The clinical manifestations and course of rheumatic fever have been studied mainly in children. Recently a number of studies of this disease in military personnel have been reported (Gray, 1949; Carmichael, 1956; Bates, 1958; Slater and Rosenbaum, 1959). In these series, patients with a past history of rheumatic fever were included, which may have modified both the clinical manifestations and subsequent progress. The present paper deals with the characteristic features of rheumatic fever occurring for the first time in young adults.

Material

A series of 27 patients diagnosed as having rheumatic fever on the criteria of Duckett Jones (1944) were amongst more than one hundred admissions for acute arthropathy to a Service Hospital between 1956 and 1959. 26 of the patients were male and one female. Their ages varied between 15 and 23, the majority being in their late 'teens. Care was taken that no patients were included in this series who had a past history of rheumatic fever, chorea, or arthropathy of unknown cause. Because of the difficulty in differentiating between rheumatic fever and other allergic arthropathies, patients who had had prophylactic inoculations or symptoms suggestive of dysentery in the 8 weeks before admission were also excluded from this series.

Clinical and Pathological Findings

The family history of five patients (20 per cent.) indicated that one or both parents had suffered from rheumatic fever. Inquiry was made not only from the patient at the time of admission, but also in subsequent follow-up questionnaires to the family doctor and patient.

Patients with rheumatic fever were admitted throughout the year, but the incidence was highest in winter and early spring, over two-thirds of the cases occurring between February and May.

Of the 27 patients in the present study, 22 gave a recent history of sore throats, with an equal incidence in each of the 4 weeks before rheumatic fever developed. Five of these patients had been treated for their sore throats with penicillin (1,000,000 Units daily for 7 to 10 days). Of the five patients who had not had sore throats, four had raised anti-streptolysin titres (370, 440, 600, and 800 Todd units per ml. respectively), and a heavy growth of beta-haemolytic streptococci of Lancefield Group A was cultured from the pharynx of the other.

Clinical Features of the Acute Attack

Anorexia, malaise, or other constitutional symptoms of rheumatic fever were uncommon, most of the patients feeling well throughout their illness. During the initial stages of their illness all cases had a pyrexia, commonly in the region of 99-102°F. Fever higher than this warranted reconsideration of the diagnosis; in one patient pneumonia, and in another streptococcal septicaemia, had complicated rheumatic fever. In several other patients, not included in this series, the arthropathy and high fever were due to osteomyelitis.

All the patients presented as cases of arthropathy. The arthropathy was usually of gradual onset, the knees or ankles being affected first in all cases. These together with the hip joints were the most commonly involved. It was very unusual for other joints to be affected, and in only five cases (15 per cent.) were the upper limbs involved. A striking feature was the mildness with which the majority of joints were involved. The degree of involvement varied considerably. In 24 patients the arthropathy consisted only of stiffness, slight swelling, and tenderness, and several of them being able to walk on the
affected limb without undue discomfort. In only three patients were the joints severely affected, making walking impossible and causing loss of sleep. In about a third of the cases, only two joints were affected, and the arthropathy was seldom of the migratory type involving several joints successively. In one patient the left knee only was involved, but the presence of carditis and an anti-streptolysin-O titre of 800 Todd units together with a rapid symptomatic improvement on salicylate therapy was felt to justify his inclusion in the present series.

No patients had erythema marginatum, erythema multiforme, or erythema nodosa. No patients developed purpuric lesions. Skin nodules were noted in the occipital region in two patients. Two patients had transient splenic enlargement.

Cardiovascular Manifestations of Rheumatic Fever

Great care was taken to elicit any evidence of carditis. Because of the difficulty and variability of auscultatory findings in patients with rheumatic fever, each patient was examined daily during the acute stages of the illness, using the routine examination suggested by Parkinson and Hartley (1946). The results of their pre-service medical examination were available for comparison with the findings of the present study. (No patient in the present series had been noted to have any cardiovascular abnormality at his pre-service medical examination.) All patients had postero-anterior and lateral chest x rays at the time of admission and when indicated these were repeated and radiological screening carried out. An electrocardiograph was obtained on admission and once a week during the acute stages of the illness.

Initially all the patients had a tachycardia of between 90 and 120 per minute. With rest in bed and treatment this rapidly settled. 1 to 3 weeks after admission a sinus brachycardia of below 55 per minute was noted in ten cases (36 per cent.), and in five of these the pulse rate remained below 40 per minute for up to 5 days.

During the acute stages of the illness the majority of the patients had an apical systolic murmur. In all but eight patients, this was a short mid-systolic aortic ejection murmur, conducted to the apex. In eight patients the apical systolic murmur was considered to be organic, as it was of a loud blowing character, was well conducted to the axilla, and was pan-systolic embracing both heart sounds. At the time of admission three patients had an aortic diastolic murmur and two further cases developed this sign during the acute stages of the illness. At the time of discharge five patients still had an apical pan-systolic murmur, two an aortic diastolic murmur, and one an apical pan-systolic murmur together with an aortic diastolic murmur. No patient had an apical diastolic murmur (Table I).

<table>
<thead>
<tr>
<th>Murmur</th>
<th>On Admission*</th>
<th>During Illness</th>
<th>On Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Apical Systolic</td>
<td>8</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Aortic Diastolic</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

* No evidence of murmurs at pre-service medical examination.

No patient developed heart failure or clinical or radiological evidence of cardiac enlargement. No patient developed bacterial endocarditis. Two patients developed pericarditis soon after admission with retrosternal discomfort and a transient pericardial friction rub; this pericarditis was clinically of the fibrinous type, and neither case developed cardiac tamponade or other evidence of a pericardial effusion.

Electrographic abnormalities were noted in six patients. In one patient with pericarditis there was generalized S-T elevation and flattening of the T-waves. In five patients there was prolongation of the P-R interval above 0.22 seconds, and in one of these a Wenkebach AV block developed and persisted for 4 days.

It was considered that sixteen out of the 27 patients (60 per cent.) had evidence of carditis during their attack of rheumatic fever. The evidence for carditis rested on the presence of an abnormal murmur in twelve patients, the presence of pericarditis in two, the presence of a P-R interval of 0.24 and 0.28 in two, and the presence of a Wenkebach conduction defect in one. Only seven patients (26 per cent.) had evidence of cardiac involvement at the time of their discharge.

Results of Pathological Investigations

The erythrocyte sedimentation rate was raised above 40 mm./hr in all cases on admission, the highest levels being found in the first week and varying between 44 and 120 mm./hr. Subsequently the E.S.R. tended to settle slowly, though one patient had a second sharp elevation associated with a recurrence of the sore throat.

A full blood count was carried out at the time of admission on all patients. Anaemia was unusual,
only nine cases having a haemoglobin of less than 80 per cent. A surprising feature was the absence of leucocytosis. One patient had a white cell count of 11,600/c.mm., but in all other cases the total white cell count was less than 10,000/c.mm. No abnormalities in the white cell differential count were found.

Difficulty was experienced in obtaining positive throat cultures, Group A beta-haemolytic streptococci only being obtained in eleven cases (40 per cent.). This difficulty was attributed to the fact that several patients had been treated with penicillin before admission to hospital. Thus five patients had been given a full course of penicillin for the initial sore throats, and a further six had been started on oral penicillin at the time of onset of the arthropathy.

In those patients in whom streptococci of Lancefield’s Group A were not isolated, antistreptolysin-O titres were measured. All sixteen patients in whom this estimation was carried out showed elevations of more than 200 Todd units per ml. The antistreptolysin-O levels varied between 220 and 1,800 Todd units per ml., the mean value on admission being 600 Todd units.

Management of the Acute Attack

The patients were, as far as possible, nursed together in a ward reserved for cases of rheumatic fever. This reduced the incidence of extraneous upper respiratory infection and improved morale.

The majority of the patients did not feel particularly ill at the time of admission, nor did they suffer much discomfort from their affected joints. In all but two cases prompt relief of symptoms was obtained by rest in bed, moulded splints, and salicylates. Initially each patient was given 2 g. sodium salicylate 4-hrly; once a satisfactory clinical response had occurred, or earlier if side-effects of salicylate treatment such as tinnitus, deafness, or hypopnoea necessitated it, the dosage was lowered to 1·5 g. sodium salicylate 6-hrly.

Only two patients did not respond to this regime. Estimation of their serum salicylate levels showed 35 and 40 mg./100 ml. and further increases in the salicylate dosage produced marked side-effects. In these two patients salicylates were stopped and prednisolone (30 mg. daily) produced rapid relief. Subsequently the prednisolone was gradually replaced by salicylates without a relapse.

All patients were given oral phenoxymethyl penicillin (120 mg. twice daily) during their stay in hospital. In those patients with a positive throat culture for Group A beta-haemolytic streptococci an initial 10-day course of intramuscular procaine penicillin (600,000 Units daily) was given, and further throat swabs were taken. In one patient it was necessary to perform a tonsillectomy to prevent successive relapse from chronic tonsillar sepsis.

The erythrocyte sedimentation rate was used as a guide to the patient’s management. Patients were not allowed up until the erythrocyte sedimentation rate had remained below 10 mm./hr for 3 successive weeks. During mobilization, which was of 4 to 6 weeks’ duration, each patient was repeatedly advised on the need for penicillin prophylaxis for at least 3 years. In those patients with valvular disease, the importance of penicillin coverage during such operations as dental extractions was stressed.

Results of Follow-Up

Since nearly all patients with rheumatic fever are invalided from the armed services, their follow-up consisted of questionnaires sent to them, together with, when necessary, letters to their doctors.

The 27 patients in the present study were followed up for from 8 to 40 months. Despite the repeated advice regarding the necessity to take continuous antibiotic prophylaxis, only nine patients had continued to take penicillin regularly. These patients had had no further sore throats or joint pains, and had lost no time from work. Of the remaining eighteen patients, five had taken penicillin only intermittently, and thirteen had taken none. Of these eighteen patients, thirteen had had further episodes of sore throats and mild joint pains, though none had been diagnosed as having a further attack of rheumatic fever.

Discussion

There is no specific laboratory test for rheumatic fever, and its diagnosis rests mainly on clinical findings. Table II (opposite) compares the manifestations of acute rheumatic fever found in the present study with those in the reports of Bland and Duckett Jones (1951) and Lieber and Holoubek (1956).

The results of the present study, in which patients with a past history of the disease are excluded, compare closely with other reports of rheumatic fever in the young adult, in which patients with a past history of rheumatic fever have been included (Bates, 1958; Slater and Rosenbaum, 1959).

The clinical manifestations of rheumatic fever in the young adult differ in several important respects from those in children. Arthritis, the
outstanding manifestation in young adults, was found by Bland and Duckett Jones (1951) to occur in only 41 per cent. of a large series of children, and in 63 per cent. of a series of patients of all ages (Lieber and Holoubek, 1956). Conversely, these workers found that chorea, which is rare in young adults, occurred in 51 per cent. of children. Evidence of carditis during the acute stages of rheumatic fever occurs in about 60 per cent. of young adults and children (Bates, 1958; Slater and Rosenbaum, 1959; Bland and Duckett Jones, 1951). Congestive cardiac failure, however, which occurs in about 20 per cent. of children, is rare in adults, and Bland and Duckett Jones report evidence of permanent cardiac damage in 66 per cent. of children, compared with only 25 per cent. in the present report and 28 per cent. in the report of Bates (1958) concerning rheumatic fever in American military personnel.

Rheumatic fever is frequently difficult to diagnose in the young adult. The mildness of the symptoms in the majority of patients in the present study, together with persistent evidence of cardiac damage in a quarter, underline the sinister form that the disease may take in this age group.

As Table II shows, chorea, erythema marginatum, and the presence of subcutaneous nodules, three of the five major criteria on which rheumatic fever may be diagnosed (Duckett Jones, 1944), are uncommon in young adults. The diagnosis of rheumatic carditis may also be difficult in this age group. Congestive cardiac failure and progressive cardiac enlargement seldom occur (Friedberg, 1959), while cardiac murmurs are frequently difficult to interpret, and pericarditis may have other aetiologies.

All the patients presented as cases of arthropathy. This was usually not severe, and in several cases involved only two joints. The arthropathy was seldom of a migratory type flitting from joint to joint, and in no case were the small joints of the hands or feet involved. These characteristics differ from the usual description of rheumatic polyarthritis in the adult, which is frequently severe, typically flits from one large joint to another, and may involve the small joints of the hand (Wood, 1956; Stoller- man, 1960).

The diagnosis of rheumatic fever in the present study was made on the findings of polyarthritis, associated in 60 per cent. with evidence of carditis, together with such minor manifestations as fever, an elevated erythrocyte sedimentation rate, electrocardiographic changes, and evidence of recent streptococcal infection. Using the modified criteria of Duckett Jones (1944), at least one major and two minor manifestations of rheumatic fever must be present before the diagnosis can be made. Because polyarthritis, together with fever and a raised erythrocyte sedimentation rate, may be found in many other conditions, evidence of a recent Group A beta-haemolytic streptococcal infection was looked for carefully, and was considered essential for the diagnosis. In the present series the majority of patients had had a recent sore throat, and in all either a positive throat culture or a raised anti-streptolysin-O titre (above 200 Todd units per ml.) was found. It was considered wise to treat all the
patients as having rheumatic fever rather than post-
streptococcal arthritis as suggested by Friedberg (1959).

The seasonal incidence of rheumatic fever in the
present study (Figure) differed slightly from that
usually encountered (Coburn, 1931). This may in
part be accounted for by the population group
studied, namely entries of recruits doing their
initial training.

All had a normal white cell count on admission
and the absence of a leucocytosis is difficult to
explain. In some this could have been due to their
having been given antibiotics for the initial sore
throat or at the onset of the arthropathy. It is of
interest that five patients developed rheumatic
fever despite receiving penicillin (1,000,000 Units
daily for 7 to 10 days) within 1 or 2 days of the
start of the initial sore throat. This agrees with the
findings of Rammelkamp, Denny, and Wannamaker
(1952) that treatment of the acute sore throat is less
effective in the prevention of rheumatic fever than
continuous prophylactic therapy.

The rarity of an apical diastolic murmur in adults
is commented on by Friedberg (1959), and no
patient in the present series developed a murmur
of this type.

The management of rheumatic fever in this age
group presented the difficulty that many patients
suffered little discomfort from the disease and were
anxious to be allowed out of bed. The initial eradi-
cation of Group A beta-haemolytic streptococci
from the throat by full doses of penicillin was con-
sidered important, as this may lower the incidence
of permanent cardiac damage (Vaisman, Rakita,
Mortimer, Gudsch, Schuster, Vignau, Roberts,
Krause, and Rammelkamp, 1958). The dose of
procaine penicillin used (600,000 Units daily for 10
days) was adequate for this aim (Denny, Wann-
amaker, Brink, Rammelkamp, and Custer, 1950).

The use of corticosteroids rather than salicylates
was not considered justified by recent experience
(United Kingdom and United States Joint Report,
1955; Bywaters, 1956; Fischel, Frank, and Ragan,
1952), especially in view of the possible side-effects
of these drugs (Smith and Good, 1956).

Despite repeated advice on the importance of
prolonged and continuous antibiotic prophylaxis to
prevent recurrence, only nine patients (33 per cent.)
continued to take oral penicillin regularly after
discharge. Of the remainder, 70 per cent. have
had recurrent sore throats and occasional joint
pains. This raises the question of the advisability
of using monthly injections of the slowly absorbed
repository benzathine penicillin, especially as this
is a more effective means of obtaining continuous
prophylaxis (Wood, Stollerman, Feinstein, Hirsch-
feld, Rusoff, Taranta, Haas, and Epstein, 1957).

Slater and Rosenbaum (1959) quote an incidence
of rheumatic fever of 1 in 1,663 young military
personnel. They found a particularly high inci-
dence during the initial training period, and in the
present series also 90 per cent. of the patients came
from recruit camps. Excellent prolonged prophylac-
taxis against streptococcal infections without serious
hypersensitivity reactions has been obtained in the
U.S. armed services with benzathine penicillin

Figure.—Seasonal incidence of first attacks of rheumatic fever in 27 young adults.
RHEUMATIC FEVER IN THE YOUNG ADULT

(Sherwood, Gronbeck, and Denny, 1957). Such prophylaxis or short-term oral penicillin may well be indicated in Great Britain during recruit training.

Summary

The clinical manifestations of rheumatic fever occurring for the first time in 27 young adults are reported. The diagnostic difficulties are emphasized, as the occurrence of chorea, erythema marginatum, and subcutaneous nodules are uncommon, while the arthritis may be mild and is seldom migratory. The sinister form that rheumatic fever may take in patients of this age group is underlined by the fact that 60 per cent. had evidence of carditis during their illness, and 26 per cent. had significant cardiac murmurs on discharge. Those patients who took penicillin regularly in the 8 to 40 months of their follow-up had complete freedom from sore throats and joint pains.

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REFERENCES


Rhumatisme articulaire aigu chez l’adulte jeune

SUMMARY

On relate les manifestations cliniques du rhumatisme articulaire aigu apparaissant pour la première fois chez 27 jeunes adultes. On souligne les difficultés diagnostiques, car la chorée, l’érythème marginé et les nodules souscutanés sont peu communs, et l’arthrite peut être bénigne et rarement migrante. La forme sinistre que le rhumatisme articulaire aigu peut revêtir chez des malades de cet âge se voit dans le fait que 60 ou 70 cent d’entre eux présentaient des signes de cardite pendant la maladie et que 25 pour cent manifestaient des souffles cardiaques organiques au moment de leur renvoi de l’hôpital. Les malades qui recevaient de la pénicilline régulièrement pendant les 8 à 40 mois d’observation étaient tout à fait libres d’angines et de douleurs articulaires.

Reumatismo poliarticular agudo en el adulto joven

SUMARIO

Se relatan las manifestaciones clínicas del reumatismo poliarticular agudo apareciendo por primera vez en 27 adultos jóvenes. Se resaltan las dificultades diagnósticas debidas al hecho de que la corea, el eritema marginao y los nódulos subcutáneos son de infrecuentes aparición, a la vez que la artritis puede ser muy benigna y raramente migratoria. La gravedad que la fiebre reumática puede asumir en enfermos de esta edad es demostrada por el hecho de que el 60 por ciento presentó signos de carditis durante la enfermedad y el 26 por ciento manifestó soplos cardíacos patológicos a ser dados de alta. Los enfermos que recibieron penicilina regularmente durante los 8 a 40 meses de observación estuvieron completamente libres de infecciones de la garganta y dolores articulares.