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## INTERTROCHANTERIC VALGUS OSTEOTOMIES IN HIP ARTHROSIS

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Surgery in hip arthrosis is a problem with many facets and a problem which is very far from being solved. At the Orthopaedic Clinic in Härnösand, arthrodesis is considered to be a method which gives good results (11) but it is, in many hands, an operation with infrequent bone union. Furthermore this arthrodesis has limited indications (11, 13) and thus there remain many patients with coxarthrosis who must be treated in other ways. A simple method which has attracted much interest is the intertrochanteric valgus osteotomy which was introduced by *Lorentz* (12) and developed by *McMurray* (14). This technique used to be complicated by the long period of after-care owing to the plaster fixation and the consequent increased rigidity of the patient. In the last decade conditions have improved owing to the use of internal fixation (2, 8, 10, 21) and the method has regained its popularity. A number of follow-up surveys have also been published but the majority of these show a miscellaneous range of etiologies and only a small number are comprised solely of coxarthroses cases (7). To confuse the issue further, some of the reported cases had been treated by conventional plaster fixation (3, 13, 14, 16, 22), some by both internal fixation and plaster (18) and yet others by a mixture of either internal fixation or plaster (1, 15, 20). Therefore the author thought it important to publish the results of a series of operations performed on clear coxarthroses in which internal fixation without plaster was used followed by uniform after-care of the patient.

In the published surveys there is a large divergence in the methods of reporting results which makes comparisons difficult. *Gade* (6) introduced a standard assessment procedure which has been developed

and used by *Shephard* (19, 20). A more recent follow-up survey of conservatively treated hip arthroses has employed the same assessment index (5).

#### MATERIAL

This series is based on patients with primary idiopathic arthrosis or secondary arthrosis owing to epiphyseolysis for which it was not possible to make a differential diagnosis. In the period 1955-60 operations were performed on 115 patients in the age range 32 to 71 years (average 56 years). A total of 124 valgus osteotomies were performed with the same technique as 9 patients were operated on bilaterally. Different operative techniques have been employed in the treatment of the contralateral joints of 10 patients as can be seen in Table 1. The sex distribution is fairly even with 63 male and 61 female hips and 70 of the patients had bilateral arthrosis. Before the operation the patients had pain for an average period of more than 4 years, 8 patients died, one of these post-operatively owing to a cerebral embolism, while 7 died several years later from causes not connected with the operation. All the remaining patients were examined by the author after a minimum post-operative period of 5 years (average period 6.5 years). The results are reported both according to subjective, objective and radiological assessment and also employing the index of *Gade* (6).

Table 1.

	Male	Female	Numbers
Unilateral osteo-arthritis with osteotomy	27	27	54
Bilateral osteo-arthritis {	Unilateral osteotomy	21	51
	Bilateral osteotomy	5	9
	Other side, other operation	8*	10
Sum	63	61	124

\* Arthrodesis 1. Smith-Petersen 4. Girdlestone 2. Moore 3.

#### INDICATIONS AND OPERATIVE PROCEDURE

The main indications were aching at rest and pain on weight-bearing. In addition relatively good mobility was required, *i.e.* flexion capacity of at least 60 degrees (13) and an adduction capacity corresponding to the intended valgus position (16, 23). After the introduction of varus osteotomies, X-rays are taken to an ever increasing extent both in abduction and adduction (17) in order that operative procedure could be modified to produce the best congruence between caput and acetabulum.

Via an incision 5 inches long and an approach through the posterior portion of vastus lateralis the shaft of the femur and the intertrochan-

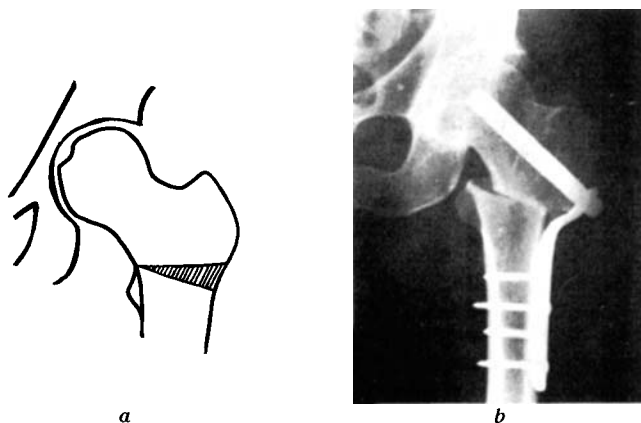


Figure 1 a and b. Diagram of operative procedure and radiological appearance of the completed valgus osteotomy.

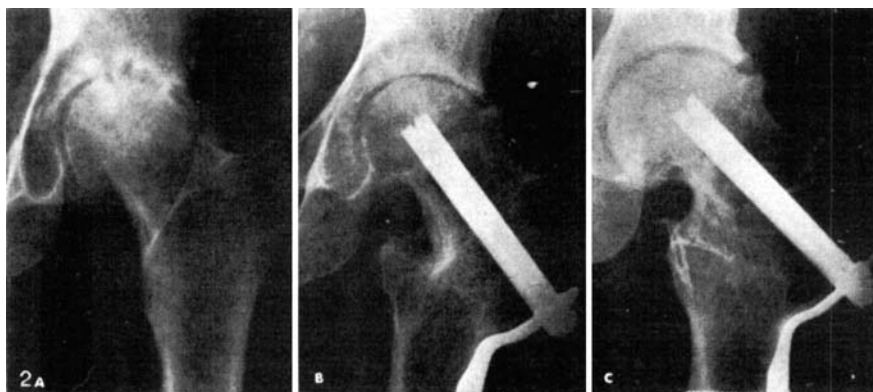


Figure 2. Radiological appearance of the arthrosis hip a) pre-operatively, b) 8 months post-operatively and c) 7 years post-operatively.

teric line were exposed. Very often a wedge was excised, as shown in Figure 1 a (2), with a lateral base in accordance with the planned valgus position. The wedge was also designed to afford correction of the flexion contracture. Afterwards the rotation malposition was corrected and the medial displacement of the distal fragment was performed. In the present series this medial displacement extended to the width of the cortex in 25 cases, up to half the diameter of the femur in 67 operations and more than half the diameter of the femur in the remaining cases.

Before internal fixation was introduced, plaster fixation was used; in the mid-fifties the Kessel plate (9) was employed in a few cases (Table 2) but late in 1955 the method of *McKee-Nissen* (10, 21) was adopted—*i.e.* fixation with plate and nail, cf. Figure 1 b. Despite the rigid fixation which prevents the maintainance of compression between caput fragment and shaft following resorption (23), the method has been proved neither to be a disadvantage nor to endanger healing. This is perhaps due to the fact that the nail is given an extra blow before the nut is tightened so substantial compression is obtained in this way in valgus osteotomies.

*Postoperative care* regularly consisted of 6 weeks bed rest and physiotherapeutic treatment of the knee was instituted 3 weeks post-operatively. After 6 weeks the patients were allowed up on crutches and systematic walking exercises were begun and training for the activities of daily living. After a total of a couple of months in hospital the patients were allowed to go home with continued exercise schedules but out-patient physiotherapy was continued only in a few cases.

*Complications:* There were 8 cases of postoperative hematoma with delayed healing; infection superficially at the site of operation in 2 cases and thrombosis in 10 cases. Bronchial pneumonia occurred in 3 cases and there was also a fatality owing to cerebral hemorrhage.

## RESULTS

Initially plaster fixation was used and afterwards, for a short period, the Kessel plate before the nail and plate procedure of *McKee-Nissen* was adopted. During the period 1955–60, which this survey covers, 6 patients were treated by plaster fixation alone. 13 operations were performed with the Kessel plate but in the majority of these cases the valgus position sought could not be maintained and, in 8 of the cases with the *Kessel* plate, instability compelled us to apply plaster in ad-

Table 2.

Fixation	Numbers	Pseudo-arthrosis	Ankylosis	Failures
Plaster only	6	1	2	4
Kessel-plate	5	2	0	2
{ Only				
{ + plaster	8	4	1	5
Nail-plate a.m. <i>McKee-Nissen</i>	97	6	0	12

dition (Table 2). 5 of these cases with plaster fixation suffered thrombosis postoperatively and 11 of the above 19 cases were not successful as their discomfort was not alleviated. 7 developed into pseudoarthroses and 3 cases healed primarily as arthrodesis, *i.e.* considered unsuccessful as osteotomies. Therefore, as 58 per cent of these 19 cases were not successful, the need for better internal fixation, by nail and plate, was obvious. In order to obtain a series consisting solely of coxarthroses operated upon in a uniform way and with fixation by nail and plate, ad modum McKee-Nissen, the above 19 cases have been excluded from the following account.

Therefore, in 97 hip operations of valgus type utilizing McKee-Nissen fixation, 70 per cent of the patients consider that the operation was worth performing. 18 per cent were satisfied but had reservations as they thought that their mobility had become worse or that they had become weaker in the leg after the operation. 12 per cent dissatisfied with the result of the operation, 3 because other troubles had arisen in the back and knee and 9 cases because their troubles were just as pronounced as before the operation. 16 per cent were completely pain-free, while a further 42 per cent had insignificant discomfort, not affecting their activity but noticeable after extreme weight-bearing or change of weather. Weight-bearing pain alone occurred in 9 per cent and aching only at rest in 3 per cent, but in all cases the pain was considerably less than before the operation. 30 per cent continued to have both weight-bearing pain and aching at rest but 18 per cent of these were considerably better than they were before the operation. No change had occurred in 12 per cent of the cases where the operation must therefore be regarded as unsuccessful. Thus 88 per cent of the patients felt some improvement after operation as is shown in summarized form in Table 3 where the results are reported according to the Gade index.

*Table 3. Pain (in groups according to Gade).*

	%
Excellent	55
Good	23
Fair	10
Poor	12

7 of the 12 unsuccessful cases (12 per cent) were reoperated on by another method: 4 cases of arthrodesis, 2 endoprostheses ad modum Moore and 1 case of arthroplasty ad modum Smith-Petersen. At the follow-up these patients could not be recorded as osteotomies and

therefore the clinical as well as the radiological findings presented here will cover only 90 hip operations.

In general the patients themselves were allowed to decide when they could dispense with the aid of sticks after the operation. 12 patients stopped using sticks within 6 months. 24 patients used sticks for between 6 and 12 months and 14 patients stopped using sticks after a period of more than 1 year; in all, 56 per cent did not use sticks at the time of last examination. 25 of the remaining 44 per cent who continue to use sticks had bilateral arthrosis and 10 of them had been operated on bilaterally. Trendelenburg's tests were negative in 53 per cent, doubtful in 30 per cent and clearly positive in 17 per cent, 98 per cent could unaided and 98 per cent could cope with personal hygiene. and shoes unaided and 98 per cent could cope with personal hygiene.

*Table 4. Ability to work.*

	%
None	43
Clerical work	5
Homework	34
Industrial work	11
Heavy work	7

*Table 5. Restriction of functional activity.*

	%
Mild	41
Moderate	46
Severe	13

Many of the patients, who had previously done heavy work in agriculture, forestry or industry, could not perform similar work in spite of the operation. At the time of follow-up 57 per cent had wage-earning work and of these 5 per cent did their work while sitting, 34 per cent had lighter work, mainly as housewives, while 11 per cent still had fairly heavy industrial work and 7 per cent heavy agricultural and forestry work. (Table 4). Of the remaining 43 per cent who did not work, 9 per cent were too old to work and 34 per cent were retired with an early pension owing to the hip trouble. Summarizing, Table 5 shows restriction of function according to the Gade-index, *i.e.* the ability to cope with the activity of daily living, including Trendelenburg, the use of sticks and the capacity to work.

Initially the indications were not completely clear but developed as

our experience of the operation increased, thus a number of patients which did not fulfill the previously stated conditions were operated on. It was found at the follow-up that, of the 12 unsuccessful operations, 7 cases had adduction contractures before the operation, 5 had no adduction ability and 5 had flexion of less than 60 degrees. Clinical examination showed that 60 cases had flexion contractures before the operation and that 80 per cent of these had been corrected. 35 out of 45 outward rotation malpositions were corrected while 14 new ones developed post-operatively so that, in all, outward rotation contractures were present in 27 per cent following the operation. The changes which took place with respect to mobility are shown in Table 6. These changes were generally slight and the mean value of the Gade index rose from 45, before the operation, to 50 at the time of follow-up. This increase is not statistically significant and therefore one cannot expect to be able to increase the mobility appreciably by this operation. It is very important to be aware of this when a patient is informed pre-operatively of the result which can be justifiably expected from the operation. This was also shown at the follow-up, when 12 patients declared themselves to be less pleased with the operation because their mobility had become worse than they expected. The range of motion before and after the operation is summarized in Table 7 in terms of the Gade index.

*Table 6. Changes in mobility by the operation in per cent.*

After operation	Increased	Unchanged	Decreased
Flexion	30	36	34
External rotation	23	52	25
Abduction	51	39	10
Adduction	38	47	15

*Table 7. Range of motion (according to Gade).*

Mobility before operation	Mobility after operation				Sum in %
	Excellent	Good	Fair	Poor	
Excellent	31	5	0	0	37
Good	22	17	8	2	57
Fair	0	2	0	1	4
Poor	0	1	0	1	2
Sum in %	59	28	9	4	100

*Table 8. Radiographic changes in per cent.*

	Better	Unchanged	Worse
Joint space	56	29	15
Cysts	50	28	22
Sclerosis	23	57	20
Osteophytes	0	51	49

X-rays conventionally analysed, showed improvement in the joint space in 56 per cent of the cases (Table 8) (1, 18, 20). There were healed cysts in 50 per cent and diminished sclerosis in 23 per cent. It was shown radiologically that the arthrosis process, which is usually seen to progress in untreated hips ceased after the operation and sometimes healed to a large extent (see Figures 2 a-c).

The nail, plate and screws were of stainless steel but owing to the discomfort caused by electrolytic action (4), we were compelled to extract these implants in 43 per cent of the cases. Of the remaining 57 per cent who retained their osteosynthesis material about half had tenderness at the site of operation. As this also was probably caused by electrolytic action around plate and nail, consideration was given to changing to vitallium implants. Unfortunately plates of this material cannot readily be bent and this is just what one is sometimes compelled to do in order to adapt the valgus angle to the adduction ability and anatomical conditions of each patient and also to make possible the medial displacement of the distal fragment.

#### SUMMARY

Valgus, intertrochanteric osteotomies were performed on 97 patients with hip joint arthrosis and fixation was achieved by plate and nail according to McKee-Nissen. These operations were carried out in the Orthopaedic Clinic in Härnösand in the period 1955-60 and the follow-up was undertaken on average 6.5 years postoperatively.

Improvement as regards aching at rest and weight-bearing pain was present in 88 per cent of the cases. 57 per cent had resumed work of some form and 87 per cent demonstrated the ability to cope with daily living. On the other hand mobility was scarcely affected by the operation. As determined radiologically the arthrosis process was found to have ceased and there were increased joint spaces and healed cysts in half of the cases.

## RESUME

Des ostéotomies intertrochantériennes valgues ont été pratiquées chez 97 malades souffrant d'arthrose de la hanche.

La fixation a été accomplie au moyen de plaques et de clous d'après la méthode McKee-Nissen.

Ces opérations ont été effectuées à la Clinique Orthopédique de Härnösand dans la période 1955–60 et les examens complémentaires ont été entrepris en moyenne 6 ans et demi après l'opération.

On a constaté une amélioration en ce qui concerne les douleurs tant au repos que provoquées par le port d'un poids dans 88 pour cent des cas. 57 pour cent avaient une certaine forme de travail. 87 pour cent ont montré qu'ils étaient capables de vivre à peu près normalement. La mobilité avait d'ailleurs à peine été affectée par l'opération. Comme déterminé par la radiographie, on a trouvé que le processus de l'arthrose s'était arrêté et qu'il y avait des espaces interarticulaires plus larges et des cystes guéris dans la majorité des cas.

## ZUSAMMENFASSUNG

Intertrochanterische Valgusosteotomien wurden an 97 Patienten ausgeführt, deren Hüftgelenk mittels Platte und Nagel gemäss McKee-Nissen fixiert worden war. Diese Operationen wurden an der orthopädischen Klinik in Härnösand während des Zeitraumes 1955–60 ausgeführt und die Nachuntersuchung wurde durchschnittlich 6,5 Jahre der Operation vorgenommen.

Besserung hinsichtlich Ruheschmerz und Belastungsschmerz war in 88 Prozent der Fälle vorhanden. 57 Prozent hatten Arbeit in irgendwelcher Form wieder aufgenommen und 87 Prozent zeigten die Fähigkeit das tägliche Leben zu bewältigen. Andererseits war die Beweglichkeit kaum beeinflusst durch die Operation. Röntgenologisch wurde gefunden, dass der arthrotische Prozess aufgehört hatte und dass erweiterter Gelenksraum und geheilte Cysten in der Hälfte der Fälle gesehen werden konnte.

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