

Orthopaedic Hospital of the Invalid Foundation, Helsinki, Finland

INTERTROCHANTERIC DISPLACEMENT OSTEOTOMY IN THE TREATMENT OF OSTEOARTHRITIS OF THE HIP

Results of follow-up examination

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In the treatment of osteoarthritis of the hip, conservative methods rarely achieve a lasting result. Therefore, operative treatment is often indicated especially when the patient has pain at night which disturbs sleep and impairs the general condition. Since 1935, when McMurray published the results of his first intertrochanteric displacement osteotomies for osteoarthritis of the hip, this method has won growing favour for early cases of osteoarthritis (Blount 1964, Ferguson 1964, Hirsch 1961, 1969, Nissen 1963, 1964, 1966, Osborne & Jahr 1957, Ottolenghi & Frigero 1962, Lucht & Tarp 1967).

When internal fixation is carried out by using only one nail in the proximal fragment, a rather high rate of non-union has been encountered (Green 1967, Rosborough & Stiles 1967, Scott 1967). In recent years various compression plates and nails have been accepted in common use (Hammond & Wainwright 1967, Müller 1957, Osborne 1964, Salenius 1970).

MATERIAL

Since 1945, more than 400 intertrochanteric displacement osteotomies have been performed at the Orthopaedic Hospital of the Invalid Foundation for the relief of pain caused by arthrosis of the hip. The present material includes the osteotomies performed up to the end of 1965. The total number of patients was 201. In 8 cases osteotomy was performed bilaterally, making a total of 209. 74 patients were men and 127 women. Table 1 shows the age distribution.

Table 1. Age distribution.

Age (yrs)	No. pat.	Men	Women
Under 20	1	—	1
20-29	8	3	5
30-39	22	6	16
40-49	55	19	36
50-59	64	27	37
60-69	42	15	27
Over 70	9	4	5
Total	201	74	127

The mean age of patients was 51½ years. The youngest was 16, with pain in the hip following arthritis of the hip. The oldest was 77 at the time of operation. The reason for treatment in all cases was pain in the hip. Pain occurred only under strain in 66 cases, and also at rest in 135 cases. 26 patients used a stick, 5 used elbow crutches, and 56 visibly limped.

The 83 cases of secondary arthroses were unilateral except for one case. There were 35 cases of bilateral primary arthrosis.

TECHNIQUE OF OSTEOTOMY

Intertrochanteric osteotomy was performed in the usual manner. The distal fragment was always dislocated medially. The degree of dislocation varied somewhat, but because a Wainwright nail was used in most cases the dislocation became large, averaging half of one-third the diameter of the diaphysis. Table 2 shows the fixation used in operation.

Table 2. Fixation of the osteotomy.

Fixation	No. of hips	Non-union
Wainwright nail	141	9 (6.4 %)
McLaughlin nail	27	2 (7.4 %)
Lane plate	5	
Kessel plate	7	
Other fixation	5 (Nicol 4 + Blount 1)	
No internal fixation	24	
Total	209	11

The ileopsoas was severed in 113 cases and left unsevered in 96. In the last few years dissection of the ileopsoas has been a routine procedure in this operation. In certain cases ligamentum ileo femorale was also deliberately discised. Plaster immobilization was used with the McLaughlin nail, the Lane plate, and the Kessel plate, and also in cases without internal fixation, a total of 33 cases. Plaster immobilization averaged 8-10 weeks. In recent years patients have been allowed to rise from bed with the aid of elbow crutches immediately after operation but without weight-bearing on the operated limb. Weight-bearing is allowed 6-10 weeks after operation. Table 3 shows correction of position during the operation.

Table 3. Change of position of fragments at operation.

Chance of position	No. of hips	Prim. arthr.	Sec. arthr.
Ad varus	25	17	8
Ad valgus	53	18	35
No change	131	90	41
Total	209	125	84

Non-union occurred in 11 cases, 9 with the Wainwright nail and 2 with the McLaughlin nail. Six of these cases were re-operated and consolidation was achieved in 4. In 7 cases, however, follow-up examination revealed non-union still present at the place of osteotomy. In 5 there were no symptoms, however, and only 2 patients had difficulties in walking. In 9 cases, post-operative thrombophlebitis occurred, but improved for the most part under medical treatment. There was one mild case of cerebral insult which recovered without leaving symptoms. In the post-operative phase one patient suffered a fracture of the femur on the same side. Wound infection occurred in 2 cases. Two patients died immediately after operation, the evident cause being pulmonary embolism in both cases. In 3 cases arthrodesis was later performed on the same side for relief of pain. Denervation had been attempted in 2 of these cases without success.

FOLLOW-UP EXAMINATION

Follow-up examination was performed in spring and summer 1968. Observation period averaged 5½ years. The longest observation period was 22 years and the shortest 2½ years. During the long observation period 17 patients had died from a variety of causes. Two patients

could not be traced, and a total of 180 came for follow-up examination, including 8 bilateral cases. 188 hips were therefore subjected to follow-up examination.

RESULTS

Table 4 shows results according to the patient's assessment.

Table 4. Result according to patient's assessment.

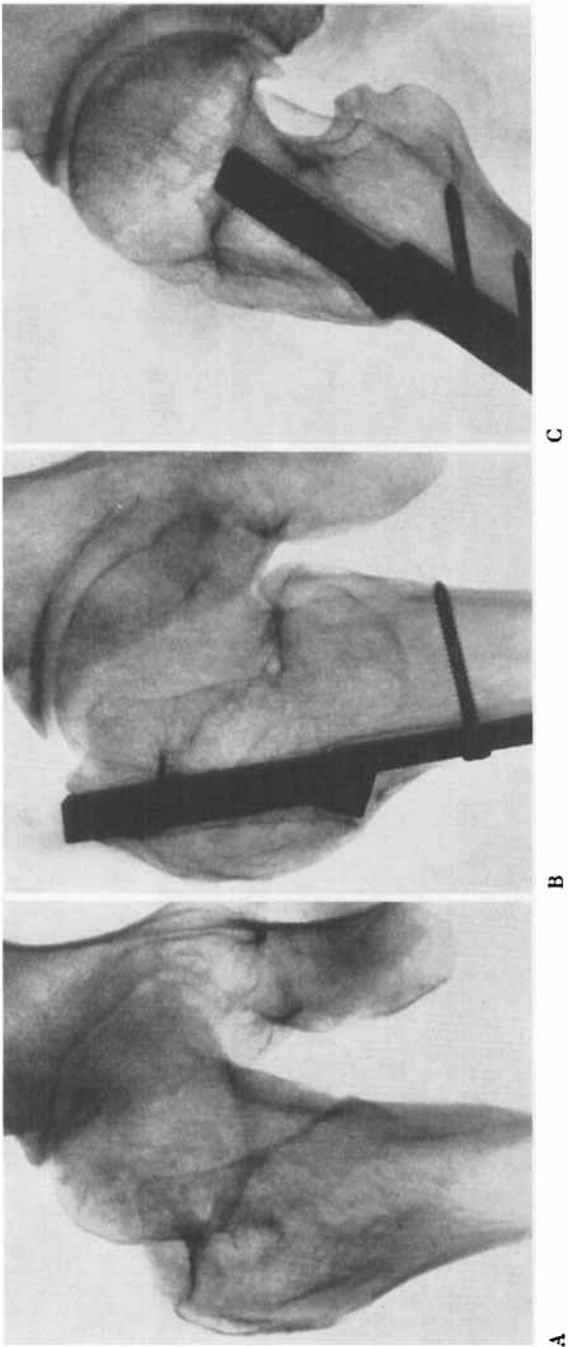
Result	No. of hips	Prim. arthr.	Sec. arthr.
Good	154 (82 %)	95 (83 %)	59 (80 %)
Fair	23 (12 %)	14 (12 %)	9 (12 %)
Poor	11 (6 %)	5 (5 %)	6 (8 %)
Total	188	114	74

The results were considered subjectively good if the patient had no pain at rest. These patients sometimes had pain under strain, but this was very slight and caused no trouble worth mentioning. The patient was often able to walk several kilometres without pain (see Table 8). Most of these patients were able to put on socks and shoes themselves (Table 6). The patient considered the result very much better than before operation. Cases were considered subjectively satisfactory if there was regular pain under strain but only seldom and very slightly at rest. Patients in this group considered the result better or much better than before operation. Cases were considered poor if there was pain at rest, and the patient regarded his condition as the same or worse than before operation. In 3 such cases the condition had previously been good for several years, but had then deteriorated. Cases which had led to arthrodesis were regarded as objectively and subjectively poor.

Table 5 shows results according to clinical and X-ray examination.

Table 5. Result according to clinical examination.

Result	No. of hips	Prim. arthr.	Sec. arthr.
Good	138 (73 %)	88 (77 %)	50 (68 %)
Fair	29 (16 %)	15 (13 %)	14 (19 %)
Poor	21 (11 %)	11 (10 %)	10 (13 %)
Total	188	114	74



*Figure 1. Subluxation and severe arthrosis of the right hip of a 64-year-old woman.
Figure 1 A. Before operation.
Figure 1 B and C. 3 years, 9 months, after operation. Note the clearly visible joint
space. The hip is painless.*

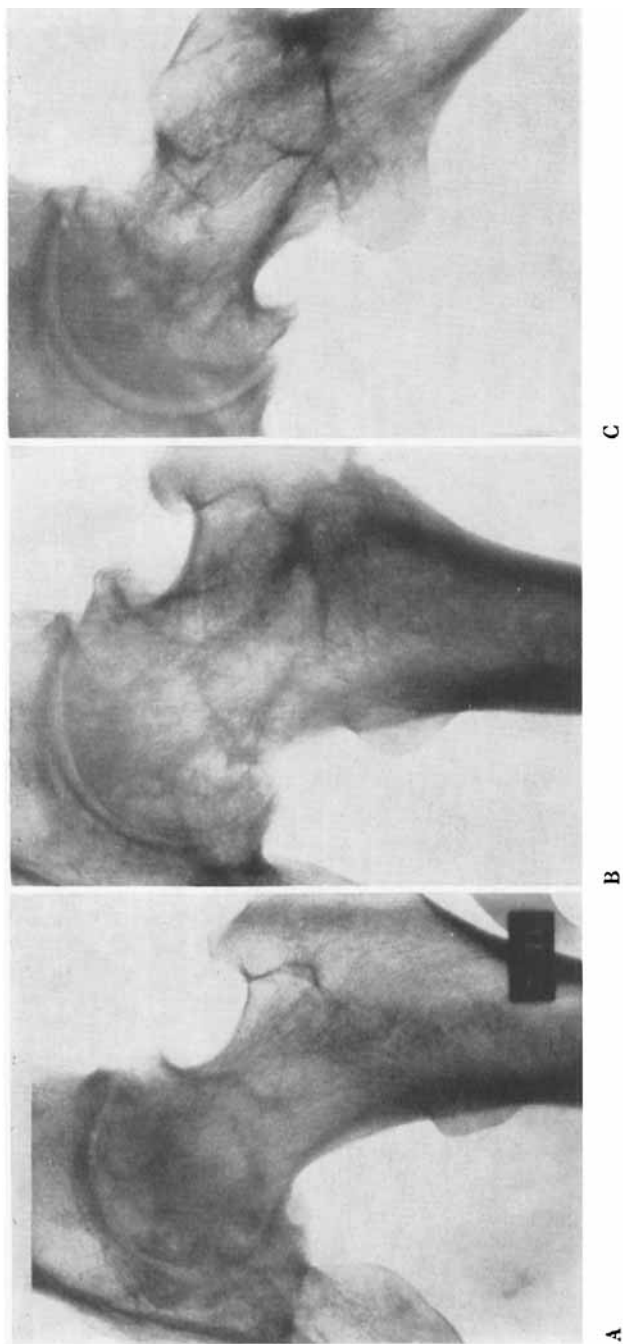


Figure 2 A. The left hip of a 36-year-old man with severe arthrosis.
Figures 2 B and C. The same hip 19 years, 8 months, after operation. After operation
the patient was a postman for 17 years, now retired because of heart injury.

The result was considered objectively good if the osteotomy had consolidated in the desired position and if arthrotic changes had decreased according to X-ray examination, the joint space had widened, and mobility in the hip had improved or remained the same after operation (Figures 1-4). These patients were able as a rule to put on shoes and socks, which demands relatively good mobility in the hip. 112 patients limped after operation, but this was not considered to impair the result. The result was regarded as objectively satisfactory if arthrotic changes in the hip had not increased after operation. Hip mobility in these patients was the same or better than before operation. They were not able to put on shoes or socks. The result was considered objectively poor if arthrotic changes had increased, if pseudarthrosis had developed at the site of operation, if the hip had stiffened, or if arthrodesis had been performed on it after operation. Results in the secondary arthrosis group are somewhat poorer than in the primary arthrosis group.

Table 6 shows the patient's activities after operation.

Table 6. Activities after operation.

	No. pat.	Per cent
Can climb stairs normally	120	67
Can climb stairs one at a time	59	33
Dresses	180	100
Puts on shoes	166	92
Puts on socks	158	88
Cuts toe nails	83	46

Mounting stairs was apparently made possible by the active flexion of the hip, which in most cases was good. The dissection of the iliopsoas tendon did not reduce the strength of flexion. The outward rotation and flexion and the slight abduction of the hip are important in putting on shoes and socks and in cutting toe nails. This becomes apparent especially in cutting toe nails. In many cases the range of motion of the hip was already limited before operation, as shown in Table 11.

Table 7 shows the use of stick post-operatively. Table 8 shows walking distance after operation. The length of walking distance was estimated by the patient himself.

In estimating the patient's post-operative working capacity his earlier occupation must be taken into consideration. If the patient has had

light work before operation he hardly begins performing heavy work after operation. Also patients retired because of age hardly start working after operation even if pains have disappeared.

Table 9 shows the patient's occupation before and after operation.

Table 7. Use of stick.

	No.	%
2 crutches	2	1
2 sticks	3	2
1 stick always	24	13
1 stick occasionally	50	28
no stick	101	56

Table 8. Walking distance.

Distance km	No. patients	Per cent
< 1	34	19
1-3	90	50
3-5	33	18
> 5	23	13
	180	

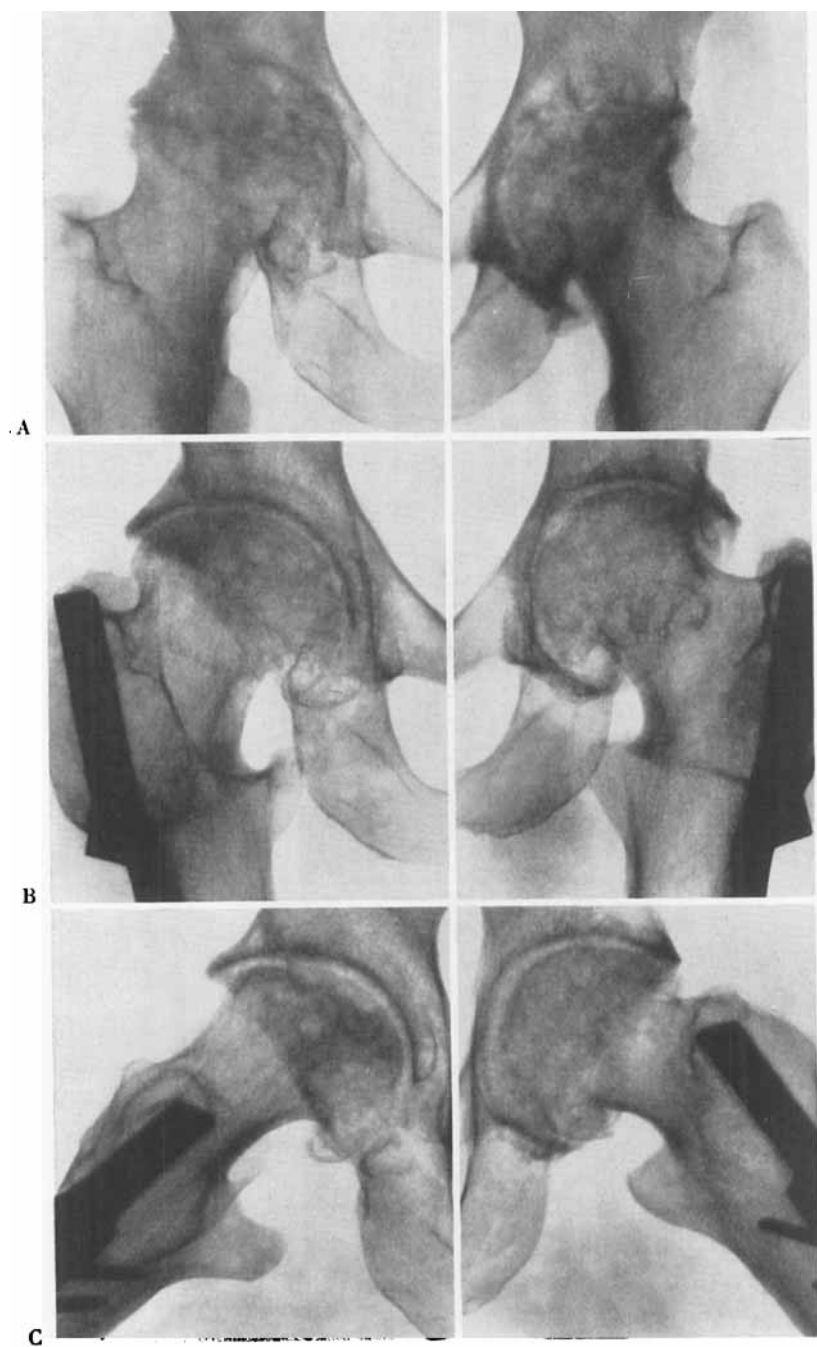
Table 9. Patient's occupation.

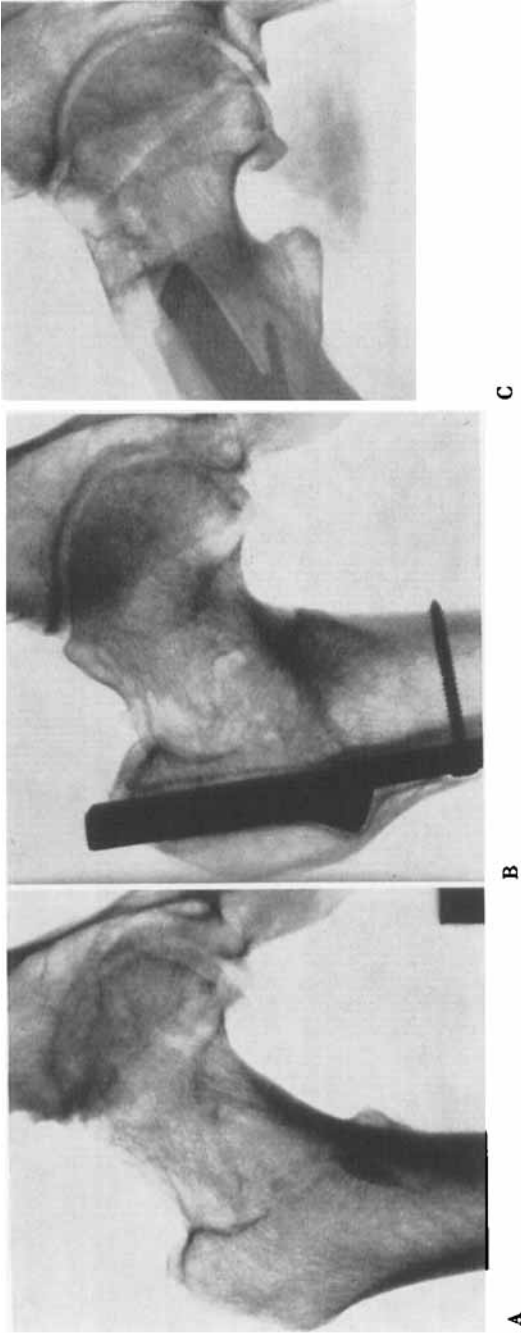
	Before operation		After operation	
	No. pat.	%	No.	%
Heavy work	42	23	17	10
Light work	116	65	103	57
Retired	22	12	60	33
Total	180		180	

Figure 3. Severe bilateral arthrosis of a 54-year-old woman with night pain.

Figure 3 A. Before operation.

Figures 3 B and C. The same patient whose right hip was operated 4 years, 1 month ago and left hip 3 years, 3 months ago. Both hips are now painless.





*Figure 4 A. Arthrosis of the right hip of a 46-year-old woman.
Figure 4 B and C. The final result 3 years, 4 months, after operation. The patient
works in an industrial laboratory.*

Table 10 shows the effect of discission of the ileopsoas on results.

Table 10. Effect of discission of ileopsoas on results

Result according to patient	No. of hips %		Ileopsoas			
			Divided		Not divided	
Good	154	(82 %)	96	(85 %)	58	(77 %)
Fair	23	(12 %)	14	(12 %)	9	(12 %)
Poor	11	(6 %)	3	(3 %)	8	(11 %)
Total	188		113		75	

Certain operative methods include several tenotomies such as severing the ileopsoas as was done in this material in some cases. The purpose of these methods is to reduce pressure on the hip by severing the tendons of muscles near the hip. In some cases pain has been relieved by the discission of adductors or ileopsoas or both separately. Severing the ileopsoas in this series did not impair the flexion of the hip. Most patients were able to raise the lower limb straight from a lying position. Walking and mounting stairs were also unimpaired.

Table 11 shows the mobility of the hip in the direction of flexion before and after operation.

Table 11. Mobility before and after osteotomy

Flexion before operation	No. of hips		Flexion after operation			
			0°-60°		60°-90°	
0-60 degrees	100 %	54 (29 %)	24	(44 %)	30	(56 %)
60-90 degrees	100 %	134 (71 %)	22	(16 %)	112	(84 %)
Total		188 (100 %)	46	(25 %)	142	(76 %)

Table 12 shows the effect of pre-operative flexion on results.

Table 12. Effect of pre-operative flexion on results

Pre-oper. flex.	No. of hips	Result according to patient		
		Good	Fair	Poor
0-60 degrees	54	40 (74 %)	10 (19 %)	4 (7 %)
60-90 degrees	134	114 (85 %)	13 (10 %)	7 (5 %)
Total	188	154 (82 %)	23 (12 %)	11 (6 %)

It appears from Table 12 that results are somewhat better in hips where pre-operative mobility was greater, but the difference between results is not statistically significant.

Table 13 shows the effect of the length of observation time on results.

Table 13. Effect of observation period on results

Period of observation (yrs)	No. of hips	Good	Fair	Poor
2- 6	146	123 (84 %)	20 (14 %)	3 (2 %)
6-10	21	16 (76 %)	0 (0 %)	5 (24 %)
10-14	5	4 (80 %)	1 (20 %)	0 (0 %)
14-18	2	1 (50 %)	0 (0 %)	1 (50 %)
18-22	14	10 (72 %)	2 (14 %)	2 (14 %)
Total	188	154 (82 %)	23 (12 %)	11 (6 %)

In Table 13 cases are divided in groups according to the observation period, showing subjectively good, fair and poor for each group. It appears that the percentage share of the various groups does not change noticeably during the observation period. On this evidence the effect of osteotomy lasts for over 20 years.

DISCUSSION

Follow-up examination showed that intertrochanteric osteotomy is an effective means of removing pain arising from arthrosis of the hip. Early mobilization of the patient obviously reduces post-operative complications. Fixation of the fragments can evidently be improved still further and time of recovery and time in hospital thus shortened.

In the present study no considerable differences were noticed concerning the result of osteotomy between the primary and secondary arthrosis. The differences of some per cent between the groups were not statistically significant. Instead, a significant difference was noticed between the groups where the ileopsoas was discised or not. It seems evident that cutting the ileopsoas has a positive influence on the result of osteotomy, and that is why this procedure has been introduced as a routine in our hospital in recent years.

According to McMurray and Nissen (McMurray 1939, Nissen 1964), flexion of at least 60-90 degrees must be obtained in the hip for the results to be good. This material showed a result almost independent of

the degree of flexion. Differences of some per cent were not statistically significant. The movement of the hip-joint was somewhat improved after operation, apparently due to relief of pain. In the group where the flexion was 0-60 degrees before the operation, half of the patients had flexion of over 60 degrees after operation. To estimate the range of movement of the hip before operation is difficult because in many cases pain prevents free movement. On the other hand, examination during anaesthesia produces flexion of the hip even to 90 degrees when sufficient amount of force is used. That is why especially the pre-operative estimation of the movement of the hip is to some extent unreliable. However, it seems evident that a stiff hip is a disadvantage for a patient even if pain is relieved.

An observation of great interest in the present material was that the effect of osteotomy had lasted for more than 20 years. Previously osteotomy was often performed in advanced cases, and post-operative immobilization in plaster was apt to impair the result. Because the results were nevertheless good in regard to the relief of pain, osteotomy can be regarded as a reliable measure in the treatment of a painful arthrotic hip.

If the hip is stiff and especially if both hips are stiff, it seems that arthroplasty would be better indicated.

CONCLUSIONS

For the operated hips, pain had disappeared at rest in 154 cases (82 %), and these patients seldom had pain even on strain. In addition pain had diminished in 23 (12 %) other hips. Arthritic changes were observed to have diminished in the X-ray, to a great degree in 138 cases (73 %) and partly in 29 cases (16 %). Osteotomy is thus to be regarded as a reliable measure in the treatment of a painful osteoarthritic hip. No statistically significant differences were found between the results in primary and secondary arthrosis. The pre-operative flexion of the hip did not affect the result in regard to relief of pain.

Discission of the ileopsoas was noted to give significantly improved results.

The effect of osteotomy had lasted in some cases of the present material for over 20 years. This is an observation of great importance, because the effect of osteotomy can be considered to last longer than the effects of any other procedure presently in use.

SUMMARY

At the Orthopaedic Hospital of the Invalid Foundation, more than 400 intertrochanteric displacement osteotomies have been performed since 1945 in the treatment of painful arthrotic hip. The present material consists of the osteotomies performed until the end of 1965. Osteotomies were performed on 201 patients; 8 of these cases were operated bilaterally. The mean age of the patients was 51½ years, the oldest being 77 years of age and youngest 16 years at the time of operation. Arthrosis was considered primary in 118 cases and secondary in 83 cases. The mean observation period was five years, eight months, varying from 22 years to 2½ years. At the follow-up examination the case was considered good if pain at rest and on strain had disappeared. The number of these cases was 154 (82 %). The result was considered fair if pain at rest was slight but appeared after walking. Even these patients considered their condition better than before operation. The number of hips in which the result was considered fair was 23 (12 %). The result was considered poor if pain had increased or if other operative procedures had become necessary. The number of these cases was 11 (6 %). Arthrotic changes had clearly improved radiologically in 73 % of the cases. Discission of the ileopsoas was performed during the operation in 113 cases and of these 85 % were good. In cases where the ileopsoas was not severed the result was good in 77 % of cases. This difference was statistically significant. The pre-operative flexion of the hip was not considered to have any statistically significant effect on subjective results and relief from pain. Because the longest period of observation was more than 20 years, attention was paid to the duration of relief of pain. It was noticed that of the 14 cases operated 18–22 years ago, the subjective result was good in ten cases, fair in two cases, and poor in two cases. It seems evident that the effect of osteotomy may last for more than 20 years.

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