

Perioperative Prophylaxis in Urological Interventions

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The aim of perioperative prophylaxis (PP) is to limit infection related to intervention. However, it can never compensate for poor hygiene and operative technique. Antibiotic prophylaxis is only one component of infection prevention management. Other important factors should not be neglected, e. g. catheter care. The end points of PP in urology go beyond the traditional aim to prevent serious wound infections, but include prevention of symptomatic/febrile genito-urinary infections, such as acute pyelonephritis, prostatitis, epididymitis and urosepsis as well. Should this be extended to include asymptomatic bacteriuria, postoperative pneumonia etc remains debatable.

The need for prophylaxis depends not only on the type of intervention but also on the individual risk for each patient. Patient's risk factors, such as age, chronic debility, diabetes mellitus, immunosuppression, etc. have to be considered.

Increased exposure to endogenous bacteria can be expected in procedures which include bowel segments, transrectal biopsy of the prostate, and in contaminated tissue. Furthermore, bacterial contamination in the urinary tract is often associated with long-term drainage (catheter, splints, nephrostoma etc.) or with obstruction due to urolithiasis, tumors,

etc. In infected stones pretreated with antibiotics persistence of pathogens within the stone must be considered even if the preoperative urine is sterile.

In the absence of risk factors and with sterile urine, prophylaxis may not be necessary. In the preoperative workup of the patient any infection, especially of the urinary tract, should be identified. If an infection is present and the intervention cannot be delayed, antibiotic therapy should be given on an empirical basis before surgery and continued afterwards, preferably according to sensitivity testing, when it becomes available.

From a microbiological point of view, any perioperative antibiotic prophylaxis represents a compromise. The desired effect of reducing the bacterial load has to be balanced against the negative consequences, e.g. drug induced adverse events and possible selection of resistant strains.

Basic studies have shown that wound infections are usually prevented by administration of an antibiotic before contamination takes place. In clinical practice, the best time for administration is 30-60 minutes prior to start of operation, i.e. when anesthesia is initiated, if the antibiotic is given intravenously. If intraoperative complications occur, the antibiotic should be given immediately. This approach has been parti-

Recommendations for perioperative antibacterial prophylaxis in urological interventions

Procedure	Most common pathogen(s)	Antibiotic(s) of choice	Alternative antibiotic(s)	Remarks
1. open operations				
urinary tract including bowel segments	enterobacteriaceae enterococci anaerobes streptococci wound infection: staphylococci	aminopenicillin + BLI, cephalosporin 2° + metronidazole	in high risk patients: cephalosporin 3°, acylaminopenicillin + BLI	in all patients
urinary tract without bowel segments	enterobacteriaceae enterococci wound infection: staphylococci	fluoroquinolone*, cephalosporin 2°, aminopenicillin + BLI	in high risk patients: cephalosporin 3°, acylaminopenicillin + BLI	in patients with increased risk of infection
implant/prosthesis penis sphincter	staphylococci	cephalosporin 1°/2°		in all patients
reconstructive genital operation	staphylococci	cephalosporin 1°/2°		in secondary operations and in patients with increased risk of infection
other interventions outside of the urinary tract	staphylococci	cephalosporin 1°/2°		in patients with increased risk of infection
2. endoscopic-instrumental operations				
prostate, bladder, ureter, kidney, incl. percutaneous litholapaxy and ESWL	enterobacteriaceae staphylococci enterococci	fluoroquinolone*, aminopenicillin + BLI, cephalosporin 2°, fosfomicin trometamol	cotrimoxazole,	in patients with increased risk of infection
3. diagnostic interventions				
transrectal biopsy of the prostate (with thick needle)	enterobacteriaceae enterococci anaerobes streptococci	fluoroquinolone*, aminopenicillin + BLI, cephalosporin 2° + metranidazole	aminoglycoside,	in all patients
perineale biopsy of the prostate, urethrocystoscopy, ureterorenoscopy, percutaneous pyeloscopy, laparoscopic procedures	enterobacteriaceae enterococci staphylococci	fluoroquinolone*, aminopenicillin + BLI, cephalosporin 2°	cotrimoxazole	in patients with increased risk of infection

*fluoroquinolone with sufficient renal excretion; BLI - betalactamase inhibitor; ESWL - extracorporal shock wave lithotripsy

cularly effective in emergency general surgery. Any antibiotic given after wound closure will not alter the rate of wound infection. Only the rate of adverse events and the selection pressure for antibiotic resistance will increase. Extrapolation of these results to urological interventions seem to be reasonable.

Generally, a single full dose of a suitable antibiotic will not be less effective than multiple dosing. Only in the case of prolonged intervention (>2.5 to 3h), is an additional dose required whose size and timing are dictated by the pharmacokinetics. Antibiotic prophylaxis should not be continued for more than 24 hours. If necessary in case of severe contamination it should be considered therapy.

A suitable antibiotic should be highly effective, well tolerated and cheap. Its antibacterial spectrum should include the expected range of normal flora and pathogens usually found at the site of operation and on the surrounding skin and mucous membranes. In patients with preceding antibiotic therapy account should be taken of the altered bacterial spectrum and its resistance pattern. For urological indications it is advisable to choose a drug with high urinary concentrations. Parenteral and preferably intravenous administration of the antibiotic is primarily recommended, to reach sufficient tissue concentrations, particularly in an emergency. Oral administration of a fluoroquinolone in patients undergoing transurethral

resection and transrectal biopsy of the prostate was also successful.

For perioperative antibacterial prophylaxis, the urological interventions are categorized into open and endoscopic-instrumental operations (including ESWL) and diagnostic procedures. Because of the bacterial spectrum expected open operative procedures are stratified whether small/large bowel and/or the urinary tract have to be opened or not.

Unfortunately, for most urological procedures appropriate prospective randomised studies are missing. At present, most studies are poorly designed. The differentiation between therapy and prophylaxis is not clear. Evaluation of risk factors is unsatisfactory, and the terms „bacteriuria“ and „infection“ are used uncritically. It is thus not surprising that the literature is inconclusive in regard to prophylaxis showing negative as well as positive results for every kind of urological intervention.

Reference

Members of the UTI Working Group: Kurt G. Naber (Chairman); Bo Bergman, Michael C. Bishop, Truls E. Bjerklund-Johansen, Henry Botto, Bernhard Lobel; F. Jimenez Cruz, Francesco P. Selvaggi: EAU Guidelines for the management of urinary and male genital tract infections. *European Urology* 40: 576-588 (2001)