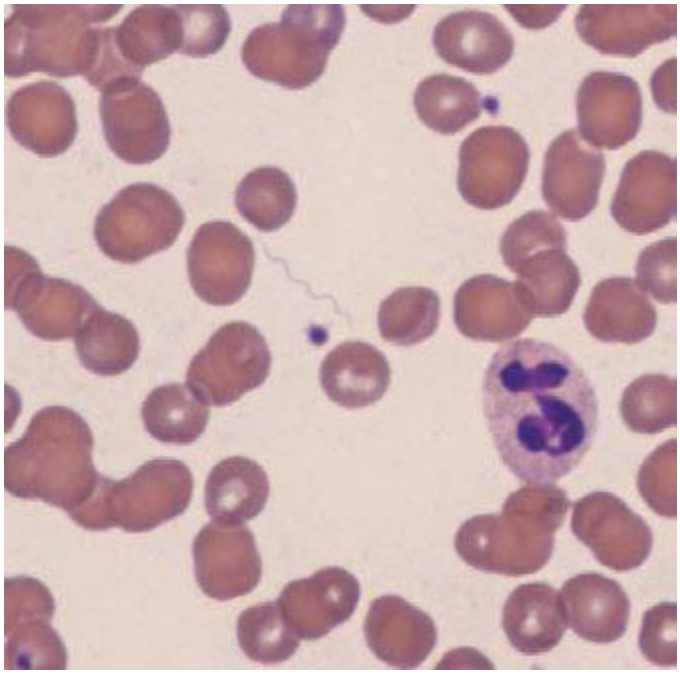

FIGURE 209-2 Photomicrograph of tick-borne relapsing fever spirochete (*Borrelia turicatae*) in a Wright-Giemsa-stained thin blood smear. Included in the figure are a polymorphonuclear leukocyte and two platelets.

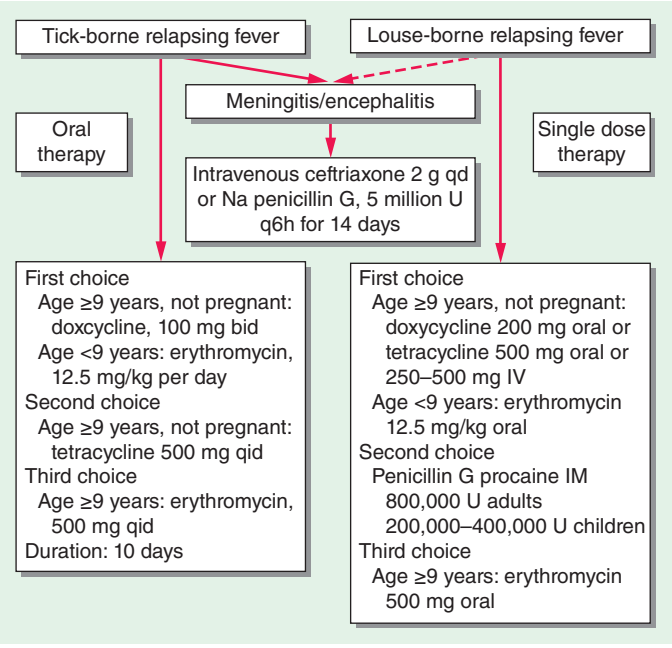

FIGURE 209-3 Algorithm for treatment of relapsing fever. If it is not known whether the patient has tick-borne or louse-borne relapsing fever, the patient should be treated for the tick-borne form. The *dashed line* indicates that central nervous system invasion in louse-borne relapsing fever is uncommon.

promising new assays under development are based on recombinant antigens such as GlpQ, a protein antigen of all relapsing fever *Borrelia* species (including *B. miyamotoi*) but not of any Lyme disease species.

DIFFERENTIAL DIAGNOSIS

Depending on the patient's history of residential, occupational, travel, and recreational exposures, the differential diagnosis of relapsing fever includes one or more of the following infections that feature either periodicity in the fever pattern or an extended single febrile period with nonspecific constitutional symptoms: Colorado tick fever (which, along with dengue, can have a "saddleback" fever course), Rocky Mountain spotted fever and other rickettsioses, ehrlichiosis, anaplasmosis, tick-borne arbovirus infection, and babesiosis in North America, Europe, Russia, and northeastern Asia. Elsewhere in the Americas and Asia and in most of Africa, malaria, typhoid fever, typhus and other rickettsioses, dengue, brucellosis, and leptospirosis may also be considered. Depending on the geographic area and types of exposure, malaria, louse-borne typhus, typhoid fever, or Lyme disease may complicate relapsing fever.

TREATMENT RELAPSING FEVER

Penicillins and tetracyclines have been the antibiotics of choice for relapsing fever for several decades. Erythromycin has been a long-standing second choice. There is no evidence of acquired resistance to these antibiotics. *Borrelia* species are also susceptible to most cephalosporins and chloramphenicol, but there is less clinical experience with these drugs. Borreliae are relatively resistant to rifampin, sulfonamides, fluoroquinolones, and aminoglycosides. Spirochetes are no longer detectable in the blood within a few hours after the first dose of an effective antibiotic.

A single dose of antibiotic is usually sufficient for the treatment of LBRF (Fig. 209-3). The recurrence rate after antibiotic treatment is ≤5%. For adults, a single dose of oral tetracycline (500 mg), oral doxycycline (200 mg), or intramuscular penicillin G procaine (400,000–800,000 units) is effective. The corresponding doses for children are oral tetracycline at 12.5 mg/kg, oral doxycycline at 5 mg/kg, and intramuscular penicillin G procaine at 200,000–400,000 units. When an adult patient is stuporous or nauseated, the intravenous dose is 250–500 mg. Tetracycline is contraindicated in pregnant and nursing women and in children <9 years old; for individuals in these groups who are allergic to penicillin, oral erythromycin (500 mg for adults and 12.5 mg/kg for children) is an alternative. Tetracycline is marginally superior to penicillin G in terms of time to fever clearance and relapse rate.

The accumulated anecdotal reports on TBRF therapy indicate a recurrence rate of ≥20% after single-dose treatment. This high rate of recurrence plausibly is due to the greater propensity of tick-borne species than of *B. recurrentis* to invade the CNS, from which they can reinvade the bloodstream after antibiotic levels decline. Accordingly, multiple antibiotic doses are recommended. The preferred treatment for adults is a 10-day course of tetracycline (500 mg or 12.5 mg/kg orally every 6 h) or doxycycline (100 mg twice daily). When tetracyclines are contraindicated, the alternative is erythromycin (500 mg or 12.5 mg/kg orally every 6 h) for 10 days. If a β-lactam antibiotic is given, it should be administered intravenously rather than orally, especially if CNS involvement is confirmed or suspected. For adults, the regimen is penicillin G (5 million units IV every 6 h) or ceftriaxone (2 g IV daily) for 10–14 days.

Experience with the treatment of *B. miyamotoi* infection is limited, but this organism likely has the same antibiotic susceptibilities as other *Borrelia* species. Until more is known about treatment efficacy, therapy for *B. miyamotoi* infection can follow the guidelines for Lyme disease—including parenteral therapy for CNS involvement—because it may be difficult to rule out co-infection.

The JHR during treatment of relapsing fever can be severe and can even end in death if precautions are not in place for close monitoring and provision of cardiovascular and volume support as needed. Rigors, fever, and hypotension occur within 2–3 h of initiation of antibiotic treatment. The incidence of the JHR is ~80% in LBRF and ~50% in TBRF. Both penicillin and tetracycline can elicit the JHR.

PROGNOSIS

The mortality rates for untreated LBRF and TBRF are in the ranges of 10–70% and 4–10%, respectively, and are largely determined by coexisting conditions, such as malnutrition and dehydration.