

A. MONBERG, COPENHAGEN:

ON THE TREATMENT OF HALLUX RIGIDUS

I wish to report some experiences which we have made at the Cripples' Home and in my department at St. Joseph's Hospital, in Copenhagen, with operative treatment of hallux rigidus, —that well known condition in which the movements at the joint of the big toe have become restricted to such an extent that dorsal flexion is entirely suspended, while plantar flexion is possible to the full extent. Coincident with the stiffness of the metatarsophalangeal joint there is associated a compensating dorsiflexion at the interphalangeal joint, and, in consequence, a clavus formation on the plantar side of the latter. The affection is confined to the metatarsophalangeal joint of the big toe; the movements at the joints of the other toes remaining free. According to the different etiology, the affection may be divided into four groups.

To *group I* belong all those cases where the rigidity is transient and is the result of the foot having been immobilised for some considerable length of time either through bandageing or confinement to bed, for instance when a plaster bandage has been applied after an arthrodesis or owing to a fracture. In such cases there occurs a soft-tissue contracture of the short flexors of the big toe; but the position is corrected in rather short time by movements of the pedal and digital joints when the patient again begins to exercise his foot in walking.

To *group II* belong the cases in which the stiffness sets in at the age of from fifteen to twenty years, especially in young girls with long, slender feet. Among our material, which comprises 70 patients, 23 (= 33 per cent.) were girls belonging to that age-

group. Of the total 70, 47 were female, 23 male. Other authors record a similar proportionality. Thus:

<i>Nilsonne</i> ,	30 cases, of which 23 female;
<i>Strömbeck</i> ,	23 » , » » 20 » ; 12 aged 15—20 years.
<i>Hackenbroch</i> ,	20 » , » » 18 » ; 18 » 10—17 years.

The clinical picture, in this as in the other groups, is that of suspended, or at least considerably restricted, dorsal flexion at the metatarsophalangeal joint; with no, or, at any rate, only slight swelling of the latter, and, on the whole, only slight indications of arthrogenous changes. On the other hand, one sometimes finds a displacement, in plantar direction, of the first phalanx, so that the border of the caput projects dorsally (see Fig. 1). On roentgen examination, one finds the caput flattened, but beyond an almost invariable, slight exostosis on the lateral side, at the margin of the caput, there are no osseous changes.

The etiology of this affection isn't quite clear. Various theories have been advanced; some of which support the belief that it is the result of osseous changes due to arthritis, while others seem to confirm the idea that it is due to contracture of the soft tissues. *Nilsonne* has tried to show, as a result of his examinations, that the first metatarsal is longer than normal in proportion to the other metatarsi. Others have suggested that disproportionate length of the big toe should be due to abnormal length of the first phalanx. In nearly all these patients one finds a long, narrow foot, of which the medial border is much more strongly developed than the lateral, and the big toe prominent beyond the other digits.

I am inclined to agree with *Nilsonne* when he says that hallux rigidus is a defense against the development of hallux valgus, inasmuch as there is a resistance which prevents the big toe from being forced over into abduction; and the stiff big toe—the hallux rigidus—then becomes the result of this contracture. It seems to me as if the lateral prominence at the margin of the caput might be the sign of a reaction on the part of the

bone, indicating that the phalanx is trying to work over laterally, but is being met with a continuous resistance due either to contracture of the soft tissues or to the articular surfaces of the caput and the phalanx itself being flattened more than is normally the case. The fact that the affection, in such an over-



Fig. 1.



Fig. 2.

whelming majority of cases, is found in women—and especially in young women still in the growing age—seems to me to indicate that it arises from wrong distribution of weight on the foot, perhaps due to ill-chosen footgear. As a result of this, an arthrosis sets in, from which the patient tries to relieve herself by tensioning the muscles; and thus is started a contracture of the short flexors of the big toe.

To the *third group* belong those cases in which the stiffness is due to pronounced arthritis deformans in the metacarpophalangeal joint, with marked changes of the caput in the form

of exostoses and destruction of the articular surfaces. In this form, the affection usually develops at a later age; that is, by the fortieth to fiftieth year; and—it is interesting to notice, in contrast to the cases under Group II—more frequently in men than in women (see Table).

As a *fourth group* we may consider the cases in which the affection is not confined to the joint of the big toe alone, but is part of a general pathologic development involving the joints and bones of the foot, such as in rheumatic affections, septic arthritis, affections occurring as sequels of poliomyelitis, cases of congenital deformity or organic nerve diseases.

For a more systematic exposition of the various theories concerning the etiology and pathoanatomy of the affection, I would refer to the paper, by *Strömbeck*, in the *Acta Chirurgica*, 1934.

The material which I have examined consists of 70 cases treated during the years 1930—1933. The distribution according to age and sex is as follows:

	15—20 years	21—40 years	41—60 years	Total
Female	23	15	9	47
Male	6	4	13	23
				70

It will be seen how remarkably frequent the affection occurs in young women between the ages of fifteen and twenty. Most of the patients complain of pain in the fore part of the foot, with particular localisation to the joint of the big toe, and of pain when going up- or downstairs, or walking on steep roads. Others complain of tenderness and clavus formation at the lateral side of the head of the fifth metatarsus. The latter condition is caused by weight of the body, in the act of stepping, being transferred to the lateral border of the foot, whereby the foot is placed in varus position in order to compensate for the lacking dorsal flexion at the metacarpophalangeal joint of the big toe. In other cases the foot is held fixedly in plano-valgus position, likewise in order to avoid putting weight on the joint

of the big toe in stepping. In one case we found inwards rotation of the whole leg, probably arisen from efforts in the same direction.

Of orthopedic measures we have used the following:

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| <ol style="list-style-type: none"> 1) inlay for fore part of the foot 2) full-length inlay with impression anteriorly | } | <p>both in order to raise the fore part of the foot and give better possibilities for normal movements in stepping.</p> |
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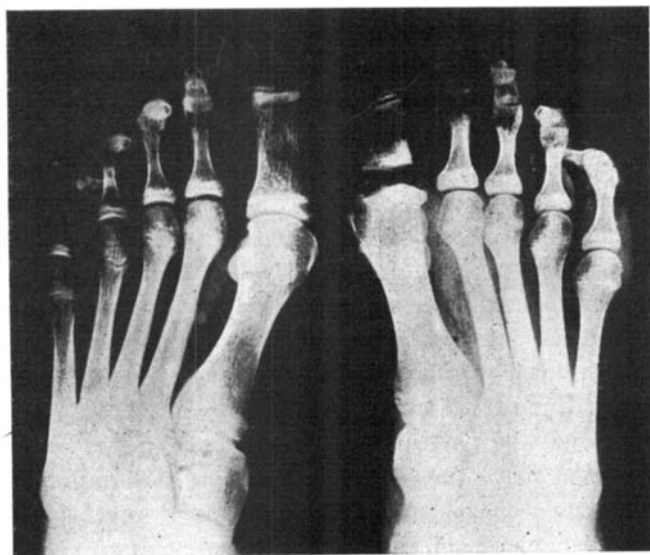


Fig. 3.

- 3) footgear with »rocker-sole«; i. e. a transverse sole immediately behind the ball of the big toe, likewise in order to improve the movements of the foot. Then
- 4) redressment, and fixation of the position obtained.
- 5) resection of one half—the basal part—of the first phalanx (Hofmann-Witzel's operation), with a view to preserving the caput as point of support, and at the same time creating a possibility for free dorsal flexion. In cases where the deformation of the caput was very pronounced, we resected the latter.

The inlays for the fore part of the foot sufficed to relieve the discomfort of the patients only in those cases where the stiffness was relatively slight; while the full-length inlays in 15 of 48 cases relieved those who were fitted with them so completely that no further measures were wished by any of them. Most of these patients wear their shoes out more quickly on the outer side, because, in the propulsive movement of walking, they put the weight chiefly over on the lateral border of the foot.

The transverse sole we have used chiefly in the case of elderly patients, in whom the foot is usually stiffer and can only to a minor extent be corrected; wherefore the inlay cannot be raised as high as necessary for making the movement in walking more free. It should be used only on boots or shoes with heels not higher than an ordinary »officers' heel«. It is noticeable that some patients walk best with very high heels. I believe the reason of this to be that the weight, in stepping, is put principally on the second phalanx, and the propulsive movement can then take place over the interphalangeal joint, especially as the dorsal part of the foot is raised much higher on account of the stiffness in the basal joint. In nearly all the cases where a transverse sole was used, the patient was relieved from pain, because the whole mechanism of movement in the foot was improved.

In cases where the inlay did not prove of any help we have recommended operation, especially in the case of young patients. The operation we then used was the one recommended by *Hofmann* and *Witzel*. We did it in the way that we excised as large a piece of the bone as we deemed it to be necessary in order to do away with the resistance to dorsal flexion at the joint. The length of the big toe was determining for the magnitude of the resection. In order to avoid the risk of ankylosis, we interposed the tendon of the extensor muscle, by suturing it to the abductor hallucis. After the operation, the toe was bandaged in 45° dorsal flexion.

Of the 70 patients, 22 were operated on; 18 *ad modum* *Witzel*, 3*) by resection of the caput, 1**) by resection both of the caput and the phalanx.

	15—20 years	21—40 years	41—60 years
Female	11	2*), 1**), 1	1*)
Male	3	1	2

In six of these cases (4 *ad modum* Witzel, 1 resection of caput, 1 resection of caput + phalanx) the result was good, in so far as the patients now walk without any pain and the dorsal flexion is increased so much that the movement of the foot in walking takes place over the joint of the big toe. The extent to which the dorsal flexion must be increased in order to make this movement entirely free is very individual, however. In that respect, the shortening of the big toe is undoubtedly the most important factor.

Of the 70 cases treated, I have after-examined 48; of the 21 operated on, 18.

Of the 18 operated on *ad modum* Witzel, I have after-examined 15. The results are as follows:

Age	good		no change		poor	
	Female	Male	Female	Male	Female	Male
15—20	4		6	1	1	
21—40					1	
41—60			1		1	

In a couple of cases the operation resulted in a loose hallux, which does not offer the resistance so important for the proper movement of the foot in walking. In all the cases, active dorsal flexion is practically inhibited.

The sum of our results with this operation is thus not very satisfactory, and I hardly believe it would be any better even if resection were attempted. We should only get a loose, slack, big toe incapable of offering the resistance which so greatly helps to ensure the proper movement of the foot in walking. I therefore believe that we should be more careful about recommending Witzel's operation, but should very largely make use of inlays and transverse sole, however unsatisfactory it may seem to employ such protective measures instead of attacking

the affection itself, especially in the case of young patients. In three cases we resected the caput. Two of these patients were twenty-five years old, the third sixty. In one of the former, we obtained a fairly satisfactory result; in the other there came complete stiffness of the new-formed joint (see roentgenogram Fig. 4). In the patient of sixty we obtained a good result, inas-

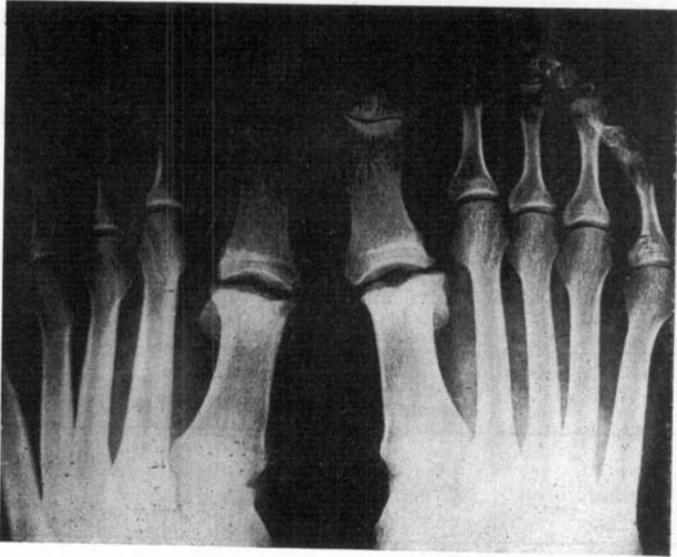


Fig. 4.

much as she walked well, without pain; but the caput of the second toe projected very much, and at times gave her trouble in spite of inlay. In one case—a girl seventeen years old—we resected both the caput and the phalanx. The result was good, both functionally and cosmetically.

My conclusion, briefly stated, is thus that in a number of cases an inlay will help the patient, and should undoubtedly be tried first. If it is found that it is not sufficient, the transverse sole should be prescribed, especially in the case of elderly people with stiff feet. With regard to operation it seems, from my experience, that resection of the phalanx does not suffice, and by

resecting the caput one takes away the important support for the medial radius of the foot. Besides, it is necessary, in order to ensure free movement, to remove a very large section; the result of which will be that the new-formed joint comes to lie so far back that, when the patient is walking, it cannot correspond with the basal joints of the other toes.

After examining these patients, I have come to the conclusion that hereafter I will try resecting a portion both of the head of the first metatarsal and of the phalanx, and interpose the fascies or tendon. I believe that by doing so I may succeed in getting the inner border of the foot shortened, at the same time as the basal joint of the big toe will be placed farther back, but no more than that its movement, in walking, will take place on a line with that of the other toes.

I should be interested to hear if any of my colleagues have obtained good results by operation; and especially I should like to know whether Dr. *Frising* has formed a good opinion of the recommended operation of arthrodesis at the basal joint of the big toe.

DISCUSSION:

G. Frising, Lund:

Dr. *Monberg* has evidently made the same experience as I with regard to plastic treatment of hallux rigidus; namely, that the result is far too often made doubtful by the tendency either of the joint to become loose and wobbly, or else to the development of a painful stiff, fibrous ankylosis. It is this experience that caused me to introduce, at the clinic in Lund, the mode of operation which I have described in the *Acta Orthopaedica* for 1931. My experiences since then have not made me change the views I expressed there. Of course, I still, as before, in most of the cases use hollow-foot inlays and, if necessary, the so-called »forward heel« under the sole of the shoe, without operation.