

PYOMYOSITIS ASSOCIATED WITH *BACTEROIDES FRAGILIS* IN A PATIENT WITH MULTIPLE MYELOMA

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Abstract. Pyomyositis is an infection of the skeletal muscle that is usually caused by *Staphylococcus aureus*. We report a 68-year-old Japanese woman who developed pyomyositis caused by *Bacteroides fragilis* following treatment for multiple myeloma. There are only two cases of pyomyositis associated with multiple myeloma in the literature. After receiving melphalan and prednisolone for five days, she developed multiple abscesses in the muscles of the right arm and thigh. Purulent exudate was aspirated from the abscess, and *B. fragilis* was identified. This is the first case of *B. fragilis* pyomyositis. Magnetic resonance imaging aided the diagnosis. Treatment consisted of surgical incision and drainage, with antibiotic administration. The immunosuppression caused by the myeloma and/or the chemotherapy presented a risk factor for the unusual infection observed in this patient.

Pyomyositis, which is the formation of single or multiple abscesses in the skeletal muscle, is common in the tropics, but rare in temperate climates.¹⁻³ It is occasionally associated with systemic infection, diabetes mellitus, immunosuppressant therapy, an immunocompromised state due to human immunodeficiency virus (HIV) infection, multiple myeloma, and injury.¹⁻³ Any of the common pyogenic bacteria can be the cause, with *Staphylococcus aureus* being the most common pathogen.¹⁻³ We report a case of pyomyositis caused by *Bacteroides fragilis* that developed after treatment for multiple myeloma.

CASE REPORT

A 68-year-old Japanese woman was admitted to the Sanae Hospital (Oita, Japan) in July 1993 because of a fever of 40°C, chills, and pain in the right shoulder joint and both knee joints. She reported having experienced occasional pain and swelling in the right shoulder joint since July 1992. The high fever disappeared after the administration of antibiotics for two weeks, but the shoulder joint pain persisted. A biopsy sample obtained from the synovial membrane revealed amyloid deposits in the membrane and small vessels. At the end of September, the patient's temperature suddenly increased to 39°C. A re-evaluation of the recurrent fever was done. A chest radiograph showed a left pleural effusion. Aspiration cytology of the effusion revealed numerous neutrophils, suggesting the presence of pyothorax. Cultures from blood and from the pleural effusion grew methicillin-resistant *S. aureus*. The sepsis and pyothorax were successfully treated with vancomycin and pulmonary drainage. There was no recurrence of fever elevation, sepsis, or pyothorax.

The patient was transferred to the Oita Medical University Hospital for further observation of the amyloid deposition and recurrent infection in October 1993. On physical examination, her blood pressure was 120/60 mm of Hg, and pulse rate was 92/min with irregular rhythms. Her temperature was 36.6°C. Her conjunctiva palpebrae demonstrated slight anemia, but no jaundice. Chest examination revealed fine basilar crackles. Pericardial friction was audible in a result of chest auscultation. There was no hepatosplenomegaly. Results of neurologic examination were normal. Myalgia was absent. The white blood cell count was 9,970/ml (normal = 2,950-8,970/ml), with 81 % neutrophils, the red

blood cell count was $222 \times 10^4/\text{ml}$ (normal = $437-580 \times 10^4/\text{ml}$), the hemoglobin level was 6.5g/dL (normal = 13.6-17.3 g/dL), and the hematocrit was 21.6% (normal = 41.2-52.9%). The erythrocyte sedimentation rate was 42 mm/hr. The C-reactive protein level was 14.6 mg/dL (normal = < 0.3 mg/dL). Biochemical analysis of the serum revealed normal values except for serum lactate dehydrogenase (LDH) and total protein, which showed values of 558 IU/L (normal = 212-410 IU/L) and 4.8 g/dL (normal = 6.3-7.9 g/dL), of which 2.5 g was albumin and 0.6 g was γ -globulin, respectively. The serum creatine kinase (CK) level was normal. Serum levels of IgG (921 mg/dL; normal = 1,088-2,046 mg/dL) and IgA (117.4 mg/dL; normal = 127-475 mg/dL) were low, but IgM (93.3 mg/dL) was within the normal range (72-358 mg/dL). The T cell number was elevated to 92% (normal = 66-88%) in the peripheral blood, while B cells were decreased to 2% (normal = 4-13%). The CD4/CD8 ratio and the lymphocyte proliferation test result for phytohemagglutinin were normal. The HIV and human T cell lymphotropic virus type-1 (HTLV-1) antibody test results were negative. Urinalysis showed markedly elevated proteinuria; total urine protein was 2.0 g/day. Immunoelectrophoresis of serum and urine showed kappa-type Bence Jones protein. A bone marrow aspirate revealed the presence of atypical plasma cells (15%). Craniography demonstrated a typical punched-out appearance, but normal results were obtained for other bones including spinal vertebrae. These findings suggested a diagnosis of Bence Jones multiple myeloma.

The systemic administration of melphalan (6 mg/day) and prednisolone (30 mg/day) for the five days was initiated on November 15, 1993. In late November, the patient exhibited tenderness and swelling of the right thigh and arm. Magnetic resonance imaging (MRI) of the extremities showed multiple cystic lesions with low-intensity signals on T1-weighted images in the right femoral quadriceps muscle (Figure 1). Aspiration biopsy from cystic lesions of the right thigh yielded yellow pus with a foul odor. The total volume of pus aspirated from the abscesses was 2,000 ml. Using standard techniques, *B. fragilis* was identified in cultures of pus. The abscesses were successfully treated by surgical incision and drainage, together with the intravenous administration (without a pump) of imipenem/cilastatin (2 g twice a day for two weeks).

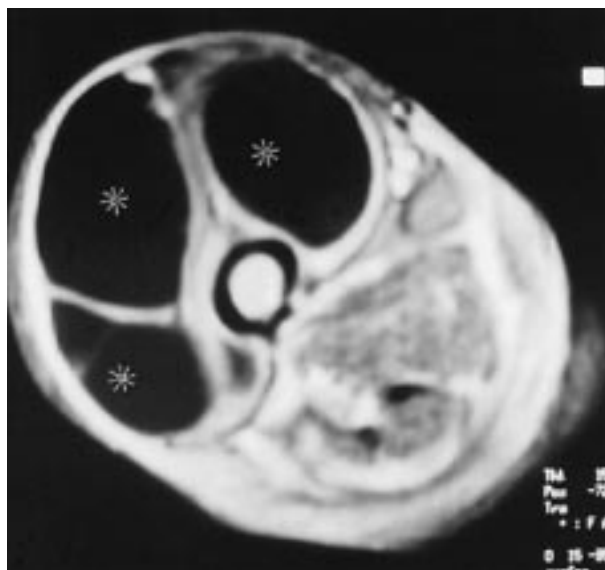


FIGURE 1. Magnetic resonance imaging of the right thigh of the patient. Low-intensity signals on T1-weighted images in giant cystic lesions were observed on the right femoral quadriceps muscle (asterisks).

DISCUSSION

Pyomyositis is an acute bacterial infection of the skeletal muscle that results in abscess formation, usually involving the large muscle groups, commonly those of the thigh.¹ Systemic signs of bacterial infection such as erythema, fever, chills, and night sweats are occasionally observed, but these occur in less than 50% of patients with pyomyositis.² The serum level of CK is seldom elevated, despite the destruction of extensive myofibrils.³ Thus, early diagnosis of this disorder can be difficult. Indeed, our patient showed neither inflammatory signs such as fever and chills nor high elevation of the serum CK level. Our patient showed elevation of the LDH level and a decrease in total protein in the serum, but we considered that elevation of LDH was due to multiple myeloma, and decrease of total protein was due to consumption caused by inflammation. Our patient, however, showed swelling of anterior right thigh without heat and pain, which had been reported by Katagiri and others.⁴ We diagnosed our patient's disorder with the aid of MRI as pyomyositis of the affected extremities, which revealed giant cystic lesions with low-intensity signals on T1-weighted images. Although definitive diagnosis should be confirmed by aspiration of the abscess, computed tomography scanning or MRI can be helpful in localizing pyomyositis with occult abscess, and in distinguishing pyomyositis from other conditions such as polymyositis, neoplasms, and osteomyelitis.⁵

The etiology of pyomyositis remains unclear. Numerous predisposing factors have been suggested, including, trauma, diabetes mellitus, administration of corticosteroids, and an immunocompromised state (e.g., leukemia, neutropenia, aplastic anemia, or myeloma).^{6,7} These factors have been implicated in predisposing the muscle tissue to bacterial infection. Primary or acquired IgM deficiency has also been reported to predispose patients to infections.⁸ Recent reports have described patients with HIV-associated pyomyositis.^{9,10}

Our patient had no recent history of trauma, exposure to a tropical climate, diabetes mellitus, HIV or HTLV-1 infection, or IgM deficiency, despite low levels of both IgG and IgA. Therefore, we concluded that her pyomyositis was associated with multiple myeloma. Most cases of pyomyositis associated with malignant tumor or leukemia have developed during or after chemotherapy for primary tumor,⁵ suggesting that immunosuppression caused by chemotherapy may induce this disease.

To our knowledge, only two previous cases of staphylococcal pyomyositis were linked to myeloma.^{6,7} Multiple myeloma and immunosuppression may emerge as risk factors for the development of this disease.

The most common causal organism in pyomyositis is *S. aureus*, which occurs in 85% of the patients.³ In the present case, *B. fragilis* was isolated from the patient's muscle lesions. This is the first reported case of pyomyositis associated with *B. fragilis* infection that we know of. This organism, characterized by gram-negative, obligatory anaerobic rods, is an important cause of abscesses in the abdomen, pelvis, lung, and brain. It usually inhabits the mucous membrane of the gastrointestinal tract, mainly the lower intestinal tract and upper respiratory tracts. *Bacteroides fragilis* can cause a localized infection in the systemic organs or may spread hematogenously to these organs if the mucous membrane barrier has been impaired. Despite a hematogenous origin, less than 5% of blood cultures test positive for *S. aureus*, even in the tropics.³ In our experience, multiple abscesses occur in the arm muscles as well as the thigh muscles. Skeletal muscle is known to be highly resistant to bacterial infection. In one experiment, the intravenous injection of *S. aureus* failed to induce pyomyositis in animal muscle.¹¹ The immunosuppression caused by multiple myeloma in our patient may have destroyed the intestinal barrier, thus making her vulnerable to invasion by *B. fragilis*.

The patient's multiple abscesses disappeared rapidly after surgical drainage and the intravenous administration of antibiotics. In other reports, two patients with pyomyositis associated with multiple myeloma were successfully managed with antibiotics alone, with no recurrence of the abscesses.^{6,7} Appropriate antibiotic therapy administered intravenously, in combination with surgical drainage, was useful in treating the pyomyositis in our patient. The presence of a muscle abscess, with or without the typical symptoms, should alert the physician to a diagnosis of pyomyositis, especially in an immunocompromised patient.

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