Acta orthop. scand. 44, 263–269, 1973

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TWENTY-NINE CASES OF BACTERIAL ARTHRITIS

A prospective study

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Accepted 14.i.1973

Since the advent of antibiotics in the 1940s the clinical course of bacterial arthritis has changed in various respect. The acute forms have become less common and subacute forms more so. Bacterial arthritis has become less common in children and more common in adults. The disease also appears to have changed from a bacteriological point of view. These changes, which have received but little attention by orthopaedic surgeons, require continual analysis of clinical series of bacterial arthritis if the principles of diagnosis and treatment are to keep pace with these changes. Such analyses are important, above all, because the diagnosis "bacterial arthritis" must be made early and treatment started without delay if permanent joint changes are to be avoided (Clawson & Dunn 1967, Schmid & Parker 1969, Kelly et al. 1970).

This paper reports an analysis of a 5-year series of bacterial arthritis treated at a department of orthopaedic surgery, with special reference to the clinical picture, the interval between the onset of infection and the beginning of treatment, the results of treatment and any predisposing factors.

MATERIAL AND METHODS

Clinical series

During the years 1963–1967 a prospective investigation was being carried out on all patients with orthopaedic infections at the Department of Orthopaedic Surgery, Malmö General Hospital. This material, whose composition has previously been described (Lidgren & Lindberg 1972) included 28 patients with bacterial arthritis. These constituted the present series. One patient had arthritis first on one joint and later of the contralateral joint. The affection on each side was regarded as a separate case. The number of cases with arthritis was thus 29.

The town of Malmö (241,778 inhabitants on Dec. 31, 1963 and 254,338 inhabitants

on Dec. 31. 1967) lends itself well to investigations of this type because the above-mentioned hospital is the only hospital for somatic diseases in the town (Lidgren & Lindberg 1972).

Since no patients with bacterial arthritis were admitted to the Department of Paediatrics during the period covered by the investigation, all cases of bacterial arthritis in the town had presumably been admitted to the Department of Orthopaedic Surgery.

Diagnosis and treatment

Joint fluid was invariably aspirated for analysis and for bacterial culture, including sensitivity tests. Recordings were made of the temperature and samples were obtained for measurements of E.S.R. and determination of the antistaphylolysis titer (ASTA) and C-reactive proteins (CRP). In some cases also blood, faeces or urine were cultured for bacteria. All patients were examined roentgenologically. At re-examination of the roentgenograms a search was also made for signs of chondrocalcinosis.

In 4 cases bacterial culture was negative and in one case no culture was performed, but bacterial arthritis was diagnosed on the basis of the clinical course, raised E.S.R., positive serologic findings, findings in the aspirated synovial fluid and prompt response to antibiotics.

The principles of treatment were as follows. As soon as bacterial arthritis was suspected samples were obtained for bacterial culture, after which antibiotic therapy was started immediately. As soon as the results of culture end sensitivity test were obtained antibiotic therapy was modified, if necessary. In most cases the affected joints were immobilised with traction or a splint in the acute stage and joint fluid was repeatedly aspirated.

Review

In 1971 information was obtained from all the patients except one, who had moved to an unknown address. 18 of the 27 patients were examined clinically and roentgenologically. The clinical examination was done according to *Joint motion. Method of measuring and recording* (1965). Blood samples were obtained for determination of ASTA, CRP and E.S.R. Five patients gave the desired information by letter or by telephone. Four of the patients had died, but some information about the course of the arthritis was obtained in other ways.

The interval between the patient's discharge from hospital and the review was on the average 5.9 year.

RESULTS

The patients (14 men and 14 women) had a mean age of 49 years at onset (range 11 to 74 years). Ten of the cases of arthritis were of haematogenous origin and 11 of postoperative; 8 were due to injection into the joint (3 arthrographies and 5 injections of steroids). Of the joints, 16 were knees, 7 hips, 4 elbows and 2 shoulder joints. Possibly

predisposing local factors were rheumatoid arthritis in 7 cases, arthrosis in 2, earlier fracture in 2, earlier trauma without fracture in 1 and radiation reaction in 1. In 3 cases chronic pain of unknown cause without associated roentgen changes was the indication for the injection with steroids, which resulted in infection.

Nineteen cases of arthritis were due to Staphylococcus aureus (positive culture of synovial fluid in 17, of the blood in 1, and of the faeces in 1), which in 12 of the cases was resistant to penicillin. One case was due to Escherichia coli, 1 to diphtheroids 1 to enterococci, 1 to βeta-streptococci and 1 to Serratia marcenscens. In 4 cases culture was negative and in one case culture was not done. In one of the cases with negative culture gonococcal complement fixation was positive. In 3 cases the bacteria were resistant to the antibiotics used before the bacteriologist's report had been obtained.

Clinical picture

None of the patients exhibited a picture of sepsis or prostration in any stage of the infection, nor was any correlation demonstrable between the clinical picture, including ASTA, CRP, ESR, and temperature, at onset and the findings at the review.

The review

At the review the patients were divided into 3 groups.

Group I. Cases where the infection had not caused any demonstrable joint change (11).

Group II. Cases where the infection had caused permanent joint injury (11).

Group III. Cases where the effect of the infection could not be estimated because the joint had already been damaged to a varying extent before the infection and it was not possible to decide whether the joint had become worse (6).

The mean age at onset in Group I was 35 years, in Group II 58 years and in Group III 60 years. Possibly predisposing factors were noted in 3 of the cases in Group I, in 8 of Group II and in 5 in Group III. The interval between the onset of symptoms and the beginning of treatment varied widely but was, on the average, shorter for the patients in Group I, where it was 6 days, compared with 23 days in Group II.

DISCUSSION

Haematogenous bacterial arthritis was formerly regarded as being most common in children. In recent years, however, there appears to have been a shift towards higher ages, so that the disease is now equally common in adults (Kelly et al. 1970, Lidgren & Lindberg 1972). This is clear also from the present study. It is of special interest that during the period covered by the investigation no cases of bacterial arthritis had been treated at the children's hospital.

The joints most often involved by bacterial arthritis were the knee and the hip, an observation that agreed well with what has been found in previous investigations (Kelly et al. 1970).

According to the literature, predisposing factors are rheumatoid arthritis, arthrosis, poor general condition, systemic treatment with steroids or cytostatics, paraplegia, earlier operations in or trauma of the joint (Ward et al. 1960, Bulmer 1966, Clawson & Dunn 1967, Schmid & Parker 1969, Kelly et al. 1970, Lidgren 1972). In the present investigation 7 of the patients had rheumatoid arthritis. Earlier trauma, operation or arthrosis were also noted. In 12 cases no predisposing factor was known.

In 8 cases the infection had occurred after injection into the joint. The importance of strict asepsis at injections into a joint cannot be emphasised enough. Though arthritis may occur after injection of steroids (Gedda & Juhlin 1959, Tondreau et al. 1959, Ward et al. 1960, Camelot & Lamoril 1964) the risk of such a complication following joint puncture performed lege artis is fairly low. These 8 cases were probably the only ones that occurred in Malmö during the 5-year period in which punctures had surely been performed in a vast number of joints.

None of our patients exhibited a picture of sepsis or poor general condition owing to the infection. This agrees with the observation made by other authors during the last decades. The formerly common acute onset has tended to become subacute.

Most of the cases of arthritis were due to Staphylococcus aureus, which was resistant to penicillin in 12 of 19 cases. Staphylococcus aureus has also been erported in the literature as causal bacteria in more than half of the cases (Ward et al. 1960, Clawson & Dunn 1967, Griffin 1967, Kelly et al. 1970). Exceptions were children between ½ year and 2 years, where Haemophilus influenza is most common (Nelson & Koontz 1966). Arthritis due to a number of other sorts of bacteria such as streptococci, pneumococci, meningococci, salmonella, proteus, pseu-

domonas and clebsiella are on record (Ward et al. 1960, Bulmer 1966, Nelson & Koontz 1966, Clawson & Dunn 1967, Kelly et al. 1970). Serratia marcescens was the causing organism in one of the cases. Only one case of arthritis caused by this microorganism could be traced in the literature (Atlas & Belding 1968), and a further, unpublished case of osteitis has been observed by the authors.

Which antibiotics should be given in the acute stage until the results of culture and susceptibility tests have become available? In Scandinavia the patients should at present be treated with a combination of isoxazolyl penicillin and a bactericidal, preferably synergistic broad-spectrum antibiotic. Isoxazolylpenicillin inhibits Staph. aureus even if they are resistant to "common" penicillin, and the broad-spectrum antibiotic inhibits a large spectrum of other types of bacteria not susceptible to penicillin. In recent years the authors have used cloxacillin combined with ampicillin or gentamycin. (Because of the risk for serious side effects, the dose of gentamycin has always been decided upon after consulation with the Department of Infectious Disease.) The choice of this combination is based on results of an investigation of the bacteriology of orthopaedic infections treated during the last 15 years at the departments of orthopaedic surgery where the authors have served. This investigation will be published in a later article.

Early antibiotic therapy is very important for the prognosis. In the acute case antibiotic therapy must be started within 1–2 days if permanent joint injury is to be avoided (Clawson & Dunn 1967, Schmid & Parker 1969, Kelly et al. 1970). This has also been confirmed experimentally (Bardenheier et al. 1966, Orchard & Stamp 1968). In the present material most of the cases were subacute-subchronic, and the interval between the onset of symptoms and treatment was, on the average, shorter for patients who were symptom free at the review than among those in whom the infection had caused permanent joint injury. The 11 patients in whom the infection had not produced any permanent joint injury were also younger than the 10 patients in whom the infection caused permanent joint destruction. In the former group only 3 of the patients had predisposing factors, compared with 7 in the latter group. The composition of the material, however, does not allow statistical analysis.

In recent series joint destruction is often reported in about half of these cases. Kelly et al. (1970) described 78 cases with bacterial arthritis from the Mayo Clinic. Twelve of these patients died as a direct consequence of their infection and only 12 patients had no joint

destruction at a review 2–10 years after the infection was cured. In the present investigation more than one-third of the patients were symptom free at the review and none of the patients died from their infection.

The relatively good end results obtained in the present series does not mean a better or different therapy, but can probably by explained by the organisation of the health service in Malmö. Since bacterial arthritis is a very painful disease, most of the patients had sought medical advice early and most of them had come straight to the Department of Orthopaedic Surgery. Others, who had sought advice elsewhere, had been referred there while their disease was still in an early stage. At the Department of Orthopaedics, where patients are also admitted at night, the treatment of arthritis was standardised in the above-mentioned way during the present investigation and both the surgeons and the personnel had received detailed instructions as to how patients with bacterial arthritis should be cared for. The patients therefore received adequate therapy in an early stage of the disease, which explains the good results achieved.

SUMMARY

All the 29 cases of bacterial arthritis diagnosed in 1963–1967 in a town of about 250,000 inhabitants were studied prospectively with special reference to the clinical picture, the interval between the onset of infection and the beginning of treatment, the result of treatment and any predisposing factor. As expected from some previous investigations of bacterial arthritis, it was found that the clinical picture of the infection had changed in several respects in the course of the last few years. The mean age of patients with haematogenous arthritis had risen, bacterial arthritis is now more common in adults than in infants, the acute onset of bacterial arthritis is now less common and the subacute form more common. Better results were obtained in patients in whom treatment was started soon after onset. Predisposing factors and the reasons why the results were relatively good are analysed.

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