

Rationality of Prophylactic Antibiotic use in Genitourinary Surgery in a Tertiary care Hospital

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ABSTRACT

Antimicrobial prophylaxis is the periprocedural systemic administration of an antibiotic, used to reduce the risk of postprocedural local and systemic infections. The present retrospective study was done in 100 patients who had undergone elective genitourinary surgery in a tertiary care hospital to investigate the rationality of prophylactic use of antibiotics in genitourinary surgery according to the American Urological Association recommendations 2011. All patients undergoing genitourinary surgery had received antibiotics. Injectable antibiotic was administered within 1 hr before surgery in 95% cases and 1-2 hrs before surgery in 5% cases. Preoperatively single antibiotic was used in 92%, two in 7% and three in 1% cases whereas postoperatively single antibiotic was used in 91%, two in 7% and three in 2% cases. Most commonly administered antibiotic group preoperatively as well as postoperatively was a second generation cephalosporin, cefuroxime along with a beta lactamase inhibitor, sulbactam (90% cases) followed by the combination of cefuroxime and an aminoglycoside, amikacin (4% preoperatively and 5% cases postoperatively). The number and group of antibiotic used preoperatively and postoperatively were quite identical. The average duration of antibiotic use was 3-10 days. The prophylactic use of antimicrobials in genitourinary surgeries in this hospital was rational with respect to time of administration and choice of antibiotic group. However, the duration of antimicrobial use was highly irrational which must be controlled to prevent the emergence of resistance strains and decrease the adverse effects and cost of health care to the patient.

Key words: Prophylactic, rational, antimicrobial, genitourinary.

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INTRODUCTION

Antimicrobial prophylaxis is defined as the periprocedural systemic administration of an antimicrobial agent intended to reduce the risk of postprocedural local and systemic infections.^[1] The antibiotics are used before, during, or after a diagnostic, therapeutic, or surgical procedure to prevent the infectious complications.^[2] It reduces postoperative surgical site and urinary tract infections that often causes increased morbidity. The incidence of post-operative infections is quite high in genitourinary surgery primarily because of contaminated nature of the procedures.^[3] Urological instrumentation is the precipitating cause of infections in 75 - 80% of cases. 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.^[4] Although prophylactic antimicrobials reduce the risk of postoperative wound infections, inappropriately extended use increases the selective pressure favoring emergence of resistant strains. Antibiotics must be used in a rational manner supported by evidence of effectiveness, causing minimal change in host defense mechanism.

It is further emphasized that surgical prophylaxis is an adjunct to only, not a substitute

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for principles of asepsis and the good surgical technique. Antibiotic prophylaxis should be regarded as one of the components of an effective policy for controlling healthcare associated infections. Unnecessarily prolonged use of broad-spectrum agent increases the risk of emergence of resistant organisms, adverse effects and health care cost. The present study assessed the rationality of prophylactic use of antibiotics in genitourinary surgery with regard to agent selected, time of administration and duration of therapy.

MATERIALS AND METHODS

A retrospective observational study was conducted in a tertiary care hospital of North India regarding prophylactic use of antimicrobial agents in patients who had undergone elective genitourinary surgery during July to December 2011. Data was collected from the medical records department. Total of 100 patients had undergone elective surgery during this period. The results were presented in percentage and were analyzed regarding selection of antibiotics, timing of administration, duration of prophylaxis and its rationality was judged based on the "Urologic Surgery Antimicrobial Prophylaxis Best Practice Policy Panel guidelines" laid down by the American Urological Association (AUA), 2011. These guidelines provide evidence for current practice pertaining to antibiotic use and list procedures where antimicrobial prophylaxis is recommended along with the agent(s) of choice, alternative agents, and duration of therapy.

RESULTS

There were 75 males (75%) and 25 females (25%) with a mean age of 52.80 ± 16.29 yrs, which indicates that the study sample is representative of population as it included subjects with wide range of age (range: 12 to 81 years). The longest hospital stay was 10 days and the

shortest was 1 day with a mean hospitalization of 4.42 ± 2.11 days.

Number of antibiotic use

All patients (100%) undergoing genitourinary surgery received prophylactic antibiotics. The number of antibiotics received is given in the table 1.

Table 1: Number of antibiotic used prophylactically

No. of antibiotics used	Preoperatively N (%)	Postoperatively N (%)
Single antibiotic	92 (92%)	91 (91%)
Double antibiotic	7 (7%)	7 (7%)
Triple antibiotic	1 (1%)	2 (2%)
More than 3	0	0

Duration of prophylactic antibiotics

Table 2 shows the rationality of timing of prophylactic antibiotic administration preoperatively. Post-operatively, prophylactic antibiotics were applied for 3 days in 3%, for 5 to 7 days in 80% and for >7 days in 17% of cases.

Table 2: Timing of antibiotic administration before surgical intervention

Timing of antimicrobial administration	No. of cases (%)	Rationality
Within 1 hrs of skin incision	95 (95%)	Yes
Early 1 hr to 2 hrs before skin incision	5 (5%)	Yes
2 hrs to 24 hrs before skin incision	0	Yes

Choice of antibiotics

The pattern of using single drug or combination of antibiotics was same in preoperative and postoperative period. The choice of antimicrobial is also identical in preoperative and postoperative period. Most common antimicrobial used preoperatively and postoperatively was a second generation cephalosporin, cefuroxime with a beta lactamase inhibitor, sulbactam in 90% cases followed by the combination of cefuroxime and

Table 3: Rationality comparison for antibiotic prophylaxis

Name of Procedure	No. of cases	Duration of antibiotic used *	Rationality
Cystography, simple cystourethroscopy, or urodynamic study	32	2.90 ± 1.42	IR
Cystourethroscopy with manipulation includes TURP, TURBT and biopsy, resection, fulguration, foreign body removal, urethral dilation or urethrotomy, or ureteral instrumentation including catheterization or stent placement/removal.	45	5.77 ± 1.79	IR
Percutaneous renal surgery includes Pylolithotomy, Ureterolithotomy and Nephrolithotomy and Nephrectomy	23	8.21 ± 1.47	IR

* Days (Mean ± S.D), IR = Irrational

TURP = Transurethral resection of prostate

TURBT = Transurethral resection of bladder tumour

an aminoglycoside in 4% (preoperatively) and 5% cases (postoperatively). Cefuroxime, sulbactam and an aminoglycoside combination was used in 3% cases preoperatively and 2% cases postoperatively. Cefoperazone, a third generation cephalosporins was used in 2% cases preoperatively and 1% cases postoperatively. Combination of three drugs, cefoperazone, an aminoglycoside and metronidazole was used in 1% cases preoperatively and 2% cases postoperatively (Table 4).

DISCUSSION

Types of prophylactic antibiotics used

The selection of antibiotics should be based on the common pathogens involved, types of incision, risk factors and local

Table 4: Choice of antibiotics

Choice of antibiotics	Preoperatively N (%)	Postoperatively N (%)
Second generation cephalosporin with beta lactamase inhibitor	90 (90%)	90 (90%)
Third generation cephalosporin alone	2 (2%)	1(1%)
Second generation cephalosporin with an aminoglycoside	4 (4%)	5 (5%)
Third generation cephalosporin, an aminoglycoside and metronidazole	1 (1%)	2(2%)
Second generation cephalosporin with beta lactamase inhibitor and an aminoglycoside	3 (3%)	2 (2%)

resistance patterns. The antibiotics selected for prophylaxis must cover the expected pathogens for that operative site. A single standard therapeutic dose of antibiotic is sufficient for prophylaxis under most circumstances. In the present study a second generation cephalosporin, cefuroxime was most commonly used which was according to guidelines. Panel guidelines and medical letter suggests the use of flouroquinolones and second generation cephalosporins as the first choice drug in most of the urological procedures due to their effectiveness and lower cost.^[1,5] Third generation cephalosporins were used in 3% complicated cases which was according to the panel guidelines and the medical letter which emphasizes that the third-generation cephalosporins should be used only in complicated cases. The widespread use of third generation cephalosporin for prophylaxis may promote emergence of resistance to these potentially valuable therapeutic agents.

Timing of prophylaxis

For surgical antibiotic prophylaxis to be successful, the antibiotic must be given in such a way that good tissue levels are present at the

time of the procedure and for the first 3-4 hours after the surgical incision. Antibiotic prophylaxis is most effective when given 0-60 minutes before surgical incision as proved by Delinger and others. A large, recent clinical study of patients receiving prophylactic antibiotics confirms that prophylactic antibiotics are most effective when given 0-2 hours before surgery.^[5-7] If antibiotic administration begins more than 2 hrs before and 3 hrs after the surgical incision the prophylactic regimen is not effective.^[5-8] In the present study antibiotics were administered just before the surgical incision along with anesthesia in 95% cases and in 5% cases it was administered 1-2 hr before surgical incision which was according to the panel guidelines and was rational.

Duration of prophylaxis

The published literature suggests that

antimicrobial prophylaxis is unnecessary after wound closure or upon termination of an endoscopic procedure in most cases, thus antimicrobial prophylaxis should be a single dose, or at least discontinued within 24 hours of the end of the procedure.^[1,5,9-11] But in the present study antibiotics were given minimum for 3 days and continued even upto 10 days after wound closure which was irrational and which may promote emergence of 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.^[12-14] 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.

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