

Bacteremia from Transurethral Prostatic Resection under Prophylactic Use of Antibiotics

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Abstract

We studied the incidence of the postoperative bacteremia developing in 44 patients undergoing transurethral resection of the prostate under prophylactic use of antibiotics. In 15 of the patients, postoperative endotoxemia was also investigated. Postoperative bacteremia was found in 10 (22.7%) of the patients, in only one of whom septicemia developed. The incidence of bacteremia was not influenced by the kind of antimicrobial agent administered prophylactically, but was significantly higher in the patients with preoperative urinary tract infection or prostatitis on histological examination of resected prostatic tissue ($p < 0.01$). Concerning species isolated from the blood, gram-positive cocci were isolated more frequently than gram-negative bacteria, and *Staphylococcus epidermidis* was the most common species. In 7 (70%) of the bacteremia patients an identical species was isolated from preoperative urine cultures. In the patients with bacteremia, significant increases in white blood cell count and maximal body temperature were found within 3 hours after the procedure as compared to before the procedure. To lower the postoperative bacteremic rate, appropriate and adequate antimicrobial agents must be used preoperatively in patients with infection of the genitourinary tract. As to blood endotoxin, the endotoxin levels in the patients with postoperative fever did not significantly differ from those of the patients without this complication.

Introduction

Transurethral resection of the prostate (TURP) is the most common operation performed to treat obstruction resulting from benign prostatic hypertrophy, while postoperative infections of the genitourinary tract are well known as infectious complications. To prevent these complications, the administration of prophylactic antibiotics has become widely accepted and has been reported to be extremely beneficial^{1)~3)}. In addition, bacteremia from TURP decreases in number with the prophylactic use of antibiotics, but is still a serious infectious complication as it occurs at a frequency of 3.3 to 46%¹⁾²⁾⁴⁾⁵⁾. Also, septicemia with a high mortality rate develops in 0.1 to 8.0% of patients²⁾³⁾. In the present study, we investigated the bacteremia from TURP under chemoprophylaxis, and in addition, we investigated the role of blood endotoxin as a postoperative pyrogen.

Patients and Methods

Forty-four patients (51 to 85 years, with a mean age of 68 years) entered this prospective study. For TURP, a 25F Storz resectoscope was employed and Uromatic® S (Baxter Healthcare Co., Deerfield, USA) was used as the continuous irrigation fluid. At the time of operation all of the 44 patients received antimicrobial agents: penicillin was administered to 11 patients, cephem to 27, monobactam to 4, and fosfomycin to 2. Chemoprophylaxis was performed as follows: the first administration of a dose for routine use was intravenously administered 30 to 60 minutes before, the second was injected within 3 hours after TURP, and a dose was given twice a day on the following 2 days. Of 19 patients with urinary tract infection (UTI; bacteriuria $\geq 10^4$ cfu/ml and pyuria ≥ 5 /hpf), 16 patients with no symptoms had no preoperative chemotherapy, and an appropriate agent based on the sensitivity test results was administered at the time of operation. To the 3 febrile patients with infection of the genitourinary tract (2 due to acute pyelonephritis and 1 due to acute epididymitis), antimicrobial agents sensitive to the causative isolates were given preoperatively for 5 days or more, with TURP performed after the urine became sterile.

Blood culture was performed using a two bottle system (Nihon Roche Co., Tokyo, Japan) within 3 hours after TURP. Blood samples were taken for white blood cell count (44 patients) and endotoxin level (15 patients) prior to, within 3 hours after TURP and the next morning. The endotoxin level was determined using Toxicolor system® (Seikagaku Kogyo Co., Tokyo, Japan).

Results

Postoperative bacteremia occurred in 10 patients (22.7%), septicemia associated with hypotension, fever, and shivers developed in only 1 patient (2.3%), and no patient died. The incidence of bacteremia was

Table 1 Incidence of postoperative bacteremia

Patient group	No. pts. (%)	No. pts. (%) treated with :		
		Penicillins	Cephems	Others*
Positive bacteremia	10(22.7)	4(36.4)	5(18.5)	1(16.7)
Negative bacteremia	34(77.3)	7(63.6)	22(81.5)	5(83.3)
Total	44(100)	11(100)	27(100)	6(100)

*Monobactam and fosfomycin administered to 4 and 2 patients respectively.

Table 2 Relationship between postoperative bacteremia and possible contributing factors

Factor	Study Group		Statistical Analysis
	Positive Bacteremia (n=10)	Negative Bacteremia (n=34)	
Age (years)* ¹	71.1±8.9	67.3±9.2	N.S.* ²
Duration of procedure (min)	86.5±34.4	102.5±33.0	N.S.
Amount of gland removed (g)	12.9±11.9	10.6±7.1	N.S.
Preoperative UTI	8	8	p<0.01
Blood transfusion	3	5	N.S.
Cystostomy during operation	1	6	N.S.
Prostatitis noted pathologically	8	10	p<0.01

*¹Each value is the mean±SD.

*²Not significant.

significantly higher than before ($p < 0.05$ by paired t-test). Positive endotoxemia (>10 pg/ml) was demonstrated in 8 patients (53.8%) and postoperative fever greater than 38°C was observed in 5 patients (33.3%) until the next morning; no relationship between endotoxemia and postoperative fever was detected.

Discussion

The prognosis of the bacteremia associated with TURP is generally good. Nielsen *et al.*⁵⁾ reported that 93% of the organisms entering the bloodstream during the surgical procedure disappeared several hours later, with the bacteremia resulting in little significant morbidity. In contrast, Robinson *et al.*⁶⁾ reported that the postoperative mortality of prostatic cancer patients with bacteremia is 25% and emphasized the importance of bacteremia in compromised hosts. With the expansion of surgical indications owing to more secure anesthetic and postoperative care, the number of compromised patients undergoing TURP will likely increase in future. Postoperative bacteremia which may occasionally develop into a serious septicemia is an infectious complication that cannot be ignored.

Many investigators have reported that chemoprophylaxis is of great value in the prevention of bacteremia from TURP^{2,4,5)}. In this study, however, bacteremia occurred at the relatively high rate of 22.7% despite the prophylactic use of antibiotics. Since the bacteremic rate was not influenced by the kind of antimicrobial agent used, further consideration of chemoprophylaxis including dose, route of infection, and spacing of antibiotics is indicated.

With regard to the factors predisposing to the bacteremia, it has been reported that the presence of preoperative bacteriuria and prostatitis is important^{1,3,5-7)}, with similar results obtained in the present study. Based on our results showing that 70% of the bacteremia patients had a species identical to that isolated from the preoperative urine culture, and that none of the 3 febrile patients with genitourinary tract infection who received preoperative chemotherapy developed bacteremia, it is considered that the choice of an appropriate chemotherapeutic agent administered at an adequate dosage is necessary in patients with genitourinary tract infection.

Regarding the blood culture isolates, gram-positive cocci dominated, with *Staphylococcus epidermidis* found to be the most common species. Since coagulase negative staphylococci including *S. epidermidis* are common inhabitants of the urethra^{6,7)} and prostate⁶⁾, they are commonly isolated from bacteremia patients^{1,4-7)}. Although, in general, these staphylococci are regarded as contaminants in blood cultures, they can not be considered as harmless pathogens in cases of TURP-associated bacteremia.

Endotoxin was demonstrated by Gephart *et al.*⁸⁾ and Garibaldi *et al.*⁹⁾ to escape from the urinary tract and enter the bloodstream during manipulation of the urinary tract, and is regarded as one of the most likely causes of postoperative fever⁸⁾. However, the present study did not show a relationship between endotoxemia and postoperative fever. As the over-all size of the patient population in which blood endotoxin was determined was too small to assess the correlation, more clinical studies will be required.

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抗菌剤予防投与時における経尿道的前立腺切除術後菌血症について

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抗菌剤が予防的に投与された44例の経尿道的前立腺切除術後患者における菌血症について検討した。そのうち15例については術後エンドキシン血症についても検討した。術後菌血症は10例(22.7%)に発生し、敗血症は1例のみに認められた。菌血症の発生頻度は、予防的に投与された薬剤の種類による影響はなかったが、術前尿路感染症や切除組織中に前立腺炎を有していた患者では有意に高かった。血中分離菌に関しては、グラム陽性球菌がグラム陰性桿菌より優位を占め、*Staphylococcus epidermidis* が最も多く分離された。

菌血症患者7例(70%)では術前尿中分離菌種と同一菌種が分離された。菌血症が認められた患者では、術前に比し術後3時間以内の白血球数および最高体温に有意の上昇が認められた。以上より、術後菌血症の発生率を下げるには、術前尿路感染症や前立腺炎を有する患者に対して、術前からの適切かつ十分な抗菌剤の投与が必要であると考えられた。血中エンドキシンに関しては、術後発熱を有した患者と有さなかった患者との間にはエンドトキシン濃度に有意差は認められなかった。