LONG-TERM RESULTS OF HIP ARTHROPLASTY FOR FAILURE OF PREVIOUS SURGERY

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We report a retrospective review of 127 low friction arthroplasties carried out for the failure of a previous hip operation. After an average follow-up of 10.4 years, 20% of cases required further revision, over half of them for deep infection. We estimated from the radiographic appearances that eventual failure by loosening was probable in 58% on the femoral side and 56% on the acetabular side of the arthroplasties.

The early results of the Charnley low friction arthroplasty (LFA) carried out after the failure of previous hip surgery have been reported (Dupont and Charnley 1972). The incidence of early complications was similar to that in other series of primary hip replacements carried out in the same unit, except that the incidence of deep sepsis was higher at 3.7%.

We now present the long-term results of LFAs carried out for the failure of a previous hip operation, giving special emphasis to complications requiring further revision and to the detailed analysis of radiographic appearances which may indicate the likelihood of later complications.

MATERIAL AND METHODS

Between November 1962 and December 1969, a total of 3589 LFAs were carried out at Wrightington. Among these were 310 patients who had 329 LFAs performed for failure of previous operations on the hip. Of these 310 patients, 191 were excluded from this review: 68 had died within six years of the LFA (none had needed a second revision) while 123 had been followed up for less than six years or had been lost to follow-up. The remaining 119 patients (127 hips) had a minimum follow-up of six years, unless a second revision had been needed before this. Antibiotic-loaded acrylic cement was

Table I. Previous operations in 127 hips revised to an LFA

	Number	Per cent
Intertrochanteric osteotomy	72	57
Femoral head replacement Moore or Thompson Judet	21 6	21
Cup arthroplasty	13	10
Total hip arthroplasty	5	4
Fracture fixation Pseudarthrosis Stabilisation by central dislocation Unspecified	4 3 2 1	8

not used and systemic antibiotics were not given routinely.

Clinical results were assessed from the records and were based on the Charnley (1972) modification of the d'Aubigné and Postel scale (1954). Radiographic assessment was by the review of the available serial films. All the measurements on the femoral side of the LFA were made directly on the radiographs (Loudon and Charnley 1980). The appearances of the bone-cement junction on the acetabular side were assessed according to Hodgkinson, Shelley and Wroblewski (1987).

RESULTS

Of the 119 patients, 29 were men and 90 were women. Their average age at the time of their first hip operation was 54.8 years (range 18 to 77.7 years) while at revision to an LFA it was 59.5 years (range 23.8 to 79.3 years). The original diagnosis was primary osteoarthritis in 91 patients (72%), secondary osteoarthritis in 22 (17%) and rheumatoid arthritis in six (5%). The previous hip operations are listed in Table I. Only in four of the cases of intertrochanteric osteotomy was the fixation device removed at a separate operation, before the LFA.

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0301-620X/88/1023 \$2.00
J Bone Joint Surg [Br] 1988;70-B:49-51.

The average follow-up for the whole group was 10.4 years (range 6 to 23.1 years) with 11.2 years (range 6.1 to 23.1 years) for the patients who have not required a second revision.

Bacteriological swabs were taken at the LFA in 25 cases only; results were negative in 20 and positive in five. Three were positive for *Staphylococcus aureus* (all developing deep sepsis), one for *E. coli* and one for diphtheroids. The results of radiographic assessment of acetabular fixation are given in Table II, and for the femoral component in Table III. In 13 cases stem subsidence could not be accurately measured because the radiographs were not comparable.

Second revision. Of the whole group of 127 hips, 26 (20.5%) had a further revision an average of 7.1 years after the LFA (range 0.6 to 14.7 years). The indications for these third operations are given in Table IV; no relationship was found with the type of the original hip operation except that the second revision rate was 30% in the combined group of those who originally had femoral endoprostheses (21 hips) or total hip arthroplasties (five hips).

Of the 15 cases of deep sepsis, eight were converted to a pseudarthrosis, while seven had a successful one-stage exchange operation. In two cases revised for pain no abnormality was found. One case of recurrent dislocation was treated successfully by reattachment of the greater trochanter. For the cases with mechanical loosening of the components or fracture of the femoral stem the components were changed.

DISCUSSION

The long-term follow-up of LFA carried out for failures of previous hip surgery shows an incidence of deep sepsis of 11.8% as compared with 3.7% at short-term review (Dupont and Charnley 1972). Although routine bacteriology was not performed in the earlier cases it is now obvious that it is indicated for all cases which have had previous hip operations. It is also suggested that removal of any metallic device should be performed as a separate previous operation, provided that it can be carried out safely. There is also little doubt that, in such cases, antibiotics in the acrylic cement (Lynch et al. 1987), or systemically, or both, are indicated.

Apart from the high incidence of deep sepsis and excluding the three cases of fractured femoral stem (2.4%), the secondary revision rate of 7.3% is not particularly high considering both the quality of the original bone stock and the stage of evolution of the Charnley LFA at the time of the first revision. However, detailed examination of the radiographic appearances leave no room for complacency. Progressive stem subsidence may well indicate eventual failure, and this was present in 43% of the cases which followed intertrochanteric osteotomy and in 50% of all the other

Table II. Radiographic appearance of the bone-cement junction at the acetabulum

Type	Width of gap		Number	Per cent
	<1mm	>1mm		
0 No demarcation			19	15
1 Demarcation in outer third only	34	1	35	27.5
2 Demarcation in outer and middle thirds	8	0	8	6.3
3 Complete demarcation	13	33	46	36.2
4 Migration of socket			17	13.4
Inadequate radiographs			2	

Table III. Radiographic appearance of the femoral component

	Number	Per cent
Unchanged	54	43
Subsidence > 1.6 mm	53	46
Fracture of cement		
Tip	14	13
Other	3	
Endosteal cavitation	15	12
Bone-cement demarcation		
General	15	
Proximal	1	35
Distal	28	

Table IV. Indications for revision of the LFA

	Number	Per cent
Infection	15	11.8
Mechanical loosening	4	3.1
Fractured stem	3	2.4
Unexplained pain	2	1.6
Dislocation	1	0.8
Fractured femur	1	0.8

groups combined. If endosteal cavitation and demarcation of the femoral cement are also considered as signs of incipient failure, then the likelihood of further revision of the femoral stem increases to 58%. As regards the acetabular side, only 15% of hips showed no demarcation at the bone-cement junction and 27.5% showed demarcation of the outer third only. Excluding two cases in which radiographs were inadequate 55.9% of cases showed either demarcation of the outer two-thirds, complete demarcation, or migration of the socket. The majority of these must be regarded as being at risk for

loosening (Hodgkinson et al. 1987), although not as yet in need of revision for asymptomatic failure.

The clinical results of an LFA carried out for the failure of a previous hip operation remain satisfactory, but this success must be balanced against the high incidence of deep sepsis and the likelihood of a rising revision rate for mechanical loosening with increasing follow-up. It must also be emphasised that clinical function does not necessarily represent the mechanical state of the arthroplasty, especially with regard to the acetabulum.

Surgeons who undertake uncemented total hip arthroplasty and expect to be able to perform an easy revision to a cemented replacement may be rewarded by short-term success but are likely to be disappointed by a high incidence of long-term failure.

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