The diagnosis and management of septic arthritis in children

Of the two major skeletal infections in children, osteomyelitis and septic arthritis, the former is more common. The two conditions may be confused with one another clinically, although the consequences of wrong diagnosis may prove disastrous for the child. Males are affected by septic arthritis two to three times more commonly than females and in 70% of cases the infecting agent is Staphylococcus aureus. In the remainder, Streptococcus pyogenes, coagulase-negative staphylococci, Gram-negative bacilli and Haemophilus influenzae may be responsible (Newman, 1976; Paterson, 1970). Other rare agents may include the pneumococcus, meningococcus, salmonella, and brucella. The commonest joint to be affected is the hip, although no joint is immune from infection.

Infection of the hip joint in neonates was described by Tom Smith (1874) and the condition bears his name. Neonates are vulnerable, especially those being treated in hospital for other conditions. Organisms may gain access to the circulation through venous or arterial puncture (Chaca, 1971). The condition begins as a septic focus in the femoral neck which breaks through into the hip joint due firstly to the fact that there are direct arterial links between the metaphysis and the epiphysis in the neonate, and secondly because the metaphysis of the hip is intra-articular. The long-term results of this condition are poor.

Blanche (1952) described 11 cases of septic arthritis of the hip occurring as a complication of osteomyelitis of the proximal femur. All these patients were treated by simple surgical drainage and either traction or plaster splintage in addition to antibiotics. All 11 cases were complicated either by metaphyseal destruction or dislocation. There were complications in all of the 10 cases described by Eyre-Brook (1960). There were 2 cases in which there was partial or complete loss of the epiphysis and in 5 in which the hip joint was either subluxated or frankly dislocated.

Diagnosis of septic arthritis in the infant may pose considerable problems, often because of other disease. A vigilant watch must be kept to explain the unexpected fever, as delays will lead to postponement of treatment. The onset of the condition.

Confirmation of the diagnosis should lead rapidly to arthrotomy and surgical drainage.
of the joint, as an indispensable adjunct to antibiotic treatment. Post-operative splintage to rest the joint and prevent dislocation is important and antibiotic treatment should be continued for at least six weeks. Evidence to support surgical treatment for septic arthritis in older children is more easy to obtain. In Paterson's (1970) series there were 87 children over the age of twelve months with septic arthritis. There were 19 failures of treatment, defined at follow-up as the presence of any clinical or radiological abnormality. Of the 87 cases, there were 50 cases treated with arthrotomy, joint irrigation, primary closure of the wound without drainage, joint immobilisation and antibiotics and in whom surgical treatment was instituted within 5 days of the onset of the condition. In this group there were no failures of treatment. The 19 failures all occurred in children treated by antibiotics with or without joint aspiration, or in whom surgical treatment was instituted more than five days after the commencement of the disease. The results were as true for other joints as for the hip. These findings were confirmed by Morrey et al. (1976).

From the clinical point of view the diagnosis may well be easier to make in the older child than in the neonate. Septic arthritis must be differentiated from acute osteomyelitis, acute rheumatoid arthritis, the irritable hip syndrome, acute tuberculous arthritis and rheumatic fever. Confusion with acute osteomyelitis is easy. The necessity is for careful, patient and gentle examination. In the latter condition tenderness is most marked over the metaphysis, and the child may be able to move the adjacent joint somewhat, although there may be a sympathetic sterile effusion. In septic arthritis the tenderness is articular, and movement of the joints are strongly resisted. Examination of the joint aspirate for cells, glucose, lactate (Behn, Matthew & Phillips, 1981) and microorganisms will help differentiate septic arthritis from other conditions. Blood cultures will be positive in a high proportion of children. Paterson's (1970) criteria for management afford the best hope to preserve the joint. The products of infection have been shown to have a very rapid deleterious effect on articular cartilage, and lysosomes may be responsible for this (Phemister, 1924; Sledge, 1965; Weissman & Spilberg, 1968; Curtiss, 1969; Daniel et al., 1976). It is not possible to extract all the fluid from a joint such as the hip or knee by aspiration alone, as fluid becomes pocketed away and irretrievable by this means. Formal opening of the joint, and irrigation with copious quantities of fluid is necessary in order to clean the joint absolutely. Antibiotics should be given in high doses, initially intravenously, and these should be continued for six weeks. Treatment may be monitored by following the fall in sedimentation rate, but this may not be an infallible guide to the success of treatment. The affected joint should be splinted in plaster until the clinical signs of the infection are past. In normal circumstances, following infection of the hip joint a hip spica may be needed for between 4 and 6 weeks. Long term follow-up of these children is necessary to prevent the possible complications and provide surgical correction where indicated.

S. H. NORRIS
Northern General Hospital,
Sheffield, England

References
Leading articles


Antimicrobial chemotherapy in the treatment of brain abscess

It is invariably necessary to start chemotherapy for intracranial abscess before bacteriological results are available and usual for such therapy to start before surgical intervention. Recommendations for primary antibiotic therapy have been made according to the location of the abscess and the most probable origin of the infecting bacteria (de Louvois, Gortvai & Hurley, 1977a). Thus, it is mandatory that therapeutic regimens for the treatment of frontal lobe abscesses of sinusitic origin should contain penicillin while the regimen for temporal lobe abscesses of ototic origin should contain an agent active against anaerobic bacteria.

The choice of an antibiotic with appropriate activity against the infecting bacteria must be linked with consideration of its ability to penetrate into the abscess cavity. Clinical and experimental data indicate that antibiotic penetration across the blood/brain and the blood/CSF barriers are different. Their relative importance in the therapy of brain abscess is difficult to assess but brain tissue penetration is more important than CSF penetration (Garfield, 1978).

Penicillin, chloramphenicol, cephaloridine and metronidazole have all been reported to penetrate intracranial pus (Black, Graybill & Charache, 1973; Lerner, 1975; de Louvois, 1978; de Louvois et al., 1977a; Ingham, Selkon & Roxby, 1977). Cindamycin and lincomycin penetrate poorly. The value of cindamycin in the treatment of brain abscess is further in doubt since the report by Khuri-Bulos, McIntosh & Ehret (1973) of a patient who developed a second bacteroides brain abscess while being treated with cindamycin for the first.

A similar situation has been reported during cephalothin therapy and it is not recommended for the treatment of CNS infections (BMJ editorial, 1973; Mangi et al., 1973). Therapeutic concentrations of methicillin have been reported in cerebral pus (Black et al., 1973) but de Louvois et al. (1977a) failed to detect similar levels of cloxacillin. Having demonstrated its penetration, these workers recommended fusidic acid as the treatment of choice for staphylococcal intracranial abscesses and subsequent clinical experience has supported this view (Gortvai, pers. comm.). There is no place for the routine use of parenteral aminoglycosides in the treatment of intracranial sepsis. The penetration of antibiotics into intracranial pus is erratic and cannot be predicted and there are reports of sensitive bacteria being isolated from pus in the presence of high concentrations of antibiotic (Black et al., 1973; de Louvois 1978).

There is little justification in the practice of reporting pus or CSF antibiotic concentrations as a percentage of the blood concentration. The practice falsely assumes that the dose response curves for blood, pus or CSF are the same and that the activity of antibiotics in pus is the same as that in serum. Maximum antibiotic concentration in pus or CSF occurs later than the peak serum level and it is clear that the activity of antibiotics may be greatly reduced within an abscess cavity (Black et al., 1973; de Louvois, 1978). Pus antibiotic concentration may be expressed more adequately either in mg/l or as a multiple of the minimal inhibitory concentration for the infecting organism when this is known.

The general problems of antibiotic toxicity are the same for infections of the central nervous system as for other sites and the use of potentially toxic compounds in circumstances where the value of the antibiotic is already in doubt (e.g. cindamycin) is contraindicated. In contrast, although the Extra Pharmacopoeia (Martindale, 1977) cautions against the use of metronidazole in patients with neurological disorders, the evidence that this compound is efficacious in the treatment of temporal lobe abscesses of otitic origin (Ingham et al., 1977; Ingham, Selkon & Roxby, 1978) is such that many centres now use it routinely. Although metronidazole penetrates well into intracranial pus (Ingham et al., 1977, Ingham et al., 1978) its true value in treatment is difficult to assess as the majority of patients treated by Ingham and his colleagues were also receiving other agents active against anaerobic Gram-negative rods. Mortality rates among patients with abscesses of otitic origin are similar whether the therapeutic regimen has contained metronidazole (Alderson et al., 1981) or not (Choudhury, 1973).