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REARTHROPLASTY OF THE HIP JOINT

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Forty patients were reviewed 24 to 52 months after their second, third and fourth arthroplasty of the same hip. The protocol assessed pain, range of motion, leg shortening, gait performance, radiological appearance of the endoprosthesis and included the patient's own evaluation. Results of rearthroplasty were inferior to those of the primary procedure, but still good enough, both in the surgeon's and the patient's opinion, to be the method of choice for revision of a failed total hip replacement.

Key words: endoprosthesis; hip surgery; rearthroplasty; total hip replacement

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After failure of a total hip replacement (THR) the orthopaedic surgeon usually has two options – to convert the joint into a resection arthroplasty (the so-called Girdlestone hip) or to make another attempt with a new THR. The pain relief and function of a resection arthroplasty is inferior to that of a successful THR (Coventry 1964) and for this reason rearthroplasty is often undertaken. Some previous investigators (Dupont & Charnley 1972, Eftekhar 1976, Eftekhar et al. 1973) have found the results of revisions of failed THRs to be equal to those after primary interventions, whereas others have presented discouraging results (Hunter et al. 1979, Hunter 1979). Successful conversions from resection arthroplasties to THRs have been reported (Ferrari & Charnley 1976). During the last 5 years a number of reoperations for failed total hip replacements have been performed in our hospital, sometimes implanting an endoprosthesis for the third or fourth time in a patient. This is a follow-up investigation to study the results of such repeated hip surgery.

PATIENTS AND METHOD

Between June 1973 and December 1977, 439 THRs were performed at the Orthopaedic Clinic of the Karolinska Hospital, Stockholm, Sweden. Fifty-nine of these operations in 53 patients were rearthroplasties, i.e., 59 failed total hip replacements were exchanged, twice in 6 patients. Thirteen patients were excluded from the follow-up: 8 were dead (one from postoperative disseminated intravascular coagulation and 7 from causes not related to the hip surgery), and 2 patients were unable to come because of disability due to other diseases. Two patients had had their prostheses extracted because of deep infections – they are included in the discussion, but did not participate in the clinical follow-up. In one patient the follow-up period was less than 24 months. The remaining 40 patients were reexamined clinically and radiologically between 24 and 52 months after their last operation. The patients were between 50 and 90 years of age at the time of surgery – 34 of them between 60 and 80 years. The reason for the primary hip replacement was in 31 cases osteoarthritis, in 8 cases sequelae following femoral neck fracture and in one case rheumatoid arthritis.

The clinical examination was performed independently by both authors in all the patients according to the protocol shown in Table 1. This is a modification of the classification by d'Aubigné & Postel (1954). Radiograms were taken and the sedimentation rate was checked in all patients.

At reoperation, conversions were made from 2 Charnley, 11 Müller, 23 McKee-Farrar and 4 Ring en-

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Table 1. Protocol for evaluation of hip joint replacements

PAIN	
None	6
Occasionally slight pain	5
Pain after 30–60 minutes of walking	4
Pain after 10–20 minutes of walking	3
Pain after less than 10 minutes of walking	2
Immediate pain on weight-bearing	1
Constant pain, resting pain	0
RANGE OF MOTION	
Flexion more than 90°	6
Flexion 90°–60°	5
Flexion 60°–30°	4
Flexion less than 30°	3
Fixed deformity	
LEG SHORTENING	
In centimeters compared to other leg	
TRENDELENBURG'S SIGN	
Positive or negative	
GAIT PERFORMANCE	
Normal gait without limitation	6
Some limitation. Cane for longer distances	5
Cane outdoors. Limp	4
Cane always	3
Two canes	2
Crutches	1
Walking impossible. Wheelchair	0
ACTIVITIES OF DAILY LIVING	
Without limitation	
With some difficulty, unaided	
Needs aid from another person	
PATIENTS' OWN OPINIONS	
Much improved	6
Improved	5
Somewhat improved	4
Unchanged or worse	3
Initially better but then worse	2

doprostheses to 18 Charnley and 22 Müller hip replacements. Eleven patients had 2 exchanges of the prostheses and 4 patients had 3 exchanges. The operations were performed by different surgeons using various incisions (anterior Smith-Petersen, lateral with trochanteric osteotomy or posterior according to Moore).

In 35 patients the indication for revision arthroplasty was pain. Five of these patients had a deep infection with positive cultures from the joint. In the remaining patients loosening was confirmed at the operation, but there were no macroscopical signs of infection and cultures were negative. One patient with a McKee-Farrar prosthesis was reoperated upon because of pain without any signs of loosening or infection. Five patients were reoperated upon for reasons other than pain. They comprised one anchylosed joint, three recurrent dislocations of the implants, and one fracture of the femoral stem.

Postoperative complications occurred in 13 patients:

Four hips dislocated immediately after operation. Three were treated by closed reduction under anaesthesia and one required open reduction.

Two patients developed deep venous thrombosis.

Five patients had postoperative wound infections. All healed within 2 weeks.

Two patients sustained a femoral fracture during surgery. They were treated operatively and weight-bearing was not allowed for 6–8 weeks postoperatively.

In one patient with a trochanteric osteotomy the osteosynthesis broke and this complication was treated surgically.

Twenty-six patients were given dextran prophylaxis. All 40 were mobilized immediately. Thirty-seven were given antibiotic prophylaxis. All operations were performed in a standard operating theatre without special ventilation.

RESULTS

The results of rearthroplasty are illustrated in Figure 1.

Pain at follow-up

Twenty of the 40 patients never or seldom had any pain in the operated hip. Twelve patients had immediate pain on weight-bearing or pain at rest. If only the patients having had one reoperation are considered the figures improve to 16 out of 25 patients pain-free in contrast to 4 out of 15 in the more-than-one-reoperation group.

Range of motion

Twenty-nine patients had more than 60° of flexion in the operated hip. Nine patients had a fixed contracture in one or more directions; 4 of these 9 patients belonged to the group that had had more than one reoperation.

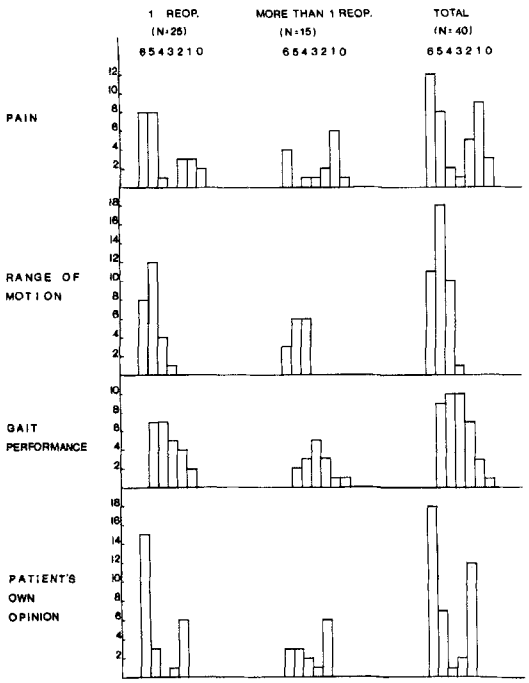

Figure 1. Clinical results of rearthroplasty (for scoring method see Table 1).

Leg shortening

Eight patients had more than 3 cm shortening of the operated leg. One of these patients with 6 cm of shortening had had a period of 3 years with a Girdlestone hip between operations.

Trendelenburg's sign

The test was noted for 36 patients. It was positive in 30 cases and negative in 6. Among the patients reoperated upon more than once negative signs were noted in only one patient out of 14.

Gait performance

Walking ability was best among the patients reoperated upon once, where 7 patients out of 25 never or seldom needed a walking aid, and worst in the more-than-one-reoperation group, where only 2 patients out of 15 were able to manage without aid. In the whole material 29 patients out of 40 could walk unaided or needed only one cane at any time. Ten used two canes or crutches and one patient was not ambulant. One of the 10 patients using two crutches had hemiplegia. Pain was the reason for the walking aids in the other 9 patients. The non-ambulant patient was confined to a wheelchair because of pain in the hip due to loosening of the prosthesis.

Activities of daily living

Thirty-five out of 40 patients had only slight problems or no problems at all with their activities of daily living. Only 5 needed daily assistance.

The patients' own opinions

Twenty-six patients considered themselves improved by the operation. Of the 14 patients, who were not improved or worse at follow-up, 12 had been initially improved but subsequently developed increasing pain in the hip 1–3 years after surgery. There was an explanation for the deterioration in every case: 11 patients had radiologically confirmed loosening of the implant, one with fracture of the femoral stem. In one patient the femoral stem had penetrated through the cortex with increasing irritation at this site.

Two patients did not consider themselves improved at all by reoperation. One of them, reoperated upon because of infection, later had a recurrence of the infection, and in the other patient no cause was ever found to explain her pain. There were no clinical or radiological signs of loosening or infection in the hip and no signs of other diseases in the knee or back.

Radiological examination

The radiograms were examined for signs of loosening, defined as a progressive increase in the radiolucent zone at the bone-cement interface. Any zone wider than 2 mm was considered a radiological sign of loosening as was any sign of change in position of the prosthesis.

Out of the 40 patients examined, 22 had a normal radiogram and 17 had signs of loosening. In one patient the femoral stem had penetrated

the cortex but there were no signs of loosening. Out of the 17 loose prostheses (either acetabular or femoral component or both) 4 were in asymptomatic patients and 13 in patients with pain – in 7 cases severe. Ten of the patients had initially been free of pain but deteriorated over the years. Two patients with normal radiograms considered their condition to have deteriorated since the operation.

DISCUSSION

Total arthroplasty of the hip joint is the standard treatment for severe osteoarthritis in the elderly patient. Most authors report good results in 86–90 per cent after this operation. Failure is usually due to early or late infection or aseptic loosening of the prosthesis.

Several reports (Carlsson et al. 1978, Dupont & Charnley 1972, Eftekhar 1976, Eftekhar et al. 1973, Lindberg 1978, Pellicci et al. 1979) have been published showing reoperations of failed THRs to be almost as successful as primary procedures.

The present material comprising 53 patients having had one or more rearthroplasties did not differ from our own primary procedures as regards the complication rate. Deep infection caused extraction of the implants in 2 cases, which corresponds to 3.3 per cent, an infection rate that might be expected when performing primary arthroplasties in a conventional operating theatre.

The dislocation rate, 4 hips out of 59, may seem high, but all the dislocations occurred immediately after operation when the patient was moved from the operating table to the bed and there were no late dislocations in the material. The surprisingly low figure of only 2 patients with deep venous thrombosis probably reflects the fact that diagnostic methods such as leg scanning, phlebography or plethysmography were not available. Operating time was only slightly longer for the reoperations than for primary arthroplasties, 2 hours and 16 minutes versus 1 hour and 52 minutes. Also there was more peroperative bleeding at reoperations, 1800 ml as compared to 1400 ml at the primary arthroplasties. These differences between rearthroplasties and primary arthroplasties are in our opinion slight and should not influence the surgeon's decision as to whether to perform a rearthroplasty or a Girdlestone operation.

Our follow-up of 40 patients having had one or more rearthroplasties did show good pain relief in 64 per cent, which is less than in most other series and also less than in our primary operation series. One reason for this may be the 15 patients who had undergone more than one prosthesis exchange. Results in this group were much worse than in the group of patients having had only one rearthroplasty.

Range of motion was acceptable (more than 60° of flexion) in most cases. Fixed contractures in any direction of motion occurred in less than 25 per cent of the patients – even in the group that had had several reoperations. This means that, in this respect, repeated surgery does not have to decrease mobility. It does, however, decrease the strength of the muscles, especially the abductors, and the majority of our patients had a positive Trendelenburg's sign and needed external support when walking.

The walking capacity improved in most cases, since most patients preoperatively were in such pain that they had to use two canes or crutches at all times. There were few patients, however, who walked without a cane outdoors after the reoperation. This was due to the fact that these elderly patients when leaving the hospital were advised to use a cane outdoors. The patients also became less dependent, managing activities of daily living without help.

The patients' own assessment of the postoperative result shows that 26 patients (65 per cent) considered themselves improved. In the remaining 14 patients the poor result was due to malpositioning, infection or loosening of the implant in 13 cases. In the remaining patient we could not explain the reason for her not being pain-free. The indication for operation in this case was loosening of the acetabular cup, which was confirmed at surgery, but maybe this was in fact asymptomatic and her preoperative pain due to another cause. With careful positioning and improved cementing technique it should be possible to obtain better results.

Progressive deterioration and loss of bone stock decrease the chances of successful rearthroplasty, and a loosening endoprosthesis with clinical symptoms should be revised without undue delay. That such reoperations, even for the third or fourth time, can be successful, if done with great technical care and thorough excision of all scar tissue and often using a long stem prosthesis, is shown by the results of the 15 patients having had more than one reoperation. Though their results were not as good as those in the patients only reoperated upon once, more than half of them were improved by the operation.

The present investigation reports results obtained in an orthopaedic service where THR is a procedure performed by many surgeons with various degrees of interest in hip surgery and where there is no special section or research programme for arthroplasties. It is therefore representative of what can be obtained outside the centres specializing in endoprosthesis surgery, where more than 90 per cent good results regarding pain relief and function are achieved (Dupont & Charnley 1972, Eftekhar 1976, Eftekhar et al. 1973). Our opinion is that rearthroplasty is a difficult operation and should only be performed by surgeons interested and experienced in hip surgery in order to give the patient the best chances for a good result.

We think, however, that revision of a failed hip replacement can lead to a good result if performed early, under highly aseptic conditions, and with a careful cementing technique after thorough excision of all former cement and scar tissue. Good results can even be obtained after two or three failed hip replacements and the Girdlestone procedure should be reserved for patients whose general state of health contraindicates major surgery.

REFERENCES

d'Aubigné, M. R. & Postel, M. (1954) Functional results of hip arthroplasty with acrylic prosthesis. *J. Bone Joint Surg.* **36**-A, 451–475.

Carlsson, A. S., Josefsson, G. & Lindberg, L. (1978) Revision with gentamicin-impregnated cement for deep infections in total hip arthroplasties. *J. Bone Joint Surg.* **60**-A, 1059–1064.

Coventry, M. B. (1964) Salvage of the painful hip prosthesis. *J. Bone Joint Surg.* **46**-A, 200–212.

Dupont, J. A. & Charnley, J. (1972) Low-friction arthroplasty of the hip for the failures of previous operations. *J. Bone Joint Surg.* **54**-B, 77–87.

Eftekhar, N. S. (1976) Revision of total hip replacement by low friction arthroplasty. The Eastern Orthop. Assoc. Meeting, Puerto Rico, Oct. 15–19, 1975. *J. Bone Joint Surg.* **58**-A, 248.

Eftekhar, N. S., Smith, D. M., Henry, J. H. & Stinchfield, F. E. (1973) Revision arthroplasty using Charnley low friction arthroplasty technique. *Clin. Orthop.* **95**, 48–59.

Ferrari, A. & Charnley, J. (1976) Conversion of hip joint pseudarthrosis to total hip replacement. *Clin Orthop.* **121**, 12–19.

Hunter, G. A., Welsh, R. P., Cameron, H. U. & Bailey, W. H. (1979) The results of revision of total hip arthroplasty. *J. Bone Joint Surg.* **61**-B, 419–421.

Hunter, G. A. (1979) The results of reinsertion of a total hip prosthesis after sepsis. *J. Bone Joint Surg.* **61**-B, 422–423.

Lindberg, L. (1978) Diagnosis and treatment of deep infection in total hip arthroplasty. *Läkartidningen* **75**, 1701–1704.

Pellicci, P. M., Salvati, E. A. & Robinson, H. (1979) Mechanical failures in total hip replacement requiring reoperation. *J. Bone Joint Surg.* **61**-A, 28–36.

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