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TOTAL HIP REPLACEMENT IN ANKYLOSING SPONDYLITIS

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Eighteen total hip replacements were performed in 10 patients with ankylosing spondylitis. The mean observation time was 3.8 years. Seven hips had been operated on before total hip replacement (THR); 6 were ankylotic before THR. The results as regards pain relief and increased walking distance were good. All hips improved in mobility after THR and this improvement was maintained during the observation time. Six of the 10 patients went back to full-time work. The differences between patients with ankylosing spondylitis and rheumatoid arthritis, as regards indications for and rehabilitation after THR, are discussed.

Key words: ankylosis; arthritis, rheumatoid; arthroplasty, hip; rehabilitation; sex; spine, rigid; spondylitis, ankylosing; vital capacity; young patients

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Hip involvement is common in ankylosing spondylitis (AS) and often leads to ankylosis of the hips (Dwosh et al. 1976). In AS the spine is usually very rigid, and therefore the decrease in hip mobility cannot be compensated for by movements of the spine. Cup arthroplasty has been tried in ankylosing spondylitis, but seems to give disappointing results (Law 1952, Johnston & Larson 1969, Brattström et al. 1974).

It is generally realized that the problems of total hip replacement (THR) in the rheumatic diseases are different from the problems of THR in osteoarthrosis. However, it is not always appreciated that patients with AS differ in many ways from patients with rheumatoid arthritis (RA) as regards indications for and rehabilitation after THR:

1. Patients with AS are usually young and physically more active than patients with RA. This makes postoperative rehabilitation easier but on the other hand means that the prosthesis will be subjected to greater stresses.

2. In AS, the upper extremities are usually in good condition, which means that the patients can use walking aids effectively and are often able to walk in spite of very bad hips.

3. Stiffness is often a greater problem than pain. By the time hip surgery is needed in AS, the spine is usually quite rigid, which makes the patient very dependent on hip movement for sitting, picking up objects from the floor etc.

4. Vital capacity is reduced because of involvement of the costovertebral joints. This may cause problems during or after general anaesthesia and may limit walking after hip replacement.

5. Improvement in range of motion after THR may be small (Arden et al. 1970,

Table 1. Some earlier reports on total hip replacement in ankylosing spondylitis.

Year	Authors	Reviewed Pat.	Reviewed Hips	Observation time	Results: Pain relief	Results: Range of motion	Results: Walking	Ankylosis (hips) Pre-op.	Ankylosis (hips) Post-op.	Comments
1969	Buchholz	12	20	?	No pain before or after THR	Improved	Improved	20	none	
1970	Arden et al.	5	9	> 6 months	71.5 per cent good or excellent		Not evaluated	?	none	Results graded according to range of flexion and presence of pain.
1970	Welch & Charnley	20	33	> 1 year	100 per cent	Sum total hip motion > 100° in all hips post-op.	Improved	13	none	
1972	Arden et al.	7	10	> 1 year	80 per cent good or excellent		Improved	2 or more	none	
1972	Harris et al.		9	> 3 months	78 per cent good or excellent		Not evaluated	?	none	
1972	Wilde et al.	1	1	4 months				1	1	Reports a case of reankylosis after THR. Hip previously operated with cup arthroplasty.
1973	Buchholz & Noack	26	41	> 2 years	Good	Improved	Improved	?	?	
1975	Halley & Charnley	9	17	> 6 months	100 per cent	88.2 per cent > 100° sum total hip motion post-op.	Improved	?	none	82.4 per cent had less than 30° sum total hip motion before THR.
1976	Bisla et al.	23	34	> 1 year	Good	"Satisfactory in 58.6 per cent	Improved	21	2	
1976	Resnick et al.	8	16	> 1 year in 14 hips		Poor		1	5 on X-ray 3 on clinical examination	All 3 hips showing clinical reankylosis had previous surgery. Three out of 5 hips with radiological reankylosis had some movement.

Table 2. Details about patients.

Pat. no.	Sex	Side	Age at op. (years)	Duration of disease at op. (years)	Previous operation	Ankylosis before THR	Grade according to the method of Merle d'Aubigné & Postel. See also Table 3.						Observation time (years)
							Before THR			At follow-up			
							Pain	Walking	Mobility	Pain	Walking	Mobility	
1	M	R	not op.	—	—	—	—	—	—	—	—	—	—
		L	61	20	—	—	1	2	4	6	5	6	2.3
2	M	R	55	29	—	—	3	2	1	6	5	4	4.3
		L	55	29	—	—	3	2	1	6	5	4	4.2
3	M	R	40	20	—	—	3	2	4	6	5	5	2.7
		L	38	18	—	—	3	3	3	6	5	5	4.8
4	F	R	35	11	cup	—	1	1	3	6	1	4	3.5
		L	35	11	cup	—	1	1	3	6	1	4	3.4
5	M	R	35	15	—	—	3	2	3	6	3	5	2.6
		L	35	15	synovectomy	—	3	3	3	6	3	5	2.8
6	M	R	not op.	—	—	—	—	—	—	—	—	—	—
		L	30	10	synovectomy	—	1	3	1	6	4	5	4.2
7	M	R	23	9	cup	+	6	2	1	6	4	4	5.0
		L	23	9	—	+	6	2	1	6	4	4	5.2
8	M	R	20	6	—	+	3	2	1	6	4	4	4.5
		L	20	6	—	+	3	2	1	6	4	5	4.4
9	M	R	20	11	—	—	3	3	2	6	4	5	4.6
		L	23	14	synovectomy	+	6	3	1	6	4	5	2.2
10	F	R	18	6	—	+	6	2	1	3	3	5	5.8
		L	20	8	cup	—	3	2	4	6	3	6	2.7
			mean = 32 years	mean = 14 years									mean = 3.8 years

Men 8 patients 14 total hip replacements.
Women 2 patients 4 total hip replacements.
Total 10 patients 18 total hip replacements.

Arden et al. 1972) and may not last. Some authors warn against the risk of re-ankylosis after hip surgery in AS (Dwosh et al. 1976, Resnick et al. 1976).

In most reported series, a few THRs in AS are reported together with a much greater number done in RA, osteoarthrosis and miscellaneous other diseases. It is usually impossible to see what difference, if any, there is between the results in the different diagnostic categories. Some earlier reports on THR in AS are listed in Table 1. All these reports except three (Wilde et al. 1972, Bisla et al. 1976, Resnick et al. 1976) include THRs done in diseases other than AS, but we have tried to separate the results according to diagnoses.

In this study, patients with AS who had undergone THR were examined to assess the results of the operation and to find out especially whether hip range of motion had been improved and whether any improvement of this kind had been maintained.

PATIENTS AND METHODS

Patients

Eleven patients with AS underwent THR in the Department of Orthopaedic Surgery of the University Hospital in Lund from September 1971 to October 1974. The patients were treated in cooperation with the Department of Rheumatology.

One patient died of a myocardial infarction 6 months after THR and is not included in this study. The others were last examined by one of the authors (Baldursson) in the autumn of 1976. The mean observation time was 3.8 years, with a minimum of 2.2 years. Further details about the patients are given in Table 2. Of special interest is the mean age, only 32 years.

Indications

Indications for THR were as follows:

Pain at rest	4
Pain and reduced range of motion	10
Ankylosis without pain	4
Total	18 hips

Before THR was decided upon, the patient and the team thoroughly discussed the patient's problems and the patient was informed about the expected improvement and the risks connected with the operation.

Operation

General anaesthesia was used. In 11 operations an endotracheal tube could be passed, but in seven operations a mask and a pharyngeal tube had to be used. No tracheostomies were done.

The operations were done in an ordinary operating room. Prophylactic anticoagulant treatment was not given. An anterolateral incision was used in 16 operations and a posterolateral incision in two operations. The greater trochanter was not detached. The neck of the femur was divided with an osteotome, usually *in situ*. An adductor tenotomy was done in four hips and a tenotomy of the iliopsoas in six hips. The operating time was 120–205 minutes, with a mean of 150 minutes. This is longer than the average operating time for THR in osteoarthrosis. Many of the THRs reported here were technically difficult because of scarring from previous operations or because of ankylosis. A McKee-Farrar prosthesis was used in 17 hips and a Howse prosthesis in one (left hip of patient no. 9, Table 2).

In five THRs cloxacillin was given before operation and continued after operation. In 12 THRs antibiotics were given only after the operation; in six of these penicillin was used, cloxacillin in five and tetracycline in one. In one THR no antibiotics were given.

Time in hospital

The stay in hospital after operation was from 14 to 86 days with a mean of 39 days. This includes the time spent in a rehabilitation clinic by some patients who were sent there upon their discharge from the department of orthopaedic surgery.

Complications

There were no complications related to the anaesthesia. One patient had a postoperative haematoma, which was evacuated. Four hips had superficial infections, all of which healed.

RESULTS

The results were assessed according to: *clinical findings*, i.e., pain (Table 4), walking ability (Table 5), mobility (Table 6) and functional capacity (Table 7) and *radiological findings*.

With regard to pain, walking ability

Table 3. Hip grading according to d'Aubigné & Postel.

Grade	Pain	Function (walking ability)	Mobility (degrees)
1	Severe and spontaneous	Few yards or bedridden; two canes or crutches	0—30
2	Severe on attempting to walk, prevents all activities	Time and distance very limited with or without canes	31—60
3	Tolerable, permitting limited activities	Limited with one cane; difficult without cane: able to stand long periods	61—100
4	Only after some activity, disappears quickly with rest	Long distance with one cane, limited without a cane	101—160
5	Slight or intermittent pain on starting to walk, less with activities	No cane but a limp	161—210
6	No pain	Normal	211—260

and mobility, the hips were graded according to the method of d'Aubigné & Postel (1954) in the form used by Halley & Charnley (1975) except that alphabetic prefixes were not used. By this method, hip mobility is assessed as the sum of flexion, extension, abduction, adduction, internal rotation and external rotation.

Pain. Four hips were pain-free before

Table 4. Pain assessed according to the method of d'Aubigné & Postel. See also Table 3.

After THR \ Before THR	1	2	3	4	5	6
6	4		10			3
5						
4						
3						1
2						
1						

Above diagonal line = improved	14
On diagonal line = unchanged	3
Below diagonal line = worse	1
Total	18 hips

Table 5. Walking ability assessed according to the method of d'Aubigné & Postel. See also Table 3.

After THR \ Before THR	1	2	3	4	5	6
6						
5		4	1			
4		4	3			
3		3	1			
2						
1	2					

Above diagonal line = improved	15
On diagonal line = unchanged	3
Below diagonal line = worse	0
Total	18 hips

THR. These four hips were ankylotic and, in three, a bony ankylosis was present. At the time of the last examination, 17 hips were pain-free. One hip is painful at rest and on weight-bearing. The cause of the pain, which started 3 years after THR, is still not clear, but late infection must be suspected.

Walking ability. Table 5 shows the improvement in walking ability after THR. Before THR, the limiting factor was hip pain or stiffness. After THR, the limiting factor in at least three patients was poor respiratory function.

In our clinic, patients with THR are advised not to "throw away the cane", but some patients find the cane unnecessary or that it interferes with their work, especially if the work includes walking and carrying. This means that in practice the is no sharp dividing line between grade 4 and 5 (with or without a cane).

Table 6. Mobility assessed according to the method of d'Aubigné & Postel. See also Table 3.

After THR \ Before THR	Grade 1	2	3	4	5	6
6				2		
5	4	1	2	1		
4	5		3			
3						
2						
1						

Above diagonal line = improved	18
On diagonal line = unchanged	0
Below diagonal line = worse	0
Total	18 hips

Mobility. Six hips were ankylotic before THR. The word "ankylotic" is used to denote absolute absence of movement on clinical examination. Three more hips had only minimal movement, less than 30° total movement in all directions.

The movement of extension-flexion is the most important one of the hip movements. This is also the hip movement that is easiest to measure and where the least error of measurement may be expected. We have therefore selected the arc of flexion to represent hip movement and Figure 1 shows the mean arc of flexion before THR and during the observation time in the 12 hips where some mobility was present before THR. The mean arc of flexion before THR was 58° in these 12 hips. After THR, there was a gain in movement during the first 6 months and after that the mobility was practically unchanged during the observation time.

Table 7. Functional capacity according to the classification of the American Rheumatism Association (Steinbrocker et al. 1949).

		Before hip replacement	After hip replacement
Class I	Complete functional capacity with ability to carry out all usual duties without handicap		5 patients 9 hips
Class II	Functional ability adequate to conduct normal activities despite handicap of discomfort or limited mobility of one or more joints	9 patients 16 hips	4 patients 7 hips
Class III	Functional capacity adequate to perform only little or none of the duties of usual occupation or self care		1 patient 2 hips
Class IV	Largely or wholly incapacitated with patient bedridden or confined to wheelchair, permitting little or no self care	1 patient 2 hips	

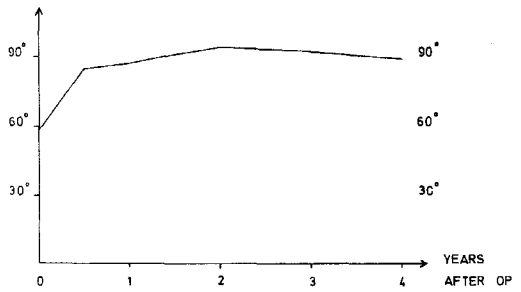

Figure 1. Mean arc of flexion in the 12 hips where some mobility was present before THR.

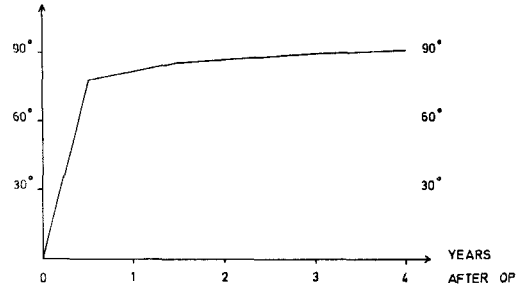

Figure 2. Mean arc of flexion in the 6 hips that were ankylotic before THR.

Figure 2 shows in the same way the arc of flexion during the observation time in the six hips that were ankylotic before THR. There was also a relatively rapid increase in mobility in these hips during the first 6 months and after that there was no great change in mobility.

The seven hips that had been operated upon before THR kept their mobility just as well as the others during the observation time.

Functional capacity. Before THR, all patients except one were in functional class II according to the classification of the American Rheumatism Association (Steinbrocker et al. 1949) but they almost qualified for class III because of hip pain, stiffness or deformity.

Six of the 10 patients were working full-time at follow-up. One patient was working part-time. One patient is studying at a university and is expected to work full-time after graduation. Of the two patients left, one is a 64-year-old retired farmer and the other is a 38-year-old housewife incapacitated by general ill-health and multiple joint symptoms.

Radiological findings

The radiographs were examined by one of the authors (T.H.O.) with special attention to signs of loosening, infection and ectopic calcifications.

The period of radiological follow-up was between 1.8 and 5.8 years with the exception of one patient (No. 9) who was last X-rayed 0.9 years after his last hip replacement.

The so-called zone about the cement did not exceed 2 mm in any of the hips. There was no case of ankylosis postoperatively. Small calcifications were found laterally to the femoral neck in five cases. No radiological signs of infection were found. Fracture of the plastic cement around the femoral stem was found in one hip (patient no. 2, left hip). This indicates that movement may occur between the prosthesis and the cement in this hip, but as the patient is symptom-free and 60 years old reoperation is not indicated.

In another case (patient no. 3, right hip) the femoral part of the prosthesis, with its plastic cement intact, has moved 5 mm in a caudal direction in relation to the femur.

DISCUSSION

Our experience of THR in AS has been encouraging. In contrast to RA patients, AS patients rarely have serious involvement of peripheral joints other than the hips. This, in addition to their young age, means that many AS patients can be rehabilitated to a gainful occupation, whereas, in the case of the RA patients, one must often be content with a pain-free and mobile hip and must accept that the ability to work is unchanged by THR.

Sexual problems are common with these young patients, as in other diseases where hip pain and stiffness occur (Currey 1970, Todd et al. 1973). THR can be a great help by removing hip pain and stiffness, thus making it physically possible for the patient to have a normal sex life. However, the patient's worries and hopes often remain unspoken and so are unknown to the surgeon, who rarely directs his questions towards sexual matters when discussing the patient's problems. Instead, the discussion centres on other aspects of hip function, such as walking and sitting, which the patient may in fact be less concerned about. As the patient and the surgeon have not discussed the sexual aspects of THR, there may remain unsolved problems that could have been solved easily and quickly by informing the patient. For instance, a female patient may abstain from sexual intercourse because of unnecessary fear of damaging her prosthesis.

As regards pain relief and improvement in ability to walk, the results are comparable to the results of THR in other patient categories. All hips have improved in range of motion and, what is interesting, have maintained that improvement during the observation period. The hips that had been operated upon before or were ankylotic before THR were no exceptions. In some cases where a patient for some reason did not exercise, a temporary decrease in hip mobility was seen. The mobility could in all instances be brought up to the previous level by a period of intensive training. We consider that the most important factor in preventing deterioration of hip mobility after replacement is patient instruction and regular supervision, preferably by a team consisting of an orthopaedic surgeon, a rheumatologist and a physiotherapist. The improvement in range of motion by THR can be maintained, but this means a great deal of hard work for the patient and perhaps for the physiotherapist, who must see the patient regularly. If poor vital capacity seems to limit the patients walking distance, breathing exercises may be useful and should be tried.

Total hip replacement can be very important in the rehabilitation of patients with AS, but it must be remembered that these young and active patients with their rigid spines do not treat their prosthesis gently and are very dependent upon hip mobility. They must be kept under supervision for a long time after THR, probably for the rest of their lives, both to discover complications (e.g., loosening or fracture of the prosthesis) in time and also to see that mobility of the replaced hips is maintained.

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