Compliance with American Urological Association Guidelines for Post-Percutaneous Nephrolithotomy Antibiotics Does Not Appear to Increase Rates of Infection

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Abbreviations and Acronyms

AUA = American Urological Association

PCN = percutaneous nephrostomy

PCNL = percutaneous nephrolithotomy

POD = postoperative day

UTI = urinary tract infection

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See Editorial on page 869.

Editor's Note: This article is the third of 5 published in this issue for which category 1 CME credits can be earned. Instructions for obtaining credits are given with the questions on pages 1174 and 1175.

Purpose: We compared infection rates after percutaneous nephrolithotomy in a group of patients without a history of infection or struvite calculi who received 24 hours or less of antibiotics postoperatively (ie compliance with AUA guidelines) vs a group that received 5 to 7 days of antibiotics postoperatively.

Materials and Methods: We retrospectively reviewed the records of consecutive percutaneous nephrolithotomy procedures in patients without a history of urinary tract infection. Group 1 received 24 hours or less of antibiotics postoperatively and group 2 received a mean of 6 days of antibiotics postoperatively.

Results: A total of 52 patients in group 1 (24 hours or less of antibiotics) and 30 in group 2 (mean 6 days of antibiotics) met study inclusion criteria. In 5 group 1 patients (9.6%) fever developed within 72 hours of percutaneous nephrolithotomy but none demonstrated bacteriuria or bacteremia on cultures. No patient in group 1 was treated for urinary tract infection on postoperative days 3 to 14. In 4 group 2 patients (13.3%) fever developed within 72 hours of percutaneous nephrolithotomy. A single patient showed bacteriuria (less than 10,000 cfu mixed gram-positive bacteria) on culture while no patient demonstrated bacteremia. No patient in group 2 was treated for urinary tract infection on postoperative days 3 to 14. There was no difference in stone-free rates or the need for additional procedures between the 2 groups.

Conclusions: In this pilot series compliance with AUA guidelines for antibiotic prophylaxis did not result in higher rates of infection than in a comparable group of 30 patients who received approximately 6 days of antibiotics postoperatively.

Key Words: kidney; nephrostomy, percutaneous; anti-bacterial agents; standards; compliance

The overuse of antibiotics is an important public health issue as it contributes to antibiotic resistance.[1] The AUA Best Practice Statement (updated in 2012) cites level IIb and level III evidence in its recommendation that antibiotic prophylaxis is indicated in all patients undergoing percutaneous nephrolithotomy for a duration of 24 hours or less.[1] A single randomized study evaluated antibiotic therapy after PCNL, comparing single dose to short course antibiotics, and found no difference in the incidence of septic complications after PCNL.[2] We hypothesized that compliance with antibiotic guidelines does not result in an increase in infectious complications after PCNL. We report a retrospective study

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comparing 2 antibiotic regimens for PCNL, including 24 hours or less of antibiotics vs several days (mean 5.9) of postoperative antibiotics.

METHODS

We retrospectively reviewed the records of consecutive PCNL procedures performed at 2 institutions. Group 1 comprised patients who received 24 hours or less of antibiotics for PCNL. All of these procedures were performed at a single institution (Massachusetts General Hospital). The first dose of antibiotics was routinely given 30 to 60 minutes prior to the start of the procedure (ie flexible cystoscopy and placement of a ureteral catheter). The final dose of antibiotics in patients in this group was given less than 24 hours after the first dose. Group 2 comprised patients who received antibiotics for several days after PCNL (mean 5.9 as described). All of these procedures were performed at a single institution (University of Vermont). During the inpatient stay if a patient demonstrated a temperature of greater than 101.5F, urine and blood cultures were obtained before the initiation of empirical intravenous antibiotics. All patients in this study were seen within 14 days of discharge home and assessed for any infectious complications in the perioperative period by office urinalysis and culture if indicated. In addition, any patient who reported receiving antibiotics during or after discharge was considered to have had cystitis.

Rates of infectious complications were compared using the Student t-test. Exclusion criteria were chronic indwelling catheters such as a suprapubic tube, history of infection within 60 days before PCNL based on documented urine cultures, history of recurrent cystitis or a prior struvite stone. In our practices all of these patients receive 3 to 7 days of antibiotics before PCNL. Patients underwent percutaneous access on the same day as PCNL. Access was performed by the treating urologist. If postoperative drainage consisted of a nephrostomy tube, it was removed on POD 1 or 2. If drainage was achieved with a ureteral stent, it was removed from POD 7 to 14.

RESULTS

Group 1—24 Hours or Less of Antibiotics (Compliance with AUA Guidelines)

A total of 52 patients met study inclusion criteria. In 5 patients (9.6%) fever developed during the inpatient stay. No patients (0%) were admitted to the intensive care unit for presumed sepsis. However, none of these patients (0%) had positive urine or blood cultures, suggesting that the source of fever was likely atelectasis or another nongenitourinary source. No patients (0%) were treated for infection from PODs 3 to 14. Mean age was 51.9 years and 29% of the patients were female.

The most common intraoperative antibiotics used were cefazolin in 37% of patients, ampicillin plus gentamicin in 19% and ceftriaxone in 17%. Mean ± SD operative time was 107.4 ± 32.0 minutes and 34 accesses (65.0%) were below the 12th rib. Stone size was greater than 2.0 cm in 79% of patients and 23% of the stones were staghorn calculi. Stone composition was pure or mixed calcium in 25 patients (46%), mixed calcium and uric acid in 10 (19%), pure uric acid in 3 (6%), struvite in 4 (8%), cystine in 2 (4%) and unknown in 8 (15%). A ureteral stent without nephrostomy served as drainage for 35% of procedures and the remainder had nephrostomy tube drainage for less than 48 hours. Tables 1 to 3 show these data. The stone-free rate was 64% and 10 patients (19%) underwent a secondary procedure for removal of residual stones. There were no significant differences between the 2 groups in

Table 1. *Patient characteristics*

	Group 1	Group 2	p Value
Mean age	51.9	55.7	0.3*
% Male/female	71/29	47/53	0.03
% Antibiotic:			
Intraop	Cefazolin (46), ampicillin + gentamicin (21), ceftriaxone (17), fluoroquinolone only (3.8), vancomycin/gentamicin (3.8), vancomycin only (3.8), ampicillin/ciprofloxacin (1.9), cefazolin/gentamicin (1.9)	Ampicillin + gentamicin (70), quinolone alone (20), vancomycin/gentamicin (6.6)	Not applicable
Postop	Not applicable	Quinolone (80), trimethoprim-sulfamethoxazole (10), cephalexin (6.6)	Not applicable
Mean antibiotic duration	24 Hrs	5.9 Days	<0.001
Median ± SD operative time (mins)	99.5 ± 32.0	125.9 ± 36.8	0.05
% Renal access location:			<0.001
Below 12th rib	65.0	97	
Supracostal	35	3	
% Drainage	PCN only (29), PCN + stent (36), stent only (35)	PCN + stent (100)	<0.001
No. stone greater than 2.0 cm (%)	41 (79)	24 (80)	0.99*
No. large staghorn calculus (%)†	12 (23)	4 (13.3)	0.4*

* Not significant.
† Greater than 50% of collecting system.