Acta orthop. scand. 45, 89–96, 1974

Departments of Orthopaedic Surgery and Rheumatology, University Hospital, Lund, Sweden.

CUP ARTHROPLASTY IN PATIENTS WITH RHEUMATOID ARTHRITIS

HÅKAN BRATTSTRÖM, CARL-AXEL CEDELL, ÅSA HAGSTAM & HELEN LINDÉN

Accepted 13.vi.73

Total hip replacements have come to play a more and more dominating part in hip surgery. There are wider indications and the method is used in progressively lower age groups. These trends were evident at the SICOT meeting in 1972. It is also clear from series with longer observation periods that difficult problems may arise in time, loosening of the prosthesis, infections and wear out being the most common. Above all it is the infected cases which give difficulties and an insufficient hip is in some cases the end result as the prosthesis has to be removed and the neck of the femur has already been resected. Warning voices were raised (e.g. Coventry 1972), and not least Charnley in his speach on "the second line of defence" has cautioned against an uncritical use of total hip replacement in the lower age groups. Cup arthroplasty has been proposed as an alternative for younger age groups i.e. patients under 45–50 years. If a cup arthroplasty becomes infected or for some reason is unsuccessful the patients have other alternatives (fibrous or osseous anchylosis, total arthroplasty, resection-angulation or eventually a new cup arthroplasty).

In cases of rheumatoid arthritis, an operation is often relevant in young people and those in their early middle age. Arthritis in the hip joint may be extremely painful and through a flexion and/or adduction contracture cause a secondary valgus strain and flexion contracture in the knee, and sometimes fixed plantar flexion of the ankle. The pains and the restriction of movement cause great difficulties in ambulation and the patient is handicapped in social and sexual relationships, family life, studies and professional qualifications. Should one offer these younger people of 25–40 years of age a total arthroplasty or first of all a cup arthroplasty?

We considered it to be worthwhile to investigate the results of the cup arthroplasties performed in Lund during the period 1966–70 in patients with rheumatoid arthritis, in order to see whether "the cup" was a realistic alternative to the "total hip".

Good operation results with cups have been reported, especially in coxarthrosis (Smith-Petersen 1948, Westerborn 1954, Kelly & Lipscomb 1958, Semb et al. 1960, Aufranc 1962, Harris 1969, Johnston & Larson 1969). The operation has even been used in rheumatoid arthritis, but there are no reports of larger patient materials with this disease and the published results vary considerably. Thus, Johnston & Larson (1969) report good pain relief for all 12 patients with rheumatoid arthritis which they present in their considerable cup material. Aufranc (1962) reports satisfactory results for 82 per cent of 1000 cup arthroplasties, of which 214 were rheumatoids but he gives no percentages for these patients. Kuhns & Potter (1966) report that out of 300 cup arthroplasties 50 per cent were "greatly improved", 25 per cent "moderately improved" whilst 25 per cent were considered "failed", but they do not indicate the number having rheumatoid arthritis.

MATERIAL AND METHODS

During the five year period 1966–70, 36 cup arthroplasties were performed on 22 women and 8 men. Five women and one man had bilateral arthroplasty. The average age of the patients at the time of operation was 44 (15–71) years. Age classification and further details of the material are shown in Table 1. It is noted that 23 of the patients could be placed in Steinbrocker's functional class III or IV. Fourteen of the adult rheumatic patients were seropositive and 11 seronegative. It is also noted that since 1970 only two cups were performed, the total hip replacement being the method of choice.

Our indications for operation have been severe pain and reduced function due to contracture and limitation of movement. Preoperatively the patient has undergone special muscular strength training and contracture treatment.

Smith-Petersen's method was used with anterior incision. In all cases the iliopsoas tendon was transferred to the ventro-lateral capsule remnant and a tenotomy of the adductor muscles was performed. The postoperative treatment followed a detailed schedule according to Aufranc (1963) and the patients were allowed full weight-bearing after 6 months from the date of operation. The patients then continued with a special training program. Average time in hospital was 49 days. Twenty-eight of the arthroplasties were performed by the same surgeon (H. Brattström).

Complications: Two women with unilateral operation were infected, which later led to extraction of the cups. The infection cleared and the patients now have a fibrous anchylosis with satisfactory functional result. The youngest patient in the material, a 15-year-old boy, had a supracondylar fracture of the femur in connection with the operation. This complication was attributed mainly to a pronounced

osteoporosis of the leg. There were no diagnosed cases of thrombosis, lung embolism or heart complications. In three women with four hip plasties supplementary *dorsal* synovectomy or removal of osteophytes was performed one to two years after the plasties. Aufranc (1962) and Johnston & Larsson (1969) report that revision was required in one-third of the rheumatic cases, i.e. rather more frequently than in other patients.

Table 1. Cup arthroplasty in rheumatic diseases 1966–1970.

	1966	1967	1968	1969	1970	
No. of hips	1	8	16	9	2	
No. of patients	30 (22 female, 8 male)					
No. of hips	36 (27 female, 9 male), 18 dx, 18 sin					
Mean age at operation	44 (15–71) years					
Age period	15–24	25–34	35–44	45–54	55–64	65→
No. of hips	6	7	6	8	6	3
Type of arthritis	Juvenile		Adult		Bechterew	
No. of patients/hips	3/6		25/27		2/3	
Mean duration of disease at operation, years	6(3–8)		13(2–45)		5(5–6)	
Mean duration of hip symptoms, years	5(1–8)		6(2–21)		5(5–6)	
Mean ESR at operation	38(22–71)		42(6–104)		32(24–40)	
Involvement of other joints	2nd hip	Knees	Feet	Back		
No. of patients	26	25	16	18		
ARA functional class	*II*	*III*	*IV*			
No. of patients	7	20	3			

FOLLOW-UP

At follow-up, all the patients were examined by an orthopaedic surgeon, a rheumatologist and a physio-therapist, and X-rayed. Details of the follow-up material are shown in Table 2. Four women with adult rheumatoid arthritis and unilateral hip plasty are excluded from the primary material, two owing to severe infection and cup extraction (see above), one owing to pronounced invalidity and one owing to travelling distance.

Table 2. Follow-up study, cup arthroplasty.

No. of patients	26 (18 female, 8 male)		
No. of hips	32 (23 female, 9 male)		
Mean observation time	2¾ (2–5¼) years		
Type of arthritis	Juvenile	Adult	Bechterew
No. of patients/hips	3/6	21/23	2/3
Mean ESR, mm	12(3–20)	46(17–76)	80(21–115)

RESULTS

The patient's subjective conception of the operation is shown in Table 3. The majority of patients had obtained considerable relief from pain (Figure 1). Rest pain was almost completely eliminated whilst pain on movement was greatly reduced and pain on weight-bearing moderately reduced. Thus, preoperatively 19 hip joints had severe pain on weight-bearing and 8 moderate, whereas the corresponding values in the follow-up were reduced to two and seven respectively.

Table 3. Patients' own opinion on the result of operation (no. of hips).

Highly satisfied	3
Satisfied	16
Uncertain	12
Dissatisfied	1
	32

On an average the patients had obtained a slight increase in the total range of motion in the hip. Preoperatively the mean value for the sum of flexion, abduction, adduction and rotation was 89°, and 112° at the follow-up. Usually preoperatively registered contractures had not improved, i.e. a preoperative flexion and/or adduction contracture in the hip joint had a strong tendency to recur. Altogether 23 hips had obtained relief from pain and improved mobility, 8 hips relief from pain but poorer mobility and one hip increased pain but improved mobility, since the operation.

X-ray examination

Bone absorption round the cup and especially on the collum side was seen in 20 hips, 7 of which were described as mild, 9 as moderate and 6 as severe. Periarticular calcification or new bone formation was seen in

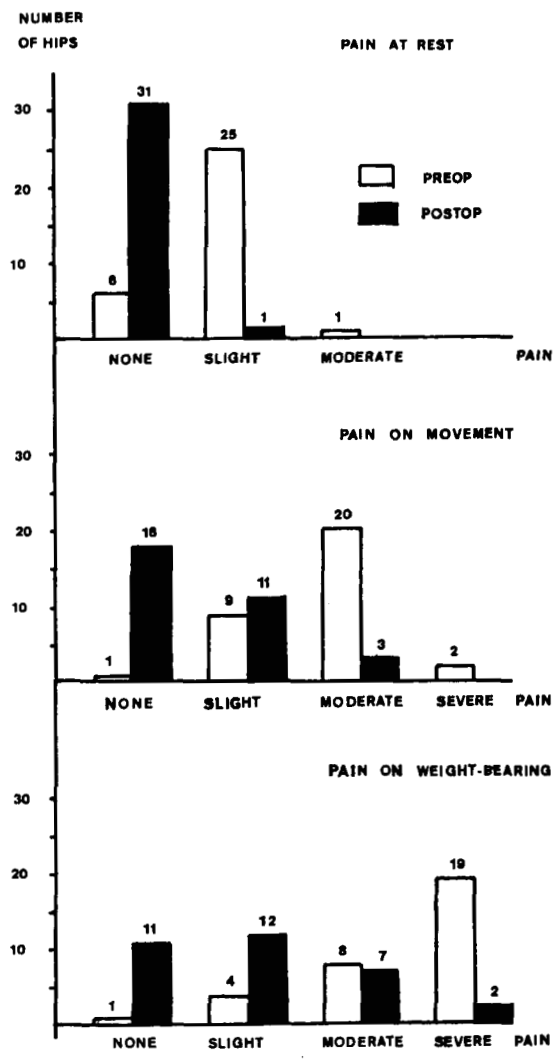

Figure 1. Effect of cup arthroplasty on pain.

15 hips and the appearance of acetabular osteophytes in 8 hips. A successive change of the postoperatively registered cup position during the observation period was seen in most patients. Thus, 13 hips showed a difference of at least 20° in the abduction-adduction direction on the anterior-posterior exposure, compared with the films taken postoperatively. The bone absorption round the cup was not correlated to the patient's age or the use of cortisone therapy. No connection between the roentgenographic and clinical appearance was found, i.e. a good

position of the cup by no means indicated that the patient was free from distress.

DISCUSSION AND CONCLUSION

Both patients with pelvo-spondylitis (3 hips) were classified as failures, one owing to pronounced contractures and the other (2 hips) owing to recurrence of synovitis in the hip joints with moderate pain on weight-bearing and a very high activity of the disease. Both these patients have had successful total hip replacements.

Another 7 patients (7 hips) were classified as failures because of moderate or severe pain. All 7 patients had remarkably good mobility at follow-up. In three hips the joint pain was caused by increased general activity of the disease and recurrence of the synovitis, as seen at reoperation (total hip replacement).

The mean age for six of these failures was 58 years (46–66), the seventh, a female, being only 30 years old. So if in this material the age limit between cup arthroplasty and total hip replacement had been 45 years and the cases with pelvo-spondylitis had been excluded, the cup arthroplasty would have been successful in 16 out of 17 hips. But the results obtained cannot be compared to the almost total relief of pain and good mobility obtained by total hip replacement. The cups require longer hospitalization and a more qualified physical aftertreatment and a surgeon who is familiar with the technical problems of the operation. In addition, there is a risk of overloading of the upper extremities during the longer period of non-weight-bearing.

The best results of cup arthroplasty can be expected in the young patient with good upper extremities, well-preserved joint movement and muscle function. A younger patient should be better able to cope with the postoperative treatment, the continuous training and contracture prophylaxis, necessary for lasting results. Knowledge of the consequences for the upper extremities and the good results of a possible secondary total hip replacement may make a shortening of the long non-weight-bearing period possible.

SUMMARY

In Lund, cup arthroplasty has been performed on 30 rheumatic patients (36 hips) during the period 1966–70. Three patients with six hip joints

had juvenile rheumatoid arthritis, two patients with three hip joints had pelvo-spondylitis and the rest had adult rheumatoid arthritis. A total of 26 patients (18 women and 8 men with 32 cup arthroplasties) have been followed during an observation period of 2–5½ years. Cup arthroplasty was found to have a good effect on pain.

The majority of hips had a slight increase in their total range of movement. X-ray examination showed a considerable bone absorption round the cup in two-thirds of the cases. Both cases of pelvo-spondylitis were classified as failures. The authors conclude that cup arthroplasty may be an alternative method of treatment to total hip replacement in younger rheumatics, i.e. under 40 years of age, if the surgeon is well acquainted with the technique. Compared with total arthroplasty, cup arthroplasty is technically more demanding, requires longer hospitalization, regular training of the patient for many years and good upper extremities.

ACKNOWLEDGEMENTS

This investigation was financially supported by Alfred Österlunds Stiftelse, Riksföreningen mot Reumatism and Stiftelsen Konsul Thure Carlssons Minne.

REFERENCES

Aufranc, O. E. (1962) *Constructive surgery of the hip.* C. V. Mosby, St. Louis.

Aufranc, O. E. (1963) Smith-Petersen arthroplasty of hip. *Campbell's operative orthopaedics.* p. 1087. Mosby Co., St. Louis.

Charnley, J. (1972) The long-term results of low-friction arthroplasty of the hip performed as a primary intervention. *J. Bone Jt Surg.* **54**-B, 61–76.

Coventry, M. B. (1972) Surgery of arthritis of the hip. *Bull rheum. Dis.* **7**, 674–677.

Harris, W. M. (1969) Traumatic arthritis of the hip after dislocation and acetabular fractures. Treatment by mold arthroplasty. *J. Bone Jt Surg.* **51**-A, 737–763.

Johnston, R. C. & Larson, C. B. (1969) Results of treatment of hip disorders with cup arthroplasty. *J. Bone Jt Surg.* **51**-A, 1461–1479.

Kelly, P. J. & Lipscomb, P. R. (1958) Primary Vitallium mold arthroplasty for posterior dislocation of the hip with fracture of the femoral head. *J. Bone Jt Surg.* **40**-A, 675–680.

Kuhns, J. G. & Potter, T. A. (1966) Correction of arthritic deformities. *Arthritis and allied conditions.* ed. Hollander, J. L., pp. 428–457. Lea & Febiger, Philadelphia.

Semb, C., Jakobsen, A. & Dahl, H. K. (1960) Fourteen years' experience with Smith-Petersen's arthroplasty. *Acta orthop. scand.* **31**, 216–217.

SICOT 12, Abstracta, 1972.

Smith-Petersen, M. N. (1948) Evolution of mold arthroplasty of the hip joint. *J. Bone Jt Surg.* **30-B**, 59–75.

Westerborn, A. (1954) Central dislocation of the femoral head treated with mold arthroplasty. *J. Bone Jt Surg.* **36-A**, 307–314.

Correspondence to:

H. Brattström, M.D.
The Orthopaedic Department
University Hospital
S-221 85 Lund
Sweden