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Prophylactic Use of Ceftriaxone and Gentamicin in TURP: A Comparative Study on Rational Outcome

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Abstract

Transurethral resection of prostate is a common procedure in genitourinary surgery. The contaminated nature and instrumentation during the procedure leads to urinary infection as well as devastating septicemia. Hence the incidence of prophylactic use of broad spectrum antibiotics in TURP case arises. Therefore, the aim of the study is to determine the justification of preoperative antibiotic as prophylaxis and post prostatectomy related urinary tract infection and its correlation with peri-operative events in patients with benign prostatic hyperplasia.60 patients of benign prostatic hyperplasia were selected according to inclusion and exclusion criteria. Urine samples were collected to measure routine examination and culture sensitivity pre-operatively and post-operatively in different groups, receiving injection ceftriaxone 1gm and injection Gentamicin 80 mg. Results shows that pre-operative and per-operative antibiotics are not much effective than that of post-operative antibiotic therapy in controlling urinary tract infection in patients undergoing TURP. The present study revealed that prophylactic single dose of antibiotics and per-operative antibiotics can be omitted and post-TURP antibiotics should be given from 3rd to 5th POD.

Keywords: Rational Outcome, common procedure in genitourinary surgery

Introduction:

Transurethral resection of prostate (TURP) is a non-contaminated surgical procedure for management of benign prostatic hyperplasia (BPH)1,2,3. It is the most frequently performed operation in men over 65 years.Antimicrobial prophylaxis is the periprocedural systemic administration of an antibiotic, used to reduce the risk of postprocedural local and systemic infections 9. The antibiotics are used before, during, or after a diagnostic, therapeutic, or surgical procedure to prevent the infectious complications10. It reduces postoperative surgical site and urinary tract infections that often causes increased morbidity.

Vol. 2, No. 03; 2018

ISSN: 2581-3366

The postoperative complications of TURP include hematuria, dysuria, fever and bacteriuria 4, 5. In the absence of antimicrobial prophylaxis, patients with previously sterile urine commonly develop bacteriuria, usually due to Gram-negative bacilli 6. Furthermore, approximately 10% of bacteriuria patients develop bacteraemia. Lower urinary tract infections (bacteruria with symptoms) have been recognized as a significant source of morbidity following TURP. However, the use of prophylactic antimicrobial agents for these procedures remains controversial, especially in patients whose urine is sterile pre-operatively. Despite the absence of bacteriuria, the incidence of post-operative bacteriuria without the use of prophylactic antimicrobials has been reported to range from 6% to 43% 8. These findings have been used to explain the relatively high rates of bacteriuria observed following administration of placebo in patients with sterile, pre-operative urine cultures 7. The incidence of post-operative infections is quite high in genitourinary surgery primarily because of contaminated nature of the procedures. Urological instrumentation is the precipitating cause of infections in 75 - 80% of cases 6. The contaminated nature of the genitourinary surgery and the placements of indwelling catheters post operatively in most of the patients increase the importance of preoperative assessment, perioperative prophylaxis and postoperative monitoring. Among patients who had urinary catheters on admission, 17.3% developed UTI post-TURP, compared with 6.7% among patients without a catheter (P = .001). Catheter-related UTIs account for roughly 40% of all nosocomial infections that increase the mean hospital stay, morbidity, and cost11. Whereas, in sterile urine preoperatively, the incidence of symptomatic UTI following cystoscopy is 5%, and the incidence of asymptomatic bacteruria has been reported ranging between 10% and 35% in most of the series 12, 13, 14. Following ureteroscopy, the reported incidence of UTI ranges between 3.9% and 25%15. Recognized sources of infection include urethral bacterial flora, urethral catheters, intra-operative or postoperative surgical contamination, and infection transferred from a distant sites 16. Surgical site infection was defined as the presence of swelling, tenderness, redness, or drainage of pus from the wound, superficially or deeply. Remote infection was defined as occurrence of pneumonia, sepsis, or urinary tract infection. There is strong evidence supporting the use of prophylactic antibiotics prior to TURP procedure. In a meta-analysis of 32 randomized controlled trials (RCT) including 4260 patients, antibacterial prophylaxis prior to TURP significantly reduced the incidence of bacteriuria and clinical sepsis5.

In hospitalized patients, E. coli accounts for about 50% of cases of UTI. The gram-negative species Klebsiella, Proteus, Enterobacter, Pseudomonas and Serratia account for about 40%, and the gram-positive bacterial cocci, E. faecalis, S. saprophyticus, and Staphylococcus aureus account for the remainder [17]. The choice of the appropriate antimicrobial agent to be used for prophylaxis takes into account both the surgical site and the properties of the antimicrobial agent. The agent should achieve serum and tissue levels of drug that exceed the minimum inhibitory concentration for organisms characteristic of the operative site. Furthermore, the optimal agent should have a long half-life so as to maintain sufficient serum and tissue concentrations for the duration of the procedure without the need for redosing. The agent should be safe, inexpensive, and not likely to promote bacterial resistance.

Vol. 2, No. 03; 2018

ISSN: 2581-3366

For the urinary tract, the cephalosporins and aminoglycosides are generally efficacious, have a long half-life, are inexpensive (when used as single dose) and are rarely associated with allergic reactions. Furthermore, the latter class can be used in patients with a beta-lactam allergy. While the incidence of adverse reaction to cephalosporins in patients with a penicillin allergy is low, consideration of an alternative agent is recommended in cases of significant penicillin allergy.

The aim of the study is to determine the justification of preoperative antibiotic prophylaxis and post operative short course of antibiotic in prevention of urinary tract infection after TURP.

Materials and methods:

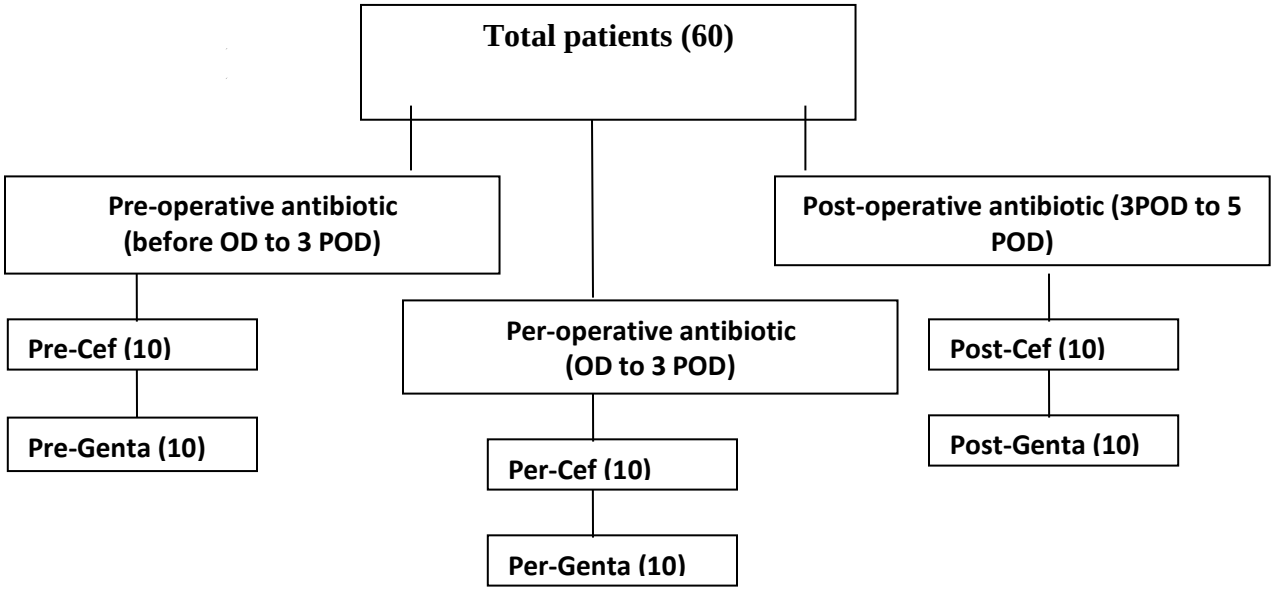
This was a prospective cross-sectional type of observational study conducted in the Department of Pharmacology and Department of Urology of Holy Family Red Crescent Medical College Hospital, Dhaka, on 60 diagnosed cases of benign prostatic hyperplasia (BPH). Ethical clearance was obtained from Institutional Ethica lReview Committee (IERC) of the College.

Patients with BPH, male with an age range of 70 ± 10 years, taking ceftriaxone or gentamicin were included in the study. Only patients without any catheter and pre-operative documented infection were recruited. Patients with history of UTI or on catheter and antibiotics were excluded.

Total 60 patients were included in the study. They were divided into three groups: pre-operative antibiotic group: pre-cef (10 cases got inj ceftriaxone pre-operatively); pre-genta (10 cases got inj gentamicin pre-operatively) and per-operative group : per-cef (10 cases got inj ceftriaxone per-operatively); per-genta (10 cases got inj gentamicin per-operatively) and post-operative antibiotic group: post-cef (10 cases got inj ceftriaxone post-operatively from 3rd to 5th pod) ; post-genta(10 cases got inj gentamicin post-operatively from 3rd to 5th pod) . Among them, single dose of Inj. Ceftriaxone was 1 gm and Inj. Gentamicin was 80 mg was given prophylactically. On the other hand, Inj. Ceftriaxone (1 gm) and Inj. Gentamicin (80 mg), per-operatively twice daily upto 3rd POD. While, Inj. Ceftriaxone (1 gm) and Inj. Gentamicin (80 mg) was given from 3rd POD to 5th POD twice daily in post-operative group.

Vol. 2, No. 03; 2018

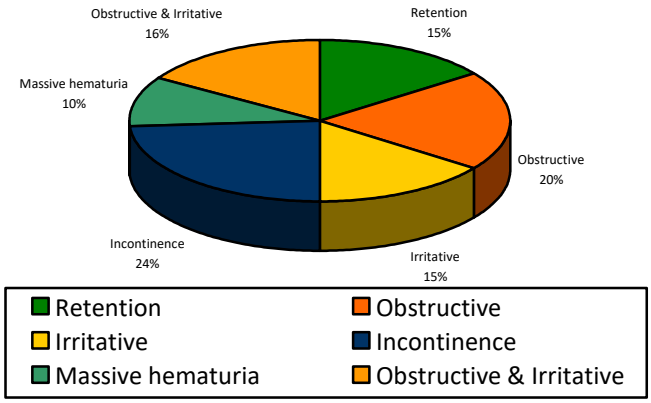
ISSN: 2581-3366



All statistical analysis was carried out with the help of Statistical Package for Social Sciences (SPSS- 17). Comparison in the incidence of post-operative bacteruria between two groups was done by chi-square tests.

Results: The average age of the study patients was 70 ± 10 years. They had history of retention, obstructive symptoms, irritative symptoms, both symptoms together, massive hematuria and urinary incontinence which are shown in Fig-I.

Fig-I: different types of urinary complaints



Vol. 2, No. 03; 2018

ISSN: 2581-3366

Figure-II: Pathogens responsible for bacteruria in patients with TURP

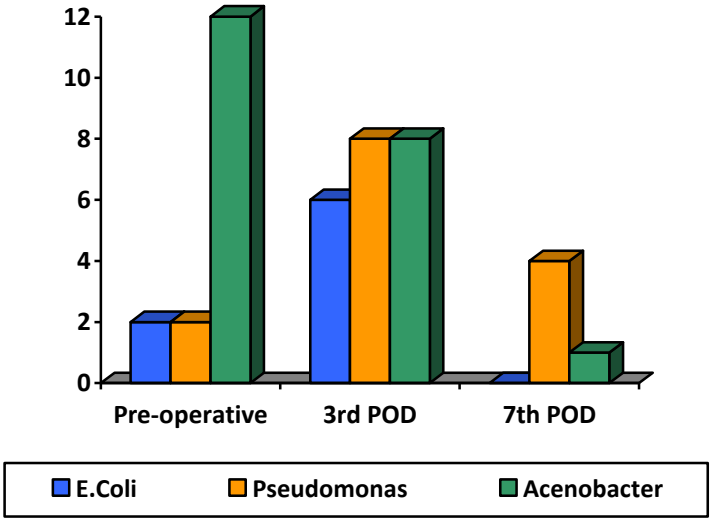


Figure II shows the no. of significant pathogens responsible for bacteruria.

Table I shows the comparison of urine culture of different study group pre-operatively. In Pre-cef group, urine culture was positive in 6 cases; out of which E.Coli was positive for 2(20%) cases, pseudomonas for 2 (20%) cases and Acenetobacter (20%) for 2 cases, pre-operatively. Whereas, Acenetobacter was positive in 2 cases each in rest of the groups. On the other hand, in group per-cef group, E.coli and Acenetobacter was positive in 2 cases.

Table I: positive culture in different study group by different organisms before operation

Groups	**E.coli** n (%)	**Pseudomonus** N (%)	**Acenetobacter** N (%)
Pre-cef	2 (20.0)	2 (20.0)	2 (20.0)
Pre-genta	0 (0.0)	0 (0.0)	0 (20.0)
Per-cef	0 (0.0)	0 (0.0)	2 (20.0)
Per-Genta	0 (0.0)	0 (0.0)	0 (20.0)
Post-Cef	2 (0.0)	0 (0.0)	2 (20.0)
Post-Genta	0 (0.0)	0 (0.0)	0 (20.0)
	4	2	12

Table II shows the comparison of urine culture of different study group before operation, on 3rd POD and 7th POD. In pre-cef group,urine culture was positive for 6 cases pre-operatively. On the

Vol. 2, No. 03; 2018

ISSN: 2581-3366

other hand, in pre-genta group, it was positive in 3 caseson 3rd POD which reduces to single case on 7th POD. Whereas , in per-cef group , urine culture was positive in 4 cases before operation, 4 cases on 3rd POD and 2 cases on 7th POD. Contrary to this, in per-genta group urine culture was positive only on 3rd POD (5 cases) and on 7th POD (2 cases). On the other hand, it was positive before operation and on 3rd POD, 4 cases each. Only 6 cases was positive in post-genta group.

Table II: positive culture in different study group by different organisms after 3rd POD and 7th POD

Group	Before operation	3rd POD	7th POD
Pre-Cef	6	0	0
Pre-Genta	0	3	1
Per-Cef	4	4	2
Per-Genta	0	5	2
Post3- Cef	6	4	0
Post3 – Genta	0	6	0
		22	5

Discussion:

The use of routine antibiotic prophylaxis prior to TURP is supported by level A evidence and recommended for all patients undergoing this procedure by the American Urological Association's Best Practice Polocy Panel on antimicrobial prophylaxis.[1]

In the present study, pre-operative and post-operative microorganisms were almost same except for 3 cases. In a similar study, it was shown that preoperative bacteruria was significantly related to the postoperative infection, but in contrast to previous findings, it was found that the preoperative and postoperative species were different except for a single case[17].

The present study findings revealed that 16 out of the 60 studied cases had significant preoperative bacteruria and treated accordingly; postoperative bacteruria was confirmed only in 23 cases with appropriate antibiotic therapy. In a similar study, it was found that significant preoperative bacteriuria was revealed in 18 (15%) patients of whom 14 (77%) patients developed negative cultures following the operation. Postoperative bacteriuria was detected in 9 (7.5%) patients who negative urine cultures preoperatively. Pre and post operative micro-organisms were different in the majority of the cases[17].

Vol. 2, No. 03; 2018

ISSN: 2581-3366

In a meta-analysis conducted in Netherland, bacterial contamination was detected in 44% of the BPH prostatic specimens. They reported satisfactory results and reduced infection rate following preoperative antibiotic prophylaxis in TURP patients[4]. Other studies found similar results and the rate decreased shortly after the operation with antibiotic therapy.[18-19] Several risk factors have been identified for post - TURP infection; the major factors include preoperative bacteriuria, long bladder irrigation phase, longer operating time (> 70 minutes), long preoperative hospitalizations (more than 2 days), long indwelling postoperative urethral catheters (for more than 3 days), and open drainage systems.[18,20] Only 1 patient developed bacteremia secondary to post-operative urinary tract in the present study. Similarly, in another study, postoperative bacteremia was found in one fourth or 22.7% of the patients, one of whom developed septicemia and prophylactic antimicrobial therapy did not influence the rate of bacteriemia[16].

In 3rd POD, no E.coli, Pseudomonas and Acenetobacter infected cases was found in pre-cef group. No. of E. coli infected cases in pre-genta group was more than the other groups. Whereas, Pseudomonas infected cases in post-genta, per-cef, per-genta group was more than the pre-genta and per-cef groups. On the other hand, Acenetobacter infected cases was more in per-genta group compared to per-cef, post-cef and post-genta groups. No Acenetobacter was found in pre-cef and pre-genta groups.

In 7th POD, no E.coli was found in any group. Whereas, Pseudomonus was positive only in pre-cef and Acenetobacter was positive in pre-genta group.

Therefore, post-operative antibiotic therapy (i.e from 3rd to 5th POD) is more efficacious to cure infection in TURP patients than that of pre-operative and per-operative antibiotic therapy. Large no. of population should be included in the future to get better result as it was an initiative. If we administer from post-operatively it will be obviously cost-effective as well reduce the emergence of bacterial resistance.

The prevalence of antibiotic resistance in any population is related to the proportion of the population that receives antibiotics, and the total antibiotic exposure[21,22]. Rate of antibiotic resistance are increasing in all hospitals. Greater importance should be given to the duration of antibiotic use as prolonged use results in increased health care cost, bacterial resistance and morbidity.

Vol. 2, No. 03; 2018

ISSN: 2581-3366

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Vol. 2, No. 03; 2018

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