Rheumatologic Emergencies

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NOTE FROM THE PUBLISHER:
This publication was developed without the involvement of or review by the American Board of Emergency Medicine.
The rheumatic disorders can affect multiple organ systems. Most often, patients presenting to the emergency department with a rheumatologic complaint have complications of a known underlying disease, usually rheumatoid arthritis or systemic lupus erythematosus. Patients also may present with the initial complaints of a rheumatic syndrome, but making a definitive diagnosis in the emergency department usually is not possible. Acute monarticular arthritis is a particularly important emergency entity because of the possibility of bacterial septic arthritis, which requires rapid identification and initiation of treatment to prevent destruction of the joint.

A. **Background**. Septic arthritis is an infection involving the synovial membrane and joint space. Bacteria are the most common pathogens. Microorganisms are most commonly introduced into the joint space by the hematogenous route. Direct implantation and extension from adjacent infection occur less frequently.

B. **Infecting organisms**

1. **Adults**
   a. *Neisseria gonorrhoeae* is the most common organism that causes septic arthritis. Sexually active women are most frequently affected. Joint involvement is typically
monarticular, involving the knee, wrist, or hand. Typical early findings include transient or migratory polyarthralgias, tenosynovitis, and polyarthritis.

b. Staphylococci are the major causative agents of nongonococcal septic arthritis. Gram-negative bacilli are also important pathogens and may account for up to one third of cases in the elderly. *Escherichia coli* is the most common gram-negative bacillus isolated. Arthritis caused by gram-negative bacilli may be related to an underlying chronic disorder, immunosuppression, or prior use of antibiotics.

c. *Staphylococcus aureus* is the primary causative organism among injection drug users and is often methicillin-resistant. Group A and G streptococci are common. Injection drug users have a high incidence of gram-negative infections, especially with *Pseudomonas*, *Serratia*, and *Salmonella* species.

2. Children
   a. *S. aureus* is the most frequent cause, especially in neonates (in whom infection with coliform bacteria is also common).
   b. *Haemophilus influenzae* had been the second most common cause, but illness due to this agent has markedly decreased since the initiation of routine vaccination.
   c. Children younger than 2 years of age are prone to *Streptococcus pneumoniae* infection, whereas group A streptococcal infection is more prevalent in older children.

C. **Areas of involvement.** The usual sites of involvement are the knee, hip, shoulder, and elbow, in descending order of frequency.

1. In gonococcal arthritis, the upper extremities are more frequently involved than the lower. The wrists are most typically affected, although the knees and hands are also common sites. Ankles and elbows are occasionally involved.
2. In nongonococcal arthritis, large joints (knee, hip, shoulder, and elbow) are the most common sites of infection. Multiple joint involvement occurs in 15% to 20% of adults, especially in elderly and debilitated patients and in those with rheumatoid arthritis.
3. Among injection drug users, vertebral and fibrocartilaginous articulations of the pelvis and sternum are common sites of infection.

D. **Underlying conditions**

1. Chronic illness
   a. Chronic conditions such as liver disease, diabetes mellitus, chronic renal failure, sickle cell disease, and hemophilia are significant risk factors for bacterial arthritis. In sickle cell disease, the hip is involved most frequently, and *Salmonella*, *S. pneumoniae*, and *S. aureus* are the most common infecting organisms.
   b. Preexisting joint disease, including rheumatoid arthritis, gout, and osteoarthritis may predispose a joint to bacterial infection. *S. aureus* is recovered from 80% of infected rheumatoid joints.
   c. Septic arthritis may involve prosthetic joints, with *Staphylococcus epidermidis* being responsible for most perioperative joint infection.

2. **Injection drug use**

E. **Clinical presentation**

1. Joint pain and tenderness are usually present. Joint swelling is the most reliable sign of capsular involvement and is associated with tenderness. When the hip is involved, it is held in a flexed and externally rotated position.
2. Fever is frequently present.
3. Back pain. Septic disc space involvement should be considered in injection drug users presenting with back pain.
4. Tendon pain. Acute tenosynovitis is a characteristic feature of gonococcal arthritis and occurs in the majority of patients. The dorsum of the hand and wrist are the most frequent sites.
5. Disseminated gonococcal infection
   a. Arthralgia-tenosynovitis-dermatitis is the most common form of disseminated gonococcal infection. It is characterized by polyarthralgias without positive joint cultures, tenosynovitis, dermatitis, and fever.
   b. Gonococcal arthritis occurs in about 40% of patients with disseminated gonococcal infection. Typically, patients present with a hot, swollen, purulent joint and minimal systemic symptoms.

F. **Complications**

1. Joint destruction. Destruction of articular cartilage is the most serious consequence of septic arthritis. This complication is particularly severe when therapy is delayed, especially in infection caused by staphylococci or gram-negative bacilli.
2. Osteomyelitis is the most common complication of septic arthritis.

3. Avascular necrosis represents an important potential complication of septic arthritis of the hip in children.

G. Laboratory data

1. White blood cell (WBC) count is elevated in about 50% of patients. Its absence does not rule out pyogenic arthritis, especially in debilitated patients. Gonococcal arthritis is more likely to be accompanied by a normal WBC count than is septic arthritis caused by other organisms.

2. Erythrocyte sedimentation rate is elevated in most cases, regardless of the organism, and is commonly > 60 mm/hr.

3. Synovial fluid analysis is mandatory whenever joint infection is suspected. The presence of skin or soft tissue infection overlying the joint is a contraindication.

   a. Fluid should be assessed for color, clarity, viscosity, and mucin clot (Table 1).

   Infected synovial fluid is usually turbid and yellow-green; the viscosity is decreased, and the mucin clot is poorly formed.

   b. A specimen should be analyzed for WBC count and crystal content. A WBC count of 50,000 to 200,000/mm³ with 80% to 90% neutrophils is relatively common in an infection, but counts can be as low as 10,000/mm³. Relatively low WBC counts are more common early in the course of the disease, in patients partially treated with antibiotics, and in disseminated gonococcal infection.

4. Synovial fluid culture should be obtained whenever a joint is aspirated. Definitive diagnostic tests for septic arthritis are either demonstration of bacteria by Gram stain or recovery of bacteria by synovial fluid culture.

   An organism is identified in 75% to 95% of nongonococcal arthritis cases in which gram-positive organisms are involved and in 50% of infections caused by gram-negative bacilli. Culture is negative in more than 75% of cases of gonococcal arthritis because of the small number of organisms present in the fluid.

5. Blood culture. Positive blood cultures are relatively common in patients with joint infections due to gram-negative bacilli. Blood cultures are positive in approximately half of patients with gram-positive infection and in children with staphylococcal arthritis of the hip. Blood culture is positive in only 20% of patients with gonococcal arthritis and in less than 10% of those with disseminated gonococcal infection.

6. Joint radiographs. Because joint infection does not immediately damage a previously normal joint, abnormalities may not be seen for several weeks.

7. Ultrasound. Ultrasonography of the hip may suggest infection by identifying fluid in the joint.

H. Treatment

1. No organisms seen on synovial fluid Gram stain but septic arthritis is suspected on clinical grounds:

   a. Adults. Nafcillin 2 g intravenous (IV) every 4 hours. For suspected gonococcal arthritis, add ceftriaxone 1 g IV daily.

   b. Children. Nafcillin 150 mg/kg/day IV plus cefotaxime 150 mg/kg/day

   c. Injection drug users. Vancomycin 1 g IV every 12 hours plus gentamicin 1.0 to 1.7 mg/kg IV every 8 hours

2. Gram-positive cocci on Gram stain. Nafcillin 2 g IV every 4 hours (children, 150 mg/kg/day IV) or vancomycin 1 g IV every 12 hours
(children, 40 mg/kg/day IV)

3. **Gram-negative bacilli on Gram stain.**
   Ceftriaxone 1 g IV daily (children, 50 mg/kg/day IV)

4. **Prosthetic joint.** Ciprofloxacin 400 mg IV or orally twice daily, plus vancomycin 1 g IV every 12 hours

I. **Nonbacterial septic arthritis**

1. **Fungal arthritis.** The most common fungal syndromes affecting the joints are coccidioidomycosis, sporotrichosis, blastomycosis, and candidiasis. Extra-articular manifestations of these syndromes are usually present. Single or multiple joint involvement may occur, and the knee is the most common joint affected. The progression of involvement is usually slow and indolent, but articular destruction can occur if the entity is not diagnosed and treated with systemic antifungal agents.

2. **Viral arthritis.** Viral arthritis is a relatively common entity. The most common viral illnesses producing synovitis are rubella, human parvovirus B19 infection (erythema infectiosum), and hepatitis B. A symmetrical polyarthritis is the rule. Treatment is symptomatic, and the prognosis for the joints is excellent.

III. **ACUTE CRYSTAL-INDUCED ARTHRITIS**

A. **Gout.** Gout is caused by deposition of monosodium urate monohydrate crystals from extracellular fluid in tissue. Acute gouty arthritis results from synovial inflammation precipitated by crystal deposition.

1. **Clinical presentation.** Acute gouty arthritis typically occurs in middle-aged or older men. The classic presentation is that of an acute monarticular arthritis producing joint pain, redness, swelling, and sometimes fever. When gout occurs in women, it is more often polyarticular. The first metatarsophalangeal joint is the first to be affected in approximately 60% of patients. Other commonly involved joints are the knee, ankle, wrist, and joints of the hand.

2. **Associated conditions include hypertension, hyperlipidemia, atherosclerosis, obesity, and alcohol abuse.**

3. **Diagnosis**
   a. **Arthrocentesis.** A definitive diagnosis can be made by demonstration of monosodium urate crystals in synovial fluid aspirated from the involved joint (Figure 1). This finding is 100% specific and 85% sensitive for gout. Synovial fluid WBC count is usually less than 50,000/mm³ (Table 1).
   b. **Hyperuricemia.** Hyperuricemia results from excessive uric acid production, diminished renal excretion, or both. Serum uric acid level is often—but not invariably—elevated in acute gout. Consequently, a normal level does not rule out acute gouty arthritis.
   c. **Clinical response.** In the absence of crystal identification, a presumptive diagnosis of gout can be made on the basis of a response to colchicine therapy.

4. **Treatment**
   a. **Colchicine** should be given orally or intravenously until gastrointestinal side effects (vomiting, abdominal pain, diarrhea) occur, joint pain is relieved, or a maximum dose has been given.

1) **IV.** Initial dose of 2 to 3 mg, with 1 to 2 mg additionally given, if necessary, 12 hours later. Do not exceed 5 mg in 24 hours. The patient must be known to have normal renal and hepatic function before IV administration is initiated. The most frequent side effect is chemical thrombophlebitis.

2) **Oral.** 0.5 or 0.6 mg every 1 to 2 hours to a maximum dose of 8 mg in 24 hours.

b. **Nonsteroidal anti-inflammatory drugs (NSAIDs)** are effective agents for management of acute gout. Any of a number may be used, including indomethacin (25 to 50 mg 4 times daily), naproxen (500 mg twice daily), sulindac (200 mg twice daily), piroxicam (20 mg daily), or ketoprofen (50 mg 4 times daily).

B. **Pseudogout.** Pseudogout is an acute joint inflammation produced by calcium pyrophosphate dihydrate crystals; it has been termed “pseudogout” due to its clinical similarity to acute gouty arthritis. Calcium pyrophosphate is the most common element in chondrocalcinosis, the deposition of calcium into joint cartilage. An acute attack of pseudogout is thought to represent an inflammatory response to intra-articular calcium pyrophosphate crystals that are shed from contiguous cartilage.
1. Clinical presentation. The clinical presentation of pseudogout is similar to that of acute gout arthritis. The knee is involved in nearly half of cases, although any of the other synovial joints may be involved. Patients are usually elderly.

2. Associated conditions. Most cases are idiopathic. The condition may be hereditary or associated with various metabolic diseases, including hyperparathyroidism, hemochromatosis, gout, hypophosphatasia, and hypomagnesemia. Joint trauma or surgery also predisposes patients to pseudogout.

3. Diagnosis. The diagnosis can be made by demonstration of positively birefringent calcium pyrophosphate crystals in synovial fluid (Figure 2). The diagnosis is suggested by the presence of typical cartilaginous calcification seen on joint radiographs.

4. Treatment. Colchicine given intravenously (see Gout, above) is effective in the treatment of pseudogout; oral colchicine is less predictably effective. NSAIDs are also useful in treatment.

IV. RHEUMATOID ARTHRITIS

A. Background. Rheumatoid arthritis is a chronic inflammatory autoimmune disease of unknown etiology that affects primarily the synovial membranes of multiple joints but often involves multiple organ systems. Rheumatoid arthritis results in...
articulat inflammation and, ultimately, destruction of the joints. Pain, heat, swelling, and functional loss predominate early in the disease, while in advanced disease there is joint deformity, malalignment, and instability.

B. Areas of involvement. The joints most commonly affected are the metacarpophalangeal, proximal interphalangeal, and the 4 lateral metatarsophalangeals. The wrists, knees, shoulders, hips, ankles, and elbows are also often involved.

C. Emergencies in rheumatoid arthritis
1. Cricoarytenoid joint. Although rheumatoid involvement of this joint is rare, it may produce acute airway compromise. The patient may present with laryngeal stridor, dyspnea, hoarseness, or cardiac arrest.
2. Septic arthritis. This entity should be suspected when swelling and heat occur in 1 or more joints. The knee is the most frequently involved joint in patients with rheumatoid arthritis, with the elbow, shoulder, and wrist being involved less frequently. Septic arthritis should be differentiated from an inflammatory flare of rheumatoid arthritis. Synovial fluid in an inflammatory flare is usually yellow and turbid, with a highly friable mucin clot and a WBC count of 4000 to 50,000/mm³ (Table 1).
3. Vertebral subluxation. Rheumatoid arthritis may produce subluxation of the cervical spine, most commonly the upper portion. This is typically an anterior subluxation of C1 on C2, but multiple levels may be involved. Spinal cord compression may result from severe subluxation. Neuritic pain radiating up the occiput is a frequent complaint and may be accompanied by paresthesias, crepitation, instability, and Lhermitte’s sign. Patients are at special risk for sustaining neck trauma in automobile accidents or from other causes. Extreme head position (eg, for endotracheal intubation) may be hazardous and should be avoided whenever possible.

V. Systemic Lupus Erythematosus

A. Background. Systemic lupus erythematosus (SLE) is a multisystem autoimmune disease of unknown etiology. The pathophysiology involves reaction of antibodies with cell constituents, producing an inflammatory response. The condition is more common in women, with an incidence ranging from 15 to 50 per 100,000. The incidence of SLE is higher in blacks than in whites. The intensity of clinical involvement fluctuates, with flares producing increased single or multiple organ system inflammation.

B. Areas of involvement. SLE can affect any organ or tissue. A patient is considered to have SLE if he or she manifests at least 4 of the following:
1. Malar rash, a classic maculopapular eruption covering the bridge of the nose and both cheeks (Figure 3)
2. Discoid rash
3. Photosensitivity
4. Oral or nasopharyngeal ulcers
5. Arthritis
6. Serositis
7. Renal disorder: proteinuria or cellular casts in the urine; glomerulonephritis is the most common serious complication of SLE, occurring in 60% to 75% of patients.
8. Neurologic disorder
9. Hematologic disorder: hemolytic anemia, leukopenia, and thrombocytopenia
10. Immunologic disorder: antibody to DNA or Sm or false-positive serologic test for syphilis
11. Positive antinuclear antibody test

C. Emergencies in SLE
1. Arthritis. Arthritis and arthralgia are the most frequent manifestations of SLE, occurring in 95% of patients. The knees, wrists, and hands are most commonly involved. Joint effusions may be produced, but signs of inflammation are less pronounced than in rheumatoid arthritis. Initial therapy is with NSAIDs.
2. Neurologic deficit. Nervous system dysfunction occurs in nearly 50% of patients with SLE and produces a variety of neuropsychiatric manifestations. These are related to the vascular abnormalities caused by the disease, but the precise pathogenesis is poorly understood.
   a. Manifestations
      1) Seizures
      2) Headache
      3) Focal central nervous system (CNS) deficit: stroke syndrome, chorea, cranial neuropathy
      4) Diffuse CNS disturbance: coma, delirium
      5) Psychiatric: psychosis, depression, anxiety, emotional lability
      6) Peripheral neuropathy
      7) Transverse myelitis
b. Treatment. The clinical presentation of neuropsychiatric SLE is similar to that of a variety of other important entities (eg, CNS infection, stroke, drug toxicity, metabolic disturbance); these must be excluded before treatment for neuropsychiatric SLE is initiated. Emergency treatment consists of administration of high-dose IV corticosteroids (methylprednisolone, 2 mg/kg/day in divided doses).

3. Serositis. Inflammation of serosal membranes can produce a number of clinical syndromes, which are all treated with NSAIDs or corticosteroids. The most common serositis syndromes are the following:
   a. Pericarditis. This produces chest pain and may be the cause for unexplained tachycardia. Pericardial effusions may be produced, but these rarely result in cardiac tamponade.
   b. Pleuritis. Pleurisy or effusion results from pleural involvement, which must be differentiated from respiratory infection and pulmonary embolism. The latter distinction is of particular importance because patients with SLE are prone to thromboembolism.
   c. Peritonitis. This must be distinguished from other causes of the acute abdomen.

D. Management of SLE. Patients with significant SLE are usually managed with one or a combination of the following agents: corticosteroids, methotrexate, hydroxychloroquine, azathioprine, and cyclophosphamide. These agents may cause multiple side effects and complications, particularly due to suppression of the immune system.

E. Drug-induced SLE is a distinct entity that typically causes fever, arthritis, serositis, and minor anemia or leukopenia. The drug most commonly associated with this syndrome is procainamide. Other drugs that may induce SLE are hydralazine, isoniazid, methyldopa, chlorpromazine, phenytoin, and quinidine. Treatment involves discontinuation of the involved drug and administration of NSAIDs.

Toxic and immune factors are believed to be responsible for the development of rheumatic fever.

B. Incidence. The incidence of rheumatic fever has greatly diminished in the United States and other developed countries over the past several decades. There is a higher incidence and increased severity of the disease in the United States among minorities (African Americans, Hispanics, Polynesians, and Native Americans). The disease is most common in those aged 5 to 15 years, with both sexes being affected in equal numbers.

C. Clinical features. The clinical manifestations include arthritis, carditis, erythema marginatum, chorea, and subcutaneous nodules. Of these, carditis and polyarthritis are the most common. Evidence of rheumatic heart disease may not be apparent until years after the acute episode of rheumatic fever. Clinical features are typically different in adults and children.

1. Arthritis is the most common feature of rheumatic fever; it is the only manifestation in 80% to 85% of adults. Joint pain, swelling, effusion, and fever are usually present, although severe polyarthralgia may be seen in the absence of objective findings of arthritis. The knees and ankles are the most commonly affected joints; involvement frequently is symmetric. Multiple joints are nearly always involved, and symptoms may be migratory.

2. Carditis. Carditis is the most serious finding in rheumatic fever. The incidence of carditis is higher in children and teenagers than in adults. Cardiac involvement occurs in about 50% of patients with acute rheumatic fever. The most important manifestations are new or changing valvular murmurs (most commonly representing mitral regurgitation), pericarditis, cardiomegaly, and congestive heart failure. First-degree atrioventricular block may be seen, but it has no prognostic significance.

3. Erythema marginatum. This rash is uncommon in children and rare in adults. It appears as small, pink, blanching macules involving the trunk and proximal extremities, with a sharp margin. Central clearing occurs when the rash extends.

4. Chorea. Once common, this is now a rare finding in children. It does not occur in adults. Involuntary movements are abrupt, rapid, and purposeless and disappear with sleep.

VI. RHEUMATIC FEVER

A. Background. Rheumatic fever is an inflammatory disease induced by group A β-hemolytic streptococcal pharyngeal infection. A latent period of 3 to 4 weeks occurs between infection and the disease.
5. Subcutaneous nodules. Small, painless movable areas of swelling over extensor surfaces may be seen in children. The most common locations are over the elbows, knees, and wrists. Subcutaneous nodules are more frequently present in patients with significant carditis.

D. Diagnosis. Diagnosis is made on the basis of the Jones criteria (Table 2).

E. Treatment

1. A course of antibiotic therapy should be given to eradicate group A streptococci from the upper respiratory tract. Benzathine penicillin G (600,000 U in children, 1,200,000 U in adults) is the recommended primary antibiotic treatment. Subsequent monthly injections of intramuscular benzathine penicillin should be administered. Alternatively, oral penicillin V may be given, 250 mg 4 times daily for 10 days. Treatment with erythromycin is recommended in penicillin-allergic individuals.

2. Salicylates are effective in reducing inflammation in rheumatic fever. Recommended dose of aspirin is 80 to 100 mg/kg/day in children and 6 to 8 g/day in adults. Serum levels of 20 to 30 mg/dL should be maintained. Use of other NSAIDs is also effective.

VII. LYME DISEASE

A. Definition. Lyme borreliosis, commonly termed Lyme disease, is a multisystem disease caused by the tick-borne spirochete *Borrelia burgdorferi*.

B. Incidence. Lyme disease is the most common tick-borne illness in the United States, with nearly 50,000 cases reported between 1982 and 1992. Most cases occur in the Northeast, upper Midwest, and the Pacific coastal regions. Lyme disease is also common in Europe, and sporadic cases have been reported elsewhere.

C. Clinical features. The natural course of Lyme disease is divided into 3 clinical stages (Table 3). The infection begins with the rash of erythema migrans (Figure 4) and flu-like symptoms and may progress after days to weeks to a disseminated stage, and in months to years to a late or chronic stage. However, not all patients exhibit an orderly progression through sequential stages. The manifestations of early disease are usually self-limited, whereas those of the late stage may be persistent. The latter include articular and neurologic involvement. A small number of late infections demonstrate a distinctive cutaneous lesion (acrodermatitis chronica atrophicans); bluish-red, slowly enlarging nodules; or plaques typically beginning on the extensor surfaces of the distal extremities.

1. Rash. The most distinctive clinical feature of early Lyme disease is erythema migrans, seen in 60% to 80% of cases. This is an expanding annular erythematous lesion usually appearing after 8 to 9 days (range, 2 to 28 days) at the site of an infected tick bite. The rash begins as a painless, nonpruritic erythematous macule. The lesion expands over days to weeks to attain a well-demarcated annular appearance with central clearing, resulting in a target configuration. Lesions are usually 5 cm in diameter or

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**Table 2. Modified Jones Criteria for Diagnosis of Rheumatic Fever**

<table>
<thead>
<tr>
<th>Major criteria</th>
<th>Minor criteria</th>
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<tbody>
<tr>
<td>Carditis</td>
<td>History of previous rheumatic fever</td>
</tr>
<tr>
<td>Polyarthritis</td>
<td>Fever</td>
</tr>
<tr>
<td>Chorea</td>
<td>Arthralgia</td>
</tr>
<tr>
<td>Erythema marginatum</td>
<td>Elevated erythrocyte sedimentation rate</td>
</tr>
<tr>
<td>Subcutaneous nodules</td>
<td>Prolonged PR interval</td>
</tr>
</tbody>
</table>

Plus

Supporting evidence of preceding group A streptococcal infection (positive throat culture, increased antistreptolysin O titer, scarlet fever infection)


*The presence of 2 major criteria or 1 major plus 2 minor criteria, in addition to evidence of prior group A streptococcal infection, indicates a high probability of rheumatic fever.*
larger. Atypical lesions may be crusted, vesicular, oval, or triangular. Multiple lesions may appear. The rash typically resolves 3 to 5 weeks after its appearance but may persist for longer periods.

2. Arthritis. The early typical pattern is that of migratory pain in joints, tendons, and muscles, usually without joint swelling. Joint involvement in stage 3 typically involves intermittent attacks of monarticular or polyarticular arthritis in the large joints, particularly the knees. Individual attacks may last for months.

3. Cardiac involvement. The most common abnormalities are fluctuating degrees of atrioventricular block. Some patients have more diffuse cardiac involvement, including findings of myopericarditis or left ventricular dysfunction.

D. Diagnosis. There currently is no established laboratory standard for the diagnosis of Lyme disease. Therefore, the diagnosis is best made on clinical and epidemiologic grounds. Although serologic testing may be helpful in distinguishing Lyme disease from other rheumatic diseases, it is of very limited value in acute cases.

E. Treatment. A number of treatment regimens are recommended for early Lyme disease. Tetracycline 250 mg 4 times daily, doxycycline 100 mg twice daily, penicillin V 250 mg 4 times daily, amoxicillin 400 mg 4 times daily, or cefuroxime 500 mg twice daily may be administered; treatment should be given for 10 to 30 days.