

TABLE 1. Study Population

	Ciprofloxacin	Ceftazidime
Number of patients	20	17
Mean age (range)	59 (40-77)	59 (29-82)
Sex (M/F)	10/10	13/4
Underlying diseases		
Diabetes mellitus	6	8
Arterial vascular disease	8	8
Postoperative wound	7	4
Decubitus ulcer	4	2
Location		
Head	1	0
Hand	0	2
Chest	1	1
Abdomen	2	0
Hip/sacrum	5	2
Leg	4	3
Foot	7	9

a significant infection due to *Staphylococcus* or *Streptococcus* were not given clindamycin.

During the administration of antibiotics, patients were seen by a physician initially, on days 3 and 7, and then at least weekly. These visits were accompanied by testing for renal, liver, and hematopoietic functions (as specified in the protocol). Patients were also assessed at the end of IV as well as oral antimicrobial therapy and were seen at least 1 month after the end of treatment. Surgery was performed if needed to remove dead tissue or to graft skin over the wound.

RESULTS

Thirty-seven adults were selected, agreed to participate, and were evaluated by study criteria. The characteristics of the study patients were similar between the ciprofloxacin and ceftazidime groups, except for gender; males predominated in the ceftazidime group (Table 1). More than half of each group had diabetes mellitus, peripheral vascular disease, or both. Infections were most often located in the lower extremity, especially the foot (Table 1).

The organisms recovered were primarily Gram-negative bacilli, with *P. aeruginosa* predominating (Table 2). A single organism was recovered in 10 ciprofloxacin and 6 ceftazidime patients. Most infections were due to a mixture of bacteria. *Staphylococcus aureus* was recovered in two sites in the ciprofloxacin group and four in the ceftazidime group. Streptococci were recovered from two infection sites in the ciprofloxacin group and three in the ceftazidime group, but none were group D strains.

Patients were followed for a period of at least 6 months after antibiotics were discontinued. Con-

TABLE 2. Bacteriology of Infections

Organism	Ciprofloxacin		Ceftazidime	
	Pure	Mixed	Pure	Mixed
<i>P. aeruginosa</i>	5	2	2	5
<i>Escherichia coli</i>	0	4	2	3
<i>Proteus mirabilis</i>	2	0	0	5
<i>S. aureus</i>	1	1	0	4
<i>Streptococcus</i> sp.	1	1	0	3
Other	1	18	2	14
Total	10	26	6	34

comitant therapy with metronidazole or clindamycin for anaerobic organisms was provided in 11 patients on ciprofloxacin and in 10 patients on ceftazidime. Skin grafts were done on four patients in the ciprofloxacin group and one in the ceftazidime group.

The duration of IV therapy was considerably longer in the ceftazidime group (16.5 days vs. 5.8 days), although the total course of therapy was longer with ciprofloxacin (24.8 days vs. 19.7 days). The difference was largely due to the restriction on the use of oral ciprofloxacin after IV ceftazidime. In eight of the ceftazidime cases, no other effective oral drug could be given because of the resistant organisms present.

Adverse effects were comparable between the ciprofloxacin and ceftazidime groups and did not require discontinuation of the drug in any case. Diarrhea in patients occurred once with ciprofloxacin and three times with ceftazidime. Nausea occurred in one patient only with ciprofloxacin.

Aerobic bacterial isolates from the initial wound culture were eradicated in 31 of 36 (86%) infection sites during therapy with ciprofloxacin and 35 of 40 (88%) infection sites with ceftazidime (Table 3). Resistance developed during ciprofloxacin therapy in two organisms (one *P. aeruginosa* and one *S. aureus*). No resistance developed on ceftazidime therapy, but four relapses occurred after treatment (three *P. aeruginosa*, one *Serratia marcescens*). Some bacteria persisted in the wounds of patients in each group despite parenteral therapy (Table 3).

The clinical outcome in each group reflected the extent of the infection and the high incidence of underlying diseases (Table 3). Cure was achieved in 10 of 20 (50%) ciprofloxacin study patients and in 7 of 17 (41%) ceftazidime patients. A single superinfection occurred during therapy in each group. The wounds became reinfected (new organisms) after therapy had eradicated the isolated bacteria in two patients on ciprofloxacin and in four patients on ceftazidime. Clinical failures also included three amputations in patients the ciprofloxacin group and two in these in the ceftazidime group.

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TABLE 3. Clinical and Bacteriologic Outcome

	Outcome by Bacteria Isolated		Clinical Outcome		
	Ciprofloxacin	Ceftazidime	Ciprofloxacin	Ceftazidime	
Eradicated	31	35	Cure	10	7
Resistant	2 ^a	0	Superinfection	1 ^b	1 ^c
Persistent	3	1	Reinfection	2	4
Relapse	0	4 ^d	Failure (amputation)	7 (3)	5 (2)
Total	36	40		20	17

^a1 *P. aeruginosa* and 1 *S. aureus*.

^b*Xanthomonas maltophilia*.

^c*S. aureus*.

^d1 *P. aeruginosa*, 1 *Streptococcus* sp., and 1 coagulase-negative *Staphylococcus* sp.

^e*Streptococcus* sp.

^f3 *P. aeruginosa* and 1 *S. marcescens*.

COMMENTS

The patients in this study were difficult to treat because of the underlying diseases that compromised their immunity and blood supply. Many had also failed previous antibiotic therapy. Even with the expected poor clinical outcome in nearly half of the patients, both IV ciprofloxacin and ceftazidime were able to eradicate the vast majority of bacteria recovered from the initial wound. Although antibiotic resistance developed in several patients on ciprofloxacin therapy and not on these on ceftazidime, bacteriological response rates were similar and relapses occurred only with ceftazidime.

Both IV ciprofloxacin and ceftazidime were well tolerated by patients, but only with ciprofloxacin was

it possible to switch to a comparable broad-spectrum oral antibiotic.

In this limited series of cases, we conclude that IV ciprofloxacin is as effective and well tolerated as ceftazidime in the empiric treatment of serious soft tissue infections. When enteral therapy is possible and if sensitivity results allow, oral ciprofloxacin can be used to complete the course of therapy with results comparable to IV ceftazidime plus an effective oral antibiotic. Although ciprofloxacin may not be the drug of choice for empiric therapy of soft tissue infections due to Gram-positive bacteria, it may well serve a very useful role in the more serious, persistent infections that are often due to Gram-negative organisms.

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