

## Prophylactic Cefuroxime in Transurethral Resection

B. G. Ferrie and R. Scott

Department of Urology, Royal Infirmary, Glasgow, UK

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**Summary.** 65 men undergoing elective transurethral resection of the prostate under the care of one urologist entered a randomised controlled trial using Cefuroxime. Patients were excluded if they had received antibiotics in a 2 week period before surgery, if they had positive pre-operative urine cultures or if they had been catheterised. 58 patients completed the study. One patient in the antibiotic group and 2 in the control group developed urinary infection. The overall infection rate was 5.17%. The control and antibiotic groups were comparable as regards age and the duration of resection. One patient in the antibiotic group developed an allergic reaction. It is felt that routine antibiotic prophylaxis in patients with sterile urine undergoing elective TUR is unnecessary.

**Key words:** Antibiotic prophylaxis, Transurethral resection of prostate.

### Introduction

Urethral instrumentation may result in urinary tract infection. A variety of techniques have been used to prevent such infection including the use of prophylactic antibiotics [9, 13]. An awareness that instrumentation and operative manipulation of the prostate gland could cause infection in the lower urinary tract [15] has led several authors to advocate the routine of antibiotic prophylaxis during this procedure [10, 12, 14]. The aim of the present study was to determine whether routine prophylaxis with a broad-spectrum antibiotic in elective transurethral resection diminished lower urinary tract infection.

### Patients and Methods

All patients were admitted for elective transurethral resection for symptoms of bladder outflow obstruction and pre-operatively had

sterile urine. The study was a randomised prospective one. Patients were excluded if they had received any antibiotic for any purpose in a 2 week period before the trial, if they had an indwelling urethral catheter or had a history of allergy to penicillin or the cephalosporins. Patients were assigned to the antibiotic or control group according to a pre-determined randomised order. The antibiotic used was Cefuroxime, whose safety and effectiveness against most urinary pathogens has been demonstrated [6]. It is also effective against beta-lactamase producing gram-negative organisms. Patients in the antibiotic group received 1.5 g of Cefuroxime intravenously immediately after induction of general anaesthesia and post-operatively 750 mg. Cefuroxime intramuscularly 8 hourly, the antibiotic being continued for 48 h after operation.

A standard technique of transurethral resection was used and all patients were under the care of the same urologist. Sterile glycine was used as an irrigant and at the conclusion of each procedure a 22Ch. Simplast catheter was inserted and connected to a closed drainage system. Forced diuresis [3] was used with Frusemide 40 mg intravenously in divided doses post-operatively. The closed drainage system was only interrupted to wash out tenacious blood clots with sterile 0.02% Hibitane-aqueous solution. Urine samples were collected as clean catch mid-stream specimens or, in the post-operative period, directly from the catheter by an aseptic technique. Urine samples were obtained post-operatively, on removal of the catheter, 2–3 days afterwards or on discharge from the hospital and at outpatient review approximately 6 to 8 weeks after operation. Infection was defined for the purposes of this study as bacteriuria of more than  $10^8$  organisms per litre of urine.

### Results

Sixty-five patients entered the study but 7 were excluded because of protocol violations after randomisation. In one patient randomised to Cefuroxime, a TUR was not undertaken after initial cystoscopy. In 6 patients (4 randomised as controls and 2 randomised to Cefuroxime) it was discovered that their pre-operative urine showed infection but this information was not available at the time of surgery. Fifty-eight patients completed the study (Table 1). The incidence of post-operative bacteriuria is shown in Table 2, positive urine cultures being obtained in 3 patients, 2 controls and one patient on Cefuroxime. One of the control

Table 1. Details of 58 patients undergoing TUR

	Control group	Cefuroxime group
<i>Number</i>	32	26
<i>Mean age</i>	67.4 years (range 41–88)	70.5 years (range 61–79)
<i>Diagnosis</i>		
Benign prostatic hypertrophy	28	25
Carcinoma of prostate	2	1
Bladder neck hypertrophy	2	0

Table 2. Incidence of post-operative bacteriuria in 58 patients undergoing TUR

	Number of patients with positive cultures	Number of patients with negative cultures
Control group	2	30
Cefuroxime group	1	25

( $\chi^2$  no significant difference)

Table 3. Duration of transurethral resection in 58 patients

	Under 30 min	31 to 60 min
Control group	16	16
Cefuroxime group	14	12

patients with an *E. coli* infection at 12 days had considerable difficulty voiding after his TUR and required 2 repeat trans-urethral resections with a prolonged period of catheterisation. The second control patient developed an *E. coli* infection 8 weeks after operation. One patient on Cefuroxime had a *Proteus* infection 7 days after operation.

In order to determine if the control and Cefuroxime groups were similar, the duration of the resections was noted (Table 3) and no significant differences could be discovered. Since a prolonged period of catheterisation can lead to lower urinary tract infection [23], the duration of post-operative catheterisation between groups was compared (Table 4). Control patients had a longer mean period of catheterisation than those given antibiotic, but this difference may be explained by the one patient previously mentioned who required repeat resections of prostate and was catheterised for a total of 22 days. Table 5 indicates the mean period of post-operative hospitalisation in the 2 groups and again any difference may be explained by the same patient.

Table 4. Duration of post-operative catheterisation (mean figures in days)

Control group	3.18 days
Cefuroxime group	2.84 days

Table 5. Duration of post-operative hospitalisation (mean figures in days)

Control group	6.1 days
Cefuroxime group	5.5 days

One patient in the Cefuroxime group developed an unexpected allergic reaction and the antibiotic was discontinued on the first post-operative day.

## Discussion

Bacteriuria is a frequent complication of trans-urethral surgery. It may be asymptomatic or cause serious infection, with bacteraemia [19], pyelonephritis, epididymitis and urethral stricture as sequelae. To avoid these complications, several methods of management have been suggested, including the use of prophylactic antibiotics [1]. The value of antibiotic prophylaxis is still unresolved and as the post-operative management of patients undergoing TUR has changed over the past 15 years, it was felt that the problem merited further study.

The reported incidence of lower urinary tract infection following TUR varies from 5% [22] to 52% [4]. In our series the level of postoperative bacteriuria was clearly low at 5.17%, that is 3 of 58 patients, one of whom required more than one resection of prostate. A possible explanation for the low prevalence of post-operative infection could be that the present post-operative management of patients employs several factors thought to lower the incidence of infection, such as auto-irrigation diuresis with frusemide [3], a closed drainage system [16], shorter resection times with improved optics and the earlier removal of urethral catheters [22].

In the past there has been debate as to whether prophylactic antibiotics are indicated in the patient with a sterile urine undergoing an elective TUR. Chodak and Plaut [2] considered all reported trials in the English literature from 1950 to 1978 and reported that many should be discarded, because they were either not controlled, not randomised, retrospective or had the antibiotic started post-operatively. More recently, Williams et al. [24] in a mixed series of both open prostatectomy patients and TUR cases advocated the use of the cephalosporin Cephadrine as a prophylactic agent. Nielsen et al. [18] demonstrated a reduction in post-operative complications using Cefoxitin. However, in Nielsen's study there were twice as many patients with prostatic

carcinoma in the treatment group as in the controls. In addition the patients in the series had considerably longer operating times than our series, and some patients with pre-operative catheters were included and some patients received other antibiotics in addition to the one under study. Other contemporary studies have similar factors which make interpretation difficult such as Shah et al. [21] who included both open and trans-urethral operations from 2 centres along with patients who had indwelling catheters before operation. In the study by Hargreave et al. [8] the authors concluded that antibiotics should be used prophylactically. However a number of patients with positive pre-operative urine cultures unknown at the time of surgery were included together with some patients with pre-operative catheters.

By contrast, Gonzalez et al. [7] raised doubts about the use of cephalosporins and Gibbons et al. [5] suggested that kanamycin made little difference to the onset of post-operative infection. Holl and Rous [11] using nitrofurantoin, co-trimoxazole and untreated controls showed no beneficial effect from the use of antibiotics. They concluded that prophylactic antibiotic therapy was not warranted in the TUR patient with sterile urine pre-operatively, who did not have an indwelling catheter and had no predisposing factors to infection. Ramsey and Sheth [20] reported benefit in a mixed group of open and transurethral prostatectomy patients given various doses of gentamicin, although commenting that prophylactic antibiotics did not appear to have significantly affected the clinical course of the patients.

Advocates of antibiotic prophylaxis must justify the cost of antibiotics, the risk of adverse reactions (in one patient in our series) and the potential problem of resistant organisms. Those who take the opposite view must consider the possible cost savings of even 1 day per patient as shown by Hargreave et al. [8], the only series to comment on this aspect.

We would suggest that when strict criteria are used as we have endeavoured to do in our study, namely sterile pre-operative urines, no pre-operative catheters and all patients having the same operation namely transurethral resection, then the likelihood of developing post-operative urinary infection is small. It is possible that modern post-operative management coupled with technical refinements in transurethral surgery which permit quicker and safer resection, modern anaesthesia and biologically inert catheter materials all contribute to lower the incidence of post-prostatectomy urinary tract infection to a point where the routine use of antibiotic prophylaxis for the non-infected average risk patient is unnecessary.

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B. G. Ferrie  
Department of Urology  
Royal Infirmary  
Glasgow G4 0SF  
UK