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EFFECT OF OSTEOTOMY ON PAIN IN IDIOPATHIC OSTEOARTHRITIS OF THE HIP

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Numerous reports of the results of follow-up examinations after high femoral osteotomies have been published. An improvement rate of 60–80 per cent is generally reported. (McMurray 1935, Shepard 1960, Robins & Piggot 1960, Harris & Kirwan 1964, Hirsch & Goldi 1968, Bastiaini 1969, Salenius et al. 1971).

The beneficial effect of the displacement osteotomy has been ascribed to biomechanical alterations of the joint (Pauwels 1963, Knodt 1964, Blount 1964). The main theory claimed that the value of an osteotomy was due to changes in the direction of the mechanical forces acting on the hip joint. This effect was achieved by displacement osteotomies.

The validity of this mechanical theory was questioned when Nissen (1963) described an osteotomy technique where no gross changes of the biomechanics of the hip joint occurred. The results achieved with this non-displacement technique equalled those after displacement osteotomies.

Pain at rest in the osteoarthritic hip joint has been shown to be correlated with high intraosseous pressures (Arnoldi et al. 1972). Further it has been shown that osteotomy resulted in immediate reduction of the high intraosseous pressure concommitant with postoperative freedom from pain at rest (Arnoldi et al. 1971). In any case these observations put further doubts on the mechanical theories as the sole source of effect of an osteotomy.

The effect of osteotomy on pain at rest and on pain on movement was described by Hirsch & Goldie (1968) and mentioned by Salenius et al. (1971). No previous study could be found where the results were analysed with respect to distinguishing the effect between displacement and non-displacement osteotomies on pain at rest and on pain on movement.

Pain at rest is the dull deep ache experienced at rest. The intensity of the ache is often correlated with previous activity of the joint, but in the severest form it is a constant pain. *Pain on movement* is the type of discomfort the patient experiences only when moving the joint with or without weight-bearing.

The aim of the present follow-up examination was to study the effect of different types of osteotomies—one with and two without displacement—on idiopathic osteoarthritis of the hip with particular regard to the effect on pain at rest and on pain on movement.

MATERIAL AND METHODS

A total of 161 hips with primary osteoarthritis were treated with high femoral osteotomies during the period 1959–1969. Forty-five patients (49 osteotomies) were not examined. Fifteen patients had died and 15 were not available for examination. In 15 hips some other type of surgery had had to be undertaken due to failure of the osteotomy. Thus the final material included in this follow-up examination consisted of 112 osteotomies in 101 patients, 58 males and 43 females between the ages of 36 and 72 years at operation (mean age 59.2 years).

Operative Techniques

Three different types of high femoral osteotomy have been performed (Figure 1). Each different operative technique was used during a certain period and no preoperative selection of cases for a specific method was made.

Method I. In use 1959–61 and 1967–69. Thirty-six displacement osteotomies. Internal fixation with nail and plate. Mean age at operation 57.7 years.

Method II. In use 1961–64. Twenty-seven non-displacement osteotomies according to Nissen (1960). Mean age at operation 59.9 years.

Method III. In use 1964–67. Forty-nine oblique subtrochanteric non-displacement

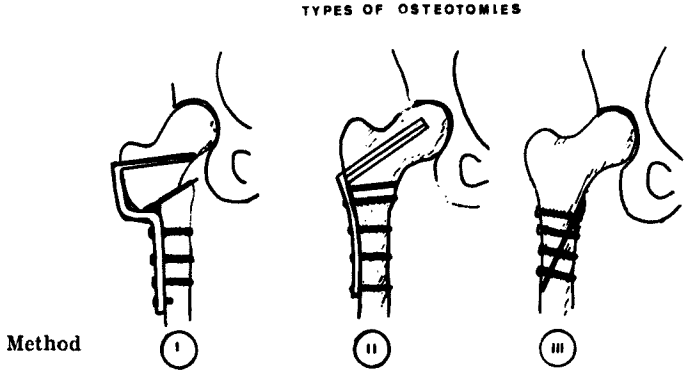

Figure 1. Types of osteotomies.

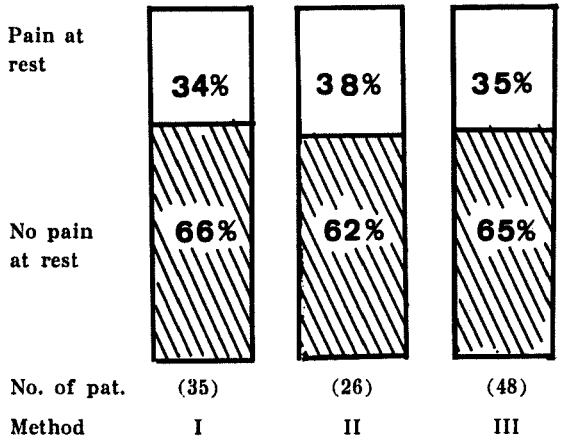

Figure 2. Effect on pain at rest.

osteotomies with internal fixation achieved by 3–5 cortical screws. Mean age at operation 59.7 years. This method was introduced by Lindahl.

As a rule, the patients were mobilized the day after the operation and partial weight-bearing with two canes was allowed until the osteotomy was considered healed. The time from operation to full weight-bearing varied from 2 to 27 months (mean 4.5 months).

Indications for Operation

The main indication was pain, particularly pain at rest. All patients had pain on movement at the time of the operation. In addition pain at rest was present in all but three hips.

The range of extension-flexion movement is shown in Table 1.

Table 1. Range of movement pre-operatively.

Extension – flexion	>90°	90°–60°	60°–30°	<30°
Number of hips	29	50	28	5

Post-operative Complications

In five patients (4 per cent) deep venous thrombosis in the leg with no further complications was diagnosed by clinical examination. In nine osteotomies (8 per cent) post-operative instability was found. Seven hips were treated with re-osteosynthesis, one with traction and one with plaster of Paris. At the time of the follow-up examination non-union persisted in three cases. In three cases (2 per cent) deep infection occurred. One transient peroneal nerve palsy was noted.

Follow-up Examination

The material was studied with clinical and roentgenological examination. The average observation period in the different groups was: Method I 6.5 years, Method II 9.3 years, Method III 6.3 years.

Statistics

X^2-analysis was used to evaluate the statistical significance of differences between the groups.

RESULTS

Total assessment. In the different methods sixty-nine to seventy-eight per cent of the patients considered that the osteotomy had resulted in a general improvement in their symptoms. Seventy to seventy-eight per cent claimed that they would agree to a new osteotomy if their preoperative symptoms recurred. No differences were found between methods.

Pain at rest—Pain on movement. A higher frequency of effect on pain at rest than on pain on movement was found (Figures 2 and 3). No differences can be seen between the methods.

Observation time. Figures 4 and 5 show that the effect upon the different types of pain tends to decrease with increasing observation time.

Walking capacity and occupation. As a whole the walking capacity remained unchanged after the osteotomy (Figure 6). However, very

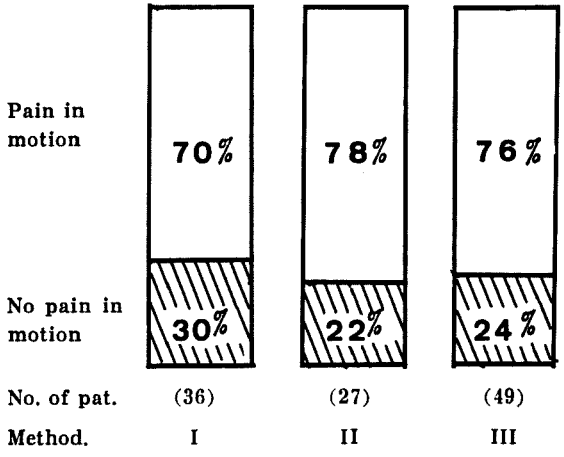

Figure 3. Effect on pain in motion.

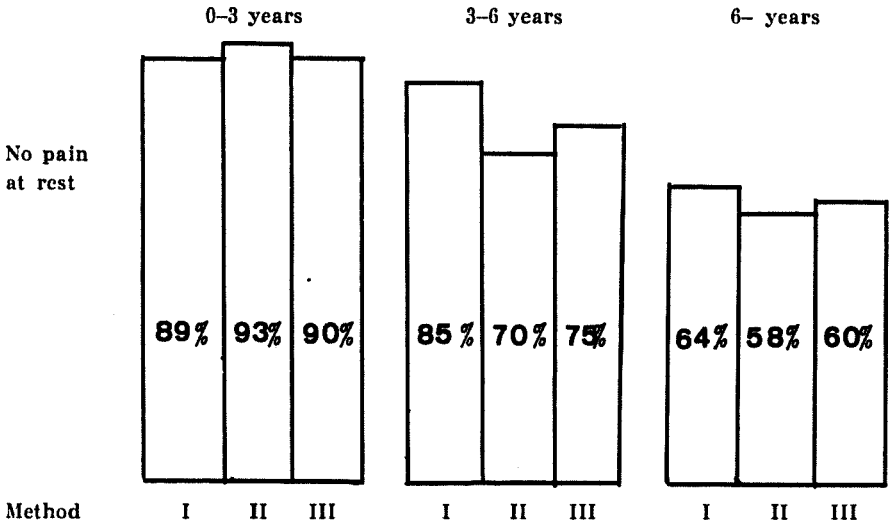

Figure 4. Pain at rest versus observation-time.

few patients could continue with heavy labour. The group performing light work included mainly housewives (Figure 7). No difference exists between methods.

Extension—flexion movement. A slight loss of movement was found in all the methods.

Roentgenological. The X-ray films were evaluated with regard to joint space, cysts and sclerosis. No trend at improvement or deterioration of any significance was found between the methods.

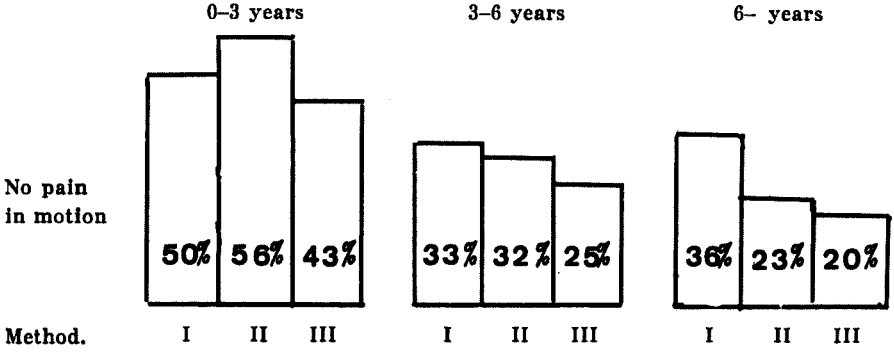

Figure 5. Pain in motion versus observation-time.

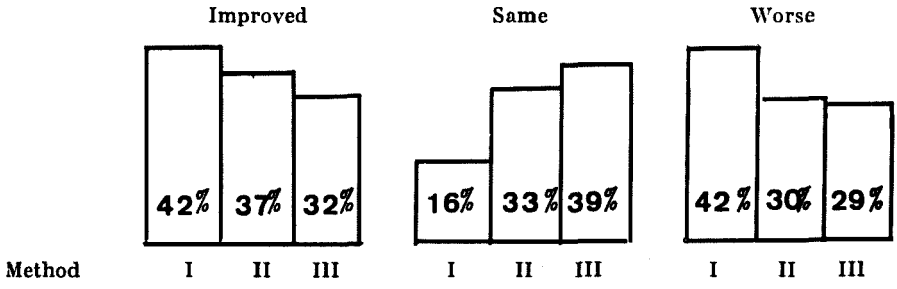

Figure 6. Walking capacity.

DISCUSSION

The results of the present follow-up examination must be evaluated with the background that pain and especially pain at rest have been the main indication for osteotomy.

The overall results expressed as "total assessment" are in agreement with the earlier opinions (McMurray 1935, Shepard 1960, Robins & Piggot 1960, Harris & Kirwan 1964, Hirsch & Goldi 1968, Salenius et al. 1971) that improvement is to be expected in about three-quarters of the patients after an osteotomy.

However, the osteotomy, regardless of whether it is performed with or without displacement, has clear limitations. From the present material we can only find a lasting positive effect on pain at rest. The ability to relieve pain at rest in good (62–66 per cent) while the effect

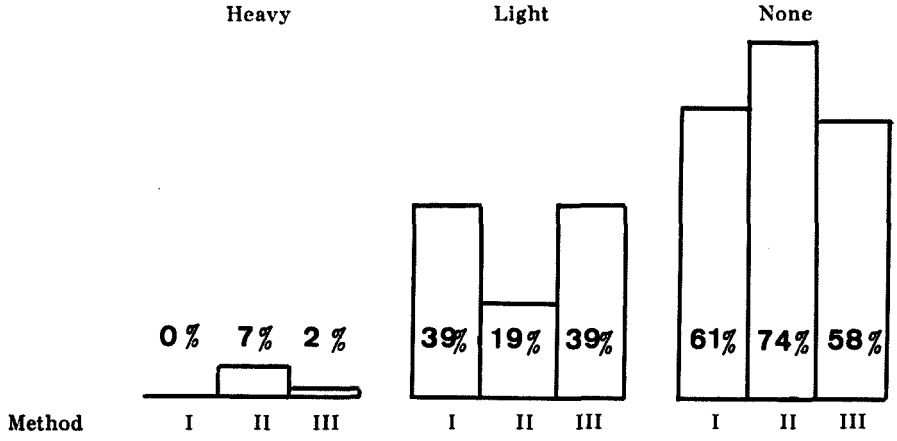

Figure 7. Occupation.

on pain on movement is poor (22–30 per cent). When comparing these findings with the results expressed as "total assessment" it is evident that relief of pain at rest was the main factor behind the patients own opinions of the result. If pain at rest is relieved the patient finds a definite general improvement in spite of possible persisting pain on movement. The explanation given by the patients is that pain on movement can be controlled by walking more slowly and carefully. If such activities do not lead to aching pain at rest in the evening and at night the patients are able to keep up or even increase their activities.

The difference in effect on pain at rest and on pain on movement also stresses the importance of the fact that pain at rest should be the main indication for osteotomy. Furthermore, these two qualities of pain must properly be taken into account when assessing the results after treatment of osteoarthritis (Appel & Friberg 1972).

The lack of significant differences between displacement and non-displacement osteotomies, must cast serious doubts on the validity of the biomechanical theories of osteotomy effect. Our results are more compatible with the theory which claims that the effect of the osteotomy could be explained by improved vascular drainage from collum and caput femoris (Helal 1965, Philips 1966, Arnoldi et al. 1971, 1972).

The trent towards deterioration of the overall results with time indicates the possibility of further surgery. This possibility and the findings that no difference can be found regarding results between the methods show that osteotomies with medial displacement should be avoided since they will be a disadvantage if a total hip arthroplasty has to be performed later.

It has been claimed that roentgenological improvement of the osteoarthritic process can be expected after an osteotomy (Robins & Piggot 1960, Nissen 1960, Heimgartner 1969), but we, like Hirsch & Goldi (1968), could not observe any general trend of changes in the severity of the osteoarthritic process after the osteotomy.

As a total evaluation of the osteotomy in osteoarthritis of the hip we feel, that in those patients where the indications for total hip arthroplasty or arthrodesis are controversial, osteotomy performed as treatment for pain at rest must still be considered as a valuable therapeutic procedure.

SUMMARY

The results after three different operative techniques for high femoral osteotomies performed as treatment for idiopathic osteoarthritis of the

hip are presented. A total of 112 operated hips with a mean observation period of 7.2 years were evaluated by clinical and roentgenological follow-up examination.

No statistically significant differences regarding the results were found between "displacement" and "non-displacement" osteotomies. The importance of the two different forms of pain from an osteoarthritic joint namely "pain at rest" and "pain on movement" is stressed. Regardless of the operative method used, the effect on pain at rest was good while the effect on pain on movement was less pronounced.

The possible significance of these findings for the pathomechanism behind the effect of an osteotomy is discussed. The results indicate that high femoral osteotomy whether performed with displacement or not is a valuable therapeutic procedure in the treatment of pain at rest caused by osteoarthritis of the hip joint.

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