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THE TREATMENT OF HALLUX VALGUS BY DISTAL OSTEOTOMY OF THE 1st METATARSAL

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The number of operations used in the treatment of a deformity is usually in inverse proportion to the success of the treatment; there are about seventy different operations which have been used in the treatment of hallux valgus (1), and the results after operations are correspondingly uncertain. Although one is reluctant to add another variant to the list, the procedure described first by *Mygind* 1953 (2) and modified by Erin Madsen gives consistently good results in suitable cases, and the technique, although exact, is essentially simple.

OPERATION

The procedure consists of a wedge osteotomy of the 1st metatarsal, performed as distally as possible without opening the metatarsophalangeal joint (Plate I). The head of the metatarsal is displaced laterally and plantar, thereby correcting all elements of the foot deformity, restoring the normal axis of the big toe, narrowing the foot, relieving pressure on the 2nd and 3rd metatarsal heads and the symptoms of metatarsalgia, and relaxing tension in the soft tissues on the lateral side of the metatarsophalangeal joint, particularly the adductor hallucis, so that tenotomy is unnecessary. The osteotomy is done through the cancellous bone of the metatarsal head, so that bony union presents no problem.

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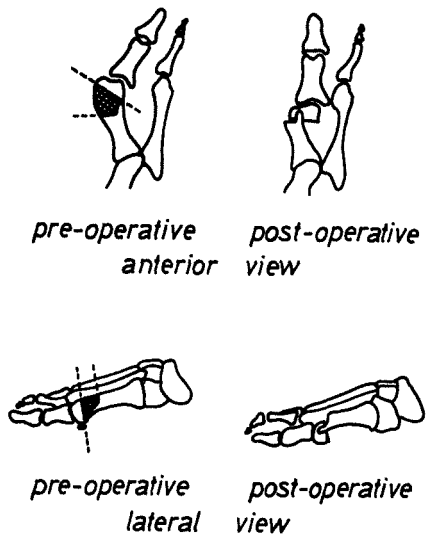

Figure 1. Wedge osteotomy of head and neck of 1st metatarsal.

The operation is performed under a dry field through a dorso-medial incision, and the osteotomy is made with the narrow blade of the oscillating saw; the distal cut is oblique through the cancellous bone of the metatarsal head, the proximal cut transverse, with a small peg located laterally and plantar on the metatarsal shaft; care is needed in forming the peg, as the cortical bone is liable to splinter. A small hole is fashioned in the cancellous bone of the distal fragment to accomodate this proximal bone peg; this hole should be dorsal and medial in the cancellous bone, so that maximal displacement plantar and laterally is achieved. After displacement of the osteotomy and impaction of the bony peg, the position is maintained by a stainless steel suture passed through bore holes in the dorsal cortex. Cancellous chips from the wedge of bone removed at osteotomy are packed around the osteotomy site, particularly laterally. The tourniquet is released after wound closure.

The position of the osteotomy should be stable without external fixation, but a plaster sole is applied to forefoot and heel, well moulded around the big toe—although not a circular plaster—to prevent redisplacement. Sutures are removed after fourteen days, and the plaster is changed to a walking sole, which is worn for 4 weeks; weight bearing is begun after removal of the sutures. After removal of the plaster 6 weeks post operatively, a canvas forefoot sling is fitted to prevent

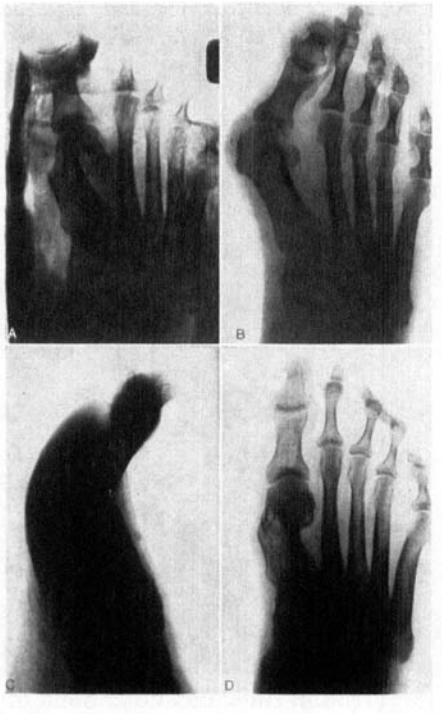

Figure 2. X-rays pre-operatively (top left), immediately post-operatively (top right), and the same foot 2 years later (bottom left and right).

spreadfoot and flattening of the transverse arch, and this should be worn for at least a year after operation. Plate II shows a typical X-ray before and after operation, and Plates III and IV clinical photographs before operation and two years later.

Figure 3. Bilateral hallux valgus deformity before operation.
Figure 4. The same case 2 years after operation.

CLINICAL MATERIAL

The series consists of eighty four operations in fifty six patients, performed between 1953 and 1963 in the Department of Orthopaedic Surgery, Sorø, Denmark. Age of the patients varied from sixteen to seventy four, with an average of forty five; the operation should not be performed until the foot is fully developed, but there is no upper age limit to the procedure, provided there is good mobility of the metatarso-phalangeal joint. Sex distribution was fifty women to six men, a ratio of 8.3:1, and there was a family history of deformity in thirty one patients (55 per cent). Clinical symptoms had varied from one to twenty five years, and had been present on the average for five years; almost all patients complained of a painful exostosis, and almost half the number of metatarsalgia (Table 1); associated foot deformities, *e.g.* clawing of the toes, and flattening of the transverse arch, were noted in fifty two patients (93 per cent).

Table 1. Pre-operative symptoms.

	Patients	Per cent
Painful exostosis	54	97
Metatarsalgia	26	47
Pain and stiffness of the 1st metatarso-phalangeal joint	8	14

RESULTS

Proper assessment of the results of foot surgery is difficult, as most adults have painful feet from time to time. The results were therefore classified as good, moderate, and poor; those with good results were entirely satisfied with the operation, had no clinical deformity, and were pain free at work and after normal use of their feet; those with moderate results included patients who were satisfied with the result and had no regrets that they had undergone operation, but had occasional pain after normal exercise or recurrence of slight deformity; poor results comprised unsatisfied patients, with pain or recurrent deformity, or both. The results are shown in Table 2.

Table 2. Operative results.

Good	61 feet	73 per cent
Moderate	21 feet	25 per cent
Poor	2 feet	2 per cent

More detailed examination of the moderate and poor results is shown in Table 3.

In the moderate series, most patients complained of metatarsalgia; stiffness of the 1st metatarso-phalangeal joint was an occasional com-

plaint, and it was necessary to remove the stainless steel suture in four cases on account of discomfort under the scar. This was performed without difficulty under local anaesthetic.

The poor results comprised one patient with severe metatarsalgia and one with painful hallux rigidus; in both cases these had been major symptoms before operation, and this procedure should not have been used.

Table 3. Analysis of moderate and poor results.

Moderate:	
1. Metatarsalgia	15 feet
2. Painful scar (requiring removal of stainless steel suture)	4 feet
3. Recurrence of deformity	2 feet
4. Pain and stiffness of 1st metatarso-phalangeal joint	6 feet
5. Numbness of medial border of hallux	1 foot
Poor:	
1. Severe metatarsalgia	1 foot
2. Severe hallux rigidus	1 foot

X-RAYS

All patients were X-rayed for the purpose of this follow-up examination; one case of non-union was found, but since the patient was symptom free, no treatment was undertaken. The X-rays of the operated series were compared with a control series of sixty patients with normal feet, with special reference to the length of the 1st metatarsals before operation, the angle between 1st and 2nd metatarsals, and the angle between 1st and 5th metatarsals, the angle of spreadfoot (Table 4).

Table 4. Comparison of X-rays with control series.

1. Length of 1st metatarsal	
Author's series	Average 5.9 cm
Control series	Average 5.7 cm
2. Angle between 1st and 2nd metatarsal	
Author's series	Average 12°
Control series	Average 5°
3. Angle between 1st and 5th metatarsals (spreadfoot)	
Author's series	Average 30°
Control series	Average 18°

It can be seen from Table 4 that while there is no great difference in the length of the 1st metatarsals in the two series, both the angle between 1st and 2nd metatarsals and also the angle of spreadfoot are significantly increased in patients with hallux valgus, and this confirms the impression that the deformity is part of a generalised foot

syndrome, in which flattening of the transverse arch and spreadfoot are among the most important features.

SUMMARY AND CONCLUSIONS

1. Hallux valgus is part of a generalised foot deformity, in which an important factor is spreadfoot.

2. Treatment by a distal wedge osteotomy of the 1st metatarsal, with displacement of the distal fragment laterally and plantar, corrects all elements of the deformity, and the procedure can be used in all age groups once the foot is fully developed; in this series of eighty four operations, the operation gave satisfactory results in eighty two cases (97 per cent).

There were no cases of infection.

3. The operation is not advised in cases of hallux rigidus or severe metatarsalgia, but it can be expected to relieve the symptoms in most cases of moderate metatarsalgia.

RESUME

1. Hallux valgus est la partie d'une déformité généralisée du pied dont un important facteur est l'affaissement du pied.

2. Le traitement par ostéotomie distale en coin du premier métatarsien avec déplacement du fragment distal latéralement et plantairement corrige tous les éléments de la déformité. Cette manière de procéder peut être utilisée dans tous les groupes d'âge une fois que le pied est entièrement développé; dans cette série de 84 opérations, l'intervention a donné des résultats satisfaisants dans 82 cas (97 pour cent). Il n'y a pas eu un seul cas d'infection.

3. L'opération n'est pas recommandée dans les cas de Hallux rigidus ou de grave métatarsalgie, mais elle peut apporter un soulagement dans la plupart des cas de métatarsalgie modérée.

ZUSAMMENFASSUNG

1. Hallur valgus ist Teil einer allgemeinen Fussverbildung, deren wichtiger Faktor der Spreizfus ist.

2. Behandlung mittels distaler Keilosteotomie des ersten Mittelfussknochens mit Verschiebung des distalen Fragmentes lateral und plantar korrigiert alle Bestandteile der Deformitet und das Vorgehen kann in allen Altersgruppen verwendet werden, sobald der Fuss voll ent-

wickelt ist. In dieser Reihenfolge vonvierundachzig Operationen ergab die Operation in zweiundachzig Fullen ein zufriedenstellendes Resultat (97 Prozent). Kein Fall von Infektion entstand.

3. Die Operation wird in Fällen von Hallux rigidus oder schweren Metatarsalgien nicht emphohlen, kann aber erwartungsgemäss die Symptome in den meisten Fällen von moderaten Metatarsalgien zum Verschwinden bringen.

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