Effectiveness of Once-Weekly
Vancomycin and Once-Daily Gentamicin,
Intraperitoneally, for CAPD Peritonitis

Peritonitis remains a major cause of morbidity and mortality in continuous ambulatory peritoneal dialysis (CAPD) (1). However, most peritonitis cases are simple infections that facilitate empiric treatments. Recent recommendations for empiric therapy include once-daily gentamicin (2) and once-weekly vancomycin, both intraperitoneally (IP) (3). Although this type of intermittent therapy is well described for vancomycin, the only supporting data for intermittent aminoglycosides are in abstract form (4-6). We report our experience using this combination regimen.

METHODS

CAPD patients, 18 to 80 years of age, who presented with signs and symptoms consistent with peritonitis, were placed on the treatment protocol. Patients were excluded if they had been on CAPD for less than one month, if 2 weeks had not passed from any previous course of antibiotics, if 2 weeks had not passed from a previous episode of peritonitis, or if there was a concomitant exit-site infection. The dialysate was drained on presentation and sent for cell count, culture, and sensitivity without Gram staining. Patients were given 30 mg/kg lean body weight vancomycin and 0.6 mg/kg gentamicin IP in the next prescribed dialysate and left in situ for a 6-hour dwell. Patients then reverted to their prescribed PD regimen. Each patient continued treatment as an outpatient and was instructed to add the antibiotics to the overnight exchange. Patients were followed up by telephone when the culture and sensitivity results were obtained and instructed to proceed with treatment as follows:

1. gram-positive organism cultured: discontinue gentamicin and give one additional vancomycin dose 7 days after the first dose;
2. gram-negative organism other than Pseudomonas or Xanthomonas: discontinue vancomycin and continue daily gentamicin for a total of 10 days;
3. mixed gram-positive and gram-negative, or culture-negative: continue both antibiotics as above;
4. fungi, Pseudomonas or Xanthomonas: patients were placed on an alternative treatment protocol.

Patients were reevaluated by physical examination after one week and had dialysate recultured at day 14.

Treatment failure was defined as a continuation of signs and symptoms of peritonitis or noneradication of organism on culture. No blood samples were taken for antibiotic assay.

RESULTS

Twenty-three male patients (16 white, 7 black; mean age 59.4 years) met the treatment criteria regimen and were followed up. They had 40 episodes of peritonitis with 41 infecting organisms (27 gram-positive, 10 gram-negative, 4 culture-negative) (Figure 1). One patient had an episode with two concurrent gram-negative organisms, Pseudomonas and Acinetobacter. Staphylococcal species were the most common (138 epidermidis, 98. aureus). Thirty-five of the 40 episodes were cured (87.5%), and 5 episodes (6 organisms) were treatment failures. There were 9 episodes of gram-negative infections caused by 10 organisms, of which 6 (67%) episodes were cured, and 3 episodes (4 organisms) were treatment failures. All 4 culture-negative episodes continued the combination regimen and remained culture-negative on follow-up culture. They had no clinical signs and symptoms of peritonitis at day 14 and were deemed treatment successes.

The Alcaligenes xylosidans failed to respond to the IP gentamicin, and oral ciprofloxacin 500 mg b.i.d. was added. This infection did not clear and resulted in catheter removal. The patient who had two gram-negative organisms did not respond to a 14-day course of once-daily gentamicin, although both organisms were sensitive to aminoglycosides. On day 10 of treatment, oral ciprofloxacin was added, and on day 14 he was switched to 4 mg/L gentamicin in each exchange for an additional 10 days; he was subsequently
Two episodes of *S. aureus* peritonitis did not respond to the first dose of IP vancomycin as assessed clinically. After 4 and 5 days the regimen was changed to continuous treatment with 25 mg/L IP vancomycin in each exchange, which resulted in eradication of the infection at day 14.

Thus 25 of 27 (93%) of gram-positive episodes of peritonitis and 6 of 9 (67%) of gram-negative episodes of peritonitis were successfully treated.

**DISCUSSION**

Continuous therapy with IP aminoglycosides has had documented success (7,8). However, there are no published data, apart from abstracts, evaluating the efficacy of once-daily IP aminoglycosides. Because of the relative infrequency of gram-negative infections and the decreasing incidence of peritonitis, it is difficult to gather large numbers of gram-negative infections in any series. In this small study we identified only 9 such episodes with 10 organisms, with a treatment success rate of only 67%. The reasons for the high failure rate are speculative. There were several unusual species identified that had unusual growth and susceptibility characteristics and that may have skewed the treatment success rate in the study. The decrease susceptibility to aminoglycosides and subsequently became gentamicin-resistant. The reasons for this are unclear. Given the large systemic bioavailability of IP aminoglycosides (9), sufficient blood levels should be maintained throughout a 24-hour period to ensure adequate dialysate concentrations. Perhaps individual patients who failed on this regimen had a reduced absorption across the peritoneum.

Based on knowledge about the pharmacokinetics of vancomycin and the documented success in a number of studies, once-weekly vancomycin appears to be an appropriate regimen. Of concern, however, was the need to change 2 patients to continuous IP therapy to eradicate episodes of *S. aureus*.

In an attempt to increase patient compliance and mimic the advantages of once-daily intravenous aminoglycosides, once-daily IP treatment has been advocated for the treatment of peritonitis. The known pharmacokinetic characteristics of aminoglycosides would suggest that this regimen is appropriate (9). However, we documented only a 67% treatment success rate using this regimen. We continue to use once-daily IP gentamicin in an attempt to gain further experience, but with an increasing concern about its efficacy. The continued attempt to rationalize the treatment of peritonitis is to be welcomed. However,
REFERENCES