THE RESULTS OF THE PSEUDARTHROSIS AFTER REMOVAL
OF AN INFECTED TOTAL HIP PROSTHESIS

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Twenty-nine patients with thirty pseudarthroses after removal of infected total hip prostheses have been reviewed one to six years later. Six hips still had a discharging sinus. Complete removal of all cement was found to be essential for healing, and various points in the technique of its clearance have been made. In this respect radio-opaque cement was a great advantage, and lateral guttering of the femur was most effective. Compared with the situation before replacement considerable relief of pain was obtained in most patients but there was much less improvement in function.

The incidence of infection after total hip replacement has been reported as 0.5 per cent by Charnley and Dandy (1974) in a long series and as 11.0 per cent by Wilson and his colleagues (1972) in a preliminary series of 100 operations. The distinction between deep and superficial sepsis, however, is not always clear. When deep infection occurs, removal of the implant is usually necessary for its complete control. This leaves a pseudarthrosis similar to that described by G. R. Girdlestone in 1943 as an effective treatment for severe and persistent sepsis around the hip. Initially Girdlestone (1928) found a procedure of this type satisfactory in dealing with tuberculosis, especially when complicated by secondary pyogenic infection. It gave wide access and allowed free drainage, features that are still important in the control of infection even with present-day antibiotics. The technique of the operation—mainly in cases of advanced osteoarthritis and ankylosing spondylitis—and its beneficial effect on pain were fully reported in 1950 by his disciple R. G. Taylor, who stressed, especially in the first of his two illustrations, the importance of making the opposing bone surfaces as flat as possible by measures such as bevelling off the prominent rim of the acetabulum and complete resection of the neck of the femur. Strangely enough, Taylor did not comment on the marked medial projection of the lesser trochanter present in cases of osteoarthritis previously treated by oblique displacement osteotomy as described in the classical paper by Osborne and Fahniri that immediately preceded his own.

A search of the literature has not revealed any detailed study of the pseudarthrosis that remains after removal of a total hip prosthesis for infection. Patterson and Brown (1972) mentioned twelve cases out of a series of 368 McKee-Farrar replacements and said that from the point of view of pain, movement and ability to walk, these twelve were at worst the same as before replacement. Wilson et al. (1972) commented on eight cases of pseudarthrosis following the eleven infections in their series of 100 replacements. A more recent paper by Haw and Gray (1976) included a brief but favourable review of five patients who had been left with a pseudarthrosis after removal of a total prosthesis for infection.

This paper is a retrospective study of a series of twenty-nine patients who had undergone removal of thirty total prostheses for deep infection one to six years previously. It is an attempt to define the problems experienced by these patients in terms of pain and disability and to examine the factors relevant to the control of the infection.

MATERIAL

The twenty-nine case histories were collected from a number of orthopaedic surgeons practising in and around Birmingham. Fifteen women and nine men had osteoarthritis; the remainder, five women, had rheumatoid arthritis. The types of prosthesis were fifteen McKee-Farrar; eleven Charnley (one case bilateral); and four Ring. The infections involved seventeen right and thirteen left hips. It is worthy of note that six patients had suffered a dislocation of the artificial hip joint at some time before the development of infection; closed reduction had been obtained in five of the six. The posterior approach to the hip was not used in any case in the series.

The diagnosis of infection was made between one week and three years after replacement, except for one that arose after six years. The period between insertion of the implant and its removal was between two weeks and seven years, with an average of two and a half years. Including any previous operation on the hip, the primary replacement and any revision of it, and procedures for the elimination of sepsis, each patient in this series had between two and eight operations (Fig. 1).

A woman of sixty-five with osteoarthritis of one hip had an osteotomy, total replacement, and replacement of a loose femoral component followed by infection. Four attempts

were made to remove all fragments of cement from the medullary cavity by drilling and curettage from above. Guttering finally gave the necessary access. This made a total of eight operations.

The ages of the patients at review ranged from thirty-nine to eighty-two years with an average of sixty-seven years. The period of follow-up after removal of the prostheses was from one to six years.

RESULTS

Functional capacity

Walking—Compared with the pre-replacement stage, only three patients achieved any degree of improvement and could walk reasonably long distances despite other limitations. By contrast three patients now had a serious limitation of walking ability compared with their previous condition; two required axillary crutches and had just as much pain, and the third patient, a case of severe rheumatoid arthritis left with discharging sinuses around both hips, had to use a walking frame. Two of these three patients had used no walking aid before replacement and one had required only a stick. Figure 2 records the grade of walking ability before replacement and seemed less important than the strength of the flexor and abductor muscle groups; those with power of Grade 4 fared quite well, whereas Grade 3 or less was often associated with pain and disability.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>SCORING ACCORDING TO THE AID REQUIRED</th>
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<tbody>
<tr>
<td>6 points</td>
<td>no support</td>
</tr>
<tr>
<td>5 points</td>
<td>one stick</td>
</tr>
<tr>
<td>4 points</td>
<td>one crutch</td>
</tr>
<tr>
<td>3 points</td>
<td>two sticks</td>
</tr>
<tr>
<td>2 points</td>
<td>two crutches</td>
</tr>
<tr>
<td>1 point</td>
<td>a walking frame</td>
</tr>
<tr>
<td>0 point</td>
<td>chair or bed</td>
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</tbody>
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Support—Every patient who could still walk required some form of support, and a comparison had been made with the aid required before replacement. Each patient was given a score according to the scale shown in Table I.

When the score after removal of the prosthesis was subtracted from the score before replacement a positive figure resulted except for five patients who used the same type of aid at both times (Fig. 3). Thus, most patients now required considerably more support.
The classification of Merle d'Aubigné and Postel (1954) did not entirely reflect the extent of disability, and in an attempt to obtain a more comprehensive appraisal several other factors were taken into account.

The ability to stand unaided—Seven patients now found this impossible and a further two could manage for only brief periods. This resulted in a serious restriction of everyday activities.

The ability to reach the feet—Fifteen patients showed no change, seven patients now found it easier, and seven more difficult.

Toilet facilities—Modification was necessary for thirteen patients, especially for the case of bilateral pseudarthrosis, a woman who now had to resort to a bed-pan because of generalised immobility from rheumatoid arthritis. The other twelve required a raised toilet seat, together with the provision of wall bars in some cases.

Bathing facilities—Seventeen patients experienced some difficulty with getting in and out of a bath after removal of the prosthesis, compared with five patients before replacement. The alternative arrangements were largely of a simple and inadequate nature. Only two patients had their bathrooms converted to take shower fittings, with wall bars for support.

Household duties—Eleven patients now found it difficult, if not impossible, to carry out normal household duties, and thirteen could not rise from the kneeling position. In particular those patients who could not stand unaided found cooking and other work in the kitchen most difficult.

Employment—Before replacement only seven patients had been engaged in full-time occupations. At the time of review, four of the seven patients were below retiring age; three were still employed, two in sedentary posts and the third as a private detective.

Pain—Compared with the state before replacement twenty-six of the twenty-nine patients had considerable relief of pain which was now totally absent in twelve and quite moderate in fourteen. In Figure 4 the two levels of pain are compared; the shift to the right represents the measure of improvement.

Of two patients who had deteriorated, one was the woman with severe rheumatoid disease and discharging sinuses over both hips; the other was a patient who had resorted to axillary crutches. Out of five patients with persistent sinuses, only two experienced any severe degree of pain, two were pain-free and one was improved. Disease of the other hip, systemic disorder and weakness of the affected limb were of more importance than pain in restricting activity.

Shortening—All patients had between 4 and 7.5 centimetres of shortening of the limb after removal of the prosthesis; this required a high raise of the shoe and contributed to the functional incapacity of some patients.

WOUND HEALING

Eleven wounds healed within one month of removal of the prosthesis and stayed so, but thirteen took between two months and two and a half years, further exploration being required for eight. Six hips were left with discharging sinuses, two of them in the bilateral case already mentioned. Usually these repeat procedures were necessary because of inadequate removal of cement by procedures that involved drilling down the shaft of the femur from above, but sequestra and retained wire were sometimes also responsible.

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The erythrocyte sedimentation rate (Westergren) was recorded just before removal of the prosthesis in twenty-seven patients and was much raised in twenty-three. In twenty cases the rate was over 50 mm/1 hour, the highest reading being 93 mm/1 hour. At review, the readings were normal in twenty of the twenty-four healed cases, whereas in a situation of continuing sepsis the rate was still above 30 mm/1 hour in four of the five patients.

OPERATIVE FEATURES

We believe that once deep infection has been diagnosed, the prosthesis should be removed as soon as possible. For the patients in this particular series any minor procedure such as drainage of an abscess or the removal of wire from the greater trochanter had failed to control the infection, although admittedly they may have been either effective or acceptably palliative for other patients who did not come to pseudarthrosis. The alternative procedure of exploration and suction-irrigation does give a prospect of retaining a functioning prosthesis but has yet to prove reliable with regard to the permanent control of infection.

Free access is essential for total clearance of the cement. Curettage of the medullary surface of the femoral shaft from above may prove inadequate; guttering of the femur from the lateral aspect gives far better access and caused no fracture during convalescence in this series. The plug of cement within the pilot hole for a Charnley type of prosthesis, or indeed any other extension of the main mass of cement, may be overlooked and prove to be a cause of persistent sepsis. A conical plug of cement below the tip of the femoral component is a common source of difficulty. Attempts to remove it from above may cause it either to displace even farther down the medullary cavity or to fragment. The answer, of course, is free access by lateral guttering of the femur and great trochanter. When radio-opaque cement has been used—as it always should be—a film of the whole field taken before closure of the wound may reveal a residual fragment.

As recommended by Taylor in 1950, any marked projection of bone should be bevelled off. This applies particularly to the outer rim of the enlarged acetabulum, to a stump of femoral neck, and to a lesser trochanter that is unduly prominent because of a previous osteotomy with marked inward displacement. Otherwise focal impingement occurs and may in course of time cause enough pain to warrant revision. This point in technique of a true “Girdlestone” pseudarthrosis can easily be overlooked when the surgeon’s attention is focused on total clearance of the cement from a difficult operative field.

Suction-irrigation with an appropriate antibiotic solution appears to hasten primary healing. In a further five patients, not included in this series because of a shorter period of follow-up, the wound healed within two weeks. Light skin traction below the knee with the knee slightly flexed over a pillow is enough to control the position of the limb and reduce the tendency towards outward rotation.

In a favourable case gentle passive movement is allowed as soon as the wound has healed at two or three weeks; exercise in slings begins at four weeks; the patient is allowed to walk with a frame or crutches at six weeks, and to proceed to two sticks at his own pace. A weight-relieving caliper is of little, if any, assistance. In the meantime, of course, the shoe has been raised some 4 to 5 centimetres. This routine naturally has to be modified in cases of rheumatoid arthritis.

Should the wound not heal within three or four weeks, the suspicion of persistent deep sepsis should be aroused; sinograms appear to yield little further information. By six weeks the time has come for a further search.

My thanks are due to Mr M. H. M. Harrison, whose thoughts stimulated and guided the preparation of this paper.

REFERENCES


