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Initial Clinical Pattern of Rheumatic Fever in Children Hospitalized at Prapokklao Hospital

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Abstract

Objective : To review initial clinical pattern of children who presented with rheumatic fever.

Methods : From July 1995 through 2003, the patients who were under 15 years old and hospitalized with a diagnosis of rheumatic fever were included in this study. Their medical records were reviewed in terms of age, sex, reasons for hospitalization, initial clinical manifestation, results of complete white blood cell count, erythrocyte sedimentation rate, C–reactive protein, ASO–titer, throat swab culture, chest roentgenogram, electrocardiogram and color flow Doppler echocardiography. The results were presented by descriptive statistics.

Results : Of 46 patients with rheumatic fever, 26 were male and 20 were female; 35 (76.1 percent) were older than 9 years, 10 (21.7 percent) were between 5 and 9 years of age and 1 (2.2 percent) was under 5 years of age. There were 42 first–attack cases and 4 recurrent cases. The age range was 4.6–14.8 years (mean 11.4 $\pm$ 2.4). The reasons for hospitalization of most patients were cardiac symptoms and abnormal movement of the extremities (chorea). The overall number of the individual manifestation of major Jones criteria at presentation were carditis in 42 cases (91.3 percent), chorea in 11 cases (23.9 percent), and polyarthritis in 6 cases (13.0 percent). There were no cases presenting with subcutaneous nodules or erythema marginatum. Among the 42 cases who had clinical evidence of carditis, there were various types of cardiac involvement. Mitral valve involvement was found in all of the cases, in which regurgitation was the most common defect (97.6 percent). Aortic and tricuspid regurgitation were found in 21 cases (50.0 percent) and 19 cases (45.2 percent) respectively. Mitral stenosis occurred in 3 cases (7.2 percent) and all of them had history of recurrent attacks. Of the 42 patients with carditis, cardiomegaly and varying extent of congestive heart failure were found in 32 cases and 30 cases respectively. In addition, there were 3 cases with flail mitral leaflet, 2 cases with pericardial effusion and 1 case with prolapse of both aortic and mitral valves. Elevated ESR (100 percent), fever (88.2 percent), positive C–reactive protein (81.5 percent), leucocytosis (76.5 percent), rising ASO titer (70.6 percent), sinus tachycardia (90.3 percent) and left atrial enlargement(51.6

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percent) were the minor Jones criteria and laboratory results commonly found among the cardiac symptom-presenting patients.

Conclusions : The clinical pattern of rheumatic fever in this study was based on forty-six children hospitalized between July 1995 and August 2003. They were mostly over 5 years old. Carditis was the most common major Jones criterion, followed by chorea and arthritis. Several patterns and varying severity of cardiac involvement, findings of minor Jones criteria and abnormalities in EKG tracings were more common in cardiac symptom-presenting patients than in chorea-presenting patients.

Introduction

Rheumatic fever is a leading cause of acquired heart disease in children and young adults and is still a major public health problem in many parts of the world,[4] especially in developing countries. It is non-suppurative sequele from group A beta-hemolytic streptococcal pharyngitis. Although M types 1, 3, 5, 6, 18, and 24 are more frequently isolated from patients with acute rheumatic fever than are other serotypes,[1] the exact pathogenic mechanism has not been enlightened. The disease commonly occurs in the patients between 5-15 years of age,[2,3] particulary those who are poor and have crowding in their home. The mostly accepted hypothesis for its pathogenesis has been abnormal immune response by host. Streptococcal group A superantigens such as pyrogenic exotoxin has also been proposed. Toxic effects from extracellular toxins on cardiac tissue and individual genetic predisposition leading to different susceptibility have also been included in the pathogenetic hypothesis. In Thailand, there have been continuous reports of rheumatic fever from various medical schools and institutes.[5-7,11] There are some differences in clinical manifestations among patients in tropical and temperate regions. The former have more incidence of carditis than arthritis,[5,6,7] which is the reverse of what is found in the latter.[3,8-10] This study was conducted in order to demonstrate and better understand the initial clinical presentation among Thai children hospitalized with a diagnosis of rheumatic fever.

Patients and Methods

This was a retrospective review conducted on 46 Thai children under 15 years of age hospitalized between July 1995 and August 2003 in the Department of Pediatrics, Prapokklao Hospital, Chanthaburi Province. All of the cases were seen by the author and received a diagnosis of rheumatic fever using the revised Jones criteria.[27] Available clinical information and laboratory results of each patient were reviewed. These included age, sex, reasons for hospitalization, intitial clinical manifestation, the results of complete white bolod cells count, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), antistreptolysin- O titers (ASO), throat swab culture, chest roentgenograms, electrocardiograms, and color flow Doppler echocardiography.

Results

During the study period, there were forty-six children hospitalized with a diagnosis of

rheumatic fever; 26 were male and 20 were female. The age range was 4.6–14.8 years (mean 11.4 ± 2.4). Thirty-five patients (76.1 percent) were older than 9 years, ten patients (21.7 percent) were between 5 and 9 years of age and one patient (2.2 percent) was under 5 years of age (table 1). The age of this youngest child was four years seven months. The reason for hospitalization was cardiac symptomps in 34 cases, abnormal movement of extremities (chorea) in 11 cases and polyarthritis in 1 case. The cardiac symptoms consisted of fatigue, malaise, precordial pain, abdominal pain from liver congestion, shortness of breath, dyspnea on exertion and edema.

Regarding the major manifestations, there were isolated carditis in 29 cases, isolated chorea in 3 cases, isolated arthritis in 1 case, chorea combined with carditis in 8 cases, and carditis combined with arthritis in 5 cases. As shown in table 2, overall frequencies of the individual major Jones criteria were carditis in 42 cases (91.3 percent), chorea in 11 cases (23.9 percent), and polyarthritis in 6 cases (13.0 percent). There were no cases presenting with subcutaneous nodules or erythema marginatum. None of the patients with isolated chorea and isolated arthritis were investigated with color flow Doppler echocardiography

With regard to the types of cardiac valves involvement in 42 patients with carditis (table 3), mitral valve was found to be involved in all of the cases and most of them (97.6 percent) were

Table 1 Age and sex distribution of 46 RF patients

Age (year)	Sex		Number of cases	Incidence %
	M	F		
< 5	1	0	1	2.2
5 – 9	4	6	10	21.7
> 9 – 16	21	14	35	76.1

Table 2 Major criteria in 46 children with rheumatic fever

Major criteria	Sex		Number of cases	Incidence %
	M	F		
Carditis	25	17	42	91.3
Chorea	4	7	11	23.9
Migratory polyarthritis	2	4	6	13.0
Subcutaneous nodule	0	0	0	0
Erythema marginatum	0	0	0	0

Table 3 Types of cardiac involvement in 42 RF patients with clinical evidence of carditis

Types of cardiac lesion / Patient groups	Non-chorea (n=34)	Chorea (n=8) (%)	Incidence
Isolated MR	5	5	10 (23.8)
Isolated MR with flail leaflet	3	0	3 (7.1)
Isolated MR with pericardial effusion	1	0	1 (2.4)
MR+AR	8	0	8 (19.0)
MR+AR+TR	7	1	8 (19.0)
MR+AR+TR+PR	2	0	2 (4.8)
MR+AR+TR+PR, with prolapse of AV and MV	1	0	1 (2.4)
MR+AR+TR, with pericardial effusion	1	0	1 (2.4)
MR+TR	3	2	5 (11.9)
MS+MR	1	0	1 (2.4)
MS+MR+TR	1	0	1 (2.4)
MS+AR+TR	1	0	1 (2.4)
Cardiomegaly	32	1	33 (78.6)
Congestive heart failure	30	0	30 (71.4)

regurgitant form (fig.1). Aortic (fig.2) and tricuspid (fig.3) regurgitation were found in 21 cases (50 percent) and 19 cases (45.2 percent) respectively. Mitral stenosis occurred in three cases (7.2 percent) whose ages were 10.4 years, 11.4 years and 13 years. All of them had history of recurrent attacks. There were co-existence of mitral regurgitation in the first case, co- existence of mitral and tricuspid regurgitation in the second case, and co-existence of aortic and tricuspid regurgitation in the third case. The extent of stenosis was mild in the first two cases, whereas it was more severe in the third case.

There were varying extent of cardiomegaly on chest roentgenogram in 32 of the 34 patients who had cardiac symptoms, whereas mild cardiac enlargement was present in 1 of the 8 chorea-presenting patients who had clinical evidence of carditis. Of the 32 cases with cardiomegaly, 30 had varying severity of congestive heart failure, 3 had flail mitral valve, 2 had minimal pericardial effusion and 1 had prolapse of both aortic and mitral valves. Although eight of the eleven chorea patients had valvular involvement detected by physical examination and color flow Doppler echocardiography, none

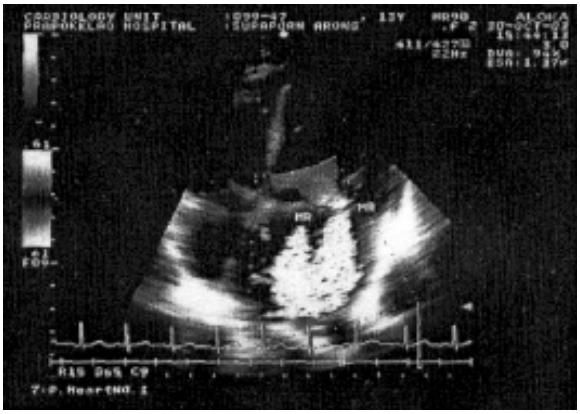

Figure 1 Mitral regurgitation in a 13-year-old patient

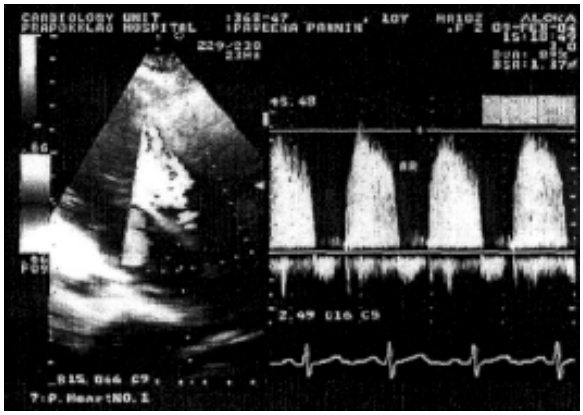

Figure 2 Aortic regurgitation in a 14-year-old patient.

of these patients had symptoms and signs of congestive heart failure. Table 4 shows the incidence of minor Jones criteria and laboratory findings. Elevated ESR, fever, positive CRP, leucocytosis and rising ASO titers were common among cardiac symptom-presenting patients. The chorea- presenting patients tended to have fewer minor Jones criteria and rising ASO titers. The electrocardiograms were available for review in 31 of 34 cardiac symptom-presenting

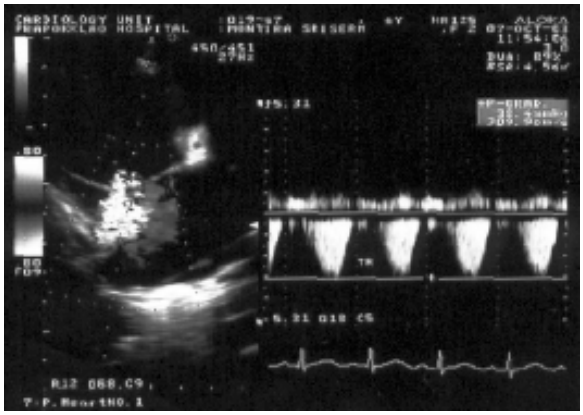

Figure 3 Tricuspid regurgitation in a 6-year-old-patient.

Table 4 Findings in minor Jones criteria, ASO titer and throat swab culture in 45 RF children

Patient group / Minor criteria	Cardiac symptom-presenting patients (%)	Chorea-presenting patients (%)
Fever	30/34 (88.2)	0/11 (0)
Arthralgia	11/34 (32.4)	0/11 (0)
Elevated ESR > 20 mm/hr	34/34 (100)	2/11 (18.2)
Positive CRP	22/27 (81.5)*	2/8 (25.0)*
Leucocytosis	26/34 (76.5)	3/11 (27.3)
Prolonged PR	4/28 (14.3)*	0/9 (0)*
Rising ASO >320 Todd units	24/34 (70.6)	3/11 (27.3)
Positive TSC	0/27 (0)*	0/9 (0)*

* Not all patients had available data for review

patients and 7 of 11 chorea-presenting patients. There were no EKG abnormalities in all of the seven patients in chorea group, including the case who showed mild cardiomegaly on chest roentgenogram. Of the 31 carditis-presenting patients, only 2 had normal EKG tracings, whereas the others had various patterns of EKG abnormalities (table 5).

Discussion

This study demonstrated that rheumatic fever was an important health problem of Thai children living in Chanthaburi, an eastern province of Thailand. This was similar to other parts of the country,[5-8] although some differences in clinical features existed. The leading manifestation of carditis in this study, at the incidence of 91.3 percent, was similar to those reported from two prominent medical schools in Bangkok[5,6] and other tropical regions.[12,13] However, incidence of polyarthritis was relatively low, when compared with those of carditis and chorea. This was in contrast to the other reports from temperate and tropical regions where polyarthritis was reported to be the most frequent[1,3,10] and second most-frequent[5,6,13] major manifestation respectively. This low incidence of arthritis and nonexistence of erythema marginatum and subcutaneous nodule in this study may be due to some factors. Firstly, the number of total cases reviewed in this study was relatively small. Secondly, because of lack of health education and poverty, some patients with polyarthritis probably treated themselves at home with ASA-containing or non-salicylate anti-inflammatory drugs, which were easily available at any drug store. As the arthritis was highly responsive to the anti-inflammatory drug and didn't last long

Table 5 Electrocardiographic findings of 38 RF children

Findings \ Groups	Cardiac symptom-presenting patients (n = 31)	Chorea-presenting patients (n = 7)
Sinus tachycardia	28 (90.3%)	0
LAE	16 (51.6%)	0
LVH	8 (25.8%)	0
Prolonged PR	4 (12.9%)	0
Low voltage	3 (9.7%)	0
RAD	3 (9.7%)	0
RVH	2 (6.5%)	0
PVC	1 (3.2%)	0
Incomplete RBBB	1 (3.2%)	0
Electrical alternans	1 (3.2%)	0
Normal	2 (6.5%)	7

during its natural course, the patient's underlying rheumatic fever probably went undiagnosed. In addition, the patients who had erythema marginatum or subcutaneous nodule probably didn't manage to see a doctor because of the mild clinical symptoms of the illness. As a result, they lost the opportunity of receiving secondary prophylaxis to prevent recurrence. Undoubtedly, carditis eventually developed. It was probable that some patients could not recall their past illness with arthritis when they were hospitalized with the unbearable degree of congestive heart failure which was the result of slowly-progressive carditis. Thirdly, most patients with chorea tended to come for medical care in hospital because of their concern about the uncontrollable abnormal movement, which persisted longer than arthritis before it spontaneously improved. These probably were the reasons why carditis and chorea were found more common than polyarthritis in this study.

The incidence of chorea in this study was somewhat high when compared with the theoretical fact[2] and other previous reports,[5,6] but it was nearly similar to that in a recent study by Tani et al,[14] who found 172 of 541 patients with rheumatic fever, representing 31.8 percent, had chorea. Although rheumatic fever is considered to be an entity occurring mainly between the ages of 5 and 15 years,[3,4,15] one child in this report, representing 2.2 percent, was under 5 years of age. Rheumatic fever patients who are under 5 years of age have been reported with varying incidence of 1-6.8 percent.[3,16-19] The child's age in this report was 4 years 7 months and presented with moderate-to-severe degree of congestive heart failure. His severe cardiac manifestation was in accordance with the conclusion of previous other reports in that, when carditis was present, it was more often moderate to severe in younger than in older patients.[14,20,21]

Besides the difference in severity of carditis, many previous reports revealed other differences in clinical presentation between the younger and the older children. Younger children under 5 years of age were more likely to present with carditis[19,20,22] and arthritis[14,20-22] than older children. However, in a recent report of 541 cases of rheumatic fever by Tani et al, there was no difference in the carditis incidence between the two age-groups.[14] In addition, from the same report the rash of erythema marginatum was seen more commonly in children who were younger than 5 years at diagnosis, and this was speculated to be because parents were more likely to participate in the bathing and dressing of younger children and thus more likely to observe an evanescent, mainly truncal rash. Chorea was reported by some series to be nonexistent in young children,[20,21] but it has been reported in an 8-month-old child, and 7 percent incidence of chorea in young children with rheumatic fever has been reported by Abdin and Eissa.[16] Based on these reported findings in young children, including one case in this study, rheumatic fever should be included in the differential diagnosis in any young child who is less than five years of age and presents with any of the following manifestations; arthritis, a murmur of mitral regurgitation, a rash suggestive of erythema marginatum, and chorea.

Younger children with rheumatic fever possessed two main risk factors reported to influence the development of chronic rheumatic heart disease. These factors were the severity of involvement at initial presentation and rheumatic fever recurrence.[23-25] As it was mentioned previously, carditis was more often moderate to severe if it was present in younger children.[10,14,21] Furthermore, younger age at presentation has been reported to be associated with increased risk of rheumatic fever recurrences.[26]

The overall mitral (100 percent), aortic (50 percent) and tricuspid (45.2 percent) valve involvement of the 42 patients with carditis were nearly similar to the incidences found in other previous reports.[5,6,7] Although regurgitation was the main form of the mitral valve involvement, it was found isolated in only 33.3 percent of the cases. This was relatively low when compared with previous report of 73 percent by Sueblinvong.[7] The difference could be attributable to difference in the resolution of echocardiographic machine used to detect the valve lesion.

The extent and severity of cardiac involvement tended to be less in chorea-presenting patients than in cardiac symptom-presenting patients, as shown in Table 3. Chorea patients also tended to have less positive findings of minor Jones criteria, as shown in Table 4. Throat swab cultures for group A beta-hemolytic streptococcus yielded negative results in all of the 36 cases investigated. These could be attributable to inefficient method of obtaining sample for culture, or some kinds of antibiotics taken by patients prior to hospitalization.

Four patients in this study, one with pure polyarthritis and three with pure chorea were not investigated with color flow Doppler echocardiography since they had no clinical evidence of carditis. At present, the role of echocardiography in the evaluation and management of patients with rheumatic fever who have no clinical cardiac involvement still remains controversial.[11,28-30] However, these four patients needed long-termed follow-up evaluation because as many as 20 percent to 34 percent of patients with seemingly pure chorea have been reported to develop chronic rheumatic heart disease.[31-33] In addition, in another report by Bland and Jones,[23] 44 percent of patients with rheumatic fever who initially had no clinical evidence of carditis developed rheumatic heart disease. These four patients in this study could have subclinical rheumatic heart disease without audible cardiac murmur, the condition reported to be potentially important.[23]

Conclusion

This study was conducted on forty six children with rheumatic fever hospitalized in Department of Pediatrics, Prapokklao Hospital between July 1995 and August 2003. There were 26 males and 20 females. The age range was 4.6-14.8 years (mean 11.4 $\pm$ 2.4). There were 42 first-attack cases and 2 recurrent cases. Of the 46 cases, 45 (97.8 percent) were over 5 years of age. The overall incidence of carditis, chorea and arthritis were 91.3 percent, 23.9 percent, and 13.0 percent respectively. There were no cases presenting with subcutaneous nodules or erythema marginatum. There were four cases

without carditis, of which three cases had pure chorea and one case had pure polyarthritis. Various types of cardiac involvement occurred mostly among the patients who presented with cardiac symptoms. Elevated ESR (100 percent), fever (88.2 percent), positive CRP (81.5 percent), leucocytosis (76.5 percent), rising ASO titers, sinus tachycardia (90.3 percent) and left atrial enlargement (51.6 percent) were also found among the cardiac symptom-presenting patients. The extent and severity of cardiac involvement, abnormal findings in each category of the minor Jones criteria and EKG tracings tended to be more in cardiac symptom-presenting patients than in chorea- presenting patients.

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