though intended to protect the patient's civil rights, the net effect was just the opposite. Because her physicians had to use physical restraints and extraordinary measures to maintain life, the patient was denied the right to be free of a threat to life and the right to be free of physical restraint. Without the legal obstacles, she could have been treated effectively in 14 days, sparing her weeks of additional involuntary detention and restraint and without her life being in danger.

Because of legal obstacles, costs increased. Our patient required 30 days of special 24-hour nursing, 23 days of parenteral hydration, 8 days of nasogastric feeding, and 18 additional hospital days while awaiting the results of legal proceedings. These hearings were directed exclusively at procedural legal matters. At no point was medical evidence introduced to alter the treatment plan. The county bore the cost of a patients' rights officer, a hearing officer, and the fees for the electroconvulsive therapy proceedings. The family paid their own attorney, and the physicians were denied all payment for the care they provided. Most of these expenses were billed to the state mental health budget in California.

Our case is an example of how using an adversarial system for making psychiatric care decisions does not help the patient. At the core is the issue of assuming responsibility for a mentally ill patient when that person is incompetent. Although traditionally the family, together with the physician, was trusted to make decisions, the family now is largely excluded. Physicians are still expected to care for and cure, but they are denied the power to make clinical decisions. Bureaucrats and lawyers divide up the clinical decision making, but they are not responsible for their actions, with the exception of the conservator, who also is denied decision-making power. This power is left to the crowded courts.

Many reforms are necessary, but any changes must fulfill basic principles. No legal procedure should endanger a patient's life, extend the time a patient remains in hospital or in restraints, delay appropriate care, or increase medical costs. Several basic remedies to the present set of procedures are in order. Primarily, the concept of "danger to self, others," and "gravely disabled" includes a vague set of criteria useful only as a screening tool. These criteria should be abandoned at the time of a hearing. What is of concern is whether or not persons suffer such impaired mental processes that they can no longer act cogently and responsibly on their own behalf. For this they must be sufficiently free of disordered thought and possess the free will and information necessary to make rational decisions. When these are absent or sufficiently impaired so as to render patients incapable of adequately assuming responsibility and representing themselves, the state has an obligation to intervene.

Once the state has determined that a patient is impaired, the decision-making function must be assumed by a state-appointed patient conservator or advocate. This advocate must be responsible for the total mandate of Section 5500(a), including "securing or upgrading treatment or other services to which the patient is entitled." One right should not be permitted to overshadow any other rights. For this purpose, the findings of an involuntary hearing and of the *Riese* hearing must be combined into one. This hearing should occur within 12 hours of notifying the court. The appointed advocate should be responsible to the patient and the family for assuring speedy, humane, and appropriate medical care when indicated under the least restrictive conditions, acting as a highly educated, informed parent or concerned family member might act under the doctrine of *parens patriae*. This person should be skilled in medical psychiatry as well as in the legal issues that affect patients' welfare.

The budget for legal matters and the costs incurred arising from these must be stripped out of the mental health budget and separately budgeted by the legislature. To include these expenses in the health budget, as is currently done, is to falsely inflate the health budget and subsequently deny medical care to patients.

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Temperate Zone Pyomyositis

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PYOMYOSITIS is a primary bacterial infection occurring in skeletal muscle with no obvious local or adjacent source of infection. It is frequently called tropical myositis because of its high incidence in warm, humid climates. It is responsible for as many as 4% of hospital surgical admissions in East Africa.[1] The first series was recorded in 1885 by Scriba.[2] The first case reported in the United States was in 1904.[3] An additional 93 cases have been described in North America, all since 1971. The early cases occurred mostly in healthy children and were reported mainly from hot, low-lying areas. Patients recently reported in the literature have often had an underlying disorder resulting in immune suppression, such as hematologic disease,[4-8] human immunodeficiency virus (HIV) infection,[9-13] connective tissue disorders,[7,14-16] and transplantation.[17]

We report our experience with 14 patients in Oregon over the past ten years.

Patients and Methods

Patients were identified by a computer search of hospital admission records or by direct review of the records of the infectious disease consulting service from 1979 to 1990. The search terms used were pyomyositis, myositis, muscle infection, and soft tissue infection. About 200 patient records were reviewed.

In all the cases included in this study, pyomyositis was

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confirmed at surgical exploration. Cases were excluded if soft tissue infection did not involve muscle, muscle infection was by direct extension from nonmuscle tissue, or insufficient information was available for a definite diagnosis. Patients with psoas muscle involvement were excluded if there was a history of a urinary tract infection.

All data were obtained from patient medical records. One case (patient 4) had previously been reported,[6] and another patient (No. 13) received definitive treatment at Ralph K. Davies Medical Center, San Francisco, California.

Results

Patients ranged in age from 15 to 70 with a mean of 43 years. Of the 14 patients, 8 were men (Table 1). Only two patients had no associated illness or antecedent trauma; four patients had one possible risk factor or source of infection, and the other eight had two or more of these factors. None had recently traveled to the tropics.

Four patients had an underlying hematologic disease, three had had minor trauma, and two had diabetes mellitus. Both patients previously treated with corticosteroids had an additional possible risk factor: systemic lupus erythematosus in one and atopic dermatitis in the other. One patient had HIV infection.

No source of infection was found in eight patients, and a possible source was determined in six. This infection was often temporally remote; four patients had had cellulitis diagnosed a month earlier, and one had gingivitis three months before the development of pyomyositis. In three of the patients, cellulitis overlay the muscle in which pyomyositis developed.

The duration of symptoms before hospital admission varied from 1 to 70 days (mean 17 days). The chief symptom in all patients was pain in the involved muscle. Clinical signs varied depending on the site of the abscess. One of the patients with pyomyositis in a psoas muscle had no external localizing signs. Local tenderness was noted in all of the other patients, with swelling in 12 and erythema in 9. Fluctuance was found in three patients.

A single muscle was infected in 12, two muscles in 1, and 1 patient had three involved muscles. The large trunk and thigh muscles were most commonly affected, but calf, upper arm, and forearm muscles were occasionally the site of abscess formation.

TABLE 1.—*Demography, Medical Background, and Possible Source of Infection in 14 Patients With Pyomyositis*

Patient	Age, yrs	Sex	Site	Associated Illness	Possible Source of Infection
1	42	♂	Buttock	Previous corticosteroid use, atopic dermatitis	Dermatitis
2	33	♂	Buttock	Past intravenous drug abuse	Skin needle tracks and abrasion, lymphadenitis
3	31	♀	Thigh, upper arm	SLE, past cyclophosphamide and corticosteroid therapy	Unknown
4	66	♂	Thigh	Diabetes; preleukemia	Cellulitis 1 mo before
5	57	♀	Calf	Minor trauma	Unknown
6	19	♂	Psoas	None	Unknown
7	15	♀	Thigh	None	Unknown
8	66	♀	Calf	Diabetes, minor trauma	Cellulitis 1 mo before
9	70	♂	Psoas	Myelodysplasia, bladder carcinoma	Unknown
10	47	♂	Thigh	Anemia, minor trauma, hematuria	Cellulitis 1 mo before, gingivitis 3 mo before
11	30	♀	Psoas, thigh, buttock	Paraplegia, postpartum	Unknown
12	25	♂	Forearm	Previous bone fracture	Unknown
13	34	♂	Thigh	HIV infection	Cellulitis 3 wk before
14	70	♀	Thigh	Aplastic anemia	Unknown

HIV = human immunodeficiency virus, SLE = systemic lupus erythematosus

TABLE 2.—*Laboratory Investigations in 14 Patients with Pyomyositis*

Patient	Leukocyte Count, x 10^9/liter*	Neutrophil Count†	Band Forms†	ESR, mm/h‡	Blood Culture Results	
					Positive	Organism
1	14.4	0.71	0.08	105	Yes	*Staphylococcus aureus*
2	14.4	0.48	0.25	--	Yes	*S. aureus*
3	7.0	0.74	0.05	--	No	*S. aureus*
4	0.7	0.20	0.12	138	No	*S. aureus*
5	29.8	0.86	0.16	--	Yes	*S. aureus*
6	19.9	0.82	0.04	76	Yes	*S. aureus*
7	13.2	0.60	0.21	108	No	*S. aureus*
8	12.3	0.86	0.02	>140	No	*Escherichia coli*
9	7.2	0.52	0.03	80	No	*S. aureus*
10	26.8	0.71	0.18	94	No	*Streptococcus intermedius*
11	17.7	0.77	0.13	116	Yes	*S. aureus*
12	7.5	--	--	48	No	*S. aureus*
13	3.8	0.78	0.01	56	No	*S. aureus*
14	1.0	0.29	0.18	--	No	*S. aureus*

ESR = erythrocyte sedimentation rate

*Values expressed in Système International units. For conventional units (cells/μl), multiply by 1,000.
†Expressed as a fraction of 1.
‡Westergren method.

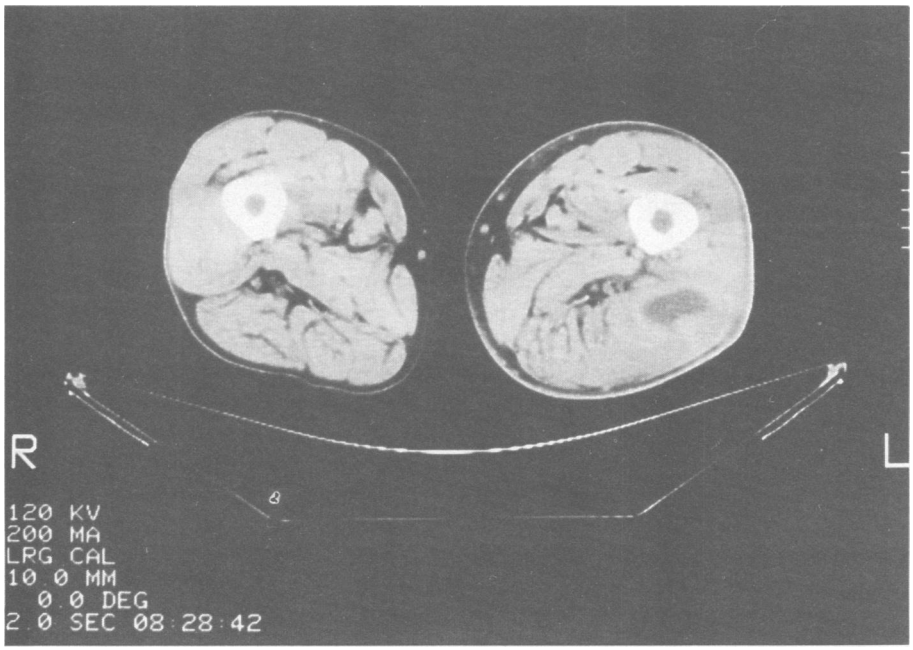

Figure 1.—A computed tomographic scan shows pyomyositis in the long head of the left biceps femoris (patient 4).

Laboratory Results

Leukocyte counts at admission in patients without hematologic disease or HIV infection varied from 7.0 to 29.8×10^9 per liter (7,000 to 29,800 cells per μl) (mean 15.1 ± 6.9) with a predominance of neutrophils and neutrophil precursors in all cases (Table 2). The erythrocyte sedimentation rate (Westergren method) was measured in ten patients and was invariably raised, ranging from 48 to more than 140 mm per hour (mean 96 ± 31). It was greater than 100 mm per hour in six (43%) patients.

An organism was cultured from a muscle or blood specimen in all patients. *Staphylococcus aureus* was the bacterium isolated in 12 (86%), *Escherichia coli* in 1 (7%), and *Streptococcus intermedius* in 1 (7%) subject. Blood cultures were positive for *S aureus* in 5 of 14 patients.

Radiology

Imaging techniques were used in 13 patients. Computed tomographic scanning was used in eight patients and in each case localized the disease process correctly to the involved muscles. The findings were not specific for pyomyositis, however. Descriptive terms used include abscess, fluid collection, low attenuation uptake, ring-enhancing lesion (Figure 1), and diffuse uptake. Computed tomographic scanning guided aspiration in three cases.

Scintigraphy—scanning using gallium 67, technetium Tc 99m, or leukocytes labeled with indium 111—was done in ten patients. It indicated soft tissue uptake in six patients, was falsely positive for osteomyelitis in two, and helped diagnose a secondary complicating osteomyelitis in two. Ultrasonography suggested pyomyositis in four and guided aspiration in one patient.

Differential Diagnosis and Treatment

A number of diagnoses were considered at presentation (Table 3). Cellulitis (8 patients [57%]), osteomyelitis (3 patients [21%]), and hematoma (3 patients [21%]) were considered most commonly, and deep vein thrombosis, perinephric abscess, and muscle strain were occasionally mentioned. The correct diagnosis was considered early in the disease course in only one patient (7%). After hospital admission, there was a delay to definitive treatment (incision and drainage of abscess) of longer than three days in nine patients (64%). As a result, prolonged hospital stays were the rule, with a mean of 28 ± 15 days. Some patients in whom the diagnosis was made early still had prolonged hospital stays. Serious complications developed in nine patients (64%), including osteomyelitis (3), multiorgan failure due to sepsis (3), and death in two patients (14%). Bacteremia occurred in five patients (36%), and all bacteremic patients suffered disease complications. Neither of the patients who died had positive blood cultures on presentation, however. The mean duration of hospital stay of the patients with bacteremia (34 ± 16 days) was longer than that of the patients who did not have bacteremia (21 ± 12 days). Preexisting illness or predisposing factors appeared to influence the outcome. Both patients who died had serious underlying diseases; one had myelodysplasia, and the other suffered from aplastic anemia. Both had gram-negative bacteremia before death; *S aureus* had been identified in the muscle tissue.

Discussion

Muscle is remarkably resistant to infection. Muscle trauma is necessary before experimentally induced bacteremia causes pyomyositis in animals.[18] In humans, muscle abscess is rarely a complication of severe staphylococcal sepsis.[19] Pyomyositis has been considered primarily a tropical disease that occurs mainly in young and relatively healthy persons. Several unproven hypotheses have been proposed to explain these demographics, including malnutrition,[20,21] previous protozoal[22,23] or viral muscle infection,[24] and disordered immunity.[25,26]

Our series of patients adds to the reported experience from temperate zones over the past five years and reveals different demographic features. Patients with temperate zone pyomyositis are generally older than those reported from the tropics and in early reports from the US. Furthermore, most of the recent patients have had an associated underlying con-

TABLE 3.—*Initial Diagnosis and Treatment Result in Patients With Pyomyositis*

Patient	Initial Diagnosis	Delay to Drainage, d	Hospital Stay, d	Complications
1.....	Cellulitis	10	27	Osteomyelitis
2.....	Myositis	1	47	Multiorgan failure
3.....	Fasciitis, cellulitis	1	8	None
4.....	Cellulitis, Sweet's syndrome	28	39	None
5.....	Thrombophlebitis, cellulitis, deep venous thrombosis	6	34	Multiorgan failure
6.....	Retroperitoneal hematoma, appendicitis	8	10	Abnormal results of liver blood tests
7.....	Spontaneous hematoma	1	14	None
8.....	Cellulitis, deep venous thrombosis	3	21	None
9.....	Osteomyelitis, perinephric abscess	20	42	Secondary *Escherichia coli* infection, ischemic bowel disease, death
10.....	Herniated disc, cellulitis, osteomyelitis	32	10	Osteomyelitis
11.....	Perinephric abscess, SBE	10	51	Septic trochanteric bursitis, osteomyelitis
12.....	Osteomyelitis, cellulitis	2	14	None
13.....	Cellulitis, lymphoma, muscle strain	78	28	Repeated drainage × 4
14.....	Pyomyositis, muscle strain, hematoma	14	42	Gram-negative bacteremia, multiorgan failure, death

SBE = subacute bacterial endocarditis

dition—including diabetes,[27-30] hematologic disorders,[4-8] connective tissue disease,[7,14-16] and HIV infection[9-13]—that may make their muscle tissue more susceptible to bacterial infection. The age distribution of our series is broad (15 to 70 years), but 11 (79%) of the patients were 30 years of age or older.

Twelve (86%) of our patients had underlying conditions that may have predisposed them to the development of pyomyositis. These factors include minor trauma, an associated illness, or a possible source of infection. Conditions such as diabetes mellitus, blood dyscrasias, and immunodeficiency represent additional risk factors for the development of pyomyositis in temperate areas.

Despite different demographic features, the muscles involved in our series are similar to those in tropical cases. Truncal and proximal large lower limb muscles were most commonly involved. Likewise, the most usual organism was *S aureus*.

Clinical and laboratory features of our series were similar to those described in the literature. In a few recent case reports,[14,15,31] magnetic resonance imaging has been found to be more sensitive than computed tomographic scanning, but it was not used in our patients.

Pyomyositis is relatively uncommon in temperate climates and is often considered late in a diagnostic workup. The differential diagnosis depends on the site involved and includes deep vein thrombosis, cellulitis, osteomyelitis, and soft tissue malignancy. Cellulitis was the most frequently considered diagnosis in our series, consistent with the observation that erythema overlying the affected muscle was noted in most of the cases. A high index of suspicion for pyomyositis needs to be maintained in patients presenting with symptoms suggestive of more common illnesses, especially when diagnostic studies are nonconfirmatory or when the response to treatment is inadequate. Substantial delays in reaching the correct diagnosis are common and may have contributed to prolonged hospital stays in our patients. The mortality rate of 14% in this series is probably a reflection of serious underlying disease in many of the patients.

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Pulmonary Paragonimiasis in Southeast Asians Living in the Central San Joaquin Valley

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HUMAN PARAGONIMIASIS is caused by the lung fluke *Paragonimus westermani* and other species. This parasite is endemic in the Far East, especially in areas of central China, Japan, Korea, the Philippines, and Southeast Asia (Vietnam, Laos, Cambodia, Thailand).[1] The disease is also found in Central and South America, West Africa, and the Indian subcontinent. Its occurrence in the United States is rare.

The central portion of California's San Joaquin Valley has had a large influx of refugees from Southeast Asia. As of 1988, an estimated 48,000 persons had emigrated to the counties of Merced, Madera, Fresno, Kings, and Tulare (*Estimates of Refugees in California Counties and the State: 1988,* Report SR 88-1 [January 1990], Department of Social Services, County of Fresno, California, pp 8-9). This population is now thought to exceed 60,000, of which about 49,000 are living in the Fresno County area (*Fresno County Plan for Refugee Services*—1990, Department of Social Services, County of Fresno, California, p 5). Heretofore, no cases of paragonimiasis from the Central Valley have been reported to the state health department (Terry Thompson and Edward Graham, PhD, MPH, Department of Health Services, State of California, oral communication, December 1990). Therefore, we report the following four cases documented within this population. In addition, we review the life cycle and human pathogenesis of this parasite.

(Yee B, Hsu JI, Favour CB, Lohne E: Pulmonary paragonimiasis in Southeast Asians living in the central San Joaquin Valley. West J Med 1992 Apr; 156:423-425)

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Report of Cases

Patient 1

The patient, a 39-year-old Laotian man, presented to a local hospital in Merced, California, in January 1979 because of persistent hemoptysis. When he was a fighter pilot in 1968, he was shot in the chest, resulting in hemoptysis. After chest tube placement, he did well except for infrequent episodes of hemoptysis over an 11-year period, for which he received penicillin shots. He became a United States resident in 1977.

On physical examination, the patient had scars from the gunshot wound at the right upper anterior chest and the chest tube site on the back. He had a leukocyte count of 11×10^9 per liter (11,000 per μl) with 0.06 eosinophils. A recent purified protein-derivative (PPD) skin test measured 14 mm. Chest x-ray films showed minimal fibrosis in the right upper lobe, attributed to the old gunshot wound, and shifting cystic opacifications in both upper lobes. Several sputum specimens were negative for acid-fast bacilli.

Based on the significant PPD reaction, a regimen of isoniazid, 300 mg a day, was started. After three months of isoniazid therapy, the patient stopped the medication on his own because of side effects. He continued to have hemoptysis. Bronchoscopy was unrevealing. Serologic tests for coccidioidomycosis were negative. A sputum test for ova and parasites was positive for *Paragonimus* species. A complement fixation titer for *P westermani* was positive at 1:128. The patient was given bithionol, 30 mg per kg of body weight every other day for three to four weeks. He reportedly took some of the medication as prescribed, and the hemoptysis had ceased when he was seen several months later. The patient has since been lost to follow-up.

Patient 2

The patient, a 13-year-old Laotian boy, was seen at a local community hospital in February 1984 because for the past three days he had had fever, chills, and hemoptysis. He had been in the United States for two years. While living in Laos, he had had bouts of hemoptysis since age 7. After drinking a home remedy, he purportedly stopped coughing blood within three days. Years later, his hemoptysis recurred while he was in Thailand. He reports being treated with some antituberculous medication for several months. He remained in good health until his current illness.

On physical examination, coarse rhonchi were heard over the right anterior portions of his chest. The patient's leukocyte count was 6.1×10^9 per liter (6,100 per μl) with 0.05 eosinophils. Other laboratory values were within normal limits. A chest radiograph revealed a few cystic areas in the right lower, right upper, and left upper lobes. A presumptive diagnosis of pulmonary tuberculosis was made, and the patient was sent to the Fresno County Public Health Department for further workup. Skin tests for PPD and coccidioidomycosis were negative. Culture of several sputum specimens for acid-fast bacilli and fungi was negative. A sputum test for ova revealed *P westermani.*

The patient was treated with praziquantel, 25 mg per kg three times a day for one day. He was seen three weeks later with the report that his hemoptysis had resolved. Tests of sputum were negative for ova. A second chest radiograph showed no substantial change. He has remained well in follow-up to the present.