

Asymmetrical Rheumatoid Arthritis after Poliomyelitis*

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An outstanding feature of rheumatoid arthritis is its tendency to be bilateral and symmetrical. This is one of the generally accepted diagnostic criteria, as suggested by the American Rheumatism Association (Ropes *et al.*, 1958). Jacqueline (1953) and Thompson and Bywaters (1962) have described unilateral rheumatoid arthritis, sparing the paralysed side, after hemiplegia. The only report of similar sparing of a paralysed limb after lower motor neurone paralysis is that by Kamermann (1966), though Heberden's nodes formation limited to the non-paralysed hand has been described after lower motor neurone paralysis by McEwen (1940), Hench (1940), and Stecher and Karnosh (1947) and after hemiplegia by Coste and Forestier (1935), Forestier (1935), and Winter (1952).

This paper records 12 cases of rheumatoid arthritis developing in patients previously paralysed by poliomyelitis, in whom the paralysed limbs have been spared totally or partially by the arthritic process.

In addition, a woman of 84 was seen who started with low-grade rheumatoid arthritis at the age of 57. She had had a virtually complete right hemiplegia since encephalitis at the age of 2, and the arthritis was almost entirely confined to the normal left arm and leg.

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During the course of this investigation several patients with osteoarthritis after poliomyelitis were also seen. On superficial analysis they would appear to fit in with the findings of Glyn *et al.* (1966) that osteoarthritis predominantly affects the non-paralysed limbs.

Case Material

Cases 1 and 2 were seen in clinics at the London Hospital. A search through the hospital records brought to light Cases 3 and 4; the former patient had died and the latter had removed and could not be found. Cases 5 and 6 were contacted through the co-operation of the British Polio Fellowship, who published a notice in their *Bulletin* asking for anyone with arthritis and polio who was willing to volunteer details. These were the only two with rheumatoid arthritis of those who replied, and they were seen by me.

These six cases formed the material for a communication to the Heberden Society in May 1966. Subsequently, several physicians offered details of similar cases known to them; these are Cases 7-12. I did not examine these patients but have seen the x-ray pictures. I know of no other cases of rheumatoid arthritis occurring after poliomyelitis. All but one patient (Case 10) were women.

Dr. A. J. Popert (Droitwich) sent details of a patient with atypical polyarthritis who had polio at the age of 5, resulting in a weak left leg and flail left foot. At the age of 24, arthritis began in the left knee, spread rapidly to the right knee, and then became generalized. She is anodular and seronegative. There are marked sacroiliac changes. Now, at the age of 32,

Summary of Salient Features of 12 Cases

Case No.	Age	Extent of Paralysis and Degree (0-++++)	Arthritis		Serology	Subcutaneous Nodules	X-ray Findings
			Duration (Years)	Distribution			
1	67	Left leg +++	5	Right hip and knee. Both hands and elbows	-	0	Symmetrical erosions in hands. Gross changes in right hip and knee, but none in left hip and knee
2	46	Right leg ++	12	Generalized but mild. Symmetrical in upper limbs. Left knee definitely the most affected joint with recurrent effusions	++	0	Erosions of hands and wrists, worse on right. No gross changes in lower limbs
3	61	Left leg +	22	Generalized and mainly symmetrical, but right knee seems to have been much more troublesome than the left	+	Both elbows	Not available
4	25	Right leg ++	2	Left knee only. (Synovial biopsy typical of R.A.)	-	0	Osteoporosis of left knee
5	38	Trunk +. Left leg ++++. Right hip +	2	Symmetrical involvement of elbows, wrists, and hands. Gross changes in right knee and minor involvement of right ankle	-	0	Erosions of both carpi. Gross destruction of right knee
6	45	Right leg ++++. Left leg +	11	Fairly symmetrical bilateral involvement of upper limbs. Both knees troublesome. Left ankle and foot worse than right	-	0	Erosive changes in hands. (No recent bilateral films of lower limbs)
7	76	Right arm ++. Right leg ++	20	Virtually unilateral, involving only the unparalysed left arm and leg	+	Left elbow	Erosive changes in left hand and foot
8	53	Left leg ++++	14	Generalized. Symmetrical in upper limbs. Unilateral in lower limbs—right knee and ankle only	-	0	Joint space narrow in both knees, but very much more so on right
9	57	Left arm ++++. Right leg ++	31	Generalized. Changes in right hand and wrist more marked than in left. Left knee and foot more severely affected than on right	++	Right elbow and left leg	Erosive changes more marked in right arm and fingers. Gross cartilage loss in left knee but not in right. Subluxation of metatarsophalangeal joints of feet, more marked on left
10	45	Right arm ++	7	Bilateral involvement but less marked in right elbow, wrist, and hand. (Psoriasis of skin but no features typical of psoriatic arthropathy)	Not done	0	Slight erosive changes in right wrist but not in fingers. Marked erosions of left hand and wrist. Erosive changes in feet, more marked on right
11	62	Right arm ++++. Right leg ++	4	Pains in left shoulder, hand, ankle, and foot. Left index metacarpophalangeal joint swollen (i.e., not definite R.A.)	-	0	Joint narrowing limited to metacarpophalangeal joint of left index
12	73	Left shoulder +++	2	Both hands, wrists, and ankles. Right shoulder	++	0	Destructive changes in both wrists and several finger joints

there are few changes in the upper limbs or left leg, but the disease is still active in her neck, right knee, and right ankle.

Findings

The Table summarizes the salient features of each case. It can be seen that the greater the severity of the paralysis the more pronounced the sparing of the joints of that limb. Thus very little arthritis was discovered in flail limbs. In fact, it seemed that it was the joints normally controlled by the paralysed muscles that escaped the arthritis (Figs. 1-4). There was good correlation between the clinical and radiological findings.

Subcutaneous nodules were present in three cases (Nos. 3, 7, and 9). In Cases 7 and 9 the nodules occurred on the non-paralysed limbs but not on the opposite, paralysed, side. This was particularly striking in Case 9.

Discussion

These findings illustrate that joints controlled by paralysed muscles show less involvement and destruction when rheumatoid arthritis develops. This is in marked contrast to the denervated neuropathic joint in which hypertrophic and destructive changes are very severe.

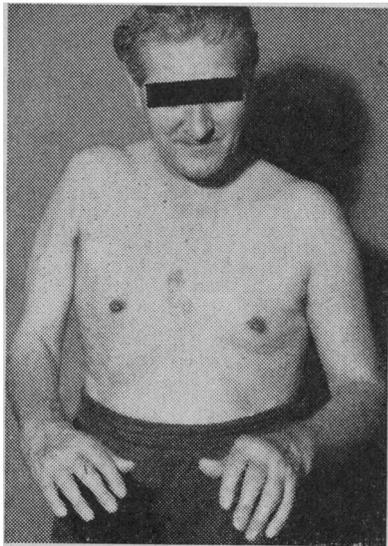


FIG. 1.—Case 10. Wasting of right shoulder muscles. More severe changes in left metacarpophalangeal and proximal interphalangeal joints with ulnar deviation.

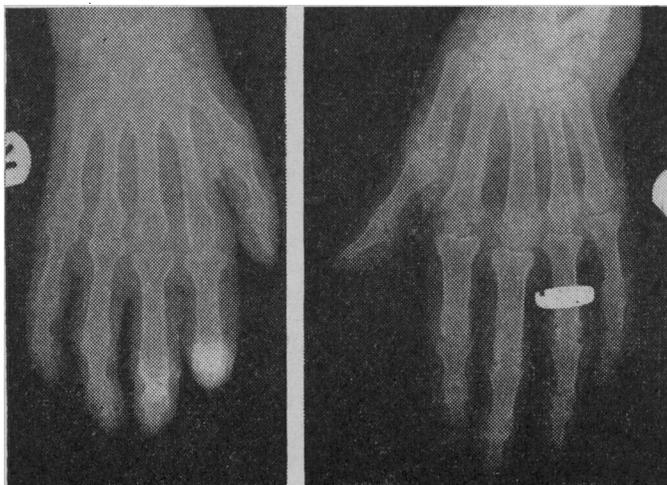


FIG. 2.—Case 7. Marked erosive changes in left wrist, metacarpophalangeal, and proximal interphalangeal joints. Poorer bone development but normal joints on left.

Of particular interest was the observation that subcutaneous nodules did not appear on the paralysed limbs. In their case in which an arteriogram was taken, Thompson and Bywaters (1962) found abnormalities on both sides, but these were more intense on the non-paralysed side. It would be of interest to have had similar investigations in this series, but in those patients under my clinical supervision this procedure did not seem worth while.

In their consideration of the protective effect of the hemiplegia Thompson and Bywaters (1962) came to the conclusion that the most reasonable explanation for the immunity of the paralysed side to the development of rheumatoid arthritis was the relative lack of use and function. They quoted some studies of vascular responses which were the same in the hemiplegic and non-hemiplegic limbs. Kamermann (1966) also regarded the protective effect as being due to comparative disuse rather than to the neurological lesion.

Castillo *et al.* (1965) have shown that the development of cystic erosions in rheumatoid arthritis is related to the degree of physical activity. Van Dam (1964) found no significant difference between the right and left hands in rheumatoid arthritis with regard to cartilage thinning, but erosions and cysts were more frequent on the right. In a review of 300 consecutive rheumatoid patients Glick (1966) attempted a correlation between right- or left-handedness and the severity of the disease in the two wrist joints and found just significantly more severe arthritis in the wrist of the dominant limb. In patients whose work was classified as heavy, and where marked asymmetry might have been expected if

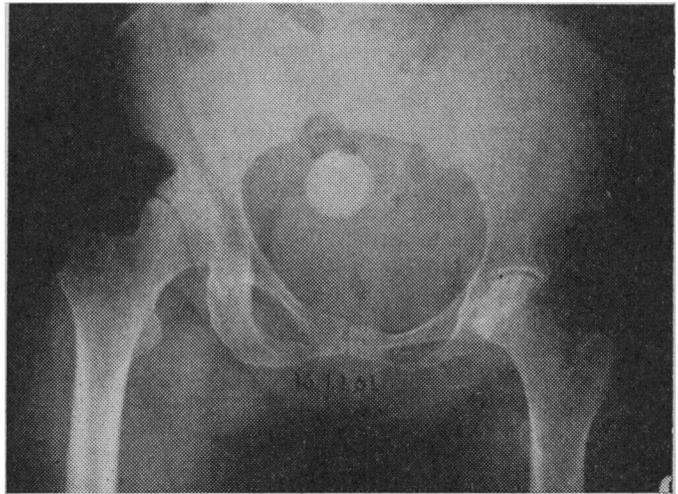


FIG. 3.—Case 1. Gross destruction of right hip joint. Decreased bone development on left, but normal joint.



FIG. 4.—Case 8. Slight joint narrowing on paralysed left side. Gross mixed arthritic changes on right.

mechanical factors were dominant, the symmetry of the disease in many of the patients was perhaps more striking than the difference between right and left. Nevertheless, the more active limbs did seem to develop the more severe arthritic changes, and the wrist involvement did appear to begin at an earlier stage. Asymmetry was noted to be more common in seronegative cases. In the present series both seronegative and seropositive cases showed asymmetry.

The experiments of Courtwright and Kuzell (1965) are very pertinent. In 20 out of 31 rats with adjuvant polyarthritis, prior section of one sciatic nerve appeared to delay the onset and diminish the severity of the arthritis in the operated limb. Similar but less marked sparing of joints resulted from prior fracturing of the femur. These two workers attributed their results to an interruption of the normal neurological control of the limb concerned rather than to mechanical factors, but the findings of this series, and their results, also correlate with different experimental work.

Dumonde and Glynn (1962), after rendering rabbits hypersensitive to their own fibrin, were able to produce an arthritis with histology similar to rheumatoid arthritis by intra-articular injection of fibrin.

Norton and Ziff (1966) injected colloidal gold particles into a joint. At synovectomy, about an hour later, these were found deep in the synovial membrane. They consider that the joint space is in continuity with the synovial extracellular space and regard the gold particles as having been mechanically propelled into their deep situation.

If, therefore, fibrin or some other immunizing agent—perhaps a globulin complex present in the joint space—is forced into the synovium by exercise or joint movements, it might be expected that in rheumatoid arthritis joint usage would increase the severity of the disease and paralysis would minimize the inflammatory process.

The actual mechanical factor involved may be the intra-articular pressure. Dixon and Grant (1964) have shown the high pressure reached when a joint is used actively, and though this work has not been repeated on joints of paralysed limbs it is reasonable to assume that, whatever stresses occur in such joints, the intra-articular pressure does not reach the levels produced in normal limbs. It is conceivable that capsular and ligamentous stresses might even be higher in a paralysed weight-bearing limb.

Glyn *et al.* (1966) have studied the incidence of osteoarthritis in people with limb paralysis occurring after polio-

myelitis. They found a positive correlation between the severity of degenerative joint changes and the power of the muscles controlling the joint. The flail limbs were relatively free from arthritis. However, it is not clear how much can be inferred between the two different types of arthritis.

What does seem clear is that after muscle paralysis the associated joints show less destructive changes of both degenerative and inflammatory arthritis than joints in the non-paralysed limbs.

The problem arises of how far these findings should influence decisions regarding rest and exercise in the management of arthritis.

Summary

Details are given of 12 cases of rheumatoid arthritis occurring in people previously paralysed by poliomyelitis. Joints controlled by the paralysed muscles were less affected than those in the contralateral non-paralysed limb. This sparing effect was most marked in completely flail limbs.

Subcutaneous nodules showed similar asymmetrical distribution in two patients.

It is suggested that decreased intra-articular pressure might be an important factor in this apparently mechanical effect.

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Adverse Reactions from the Illicit Use of Lysergide

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Lysergide (lysergic acid diethylamide; L.S.D.) is a drug with marked effects on the mind. Illegal use of the drug in the United States has led to reports of untoward and adverse reactions (Cohen and Ditman, 1962, 1963; Ludwig and Levine, 1965; Frosch *et al.*, 1965). Severe abnormal reactions have also occurred in the United Kingdom when the drug has been obtained illicitly and taken without medical supervision, and some are reported here.

Case 1

A youth aged 19 was educated at a grammar school but failed G.C.E., and after leaving school at the age of 16 never worked. He

then lived a vagrant existence and at different times took marijuana, oral amphetamines, intravenous heroin and cocaine, and methylamphetamine hydrochloride (Methedrine) intramuscularly. He had always obtained drugs illegally. When he first took L.S.D. he had a short-lived paranoid psychotic reaction.

"I had a bad trip the first time I took it. I thought I was in a different place to where I was. I was very frightened; I thought people were coming after me. All these red people were coming after me for some reason. I was very scared and ran out of the room. I thought they would get me. I did not know if they were the devil's people or something. I was running about the streets scared. I don't know what happened for about four hours; I was very frightened and running about the streets."

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