LATE INFECTION AFTER TOTAL HIP REPLACEMENT

E. MALCOLM DOWNES, SWANSEA, WALES

Four patients who developed deep infection of six hips, on average three and a half years after total replacement by McKee-Farrar prostheses, are described. In each case there was strong evidence that the source of the infection was a distant focus.

Deep infection is the most serious complication of total replacement of the hip joint and usually leads to removal of the prosthesis, the patient being left with a Girdlestone type of pseudarthrosis. The infection may not present for a considerable period after operation, though relatively few cases occur after one year (Charnley 1969). The source of a late infection is usually controversial, but a long delay with no previous evidence of infection suggests spread by the bloodstream from a distant focus. This hypothesis has been repudiated by Charnley (1969, 1972), who cited the fact that by meticulous attention to an aseptic theatre technique he had reduced the incidence of both early and late deep infection. In his view this suggested an exogenous rather than endogenous source of later infection.

Details are presented here of four patients in whom various factors indicated that the late infection of six McKee-Farrar artificial hips was endogenous.

CASE REPORTS

Case 1—A woman aged sixty-eight with bilateral osteoarthritis of the hips underwent replacements, on the left in December 1968 and on the right in July 1969. The convalescence was uncomplicated on both occasions and she remained in good health until December 1970, when she was admitted with a parotid abscess and staphylococcal septicaemia. A culture was not obtained from the parotid abscess. For a time her condition was desperate and treatment in the intensive care unit was related to her general state. Two weeks after admission it became clear that both hips were painful and aspiration produced pus from each side from which *Staphylococcus pyogenes* was cultured. Her general condition did not permit removal of the prostheses for a considerable time, but eventually this was done in July and September 1971.

The grave mistake was made of not clearing out all the cement, which was not radio-opaque. Chronic osteomyelitis of both femora ensued, leading to a pathological fracture of the shaft of the right femur which united after a period of traction. She still has two chronic discharging sinuses over each hip and is now an inmate of a geriatric hospital, where she is fairly comfortable and can walk a short distance with an aid. In view of the circumstances, removal of the residual cement has not been considered.

Case 2—A woman aged fifty-four underwent replacement of both hips in November 1969. She made an uneventful

recovery and remained well until July 1974, when she developed a sore throat, pyrexia and general malaise. Two weeks later there was a sudden onset of pain in the right shoulder and in both hips, and movement of all three joints was restricted. Inflammation developed around both operation scars. The white cell count was 11,000 per cubic millimetre and the erythrocyte sedimentation rate (Westergren) was 130 millimetres in the first hour. Blood culture grew *Staphylococcus pyogenes*, phage type 52. Pus was aspirated from the right shoulder and from both hip joints, and in each case the organism cultured was a *Staphylococcus pyogenes* of the same phage type 52. Both prostheses and all cement were removed, with an interval of ten days between each procedure. Antibiotics were administered systemically and through a closed irrigation-suction drainage system. The incisions healed during a month spent on traction.

After a prolonged period of rehabilitation she was discharged home, and when last reviewed she could walk about a hundred metres with an aid.

Case 3—A woman aged forty-three had suffered from psoriatic arthritis for fifteen years, with severe involvement of the hips. In November and December 1970 she underwent total arthroplasties, from which she made uneventful recoveries and had excellent relief of symptoms. In 1972 she was treated at a spa with Myocrysin because of pain in other joints and developed a more marked skin rash, but this was not a significant problem. In September 1974 the dosage was greatly increased and a severe skin reaction followed, now with areas of infection. In November 1974 she developed pain in the right hip and thigh accompanied by general malaise and pyrexia. Movements of the right hip were painful and restricted, whereas the left hip was painless and mobile. The white cell count was 21,000 per cubic millimetre and the erythrocyte sedimentation rate (Westergren) was 100 millimetres in the first hour. Blood culture grew *Staphylococcus pyogenes*. Pus aspirated from the right hip grew *Staphylococcus pyogenes*, phage type 29/52/52A/79/80/47/53/54. A swab taken from an infected area of skin yielded an identical organism. The prosthesis and all cement were removed; antibiotics were given both systemically and through an irrigation-suction drainage system. The wound healed soundly during a month on traction. After this she progressed well and is now free of pain and walking with two sticks.

Case 4—A man aged sixty-two had replacements for bilateral osteoarthritis in January and May 1971. On each occasion recovery was uncomplicated and he remained symptom-free with excellent function of the hips until October 1974, when he developed general malaise and pyrexia with severe pain in the right hip and marked restriction of movement. His

E. M. Downes, F.R.C.S., Consultant Orthopaedic Surgeon, Morriston Hospital, Morriston, Swansea SA6 6NL, Wales.

remaining teeth—the lower incisors, canines and one premolar—were grossly carious and the adjacent gum was inflamed; radiographs showed bone destruction secondary to periodontal infection. The white cell count was 11,000 per cubic millimetre and the erythrocyte sedimentation rate (Westergren) was 100 millimetres in the first hour. Blood culture grew a β -haemolytic *Streptococcus* of Lancefield group B. Attempted aspiration of the hip failed to yield pus. Flucloxacillin was prescribed, with rapid improvement in the symptoms and signs.

Five days later the seven remaining teeth were extracted, and although they showed only the normal bacterial flora, the blood culture taken within an hour of extraction grew *Streptococcus viridans*. The antibiotic therapy was continued, the pain in the hip became minimal, and the sedimentation rate fell to 26 millimetres. After six months, in April 1974, the antibiotics were discontinued, but within three days severe pain in the right hip recurred. Aspiration now produced pus from which a β -haemolytic *Streptococcus*, Lancefield B, was cultured. The prosthesis and all cement were removed and antibiotics were given both systemically and through an irrigation-suction drainage system. The wound healed well and after a period on traction he was mobilised and discharged home.

When reviewed in August 1975 he walked well with one stick, had only slight pain in the right hip, and the sedimentation rate was normal.

DISCUSSION

In the recent literature several cases have been reported in which the clinical evidence suggested that total hip prostheses had become infected from an endogenous source (Mallory 1973; Burton and Schurman 1975; Cruess, Bickel and von Kessler 1975). There are features of our four cases which indicate a similar origin. These are four cases out of seven who have developed deep infection, either early or late, in a series of some 450 hip replacements by the McKee technique in one unit where every patient has had careful and regular follow-up. For this small group the average interval between operation and the clinical picture of infection was three and a half years, whereas other authors have commented that late, deep infection more commonly presents in the first eighteen months (Charnley and Eftekhar 1969; Roles 1971; Charnley 1972). During the long "latent period" before infection developed there was a total absence of relevant symptoms and signs in all four cases but a recent potential source of endogenous infection was present in each of them (Table I).

The evidence here is circumstantial, though if some

doubt is felt about endogenous spread from a distant site in all four cases, the fact that in two patients bilateral prostheses were simultaneously infected by an identical organism is strong evidence in favour of such a source. Spread could have occurred through the bloodstream from one infected joint to the other; otherwise one must postulate that in these cases infection by the same organism was introduced into both joints at the initial operations and became active simultaneously after a long symptom-free interval. Furthermore, in one of these bilateral cases a previously healthy joint, the right shoulder, was simultaneously infected by a *Staphylococcus pyogenes* of the same phage type 52. It is accepted that septic arthritis is usually of haematogenous origin (Watkins, Samilson and Winters 1956) and it is reasonable to suppose that prosthetic joints are liable to infection in the same way.

In most series a significant proportion of the infecting organisms in cases of late sepsis after hip arthroplasty have been either skin or bowel commensals, or else cultures have been sterile (Charnley and Eftekhar 1969; Roles 1971; Charnley 1972; Fitzgerald, Peterson, Washington, Van Scoy and Coventry 1973; Wilson, Aglietti and Salvati 1974). In the present series the infecting organism in each case was a virulent pathogen.

An increased incidence of infection, both early and late, after a previous operation has been noted (Charnley and Eftekhar 1969; Lazansky 1970; Roles 1971). None of our patients, however, had undergone such a procedure.

There is evidence to suggest a correlation between elevation of the sedimentation rate and deep infection after total hip replacement (Roles 1971; Mulier, Desmet, Martens and Hoogmartens 1973; Cruess *et al* 1975). All our four patients had a gross elevation.

Where two prostheses become infected and have to be removed, the mobility and functional independence of the patient are greatly impaired. Indeed, one patient now requires permanent in-patient care and another is virtually restricted to an indoor life.

In terms of management two points of practical importance emerge. Firstly, that in established deep infection all the foreign material should be removed (Dandy and Theodorou 1975), and secondly, that antibiotics through an irrigation-suction drainage system are an aid to rapid resolution of the infection.

To summarise, it is suggested that there is always a risk of endogenous infection after total hip replacement

TABLE I
FEATURES OF THE FOUR CASES DESCRIBED

Case number	Diagnosis	Interval before infection	Organism	Potential source of infection
1	Osteoarthritis	18 months, right and left	<i>Staphylococcus pyogenes</i>	Parotitis
2	Osteoarthritis	56 months, right and left	<i>Staphylococcus pyogenes</i>	Throat infection
3	Psoriatic arthritis	48 months	<i>Staphylococcus pyogenes</i>	Gold-induced dermatitis
4	Osteoarthritis	45 months	β -haemolytic <i>Streptococcus</i>	Carious teeth

and that this may not occur for some years. If this is so, it follows that the possibility of infection from a septic focus elsewhere in the body must constantly be borne in mind, both in the selection of cases for operation and afterwards. Any potential source of infection should be

treated before replacement, and afterwards any procedure liable to produce a bacteraemia, such as the extraction of a carious tooth, should be carried out under full antibiotic cover, for the penalty of infection around a total prosthesis can be severe.

I wish to thank Mr E. Mervyn Evans for permission to report his cases and for his advice on the preparation of this paper.

REFERENCES

- Burton, D. S., and Schurman, D. J. (1975) Hematogenous infection in bilateral total hip arthroplasty. *Journal of Bone and Joint Surgery*, 57-A, 1004-1005.
- Charnley, J. (1972) Postoperative infection after total hip replacement with special reference to air contamination in the operating room. *Clinical Orthopaedics and Related Research*, 87, 167-187.
- Charnley, J., and Eftekhari, N. (1969) Postoperative infection in total prosthetic replacement arthroplasty of the hip-joint. *British Journal of Surgery*, 56, 641-649.
- Cruess, R. L., Bickel, W. S., and von Kessler, K. L. C. (1975) Infections in total hips secondary to a primary source elsewhere. *Clinical Orthopaedics and Related Research*, 106, 99-101.
- Dandy, D. J., and Theodorou, B. C. (1975) The management of local complications of total hip replacement by the McKee-Farrar technique. *Journal of Bone and Joint Surgery*, 57-B, 30-35.
- Fitzgerald, R. H., Jr., Peterson, L. F. A., Washington, J. A., II, Van Scoy, R. E., and Coventry, M. B. (1973) Bacterial colonization of wounds and sepsis in total hip arthroplasty. *Journal of Bone and Joint Surgery*, 55-A, 1242-1250.
- Lazansky, M. G. (1970) Complications in total hip replacement with the Charnley technic. *Clinical Orthopaedics and Related Research*, 72, 40-45.
- Mallory, T. H. (1973) Sepsis in total hip replacement following pneumococcal pneumonia. *Journal of Bone and Joint Surgery*, 55-A, 1753-1754.
- Mulier, J. C., Desmet, L., Martens, M., and Hoogmartens, M. (1973) Postoperative infection in total hip replacement. *Acta Orthopaedica Belgica*, 39, 630-643.
- Roles, N. C. (1971) Infection in total prosthetic replacement of the hip and knee joints. *Proceedings of the Royal Society of Medicine*, 64, 636-638.
- Watkins, M. B., Samilson, R. L., and Winters, D. M. (1956) Acute suppurative arthritis. *Journal of Bone and Joint Surgery*, 38-A, 1313-1320.
- Wilson, P. D., Jr., Aglietti, P., and Salvati, E. A. (1974) Subacute sepsis of the hip treated by antibiotics and cemented prosthesis. *Journal of Bone and Joint Surgery*, 56-A, 879-898.