

Original Article

Clinical Stage, Age and Treatment in Tropical Pyomyositis: A Retrospective Study Including Forty Cases

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Abstract

A comparative and retrospective trial of 40 patients with tropical pyomyositis covering studies done between January 1, 1987 and November 31, 1990, at the General Hospital at Cosamaloapan, Veracruz, IMSS, was undertaken. The objectives were to compare predisposing factors, clinical data, morbidity, mortality and hospital stay among 1) medical (group I) and surgical treatment (II), 2) adult and pediatric populations and 3) the clinical stage of the disease (invasive, suppurative and late). In group I, the family history of diabetes (56%), fever (66%) and hospital stay (6.5 ± 1.8 days) were significantly different from group II (19%, 100% and 12.8 ± 5.5 days), respectively. The mean age in adult and pediatric populations was 38 and 8 years,

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respectively. Pediatric patients had lowest hemoglobin levels (9.7 ± 1.3). Upper respiratory antecedent was highest in suppurative stage (65%). In the late stage eosinophilia (5.9 ± 6.9), fluctuance muscles (100%), complication rate of 57%, surgical drainage (100%) and mortality of 29% were found. Cultures were performed in 20 cases with negative results in 55% and the remaining 45% were positive to *Staphylococcus aureus*. Pyomyositis appears to be multifactorial in origin, the antecedents of trauma and upper respiratory infection were the major predisposing factors. Septicemia caused high morbidity and mortality in the late stage. Surgical treatment was frequently needed, increasing costs. (*Arch Med Res* 1996; 27:165)

Introduction

Tropical pyomyositis is a purulent infection of the muscles, usually accompanied by a single or multiple abscesses (1). This entity is unusual in non-tropical areas and was first described in 1885 by Scriba (2) in Japan.

The clinical behavior of this muscular pyogenic disease has already been described (1-3). In the United States the first case was formulated in 1971 (4), with less than 50 cases reported to date. In Mexico, reports have been anecdotal, scarce and isolated, except for the paper by Uribe-Flores et al., reporting 25 patients, at the same geographic site we explored (5). Our report is the largest in Mexico.

This disease accounts for 3 to 4% of surgery undertaken in tropical regions (6-8). The mean of pyomyositis per 1,000 hospital discharges in the study group rose from 0.86 in 1988 to 1.8 in 1989 and 3.7 in 1990. During treatment of these cases, we observed a severe disease,

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Table 1
Predisposing Factors and Clinical Characteristics of Patients with Medical (Group I) and Surgical (Group II) Treatment in Tropical Pyomyositis

	Group I	Group II	p value
	n=9; age range 3-59 yrs; mean age 24 yrs (%)	n=31; age range 1-78 yrs; mean age 20 yrs (%)	
PREDISPOSING FACTORS			
Trauma antecedent	4 (44)	13 (42)	NS
Diabetes mellitus	1 (11)	2 (6)	NS
Family history of diabetes	5 (56)	6 (19)	0.04*
History of upper respiratory infection	1 (11)	3 (10)	NS
CLINICAL CHARACTERISTICS			
Affection of thigh muscles	1 (11)	14 (45)	NS
Fever (>38°C)	6 (66)	31 (100)	0.008*
Fluctuance muscles	6 (67)	19 (61)	NS

NS = non-significant.

* = significant values.

All p values were obtained with Fisher exact test.

requiring hospitalization and surgery. Therefore, we decided to make a retrospective study of hospital discharges diagnosed as pyomyositis for 3 years prior to the study, in order to learn its epidemiologic, clinical and therapeutic characteristics.

Materials and Methods

A retrospective study, by means of comparative cohorts, was undertaken based upon clinical histories of hospital discharges due to tropical pyomyositis, between January 1987 and November 1990. This took place at the Zonal Hospital #35, at Cosamaloapan, Veracruz, Instituto Mexicano del Seguro Social. Forty cases were identified throughout this period based upon the archives of the Hospital's Service of Traumatology and Surgery.

Diagnosis was based upon the following criteria: local swelling (induration or fluctuance muscles), redness, pain, local hyperthermia and/or fever. The variables reported in the world literature, concerning the patients' characteristics in this disease, were studied: a) predisposing factors - age, sex, trauma antecedent, diabetes mellitus, family history of diabetes, history of upper respiratory infection, undernutrition, low socioeconomic status and b) clinical characteristics - fever, pain, local muscular swelling, localization, leukocytosis, low hemoglobin, eosinophilia and its association to *S. aureus*.

Table 2
Clinical Stage, Complications, Mortality and Length of Hospital Stay According to the Modality of Treatment in Tropical Pyomyositis

Variable	Group I (n=9) (%)	Group II (n=31) (%)
CLINICAL STAGE		
Invasive or initial	6 (66)	10 (32)
Suppurative	3 (33)	14 (45)
Late	0	7 (22)
COMPLICATIONS	1 (11)	3 (10)
MORTALITY	1 (11)	1 (3)
HOSPITAL STAY IN DAYS (X ± SD)	6.5 ± 1.8	12.8 ± 5.5*

*p < 0.01 (Kruskal-Wallis one-way analysis).

The study groups were separated according to: 1) the therapy received: group I, medically treated patients and group II; patients subjected to surgical treatment (fasciotomy abscess drainage and debridement, leaving the wound open or delaying primary closure), 2) age population, defined as adult if years were >16; and pediatric if < or = 16 years, and 3) the clinical stage. The

Table 3
Predisposing Factors and Clinical Characteristics of Adult and Pediatric Populations in Tropical Pyomyositis

	Adult population n=18; age range 17-78 yrs; mean age 38 yrs (%)	Pediatric population n=22; age range 1-16 yrs; mean age 8 yrs (%)
PREDISPOSING FACTORS		
Trauma antecedent	5 (28)	12 (55)
Diabetes mellitus	2 (11)	0
Family history of diabetes	4 (22)	6 (27)
History of upper respiratory infection	1 (6)	3 (14)
CLINICAL CHARACTERISTICS		
Affection of thigh muscles	8 (44)	8 (36)
Fluctuance muscles	13 (72)	12 (55)
CLINICAL STAGE		
Invasive or initial	6 (33)	10 (45)
Suppurative	8 (44)	9 (41)
Late	4 (22)	3 (14)
SURGICAL TREATMENT		
MORBIDITY	2 (11)	2 (9)
MORTALITY	2 (11)	0
LENGTH OF HOSPITAL STAY (\bar{X} ; SD)	13.2 \pm 6.3	10 \pm 4.6

Non-significant p values.

early invasive stage included all patients with clinical complaint of fever, muscle pain, redness, firm induration, tenderness and mild leukocytosis in the preceding 10 days. The second or suppurative stage included all patients hospitalized when their disease has 10 to 21 days from the onset of symptoms, and included fever, muscle edema, and eosinophilia. The late stage included all patients with symptoms beyond 21 days of the clinical course. This septicemic stage included all patients that developed metastatic abscesses or those with fluctuance muscles and leukocytosis $>15,000$. The infective organism was cultured from the purulent material which was surgically drained. Bacterial growth was assessed 72 h later. A comparison was made of the characteristics of each group, such as complications, mortality and hospital stay.

Statistical analysis with chi squared, Yates corrected, exact Fisher test and Mantel-Haenszel for trends in proportions were performed. For means variance analysis for a single tract for non-grouped data or Kruskal-Wallis if populations did not have normal distribution, was made. The homogeneity of variance was determined by

the Bartlett test. The results were significant at 0.05 α -level.

Results

Forty patients were studied. Their average age was 21 \pm 18.8 (the youngest being 1 year old and the oldest 78). The most frequent affected site was the lower limbs (48%).

Treatment Modalities

Group I had fever in 66% vs. 100% of group II (Table 1). Diabetes mellitus was the most frequently found family background, appearing most in group I ($p < 0.05$). The rest of the predisposing factors and clinical characteristics were independent of the modality of treatment ($p > 0.05$). Undernutrition, low socioeconomic status, local muscular pain and swelling were observed in all patients with similar group frequencies. The complications, mortality and clinical stage were similar in patients treated medically or surgically (Table 2). The

Table 4
Clinical Stage, Morbidity and Mortality

	Clinical stage		
	Initial (n=16)	Suppurative (n=17)	Late (n=7)
PREDISPOSING FACTORS			
Trauma antecedent*	6 (38)	7 (41)	4 (57)
Diabetes mellitus	2 (13)	0	1 (14)
Family history of diabetes	4 (25)	3 (18)	1 (14)
History of upper respiratory infection†	1 (6)	11 (65)	1 (14)
CLINICAL CHARACTERISTICS			
Fever (>38°C)	14 (88)	17 (100)	7 (100)
Affection of thigh muscles	5 (31)	6 (35)	0
Fluctuance muscles*	6 (38)	12 (71)	7 (100)
SURGICAL TREATMENT*			
	10 (63)	14 (82)	7 (100)
COMPLICATIONS			
Staphylococcal pneumonia	0	0	4 (57)
Septicemia†	0	0	3 (42)
MORTALITY			
	0	0	2 (29)

Significant p values: *chi-squared trend for proportions, †chi-squared test.

length of the hospital stay for surgically treated patients was twofold greater than group I ($p < 0.01$)

Age

Adult and pediatric populations were similar in predisposing factors, clinical characteristics, stage, surgical treatment, morbidity, mortality and length of hospital stay (Table 3).

Clinical Stage

Trauma antecedent increased (19%) significantly from initial to late stage (Table 4). The upper respiratory infection background was highest in suppurative stage (65%). Fluctuance muscles were observed in the three stages, mainly in the late (100%). The proportions of patients treated surgically increased significantly, 37% from the initial to the late stage (Table 3). Complications and mortality were observed only in this stage with 57 and 29%, respectively.

Laboratory findings in pediatric population showed anemia with lower hemoglobin level than adults (Table 5). Significant eosinophilia of 5.9 ± 6.9 was observed

only in the late stage. Hemoglobin, leukocytes and eosinophils were independent of the modality treatment. Cultures were performed in 20 cases, 55% were negative and in those with positive results, *S. aureus* was always isolated. In three patients *S. aureus* was isolated associated with β -hemolytic streptococcus and *E. coli* (Table 6).

All patients received antibiotics, as single dicloxacillin therapy (30%) or combined trial (70%), mainly gentamicin plus dicloxacillin (36%). Other antibiotics were added to this trial such as cefotaxime (5%), rifampicin (5%), trimethoprim (2.6%) or penicillin (7.8%). Other combinations (13.6%) with a relative frequency less than 2.6% were found as well.

Discussion

The incidence of pyomyositis is increased as one becomes familiar with the disease and its diagnosis. We believe that the growing trend in the population studied was due to increased awareness of the disease. We consider the mean per 1,000 hospital discharges is similar to that reported in the world literature (1,7).

Predisposing factors reported in the literature are those leading to a deficient immunologic status (9), such as

Table 5
Laboratory Findings by Population Age, Stage and Treatment Modality

	Laboratory findings		
	Hemoglobin	WBC ^a	Eosinophils
POPULATION AGE			
Adult	11.3±2.3	11,300±860	3.7±5.1
Pediatric	9.7±1.3*	12,700±440	3.2±5.4
CLINICAL STAGE			
Initial or invasive	10.8±2.0	9,100±150	1.4±2.6
Suppurative	9.9±1.9	13,600±540	2.1±2.0
Late	10.8±2.2	15,000±125	5.9±6.9*
TREATMENT MODALITY			
Medical	10.3±1.3	11,300±410	5.2±44.6
Surgical	10.5±2.1	12,200±230	2.9±23.0

^aWBC = white blood count.

*p <0.05 (Kruskal-Wallis one-way analysis of variance).

low socioeconomic stratum throughout which the patient experiences undernutrition and anemia. The role of immunocompetence has not been fully defined during the development of pyomyositis (9,10); nevertheless, a susceptibility toward the infection may result as a defect in immunologic surveillance, specifically at cellular immunity. This type of infection has been reported in patients with diabetes, leukemia, AIDS, aplastic anemia, and agammaglobulinemia. These patients show alterations of inductor/helper T4 lymphocytes, leading to a series of abnormalities which include T lymphocytes, killer cells, lymphocytes B and monocytes (10,11). The background of a local trauma was found in 43% of these cases, whereas the literature reports between 25 and 66% (12,13). In this trial we observed that the trauma antecedent increased proportionally to the severity of the disease. This antecedent occurs in over half of the pediatric cases (14), similar to our 55%. In the tropics, adults comprise two thirds of the cases of pyomyositis (12); however, our findings showed similar prevalence in the adult and pediatric population. Some theories involve a direct mechanical trauma upon the muscle, as reported by Miyake (14), who was unable to produce muscular abscesses in dogs at the site of staphylococcal inoculation, if a previous clamping, or ischemia due to electric shock, was not present. Ashken and Cotton in an experiment with the Armed Forces proposed the theory that the formation of a post-traumatic hematoma generates a nest which develops a muscular abscess in the presence of a transitory bacteremia. The affection is most frequent in the muscular masses of the lower limbs (48%), presenting similar relative frequencies in the groups

Table 6
Results of Twenty Cultures in Forty Patients with Tropical Pyomyositis

Culture results	n (%)
POSITIVE	9 (45)
<i>Staphylococcus aureus</i>	6 (67)
<i>Staphylococcus a.</i> and β -hemolytic streptococcus	2 (22)
<i>Staphylococcus a.</i> and <i>E. coli</i>	1 (11)
NEGATIVE	11 (55)

compared; therefore, we believe that this site is more frequently exposed to trauma.

Tropical pyomyositis shows three clinical phases (12). The initial one is invasive with progressive pain, local muscular swelling and low fever. The following stage occurs 2 to 3 weeks later, the outstanding findings being abundant muscular edema, leukocytosis and fever. In the tropics 90% of the patients arrive in this condition, although cultures are usually negative as in our 55%. The delayed stage appears with high fever, tumor fluctuation involving the affected muscles. This may progress to septicemia and death, as in two of our cases. Death from pyomyositis with septicemia is rare in the pediatric population, but occurs in one fourth of reported adult cases. Septicemia caused two deaths in this trial, observed only in the adult population.

We had problems in classifying patients because in this retrospective study doctor's interpretations of induration or fluctuation differ. Fluctuance muscles were shared by patients of the three stages. We found that in some cases well stratified as initial or suppurative by time duration of symptoms, or leukocytosis <15,000 had some cases with fluctuance muscles, findings were exclusive of the late stage. The majority of cases receiving surgery were at this stage (71%) with a fluctuating tumor (100%). During this phase surgical drainage was required, as well as fasciotomy, with closure delay if there were septic complications or important muscular destruction. Drainage of pus and antibiotic therapy were the standard treatment. The initial antibiotic therapy should be directed against *S. aureus*, according to the clinical development and culture results, since it was the predominating infecting organism in this trial as all other series. Cultures were negative in half of the cases of those patients in whom cultures were obtained. Antibiotics are useful as single (broad spectrum) or in combined trial, always covering this infective organism.

The worst clinical stage of the disease was significantly associated with trauma antecedent, upper respiratory infection antecedent, eosinophilia and to a higher frequency of surgical drainage, morbidity and mortality. Pediatric populations showed anemia and the length of the hospital stay was twofold in those who underwent surgical treatment.

Pyomyositis appears to be multifactorial in origin. Because of its rarity and deceiving clinical presentation, the disorder may go unrecognized for weeks. All efforts should be directed towards an early diagnosis, so as to prevent septicemia and death, otherwise surgery is inevitable and increases the costs of treatment.

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