yet to be proved.

OBJECTIVES
In this study, we analyse UTI and SRS rates in patients and study the advantages and disadvantages of a peri-interventional antibiotic prophylaxis only vs. a continuous low-dose antibiotic treatment for the entire stent-indwelling time.

PLACE AND DURATION
This randomised prospective study included 500 patients admitted to the Department of Urology, Mahatma Gandhi Hospital from January 2015 to December 2015 undergoing ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL) for urolithiasis.

METHODS
This randomised prospective study included 500 patients admitted to the Department of Urology, Mahatma Gandhi Hospital from January 2015 to December 2015 undergoing ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL) for urolithiasis. Patients were randomly allocated into two groups on lottery basis at the time of admission: Group A with 250 patients were given peri-operative antibiotic and Group B with 250 patients were given a continuous low-dose antibiotic treatment for the entire stent-indwelling time. All patients received peri-interventional antibiotic prophylaxis with 1g ceftriaxone given IV 30 minutes prior to anaesthesia induction to obtain a peak concentration at the time of highest risk during the procedure. According to the local pathogens profile and susceptibility in our region, the antimicrobial agent of choice for continuous low-dose treatment was levofloxacin (250 mg) once daily.

RESULTS
In Group A, 47 patients developed UTI who were managed with a full course of antibiotics and 20 patients developed SRS with symptoms of haematuria, nocturia and pain abdomen. In Group B, 73 patients developed UTI and were managed with a full course of antibiotics and 24 patients developed SRS with symptoms of haematuria, nocturia and pain abdomen. 17 patients were further excluded from the study due to positive urinary cultures/staghorn calculi and/or septicaemia requiring full-dose antibiotic treatment. None of the patients experienced any side effects from the drugs prescribed. Compared with reports using no antibiotic prophylaxis, in the present study there was a lower rate of UTI and SRS in patients receiving peri-interventional antibiotics (19.42% and 8.26%) in comparison to low-dose continuous antibiotics (30.29% and 9.95%).

CONCLUSION
It is imperative to perform a urine culture and analysis in all patients undergoing interventional urological procedures to avoid the risk of development of SRS. Peri-operative antibiotic therapy is better than low-dose continuous antibiotics. In our experience, we suggest that peri-operative antibiotics with due follow-up of urine analysis, culture and sensitivity is mainstay to avoid both URS and SRS. Many different pharmaceutical and technical approaches have been investigated to reduce the symptoms. Thus, only culture confirmed infections may be prescribed antibiotics, more or less to avoid creating drug-resistant bacteria.

KEYWORDS
Double J Stent, Percutaneous Nephrolithotomy (PCNL), Retrograde Ureterolithotomy, Cystoscopy, Antibiotics.

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INTRODUCTION

Ureteral stents are the basic and the most frequently used agents in the area of urology. The specialty has bloomed after its invention. A ureteric stent is a specially designed hollow tube, made of a flexible plastic material that is placed in the ureter. Its length varies from 24 to 30 cm. Additionally, they come in different diameters to fit different size ureters. Over the last two decades, different types of stents have been used, all of them serve the same purpose i.e., urinary diversion, ureteral obstruction relief, and postoperative drainage, thus issues related to their use have also increased.

Complications with stenting are frequent, namely urinary tract infections (UTI) and stent-related symptoms (SRS) like dysuria, flank pain, haematuria and increased voiding frequency.

Literature has ever suggested that longer indwelling stents in the ureter carry a risk of a higher tendency of microorganisms to develop a biofilm on the stent surface supporting the phenomena of stent encrustation adding to patient morbidity, increased chances of infection and which can eventually lead to renal failure or even death.[1,2] Peri-interventional antibiotic prophylaxis is recommended by the European Association of Urology for prevention of urinary tract infections,[3,4,5] but there is no adequate evidence supporting the role of low-dose empiric antibiotics with respect to the time of indwelling. Drugs and doses are catered to each patient with the conception that it will have a positive effect on controlling SRS; this is yet to be proved.

OBJECTIVE

In this study, we analyse UTI and SRS rates in patients and study the advantages and disadvantages of a peri-interventional antibiotic prophylaxis only vs. a continuous low-dose antibiotic treatment for the entire stent-indwelling time.

PATIENTS AND METHODS

This randomised prospective study included 500 patients admitted to the Department of Urology, Mahatma Gandhi Hospital from January 2015 to December 2015 undergoing ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL) for urolithiasis.

Patients were randomly allocated in two groups on lottery basis, Group A with 250 patients were given peri-operative antibiotic and Group B with 250 patients were given a continuous low-dose antibiotic treatment for the entire stent-indwelling time. Of the 500 patients, 276 patients underwent PCNL and 224 patients underwent URS. 17 patients were not included in the study due to positive urinary cultures/staghorn calculi and/or septicaemia requiring full-dose antibiotic treatment.

The patients were subjected to a complete pre-operative workup as per protocol i.e. history taking and general physical examination to identify any anatomical disorders or congenital anomalies. Complete blood count, urine analysis, urine for culture and sensitivity, coagulation profiles, electrolyte tests and renal function tests were conducted along with X-ray KUB. Non-enhanced CT were performed as required.

Inclusion Criteria: Sterile urinary culture before stent placement, no fever and no antibiotic medication in the past 2 weeks.

Exclusion Criteria: Positive urinary cultures, staghorn calculi and/or septicaemia requiring full-dose antibiotic treatment. Urine was obtained via single-use catheter in females and midstream urine samples in males. Samples were tested by dipstick test and by urinary sediment analysis and thus cultured on agars. Antibiotic culture and sensitivity were also obtained for all patients.

Procedure: All patients received peri-interventional antibiotic prophylaxis with 1 g ceftriaxone given IV 30 minutes prior to anaesthesia induction to obtain a peak concentration at the time of highest risk during the procedure. According to the local pathogens profile and susceptibility in our region, the antimicrobial agent of choice for continuous low-dose treatment was levofloxacin (250 mg) once daily. Patients were prescribed paracetamol for analgesia on demand (Maximum dose 3 × 500 mg/day until stent removal), while none received α-blocking agents or anti-cholinergic drugs. Double J stents were placed post procedure in all patients undergoing URS and PCNL as per our departmental protocol.

Baseline and Follow-up Investigation: Stents were placed for a period of 3 weeks (21 days) in all patients. Patients were subsequently evaluated for UTI and SRS at Day 7, 14 and 21 (after stent removal). Stent was also sent for culture and sensitivity. Significant bacterial count/UTI was defined as ≥10, 000 colony-forming units (CFU) per mL in the urine culture. Cultures with more than three bacterial strains were considered contaminated.

Clinical signs and symptoms caused by bacterial infections are similar to SRS, thus the presence or absence of an infection was used to distinguish SRS from UTI. Any patient who developed UTI was managed with a full course of antibiotics and patients with SRS were excluded from the study.

Group Characteristics of Patients:

1. Group characteristic for patients with SRS only were: Clinical symptoms positive, urinary culture negative and fever negative.
2. Group characteristic for patients with afebrile UTI were defined: Clinical symptoms positive, urinary culture positive and fever negative.

3. Group characteristic for patients with febrile UTI were: Clinical symptoms positive, urinary culture positive and fever positive.

Endpoint and Statistics: Primary endpoints were overall rates of UTI. Secondary endpoints were SRS rates and severity of drug side-effects. Chi-square test was used for categorical data, Mann–Whitney test (for non-normal data, stent-indwelling time) and t-test (for age).

RESULTS: In Group A, 27 patients developed UTI who were managed with a full course of antibiotics and 2 patients developed SRS with symptoms of haematuria, nocturia and pain abdomen. In Group B, 63 patients developed UTI and were managed with a full course of antibiotics and 4 patients developed SRS with symptoms of haematuria, nocturia and pain abdomen. None were excluded from the study. None of the patients experienced any side effects from the drugs prescribed.

Sl. No.	Variable	Group A	Group B
1.	No. of Patients	250	250
2.	Patients Excluded	8	9
3.	Mean Age	48 (25-68)	46 (25-68)
4.	Stent indwelling time	21 days	21 days
5.	Patients with UTI	47/242 (19.42%)	73/241 (30.29%)
6.	Patients with SRS	20/242 (8.26)	24/241 (9.95)
At 7 Days			
Patients with Clinical Signs or Symptoms		21 (Fever +)	31 (Fever +)
Antibiotic resistance on c/s		No	No
At 14 Days			
Patients with Clinical Signs or Symptoms		19 (Fever +)	23 (Fever +)
Antibiotic resistance on c/s		No	No
At 21 Days			
Patients with Clinical Signs or Symptoms		7 (Fever +)	19 (Fever +)
Antibiotic resistance on c/s		2	4

Table 1: Patient Demographics–Group Specific–Review of UTI and SRS

DISCUSSION: For the rates of UTI, the concept of a peri-interventional antibiotic prophylaxis during endoscopic urological procedures is known to be better than no antibiotic coverage.[4] It is a common urological practice to continue the antibiotic treatment with a variable dose patterns catering to the patient's condition and low-dose fashion has prevailed without any documentation in literature in uncomplicated implantations. The efficacy of ureteral stents in the urology has been extensively proven and they are omnipresent in the operating room. However, ureteral stents are associated with complications. "Stent Syndrome", encrustation (Most Common), migration and urothelial hyperplasia are common problems related to longterm ureteral stenting. The intent of antibiotic coverage is to lower UTI rates and achieve a positive effect on SRS. With the ever increasing rates of drug resistances, use of newer drugs with their associated cost and side-effects, thus need a critical antibiotic prescription policy. Therefore, our aim was to evaluate the benefits and disadvantages of a peri-interventional antibiotic prophylaxis only compared with a continuous low-dose antibiotic treatment. All 500 patients received antibiotic prophylaxis during stent placement. 17 patients were excluded from the study, of which 8 patients had a staghorn calculus, 5 patients had a positive urinary culture and 4 patients presented with mild-moderate septicaemia. Patients undergoing procedures had a mean stay of 3 days post-procedure (Range 2-7 days). Compared with reports using no antibiotic prophylaxis, in the present study there was a lower rate of UTI and SRS in patients receiving peri-interventional antibiotics (19.42% and 8.26%) in comparison to low-dose continuous antibiotics (30.29% and 9.95%). We detected a higher incidence of fever in patients receiving continuous low-dose treatment in comparison to peri-operative antibiotics. This might partly be due to the reason that the Rajasthan, India region has a high stone prevalence in comparison to the rest of the country and patients maintain somewhat poor hygiene. Febrile UTI in the follow-up investigations were mainly febrile cystitis, irrespective of the antibiotic treatment strategy. In the present study, the UTI rates were not correlated with other studies as all stents were placed for only a period on 3 weeks.

CONCLUSION: It is imperative to perform a urine culture and analysis in all patients undergoing interventional urological procedures to avoid the risk of development of SRS. Peri-operative antibiotic therapy is better than low-dose continuous antibiotics. In our experience, we suggest that peri-operative antibiotics with due follow-up of urine analysis is mainstay to avoid both URS and SRS. Many different pharmaceutical and technical approaches have been investigated to reduce the symptoms.[6-8] Thus, only culture confirmed infections may be prescribed antibiotics, more or less to avoid creating drug-resistant bacteria.

REFERENCES:

1. Klis R, Korczak-Kozakiewicz E, Denys A, et al. Relationship between urinary tract infection and self-retaining Double-J catheter colonization. J Endourol 2009;23(6):1015-1019.
2. Evangelos Liatsikos, Panagiotis Kallidonis, Jens-Uwe Stolzenburg, et al. Ureteral stents: past, present and future. Informa Healthcare 2009;6(3):313-324. doi:10.1586/erd.09.5.
3. Grabe M, Bjerklund-Johansen TE, Botto H, et al. EAU Guidelines, edition presented at the 25th EAU Annual Congress, Barcelona 2010. ISBN 978-90-79754-70-0.
4. Grabe M. Antibiotic prophylaxis in urological surgery, a European viewpoint. Int J Antimicrob Agents 2011;38(Suppl):58-63.
5. Fischbach MA, Walsh CT. Antibiotics for emerging pathogens. Science 2009;325(5944):1089-1093.

6. Damiano R, Autorino R, De Sio M, et al. Does the size of ureteral stent impact urinary symptoms and quality of life? A prospective randomized study. Eur Urol 2005;48(4):673-678.
7. Dunn MD, Portis AJ, Kahn SA, et al. Clinical effectiveness of new stent design: randomized single-blind comparison of tail and double-pigtail stents. J Endourol 2000;14(2):195-202
8. Lee C, Kuskowski M, Premoli J, et al. Randomized evaluation of Ureteral Stents using validated Symptom Questionnaire. J Endourol 2005;19(8):990-993.