JUVENILE RHEUMATOID ARTHRITIS*

A FOLLOW-UP OF 75 CASES

BY

IB FRIMODT LINDBJERG†

From the Paediatric Department, University Hospital, Copenhagen, Denmark

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The diversity of manifestations familiar in the collagen diseases, and the erratic nature of their course, are reflected also to a pronounced degree in juvenile rheumatoid arthritis. As a result of the low incidence of this disease, studies have usually been made on rather small series of cases, often selected in one way or another.

Following the introduction of pituitary and adrenal hormone therapy not quite 15 years ago, the therapeutic possibilities became extended. It was, therefore, considered of interest to review our own experience in recent years, in an attempt to add to our knowledge of the disease.

Subjects

The material examined consisted of a total of 75 children who had been admitted during the period 1944-62 in the paediatric department of the University Hospital, Copenhagen, with the diagnosis rheumatoid arthritis. The 75 children satisfied the criteria proposed by the American Rheumatism Association in 1959 (at least 'definite rheumatoid arthritis'). In all cases the disease had begun before the age of 15 years. Of the patients examined, 20 had also been included in the large Danish material of Sury's study (1952), which terminated in 1949.

There were 30 boys and 45 girls in the series; they had been referred from all parts of Denmark, and one came from Iceland.

The average number of admissions per patient was 2.5, with a mean duration of stay of 107 days, giving a mean total per patient of 272 days. (For comparison, Edström's 161 patients from 1936-56 had been admitted for a mean total period of 253 days, per admission 138 days) (1962).

Fig. 1 shows the age distribution of the patients at the onset of the disease.

Aetiological Factors

The case histories have been reviewed with a view to eliciting possible aetiological factors. Information on the occurrence of rheumatoid arthritis in nearest relatives (sibs, parents, grandparents) was obtained in 13 patients. In 9 there was preceding infection for up to two months before the onset of the joint condition: 5 with angina, 3 with heavy colds, and 1 with otitis media. Joint trauma shortly before the rheumatoid condition was reported in 8 patients. A temporal association with vaccination was reported in 3 patients (1 calmette vaccination, 1 polio vaccination, and 1 diphtheria-tetanus vaccination).

There was a history of otitis media in 8 patients, 6 having had the disease during the years preceding the first joint attacks, and 2 having had the disease after the onset of the joint attacks but before the first recurrence of the attacks.

FIG.—Age distribution at the onset of the disease.

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† Present address: Glostrup Hospital, Copenhagen.

Course of Disease in Initial Stage

In 48 patients the joint disease began in several joints simultaneously, often appearing symmetrically (Table 1). In 27 patients (36%), on the other hand, there was a monarticular initial stage lasting at least one month. In these latter patients the knee joint was the one most frequently attacked with 11 patients, next came the wrist in 5 patients, ankle-joint in 4 patients, and the elbows, finger-joints, and toe-joints in 2 patients each. The cervical spine was attacked first in one.

TABLE 1
INCIDENCE OF VARIOUS CLINICAL FEATURES
IN THE INITIAL STAGE

Clinical Feature	No. of Patients
Monarticular initial stage	27 (36)
Polyarticular initial stage	48 (64)
Febrile periods	35 (47)
Lymphadenopathy	29 (39)
Exanthema	15 (20)
Cardiac affection	4 (5)
'Still's type'	4 (5)

Figures in parentheses are percentages

Generalized reactions in the form of febrile periods were observed in 35 patients (47%), often with prolonged and fluctuating fever. There was well-pronounced lymphadenopathy in 29 and exanthema in 15. Splenomegaly was demonstrated in 7, hepatomegaly in 3, and subcutaneous nodules in 6 patients.

The heart was affected in 4 patients, 3 with pericarditis and 1 with atrio-ventricular block. In a further 5, a harsh systolic murmur was heard, which subsequently diminished, and in 6 a systolic murmur of functional type was reported.

Ocular complications were demonstrated in 8 patients (11%); in 7 of these there was iridocyclitis, while band-shaped keratitis was observed in 5. Cataract developed subsequently in 4 patients.

Four patients (5%) presented the clinical picture of a disease with acute course and generalized reactions, as described by Still. In 2 of these, the original diagnosis had been leukaemia.

Based on information as to joint signs and symptoms and requirements of treatment, the active period of the disease in the surviving patients was determined as more than five years in 27, from one to five years in 34, and less than one year in 9 patients.

Follow-up

The condition of the 75 patients was studied in the summer of 1962. About half of them were aged 5-14 years, while the other half were aged 15-30 years. In 63 cases, more than 5 years had elapsed since the commencement of the disease. The mean

period of observation for the survivors was 10.6 years (boys 11.0, girls 10.3 years).

A total of 39 patients attended the out-patients' department for the examination, and 26 were examined at home. In 3 patients, detailed information was provided by the physiotherapy departments in which they were hospitalized at the time. In a further two patients who were abroad, only written information from their relatives was available. Five patients had died, the date and cause of death being stated.

In the follow-up, information was obtained on the general condition, the working capacity, and the medication requirements. The joint mobility was noted on a form, the heart examined and blood pressure measured, and blood samples taken for sero-reactions, Hb percentage, and erythrocyte sedimentation rate determination.

Based on the examination, the patients were grouped into classes in accordance with the criteria recommended by the American Rheumatism Association (Steinbrocker, Traeger, and Batterman, 1949): patients in Class I have completely normal functional capacity, in Class II they have slightly restricted functional capacity which does not signify any considerable handicap, in Class III they are severely handicapped and can attend to their personal needs only with difficulty. Finally, in Class IV the patients are wholly incapacitated and are confined to wheel-chair or bed.

Table 2 shows the distribution into the four classes. The results showed that in about one-third of the patients it was impossible to demonstrate any sequelae of the disease; Classes I and II together gave 71% in whom there was more or less good functional capacity, while 22% were severely incapacitated. The last 7% (5 patients) represented those that had died, the youngest at the age of 2½ years, the oldest at the age of 19 years.

TABLE 2
CONDITION OF PATIENTS ON FOLLOW-UP (DISTRIBUTED
INTO CLASSES OF FUNCTIONAL CAPACITY)

Class	Male	Female	Total
I	8	19	27 (36)
II	10	16	26 (35)
III	6	1	7 (9)
IV	5	5	10 (13)
Died	1	4	5 (7)
Total	30	45	75

Figures in parentheses are percentages

In 4 patients, the causes of death were in all probability sequelae of the rheumatoid arthritis (amyloid nephrosis in 3, heart failure in 1), while one

TABLE 3
RESULTS OF SERO-REACTIONS ON FIRST EXAMINATION AND ON FOLLOW-UP

	First Examination			Follow-up		
	Positive	Negative	Total	Positive	Negative	Total
Streptococcal agglutination test	8	53	61	2	57	59
Latex-fixation test	1	11	12	14 { 7+ 6++ 1+++ 2	40	54
Rose-Waaler test	1	15	16		50	52

patient, an 8-year-old boy, died after an overdose of sleeping drugs, in connexion with attempted suicide on the part of his mother.

The two classes with the best functional capacity (I + II) included 60% of the boys (18 patients) and 78% of the girls (35 patients). The difference is not significant ($p > 0.1$).

The disease was still active in 12 patients on follow-up, estimated from the joint symptoms, need for medication, and erythrocyte sedimentation rate. Of these, 3 were in Class II, 4 were in Class III, and 5 were in Class IV. In 5 of these patients the duration of the disease was less than five years, while in 4 of them it exceeded ten years.

The period of observation was less than five years in 12 patients. One of these had died, while the other 11 were distributed as follows: 4 in Class I, 4 in Class II, 1 in Class III, and 2 in Class IV. Of these 11 patients, 5 still showed signs of activity (2 in Class II, 1 in Class III, and 2 in Class IV).

TABLE 4
GASTRIC ACIDITY EXAMINED BY AZURE-A-RESIN (DIAGNEX-BLUE) (ON FOLLOW-UP)

Class	Azure-A-positive (- acid)	Azure-A-negative (- acid)
I	9	0
II	12	2
III	2	1
IV	4	1
Total	27	4

TABLE 5
DISTRIBUTION OF PATIENTS INTO CLASSES OF FUNCTIONAL CAPACITY (ON FOLLOW-UP) IN RELATION TO MAXIMUM ERYTHROCYTE SEDIMENTATION RATE WITHIN FIRST YEAR OF DISEASE

Condition on Follow-up	Erythrocyte Sedimentation Rate		
	< 50 mm.	50 mm. ≤ 100 mm.	> 100 mm.
Class I	11 { 22 (92%)	13 { 25 (76%)	2 { 6 (40%)
Class II	11 {	12 {	4 {
Class III	1 {	3 {	1 {
Class IV	1 { 2 (8%)	4 { 8 (24%)	5 { 9 (60%)
Died	0 {	1 {	3 {
Total	24	33	15

Of the sero-reactions investigated, the streptococcal agglutination titre (SAT), the latex-fixation test (RAT), and Rose-Waaler's test gave only a few positive reactions (Table 3).

The anti-streptolysin titre was shown to be increased in 19 out of 56 patients (34%), and the anti-streptococcal-hyaluronidase titre was raised in 3 out of 56 (5%).

No sign of rheumatic heart disease was found in any of those followed up. One patient who died had shown terminal signs of cardiac decompensation.

There was no rise in blood pressure in any of the patients examined.

Seven patients had had bone fracture during the course of the disease (four of the femur, two of the tibia, one of the thoracic spinal column).

Most of the patients who attended the out-patients' department were also examined for achlorhydria. The Azure-A-resin test (Diagnex-Blue) was used as a test of the content of free acid in the gastric secretion, as this is a test that can be performed ambulant, without any great inconvenience to the patient. Acid secretion was found to be retained in 27 out of 31 patients (Table 4). Among those examined there were 7 patients with active rheumatoid arthritis, 2 of whom lacked free acid. The same was the case in 2 out of the 24 inactive patients.

Condition on Follow-up in Relation to Mode of Onset of Disease

Of the 27 patients in whom the affection was localized to a single joint at first, follow-up showed more or less good functional capacity in 81% (Classes I plus II). In those patients where a number of joints were involved, 65% had a correspondingly good functional capacity. The difference is not significant ($p > 0.1$).

All the 13 patients aged 10 years or more at the onset of the disease were alive at follow-up. One of them was incapacitated, 5 were in Class I, and 7 in Class II.

In Table 5, the maximum rise in erythrocyte sedimentation rate demonstrated during the first

year of the disease is shown in relation to the condition on follow-up. Of those patients whose erythrocyte sedimentation rate did not exceed 50 mm. (or more than 25 mm. microsedimentation by Landau's method), 92% belonged to the two classes with the best functional capacity. Of those patients whose erythrocyte sedimentation rate reached between 50 and 100 mm. during the first year of disease, 76% were in the best classes. Where the sedimentation rate exceeded 100 mm. during the first year (microsedimentation value 35 mm.), only 40% had a correspondingly good functional capacity. The difference between the two groups with highest and lowest sedimentation rates is statistically significant ($p < 0.01$).

Among the patients who had had pronounced anaemia (Hb less than 70%) at some time during the first three years of the disease, the course was favourable in 46%, against 83% among those patients in whom anaemia was not demonstrated (Table 6) ($p < 0.01$).

Febrile periods during the initial stages of the disease occurred in 35 patients, 51% of whom had good functional capacity on follow-up, while this was the case in 90% of the other patients (Table 7) ($p < 0.001$).

There was information on the leucocyte count in 61 patients. Table 8 shows the distribution of the maximum values (demonstrated within the first three years), as well as the condition after the follow-up.

No leucocytosis, pronounced anaemia, or febrile periods was observed in 17 patients, just as the sedimentation rates did not reach 50 mm. in these patients. On follow-up, none of them showed any significant limitation of functional capacity (8 in Class I, 9 in Class II).

Of the 4 patients in whom the disease presented with severe general symptoms ('Still's type'), follow-up showed that two of them were in Class II and one was in Class IV, while the last had died at the age of 6½ years.

In 29 patients (39%), lymph glands could be palpated, which were described as at least pea-sized.

TABLE 6

OCCURRENCE OF ANAEMIA IN INITIAL STAGES OF DISEASE IN RELATION TO CONDITION ON FOLLOW-UP

Condition on Follow-up	Cases with Pronounced Anaemia	Cases Without Pronounced Anaemia
Class I	6	18
Class II	5	20
Class III	2	2
Class IV	7	6
Died	4	0
Total	24	46

TABLE 7

OCCURRENCE OF PERIODS OF FEVER IN INITIAL STAGES OF DISEASE IN RELATION TO CONDITION ON FOLLOW-UP

Condition on Follow-up	Cases with Initial Periods of Fever	Cases Without Initial Periods of Fever
Class I	9	17
Class II	9	18
Class III	4	1
Class IV	9	3
Died	4	0
Total	35	39

Of these, 18 (62%) were placed in the best functional capacity classes on follow-up. Of the 14 patients in whom considerably enlarged lymph glands were described (at least almond-sized), 6 (43%) had good functional capacity.

Among 53 patients, a raised SAT in the early stages of the disease was found in 8 (15%); 7 of them were over the age of 10 years, 1 was 8½ years old. Of these 8, 1 was placed in Class I, 4 in Class II, 1 in Class III, and 2 in Class IV.

The duration of the active period of the disease had exceeded five years in 4 of the patients who had died, and in 27 of the survivors. Follow-up among the latter showed good functional capacity in 12 (44%), while 15 (56%) were incapacitated.

Treatment

All patients had received salicylates as analgesics according to requirements, and in addition physio-

TABLE 8
RELATION BETWEEN LEUCOCYTE COUNT IN INITIAL STAGES OF DISEASE AND CONDITION ON FOLLOW-UP

Condition on Follow-up	Maximum Leucocyte Count, μ L*				Total > 15,000
	< 15,000	15-20,000	20-25,000	> 25,000	
Class I	19	4	0	1	5
Class II	15	3	3	0	6
Class III	0	4	0	0	4
Class IV	4	1	0	3	4
Died	2	0	2	0	2
Total	40	12	5	4	21

* Demonstrated in at least two examinations

TABLE 9
NUMBER OF PATIENTS IN VARIOUS TREATMENT GROUPS AND CONDITION ON FOLLOW-UP
(ONE INADEQUATELY REPORTED, ONE DIED FROM EXTRANEUS CAUSES)

Treatment Groups	Functional Capacity Classes				Died	Total
	I	II	III	IV		
Gold therapy alone	9	6	0	1	0	16
Hormone therapy alone	7	7	3	6	3	26
Gold + hormone therapy	2	11	2	4	1	20
- Gold, - hormone therapy	8	3	0	0	0	11

therapy in the form of baths, hot packs, and exercises.

Eighteen patients received intravenous or intramuscular injections of gold preparations (Sanocrysin or Oleosanocrysin (Na-auro-thiosulphate, gold content 37%), Myocrysin (Na-auro-thiomalate, gold content 50%), or Aurodetoxin (Na-auro-keratinate, gold content 11-13%). In the majority, the total gold amount given was 5-20 mg./kg. body weight. Twenty-six patients received hormone therapy: injections of ACTH (5-20 mg. four times daily), possibly continuing thereafter with cortisone, and later prednisone, orally. Twenty patients received both hormone therapy and series of gold injections. The last 11 patients received neither hormone nor gold therapy.

Table 9 is a review of the functional capacity of the patients in the four treatment groups at the time of follow-up.

In 15 patients, the total duration of hormone therapy did not exceed three months, while 11 received treatment over a longer period (three months to eleven years). Of these, 7 were still receiving treatment in 1962 (3 of them in Class II, 3 in Class III, 1 in Class IV).

The gold therapy had to be withdrawn in 10 patients on account of toxicity (fever, violent joint reaction, exanthem, falling thrombocyte count, or falling leucocyte count). Two of these patients, however, were subsequently able to tolerate the gold therapy.

One patient developed albuminuria shortly after the start of ACTH treatment, which was withdrawn.

During the course of the steroid therapy, one of the patients undergoing long-term treatment developed shock that threatened to be fatal, following gastroenteritis. In another patient, compression fractures of the thoracic vertebrae were demonstrated.

Discussion

There is agreement between the present material and previously published series on a number of points.

This is so, for example, with regard to age at onset of the disease, where Fig. 1 shows an accumulation

of patients in the second to fourth year of life, a result that corresponds to the findings in a number of series with a total of 735 patients (Bille, 1948; Edström and Gedda, 1957; Fyfe, 1955; Grokoest, Snyder, and Schlaeger, 1962; Hellström, 1961; Sairanen, 1958; Schlesinger, Forsyth, White, Smellie, and Stroud, 1961; Sury, 1952).

The sex distribution (preponderance of girls in the proportion 3 : 2) is of the order of magnitude usually found. An examination of 13 major series (Badley and Ansell, 1960; Bille, 1948; Coss and Boots, 1946; Edström, 1962; Ellefsen, 1962; Fyfe, 1955; Grokoest *et al.*, 1962; Hellström, 1961; Norcross, Lockie, and McLeod, 1958; Pickard, 1947; Sairanen, 1958; Schlesinger *et al.*, 1961; Sury, 1952) showed that there were from one and a half to three times as many girls as boys (a total of 426 boys and 850 girls).

The incidence of clinical manifestations likewise corresponds in the main to that of previous findings, as the following figures show: febrile periods in the initial stage occurred in 47% of the patients (Sury, 1952, 24%; Norcross *et al.*, 1958, 42%; Ansell and Bywaters, 1959, 44%; Grokoest *et al.*, 1962, 44%; Sairanen, 1958, 49%). 'Still's type' occurred in 5%, while Norcross *et al.* (1958) found 26%, Fyfe (1955) 14%, Sairanen (1958) 7%, and Edström (1962) 4%. Among Sury's (1952) patients, 3% had Still's triad, while Hellström (1961) found no examples of this among his 48 patients with rheumatoid arthritis.

The monarticular initial stage occurred in 36% of the patients in the material, while Sury (1952) found 27%, Hellström (1961) 29%, Edström (1962) 32%, and Grokoest *et al.* (1962) 39%.

Ocular complications occurred in 11% of the present material, while Schlesinger *et al.* (1961) found 5%, Ansell and Bywaters (1959) 7%, and Sury (1952) 15%.

Leucocytosis was observed in 21 out of 61 cases (34%). Grokoest *et al.* (1962) found 25%, Schlesinger *et al.* (1961) 44%, and Kelley (1960) 47%.

Lymphadenopathy was present in 39% of the patients. Norcross *et al.* (1958) found 16%, Grokoest *et al.* (1962) found 25%, Ansell and Bywaters (1959) 34%.

The incidence of hepatomegaly and splenomegaly,

as well as cardiac involvement, shows the same order of magnitude as usually quoted (Ansell and Bywaters, 1959; Grokoest *et al.*, 1962; Sairanen, 1958). Different observers find considerable variations in the incidence of these organic findings, presumably as a result of lack of uniformity in the degree of severity of the cases, as certain series comprise many patients with pronounced generalized reactions (Norcross *et al.*, 1958), while others include only a few.

To facilitate a comparison with other series, the criteria accepted for the diagnosis of rheumatoid arthritis have been those established by the American Rheumatism Association. These criteria are more difficult to meet in children than in adults. For one thing, positive sero-reactions are less common, and for another, a prolonged monarticular stage and an intermittent course are more commonly observed in childhood. A variety of criteria have been suggested, embracing modifications which take these factors into consideration (Hellström, 1961; Grokoest *et al.*, 1962).

Hellström has proposed the designation 'benign, aseptic arthritis' for the milder cases, including for example cases with joint symptoms of a duration of 3-6 weeks. It could be shown that the prognosis was better in this group. The present material contained only a very few patients of this type (presumably because the patients were often referred from other departments). These patients were not included in the study.

Classification by degree of functional capacity ('classes') has been used in preference to classification by stage of the disease ('stages'), as the latter depends to some extent on radiological criteria. The follow-up did not include a radiological examination, as many of the patients had to be examined at home.

Classification by degree of functional capacity has in addition a greater relevance from the point of view of social medicine.

Prognosis. On follow-up, 71% of the patients had only moderate joint changes or were completely free of symptoms. This observation that the disease has a relatively benign course in more than two-thirds of the cases has also been demonstrated in several series published in recent years (Ansell and Bywaters, 1959; Edström, 1962; Sury, 1952).

At an early stage of the disease, therefore, there are only limited possibilities of evaluating the prognosis in the individual patient.

Sury found a greater mortality and a greater number of severely incapacitated patients in the class with an acute, febrile initial stage. Norcross *et al.* (1958) stressed that an acute initial stage with

severe generalized reactions influences the prognosis unfavourably. Edström (1962) reports that the prognosis is more unfavourable for patients with 'Still's type' than for the other patients.

The present study has shown that when the general condition is affected in the initial stage of the disease (in the form of febrile reaction, pronounced rise of the erythrocyte sedimentation rate, or anaemia), the prognosis is unfavourably influenced to a significant extent. But even where such prognostically poor signs are present, the final result has been favourable in 40-50% of the patients.

In the present material, it is also possible to observe an association between a prolonged active period and a poor final result (as pointed out, among others, by Colver, 1937; Sury, 1952, and Norcross *et al.*, 1958).

Coss and Boots (1946) have mentioned leucocytosis as a poor prognostic sign. The present investigation seems to confirm this, though in a number of cases it was not possible to obtain a report of the leucocyte count in the first few years of the disease.

No significant difference was found in the prognosis between cases with monarticular and cases with polyarticular onset.

The prognosis was independent of the sex of the patient, but survival appeared to be better for those in whom the disease began after the age of 10 years. The figures are, however, too small to permit definite conclusions on this point.

Acid Content of Gastric Secretion. It has previously been shown that the acid content of the gastric secretion is reduced more frequently in patients with rheumatoid arthritis than in normal adults (Edström, 1939), but no studies have been made of the gastric secretion in juvenile rheumatoid arthritis.

The examination carried out showed that 4 out of 31 patients (13%) lacked free acid in their stomach contents. As the method used is stated to give a number of false negative results, but only 1-5% false positive results (in comparison with the histamine test) (Christiansen, 1962), the true incidence of achlorhydria in the patients examined was unlikely to have exceeded 13%.

Therapy. Attempts to compare the various forms of treatment have encountered the difficulty that, to a certain degree, the activity of the disease must be decisive for the type of treatment employed. This can be seen from Table 9. Those patients who received neither gold nor hormone therapy were those with least functional impairment. Gold injections were given as sole treatment in a number of cases. The best clinical effects were observed in three of those patients who had received most gold

TABLE 10
REVIEW OF COURSE OF DISEASE AND DOSAGE OF GOLD PREPARATIONS IN 16 PATIENTS,
NONE OF WHOM RECEIVED HORMONE THERAPY

Sex	Age (yr.)	Weight (kg.)	Gold Prepn.*	Total Gold Dosage (mg.)	Gold mg./kg. Body Weight	Duration of Treatment (mth.)	No. of Injections	Functional Capacity		Rheumatoid Activity		Clinical Effect	Functional Capacity on Follow-up	Age at Follow-up (yr.)
								Before	After	Before	After			
F	1	12	a	2250	22	3	14	II	II	+	-	++	I	20
M	7 10/12	24	b	1110	17	7	25	III	III	+	+	++	I	24
F	10 6/12	28	c	1125	15	3	14	IV	III	+	+	++	IV	24
F	12	31	d	385	6	2	8	III	III	+	+	++	I	24
F	12 4/12	34	b	975	11	9	35	III	III	+	+	++	II	28
F	7 11/12	22	b	555	9	3	10	II	II	+	+	++	I	25
F	6 11/12	30	d	565	9	3	15	II	II	+	+	0	I	15
F	3 8/12	13	c	198	8	2	14	II	II	+	+	++	I	9
M	7 4/12	22	d	410	7	2	8	II	II	+	+	++	II	22
F	5 3/12	19	d	208	6	3	14	II	II	+	+	++	II	11
F	7 5/12	24	d	206	4	4	15	II	II	+	+	++	II	11
F	3 9/12	13	d	141	6	3	9	II	II	+	+	++	II	8
M	7 5/12	20	b	95	5	3	8	II	II	+	+	++	II	21
F	4 11/12	17	a	520	4	1	12	II	II	+	+	++	I	21
F	12 6/12	31	d	192	3	2	13	II	II	+	+	0	I	17
M	10	36	b	255	2	1	5	II	II	+	+	++	I	24
F	12 3/12	41	d	201	2	3	14	II	II	+	+	++	II	17
F	14 4/12	54	c	95	1	1	5	II	II	+	+	0	I	30

* a = Aurodetoxin, b = Sanocrysin, c = Oleosanocrysin, d = Myocrysin.

per kg. body weight, in all three cases more than 10 mg./kg. (the total dose being approx. 250 mg., 400 mg., and 400 mg. gold, respectively). But in these cases, the duration of hospitalization and physiotherapy had been longer (Table 10).

Steroid therapy is reported as of value by several authors, especially in those cases where a strong generalized reaction is present (Edström, 1962; Norcross *et al.*, 1958; Schlesinger *et al.*, 1961). There is, however, agreement that prolonged therapy should be avoided as far as possible on account of the side-effects.

Edström (1962) stresses that the prognosis in cases of 'Still's type' has been considerably improved since the introduction of steroid therapy.

In the present material, likewise, steroid therapy has been employed mainly in febrile acutely ill patients, and has in most cases been able to bring the temperature to normal levels, to lower the sedimentation rate, and to improve the joint symptoms. It may be assumed that the course of the disease has become modified in some of these cases. Steroid therapy is likewise of significance in facilitating measures of mobilizing treatment.

Comparing, however, the results achieved for the group in which the disease commenced after hormone therapy was introduced (43 patients) with the results for the material as a whole, the same percentage distribution is found in the best class and the worst class; the same distribution is likewise found in Sury's material, where none of the patients received hormone therapy.

Provided that the patient material has not changed

in character to any essential degree in the past decade (as does not appear to be the case), it may be concluded that there has not been any decisive improvement in prognosis for cases of juvenile rheumatoid arthritis as a whole, since the introduction of steroid therapy.

Summary

75 consecutive cases of juvenile rheumatoid arthritis have been followed up at an average interval of 10.6 years after the onset of the disease.

The distribution of the patients corresponds to that of other similar series with regard to age and sex as well as to clinical findings in the initial stages of the disease.

On follow-up, 36% of the patients were symptom-free, 35% had slightly reduced joint function, 22% were incapacitated, and 7% had died.

As no previous studies have been made of the acid content of the gastric secretion in juvenile rheumatoid arthritis, this was examined by means of the Azure-A-resin test (Diagnex-Blue) during the follow-up. According to this test, 4 out of the 31 patients examined had achlorhydria.

The prognosis was poorest in cases with pronounced general symptoms during the initial stage. A rise in the sedimentation rate above 100 mm. within one year after the onset of the disease, together with febrile periods, signified a statistically significant worsening in the prognosis.

The effect of various modes of therapy is discussed. No clear change in prognosis could be observed for the period following on the introduction of pituitary and adrenal hormone therapy.

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