

BONE AND JOINT INFECTIONS - A PROBLEM

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This problem is formidable for many reasons. The immense scope of the subject itself, ranging from acute septic arthritis of infancy to tuberculosis of the spine is one problem. The differences in pattern of disease in different parts of the world, where both organisms and hosts vary widely, is another. The rapid succession of antibiotics that have been invented in recent years, antibiotic resistance and the alterations in the character of the organisms produced by it confuse the issue further.

To start at the acute end of the spectrum-and say a little about septic arthritis of infancy. Here the message is that of Lloyd-Roberts (5). In his Robert Jones lecture given in September of 1974 he drew attention to the common observation that the constitutional response of young infants to what is in fact a se-

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vere infection may in some cases, be very slight. There may be little to suggest that the hip is involved until oedema of the thigh prompts an X-ray-which reveals severe damage than was expected - perhaps already partial destruction of the femoral head, and dislocation (3). Working with microbiologists at the Hospital for Sick Children in London, Lloyd-Roberts (5) has studied the immunological status of these children and has discovered that both acute sufferers from the condition and, perhaps more significantly, children who had had the disease in the past, had unquestionably low "Immunoglobulin" readings. Furthermore the destruction of the femoral head which had occurred in the cases with immunodeficiency was more severe than in those which did not display this phenomenon. These immunodeficient patients were sometimes premature - and in the premature cases the septic arthritis appeared rather earlier in life. The immunodeficient children tended too be rather poor subjects for later reconstructive surgery.

To summarise the implications -

(a) Some babies, including a higher proportion of premature ones, are particularly vulnerable to sepsis because of delayed or deficient development of

immune mechanisms.

(b) These "at risk" babies may develop septic arthritis and if they do so their constitutional response will be deceptively quiet.

(c) The degree of femoral head destruction which occurs in these cases is considerable, and may impede later attempts at reconstructive surgery.

While on the subject of septic arthritis of the hip in childhood let us look at the danger which exists, in older children, of avascular necrosis in the femoral head from osteomyelitis in the trochanteric region. The aetiology of this change is said to be interference with the blood supply of the capital epiphysis by the inflammatory process (by producing septic thrombosis) or simple pressure from the sympathetic effusion. Kemp and Lloyd-Roberts have described six such cases and advocate early decompression of osteomyelitis at this site in children treating them as a "special case".

The staphylococcus is the main culprit in causing bone and joint infection in most European countries and to correct a possible misconception, this is by no means a rare disease in Iran. There has been a running battle over the last twenty years about treatment. There are broadly speaking, two schools of thought about the treatment of acute osteomyelitis (1). Both agree that

you should first make a diagnosis. you do this by recognition of the clinical picture-generally fairly easy but just a little worrying because of uncertainty about the identity of the organism. Blood cultures are taken-usually three within a short period of time, and before the results are known, heavy dosage of a combination of bactericidal antistaphylococcal antibiotics are given. The disagreement is about what you do next. One group recommends surgery if the pain and constitutional illness have not improved substantially within 24 hours and the other faction advocate continuing conservative treatment until there is very positive and obvious clinical evidence of pus formation. You could claim that this is merely a disagreement of degree, not of kind, but the emotional difference, for the surgeon, is great: of course, if you do operate you may well identify the organism, and that is a great help.

Identification of the organism can be done broadly speaking either directly or indirectly. Direct means growing the organism either from the lesion-but in the important early hours of the disease there will be no, pus, or from blood culture, but you may pick a time when there is no bacteraemia. Indirect means measuring the body's response to the attack-and this means immunologi-

cal techniques. The Mantoux or Heaf tuberculin test is not of very much use in Western Europe, because of previous low grade infection-and the problem in a way becomes a negative one-proving that a lesion is tuberculous by showing that it is not due for example to salmonella, Brucella, or the Staphylococcus. The toxins produced by staphylococci are numerous-and include haemolysins, leucocidins, and ribo-nucleases which attack DNA and RNA. These are actually enzymes and one of them, a heat-stable one, is only produced by coagulase positive staphylococci or Staph-aureus. Thus although over the last 10 years we have been able to get some information about the identity and behaviour of staphylococci by measuring anti-haemolytic activity and antileucocidins, these have not made possible, for instance, a clear distinction between the staphylococcus and the tubercle bacillus. It now looks however as though the anti-nuclease titres may make it possible to identify an infection as staphylococcal early in its history and to monitor its progress in response to treatment. This work, by Taylor and his colleagues at the Institute of Orthopaedics London is as yet unpublished but promises to be a substantial advance in the management of all staphylococcal infections. Another difficult question that it may help to answer-when do-

es one stop antibiotic treatment in osteomyelitis? The various parameters that have been used to determine this in the past—such as the white cell count, the E.S.R. etc., have all proved fallible and therefore this technique may prove to be really helpful.

The subject of subacute Phyogenic osteomyelitis is very complicated (4).

An excellent account of this disease was produced by Harris and Kirkaldy-Willis in 1965.(4).The clinical picture is of pain of insidious onset. There is little or no general reaction. The main physical signs are localised tenderness and swelling, sometimes only one is present and sometimes neither. Harris and Kirkaldy-Willis divided their cases into two groups, those with an abscess cavity and those without. In the long bones the lesions affect the diaphysis, exhibit a predilection for the lower tibia, and, perhaps surprisingly, the lesion can lie across a still active growth plate. The abscess cavity, and this is a characteristic and interesting point, may be delineated by quite a fine endosteal line, not thick sclerosis as is seen in the classical Brodies abscess. Multiple abscesses can occur, very much like diffuse chronic osteomyelitis following acute disease.

The other broad grouping of the disease, that without abscess formation, can itself take several forms. There is diffuse diaphyseal necrosis with cortical sequestration (again resembling another form - the acute necrosing disease which occurs with nutrient artery thrombosis), the sclerosing osteitis of Garre - perhaps the earliest described form of subacute osteomyelitis, and a more localised form in the diaphysis producing a condition which may be confused with Ewings sarcoma.

The disease may also affect vertebrae. In a survey in 1963 of non-acute infective lesions of the spine subjected to direct attack surgery at the Royal National Orthopaedic Hospital it was found that 4% were due to the staphylococcus. 72% were tuberculous, and in 16.5% no organism was isolated. In Harris and Kirkaldy-Willis' paper (4) a very interesting fact is recorded-that no fewer than 10% of spinal lesions that were originally thought to be tuberculous were in fact staphylococcal. However the staphylococcal lesions were often showing signs of healing by the time the diagnosis was made.

The characteristic appearance of tuberculous spondylitis in families and the fact that staphylococcal lesions characteristically show more new bone formation and more sclerosis, perhaps with bony bridge formation.

However, the distinction can be a difficult one, and it is really only since direct attack surgery has been available that comparative figures have been known.

It therefore becomes very interesting indeed to wonder whether the use of the newer antistaphylococcus titres, when they become widely available will enable us to avoid surgery in some cases. It should be recalled that the titre which were available at the time of the Harris and Kirkaldy-Willis paper were not as useful as they claimed but does seem that the new ones will be.

Clearly there could be a number of explanations for the existence of subacute staphylococcal infection. The organism could be of low virulence, or could have its virulence reduced but not eliminated by inadequate doses of antibiotics though to be a potent possibility in England, where the prescription of very short courses of antibiotics by family doctors has been a serious problem. The resistance of the host might, on the other hand be increased, and in countries where people do not wear shoes, it is thought that repeated staphylococcal foot infections might increase resistance to the organism.

Treatment of subacute osteomyelitis requires adequate and prolonged use of a pair of proven bactericidal antibiotic agents. Surgery, to gutter bone widely, remove

sequestra, and ideally to expose clean, bleeding, cancellous bone, may also be necessary. Recently some work at Southampton England has suggested that cavities dealt with adequately in this way heal most readily if they are packed tight with cancellous bone grafts. Certainly the essential thing is to surround the area with an adequate blood supply on all sides.

The use of continuous irrigation techniques in treatment (2). A number of reports have appeared in the literature since 1960. And yet the method has not gained general favour. A thorough surgical tidying up of the lesion was required, followed by meticulous suture, with two tubes-one to allow fluid in and the other to suck it out. The skin closure must be meticulous, that any leakage was dangerous, that the balance between the two tubes must be exact, that constant and extremely close observation, with early recognition of problems, was essential. The principle is of course easy-a simple inflow and outflow, the former containing either normal saline for its purely mechanical flushing effect, or some medication-antibiotic, detergent, or chemotherapeutic agent.

A very sophisticated arrangement was described in the J.B.J.S. in 1969 by Dr. Dilmaghani, and Colleagues. It can be seen that a variety of materials can be instilled, and that, by a simple adjustment of the clip

arrangements the flow can be reversed without changing the tubes around physically. One or two special comments are required. The detergent has two actions-it inhibits the formation of penicillinase and, since it is a mucolytic wetting agent, it breaks up pus, mucus and necrotic tissue and thus enables the antibiotic to penetrate further into the debris and kill the organism. The suction pressure must be low such as can be achieved with a Roberts pump - and not high as with a vacuum drain.

(It is best, when initially devising such an apparatus, to experiment with pump pressures until you get it just right for the tube bore, length, suction etc.) The last special point is that no exit tube and in the complicated system this means no tube, should be in a normally vascularised medullary cavity otherwise excessive blood loss could ensue. This method of treatment may be used, of course, not only on cases of osteomyelitis but in infected joint replacement prostheses and in septic arthritis.

Finally to discuss septic arthritis in the elderly. Surprisingly little attention has been paid to this, as a subject in itself, in the literature. Differences exist in different types of community in different parts of the world. A series was described from the Mayo Clinic in 1970 and many most interesting features were recorded.

First-the age incidence. Of seventy eight patients there were 20, 22 and 16 patients respectively in the sixth, seventh and eighth decades of life. The condition was incorrectly diagnosed by the referring physician in no fewer than 56 patients, and only 27 out of 71 patients with monarticular disease had any fever. Anaemia and a raised sedimentation rate were found frequently but a raised white blood cell count was not a reliable guide to diagnosis. The presence of a positive blood culture was a very bad prognostic sign-six out of eight patients with monarticular disease and a positive blood culture died.

The disease was staphylococcal in a large number. The disease relatively common in predominantly urban, adequately or even over doctored communities is the fact that a high proportion of the patients had been on steroid treatment either locally or generally. To emphasize this point it should be remembered that:

1. Septic arthritis is common in the elderly.
2. It is very insidious in nature.
3. It can easily prove fatal.

The reason for the development of this condition in old age can only be surmised. Certain factors could predispose to it.

1. Senile diabetes (present in 10/78 of the Mayo-Clinic Series).
2. Other obvious predisposing factors-steriod treatment, known infection elsewhere, rheumatoid disease.
3. Probably impaired phagocytosis of the synovial cells-a senile change.
4. Possibly the immunological response of the patient as a whole-the ability to produce antibodies, is defective, so that the most potent factor in the production of the disease is the same as the applying in the babies.

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