

## Tularemia and Once-Daily Gentamicin

Tularemia has been a subject of interest over the last few years, as it can be used as a biological weapon (2). An aminoglycoside such as streptomycin has been the accepted treatment of choice and can achieve a 100% cure rate. Gentamicin administered three times a day has been used as an alternative (5). The use of once-daily dosing has been recommended, but few data regarding its success rate against this infection are available. We report two cases of glandular tularemia successfully treated with once-daily gentamicin.

**Case 1.** A 23-year-old white male sustained a bite on his index finger while petting a kitten. Within 5 days, he developed fever, painful axillary lymph nodes, myalgia, and headache. He was treated with ceftriaxone for 2 days and then with amoxicillin-clavulanate for 14 days with some improvement. However, symptoms recurred after he finished the antibiotic course. He was referred for further workup and management. A tularemia agglutination test result was 1:320. He was started on intravenous (i.v.) gentamicin at 5 mg/kg of body weight daily as outpatient therapy, which was adjusted to maintain a trough serum concentration of 0.5 to 1.5  $\mu\text{g/ml}$  and a peak serum concentration of 8 to 10  $\mu\text{g/ml}$ . His serum creatinine level before the initiation of therapy was 0.8 mg/dl. His condition improved significantly within 48 h. On day 7 of treatment, he underwent incision and drainage of an axillary lymph node, as it was large and fluctuant. The culture was sterile. The patient finished 10 days of treatment. His serum creatinine level at the end of therapy was 0.8 mg/dl.

**Case 2.** A 28-year-old male, a brother of the first patient, was bitten by the same kitten and within three days developed generalized muscle aches and painful axillary lymph nodes. He was treated with ceftriaxone for 1 day followed by azithromycin for 5 days, with improvement. His symptoms recurred after the cessation of therapy. He was subsequently treated with ceftriaxone for 2 days and then with amoxicillin-clavulanate for 10 days, with some improvement. Upon referral, a tularemia agglutination test result was 1:160. The serum creatinine level was 0.7 mg/dl. He was treated with i.v. gentamicin 5 mg/kg daily for 7 days to keep peak and trough serum concentrations in the same range as for the first patient, with complete resolution of symptoms. The posttherapy serum creatinine level was 0.8 mg/dl.

Neither patient experienced side effects or relapse after 5 months.

**Discussion.** *Francisella tularensis* is a gram-negative pathogen primarily of animals and occasionally of humans. Tulare-

mia continues to be responsible for significant morbidity and mortality, despite the availability of numerous antibiotics active against the organism (5). Streptomycin has long been considered the drug of choice for tularemia, but it may be associated with significant side effects. Tetracycline, chloramphenicol, and quinolones are useful alternatives, although relapse rates are higher.

Gentamicin is more widely available and can be given intravenously as an acceptable alternative (3, 4). Several case reports have shown that gentamicin given as three doses daily for 7 to 10 days has a cure rate of 86%, a relapse rate of 6%, and a failure rate of 8%. In these reports, only 41% of the patients had been on gentamicin monotherapy, or they were treated with shorter courses of therapy (<6 days), or they suffered a delay in the institution of treatment (1, 3). Although once-daily gentamicin has been recommended, its efficacy has not been reported. Our patients were treated as outpatients with i.v. gentamicin and had complete resolution of symptoms with no relapse and experienced no significant side effects.

**Conclusion.** Once-daily gentamicin therapy is an effective treatment for patients with tularemia. Patients should be closely monitored, with gentamicin peak serum concentrations between 8 and 10  $\mu\text{g/ml}$  and trough serum concentrations of 0.5 to 1.5  $\mu\text{g/ml}$  maintained.

### REFERENCES

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