steroids on any other patients than rheumatoids using this technique?

DR. VERNON-ROBERTS We intended to carry out a further investigation on patients before and during therapy to evaluate them clinically by one of the recognized indices. We did not carry this out in the investigation presented, but Dr. Jessop made a clinical assessment of disease activity and we found a significant correlation between this and the phagocytic scores of macrophages in the untreated patients with rheumatoid arthritis, which gives us encouragement to continue this investigation. Regarding your second point, we had a few patients not included in this series who had polymyalgia rheumatica and were on steroids. They exhibited marked depression compared to our control group.

DR. A. G. MOWAT (Oxford) These are two very nice papers, but I wonder if you have not confused yourselves by this simple 'skin window' technique? There are four or five stages to this inflammatory process: these include changes in the vessel wall, migration of cells through the vessel wall, chemotaxis of the cells, and finally phagocytosis. Your method measures only phagocytosis. In rheumatoid arthritis there are important vascular changes and a serious defect in chemotaxis of the cells has been demonstrated (Mowat and Baum, 1971).

DR. VERNON-ROBERTS We have qualified our statements and have made it clear that all these factors operate in inflammation. In using these techniques we cannot distinguish which aspects of the inflammatory response these compounds were inhibiting. We know, for example, that prednisolone inhibits every stage from the release of monocytes from the bone marrow pool to the phagocytic activity of the migrant cells. One does not know much about the mechanism of action of gold, but we are going to carry out further experiments on animals to study the production of monocytes, their emigration, chemotaxis, and so on. We think that the very significant difference between the rheumatoid and control groups and the results in our patients on gold and steroid therapy suggest that this relatively crude test may provide useful information on response to treatment.

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Joint Hypermobility—Asset or Liability? A Study of Joint Mobility in Ballet Dancers. By R. GRAHAME and the late Miss J. M. JENKINS* (*Guy's Hospital*) This paper was published in the *Annals* (1972), 31, 109.

Discussion

DR. J. A. D. ANDERSON (London) Have you considered using applicants rejected by the Royal School of Ballet as alternative controls for your study?

* We regret to announce that Miss J. M. Jenkins died on March 15, 1972.

DR. GRAHAME It was difficult enough to examine the ballet students, let alone the rejects!

PROF. E. G. L. BYWATERS (Taplow) Did any of your ballet students in training show, or give a history of, joint effusions, and do you think that these could be avoided by adequate muscular control?

DR. GRAHAME Surprisingly few of these girls—they were only 17 years old—had had trouble of this nature, but a lot of older patients whom I have seen with generalized hypermobility do have this problem and in these cases I do believe that attention to the musculature, and particularly quadriceps drill, in relation to the knee joint, is of great value in preventing this complication.

DR. J. H. GLYN (London) Dr. Grahame has persuaded us that hypermobility is indeed an asset to a 17-year-old ballet student. Does he know what happens to these hypermobile joints eventually? Presumably there must have been long-term studies on the incidence of degenerative and other arthritic diseases as such girls mature. The first metatarsophalangeal joint would seem to be an obvious joint worthy of such a simple prospective study.

DR. GRAHAME I don't think there are much data on this subject, but perhaps this would be the appropriate time to mention that we have now set up at Guy's a clinic that will study the consequences of joint hypermobility as seen in ballet dancers. Perhaps in 20 years time we may be able to look into this.

DR. J. B. MILLARD (Clacton) May I ask Dr. Grahame to carry on with this type of research, because osteoarthritis of the hips is a great problem, and my impression is that people with hypermobile hips, like the Chinese and the people from the far East, do not get osteoarthritic hips. It is important to find out why.

Total Hip Replacement using the Charnley Prosthesis in Inflammatory Joint Disease. By J. HARRIS, C. D. R. LIGHTOWLER, and R. C. TODD (*The London Hospital*)

Between August, 1966, and December, 1970, 73 Charnley low-friction arthroplasties were performed in 55 patients with inflammatory joint disease. The main indication for surgery was severe pain in a hip which was the site of extensive destructive change. There were 54 operations performed for rheumatoid arthritis, twelve for ankylosing spondylitis, psoriatic arthropathy (3), Still's disease (3), and Behçet's syndrome (1).

44 patients were reviewed in a clinic and five replied to a questionnaire. Three are dead and three are lost to follow-up. 65 operations were therefore reviewed (59 in the clinic and six by questionnaire).

Before total hip replacement, 95 per cent. of the hips were severely painful, and postoperatively 88 per cent. were virtually pain-free. In those patients who attended for follow-up (excluding four in whom the prosthesis had been removed) movement had increased by at least one grade (d'Aubigné and Postel, 1954) in 89 per cent. There was at least 60° of flexion in 89 per cent. of hips.

The most serious complication was deep infection, which occurred in seven instances (10.8 per cent.). Possible predisposing causes were previous hip surgery (2); open reduction of dislocated femoral prosthesis (2); corticosteroid therapy (2); previous superficial wound infection (1). The only satisfactory treatment for deep infection was removal of the prosthesis. Other complications included superficial wound infection and haematomata (6), deep vein thrombosis (7), transient sciatic nerve damage (2), and discomfort due to wire sutures (5).

In a doctors' assessment based on pain relief and flexion, 78 per cent. of results were classified as excellent or good. The patients themselves assessed 85 per cent. of operations as excellent or good.

Discussion

DR. H. HILL (Stoke Mandeville) You might be interested to know of our results with hip replacement in 26 rheumatoid patients. We had less trouble with both superficial and deep infections but a very much higher incidence of deep vein thrombosis. In particular, I should like to draw your attention to two patients who had excision arthroplasties which were later converted to total hip replacement. One developed a deep infection down to the bone, and the other had a deep venous thrombosis. Both had recurrent dislocation of the prosthesis needing surgical reduction, and one of these still has recurrent dislocation but manages to get it back herself.

DR. M. GUMPEL (London) What was the overall rate of infection for the orthopaedic teams concerned and for the operating theatres, please? What were the overall infection rates for those orthopaedic teams in operations not related to replacement arthroplasty and, similarly, what were the rates of infection for those operating theatres? This will enable us to compare the infection rates in replacement surgery with the degree of infection that you normally get in these theatres.

DR. HARRIS I am sorry, I cannot tell you the rate of infection of the theatres. Certainly in our series of total hip replacement for osteoarthritis, the rate of infection was appreciably lower, being about 5 per cent. (Todd, Lightowler, and Harris, 1972).

DR. B. M. ANSELL (Taplow) I was particularly interested in your comment on infection when a replacement is a secondary procedure. Our infection rate in Heatherwood/Wexham/Taplow is somewhat similar, and we have been particularly struck by the fact that, when total hip replacement follows a previous procedure, our infection rate is very much higher. This is a very important point to be borne in mind when considering surgery for rheumatoid subjects.

DR. HARRIS Mr. Charnley finds the same increased incidence when he does repeat operations at Wrightington (Dupont and Charnley, 1972).

DR. A. G. MOWAT (Oxford) I can partly answer Dr. Gumpel's question. In Oxford we have not found any significant difference in wound infection rates, either in total hip replacement or in other operations, between rheumatoid and non-rheumatoid subjects. Certainly the question of steroids has been examined carefully and does

not seem to be so important as has previously been suggested. The only correlation of problems of wound healing with steroids was on duration rather than dosage; there seems to be some effect only after 3 years. I should also like to mention that two of your deep infections occurred in patients who had been on steroids over 3 years. Do you regard this as a complication of the operation or as a pyarthrosis occurring in rheumatoid patients? It has been suggested that hospital patients have a 3 per cent. incidence per year of pyarthrosis (Karten, 1969).

DR. HARRIS Yes, I suppose it is possible that infection might have occurred if they had not had the total hip replacement. It would probably be unfair to say that the infection was unrelated to the operation if it occurred only in the operated joint.

DR. A. B. MYLES (Chertsey) The question of steroids and infection after operations is always coming up and is always spoken of as 'previous steroid therapy'. There is quite a lot of evidence to suggest that it is not *previous* steroid therapy but *current* steroid therapy, that is to say unnecessarily large corticosteroid cover for surgery, which is the most important factor (Winstone and Brooke, 1961).

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Penetration of Ampicillin and Cloxacillin into Synovial Fluid and the Significance of Protein Binding on Drug Distribution. By A. HOWELL, R. SUTHERLAND, and C. N. ROLINSON (*The Middlesex Hospital and Beecham Research Laboratories*)

Pyogenic arthritis may be caused by a wide variety of organisms, of which a penicillin resistant staphylococcus is one of the most common. It was felt to be of interest therefore, to study the passage of two semi-synthetic penicillins, ampicillin and cloxacillin, from the serum into the joint fluid. The drugs were given orally to patients with rheumatoid arthritis or osteoarthritis who had chronic joint effusions. Samples of serum and joint fluid were obtained at regular intervals after administration, and the levels of the antibiotics were measured. Both cloxacillin and ampicillin diffused readily across the synovial membrane. However, the levels of ampicillin in the joint fluid approximated quite closely to the serum levels whereas the synovial fluid concentrations of cloxacillin were much lower than those in the serum.

As cloxacillin is known to be much more highly bound to human serum protein than ampicillin, it was thought that this might account for the results. Further experiments were carried out in which the concentrations of free cloxacillin were estimated, having measured the degree of protein binding of the drug in each patient's serum and joint fluid by the ultra-filtration technique. There was a much greater similarity between the free levels of cloxacillin in the serum and synovial fluid than between the total levels. This suggests that protein binding has an