Radiographic progression in children with polyarticular juvenile rheumatoid arthritis: a pilot study

T Mason, A M Reed, A M Nelson, K B Thomas

Objective: To assess disease progression on hand/wrist x-rays from children with polyarticular juvenile rheumatoid arthritis.

Methods: Initial and subsequent films of 13 white children (10 girls) were read blind by a paediatric radiologist for the presence of joint space narrowing (JSN), erosions, and relative carpal length (RCL).

Results: One child had subcutaneous nodules; one (of 11) was rheumatoid factor positive; six were ANA positive. Median age at diagnosis was 10.7 years (2.9 to 15.9). Median number of involved joints (swelling, pain, or decreased range of motion) at diagnosis was 16 (6 to 33). Four initial x rays had either erosions or JSN. Subsequent x rays were done at (median) 13.3 (8.3 to 24.9) months after initial x rays. One of 10 subsequent x rays had shortened RCL, and six of 13 were worse than the initial ones. Four of these developed new erosions, one had increased number of erosions, and one developed new JSN.

Conclusions: About half the children with polyarticular juvenile rheumatoid arthritis will have evidence of radiographic progression within two years after diagnosis. Thus newly diagnosed children are at high risk of substantial joint destruction and potential disability, emphasising the need for prompt treatment.

CONCISE REPORT

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RESULTS

All 13 children were white, and 10 were female. Median age at the time of diagnosis was 10.7 years (range 2.5 to 15.9), and the median duration of hand/wrist symptoms at the time of diagnosis was 6.0 months (2 to 11). All had polyarticular onset and none had extended oligoarticular disease. The median number of involved joints (decreased range of movement (ROM), painful movement, or swelling) at the time of diagnosis was 16 (6 to 33). At the time of diagnosis, one had subcutaneous nodules. One of 11 had raised serum rheumatoid factor (RF), and six of 13 had serum antinuclear antibodies (ANA) in a titre of more than 1:40 or its equivalent. All the initial hand/wrist x rays were done within six weeks of the date of diagnosis. The clinical data are summarised in table 1.

Abbreviations: DMARD, disease modifying antirheumatic drug; JSN, joint space narrowing; RCL, relative carpal length.

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Thirteen sets of initial hand/wrist x rays were studied. Four of these had erosions or joint space narrowing. The median time between initial and subsequent x rays was 13.3 months (range 8.3 to 24.9). In one subject, erosions did not progress from the initial hand/wrist x ray.

Six subjects (46%) had evidence of radiographic progression. Of the six that progressed, five had erosive disease on the subsequent x rays (all of these had joint space narrowing). Four of the five with erosions on subsequent x rays had developed new erosions, and one had an increased number of erosions. One of the six that progressed developed joint space narrowing without erosions. All the erosions were either in the carpal or metacarpophalangeal joints. Those that progressed had a longer delay in initiation of disease modifying antirheumatic drug (DMARD) treatment.

Two of the children had closed carpal physes at diagnosis and one had closed physes on the subsequent hand/wrist x rays, so an accurate assessment of RCL was not possible in these three subjects. Of the 10 remaining subjects, one had a shortened RCL on subsequent x ray. Four of the five who progressed and had assessment of RCL did not have shortening. These radiographic data are summarised in table 2.

**DISCUSSION**

This was a pilot study to evaluate the rate of radiographic progression of hand/wrist x rays in children with newly...
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diagnosed polyarticular juvenile rheumatoid arthritis. About 50% of adult patients with rheumatoid arthritis may have erosions within three years of their diagnosis.11 The data from our study are consistent with this observation, as nearly half our cohort of children had erosive disease within two years of diagnosis.

We have previously reported our experience in assessing the relative frequency of radiographic abnormalities—such as periarticular osteopenia, joint space narrowing, and erosions—in a cohort of children with newly diagnosed polyarticular juvenile rheumatoid arthritis.14 In that cohort of nearly 20 children, over a quarter had either erosions or joint space narrowing at the time of diagnosis.

Only one of our subjects had “shortening” of RCL. This child also had radiographic progression. As most of the subjects with radiographic progression did not have shortening of the RCL, perhaps assessment of this variable is a less sensitive indicator of radiographic change than assessment of joint space narrowing and erosions in an older cohort of children with polyarticular disease.

We attempted to identify indices that would distinguish those who progressed from those who did not, but the small number of subjects in the study limited the generalisability of the findings. The responses to the various therapeutic interventions would clearly affect the likelihood of progression. Also, differences in the time between the initial and subsequent x rays may also account for some of the variation between the groups with respect to progression and shortening. We could not rule out a selection bias favouring cases with more clinically severe disease, who might have been more likely to have had hand/wrist x rays. However, these pilot data suggest that the rate of radiographic progression in polyarticular juvenile rheumatoid arthritis is significant, and further study is indicated.

A paper by Oen et al showed that joint space narrowing but not erosions correlated with clinical outcome measures in children with juvenile rheumatoid arthritis after several years of disease.15 Our study differs substantially from that cross sectional study, as ours looked at radiographic progression in newly diagnosed polyarticular disease.

A recent study by van Rossum et al described a method for evaluating joint radiographs in children with juvenile idiopathic arthritis.16 In that study of children with all subtypes of the disease the correlation of radiographic findings with clinical findings was also good.

Another recent paper, by Magni-Manzoni et al, showed a strong relation between the baseline Poznanski score of the wrist and the radiographic and clinical outcomes in a cohort of nearly 100 children with juvenile idiopathic arthritis.17 This group was quite young, with a median age of 4.6 years, and included systemic onset, extended oligoarticular, and polyarticular disease. This very important study showed that serial radiographic assessment correlates with important clinical outcome (as assessed, for example, by the child health assessment questionnaire (CHAQ)). Their study differed from ours in several ways. Their cohort was quite young and included systemic onset and extended oligoarticular disease, which were excluded from our cohort. Also, our subjects had x rays of the hands and wrists, not just the wrists. Finally, the median duration of disease at baseline was 1.1 years, while our cohort had baseline studies at diagnosis. It may be that multiple methods of assessing these x rays will be necessary, to account for the limitations of the Poznanski score and for maturing carpal bones.

Our data suggest that children with newly diagnosed polyarticular juvenile rheumatoid arthritis are at significant risk of radiographic progression within the first two years of the disease, as in adults with rheumatoid arthritis. The data also support the need for timely diagnosis and initiation of treatment in this disease. Prospective studies using these techniques of radiographic evaluation could assess the degree to which serial hand/wrist x rays correlate with the clinical outcome.

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Accepted 16 July 2004

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