

EXCISION OF METATARSAL HEADS FOR PAIN UNDER
THE ANTERIOR ARCH OF THE FOOT
WITH WEIGHT-BEARING

By

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Conditions in which weight-bearing causes forefoot discomfort in the form of tenderness and corns under the metatarsal heads are particularly common in middle-aged and elderly women and may be the cause of severe disability. The treatment in such cases is aimed at preserving or improving function by relieving the pain and correcting the deformity which is usually present. To this end, conservative treatment is primarily indicated. Relief from the pressure of weight-bearing by means of some form of support in combination with technical measures to adapt the shoes usually achieve the desired result.

Surgical treatment, consequently, is indicated in a small number of cases only and reserved for patients with particularly severe deformities or those whose condition has failed to respond to prolonged conservative treatment. Soft tissue surgery, such as tenotomy, may at times be useful, but as a rule it will be necessary to remove prominent bone which causes deformity. In 1911 Hoffmann launched an operation for excision of the metatarsal heads in the English literature, which has remained somewhat of a standard procedure and is mentioned as a useful alternative in most of the handbooks (*Nordisk Lärobok i Ortopedi*, for one). While the merits of the operation are unquestioned, opinions differ in particular with regard to its extent. Definite principles are lacking, moreover, to establish the indications for this form of treatment in various painful conditions of the forefoot. Detailed follow-up studies, furthermore, are scarce.

It is generally accepted that feet which are deformed and painful as the result of rheumatoid arthritis are amenable to treatment by excision of one or more metatarsal heads (*Thomsen 1937, Key 1950, Clayton*

1960). "Severe grades of contracted or clawed toes" due to other causes, too, were operated upon successfully by *Hoffmann* as early as 1911. The operation appears hardly ever to have been used, on the other hand, to relieve pain from weight-bearing in cases without contracture of the forefoot, for instance in *Morton's disease* and similar conditions.

Hoffmann recommended excision of all five metatarsal heads and, furthermore, advised to remove enough of the remainder of the metatarsal bone to permit unhampered movement of the phalangeal base down to the level of the metatarsal stump after operation. Even more radical was *Clayton's* method, in which the excision was extended to include part of the phalanges of all five toes. *Thompson*, on the other hand, considered that only a prominent head subjected to undue pressure from weight-bearing should be excised, so that the pressure might be equally distributed over the remaining metatarsal bones. *Key* (1950) likewise recommended that only those parts of the foot skeleton be removed from which the symptoms emanated. *Lewin* (1959) combined the operation with transplantation of the extensor tendons to the metatarsal bones. Otherwise the procedure has usually been varied only with respect to the incision. Both dorsal and plantar transverse incisions have been used to perform extensive excisions, while a longitudinal dorsal incision has been recommended for excision of a single metatarsal head (*Campbell's Operative Orthopaedics*).

A follow-up study has served as the basis for an evaluation of this operation. In view of the background outlined in the foregoing, two questions have been considered of primary interest:

- 1) What value has the procedure in relieving discomfort from weight-bearing in various types of foot disorders?
- 2) How extensive should the operation be in the different cases or, in other words, how many metatarsal heads should be excised?

M A T E R I A L

All of the 30 patients who made up the series were included in a follow-up examination. The total number of feet operated upon was 41. The interval between operation and follow-up varied from 6 months to 4 years, with an average of almost 2 years. All but 1 of the patients were women. The incidence reached a peak in the age groups between 50 and 70 years (Table 1).

The most common symptoms were pain from weight-bearing, tenderness on palpation and corns under one or more metatarsal heads. It

TABLE 1
Age Distribution.

| 20-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|-------|-------|-------|-------|-------|-------|
| 2 | 4 | 3 | 9 | 9 | 3 |

was remarkable that the symptoms in all but one of the cases were localized to the region under the second to fourth metatarso-phalangeal joint.

With respect to the question posed under 1), the patients were divided into two categories, to wit, cases with and without contracture of the forefoot. The first group included all cases in which the foot presented the typical picture of luxation of the phalangeal base in the four lateral toes, with the base of the phalanx due to shortening of tendons, ligaments and other soft structures displaced onto the upper surface of the metatarsal head and pressing the metatarsal bone downwards. It was considered essential that the deformity should be rigid and not amenable to manipulative reduction. The material included 31 feet of this type, 19 of them in patients with manifest rheumatoid arthritis. In 27 of these cases, the deformity was combined with hallux valgus of varying severity, which in 11 cases was corrected by a Reverdin operation prior to or in combination with excision of the metatarsal heads.

In a few of the 10 cases without contracture of the foot, the presented symptom was a single painful corn. In the other cases in this group, the complaint was a distinct pain under a metatarsal head without any objective signs of disorder. To some extent, these symptoms were suggestive of Morton's disease and in a number of cases resection of the digital nerve had been performed, without effect on the condition. Insufficiency of the anterior arch and subluxation of the phalangeal bases of the toes could to some extent be observed in cases of this type too, but the foot was invariably flexible and amenable to reduction. As is only natural in a clinical division of this kind, a few dubious cases were encountered, but on the whole the classification presented no problems.

Theoretically, excision of a metatarsal head implies the removal of a weight-bearing surface that may be valuable. For this reason, the extent of the operation tended at first to be limited and only the metatarsal heads over the painful regions were excised. Later on, guided by experience, more extensive excisions were performed. In 13 cases the second, third and fourth metatarsal heads were removed, in 9 cases the operation involved the second and third head and in 19 cases only one head was

excised. Excision of the four lateral or all five metatarsal heads was in no case considered justified. A plantar incision was used in all cases, longitudinal for excision of a single metatarsal head, otherwise transverse.

Clayton (1960) has stressed the importance of immobilizing the foot after operation in the corrected position by means of a properly fitted plaster bandage. This technique was adopted in the latter part of the series, subjected to more extensive excision. The bandage was left on for 2-3 weeks, after which full weight-bearing was permitted.

RESULTS

In evaluating the results, it should be stressed that the operation by no means produced a normal foot. Even though extensive excision could make a contracted foot more flexible, residual deformity in most cases required the continued use of supports or specially made shoes. The aim of the treatment was necessarily restricted to relieving pain from weight-bearing as much as possible, with considerably improved function as a concomitant result.

In evaluating the results of treatment, therefore, the material was divided into 3 groups according to the following criteria:

- 1) Complete relief from pain with weight-bearing.
- 2) Considerable improvement, but some residual tenderness with weight-bearing.
- 3) No improvement.

Expressed in figures, this evaluation gave the following results for the total series: freedom from pain in 19 cases (46 %), improvement in 14 cases (34 %), no improvement in 8 cases (20 %) (Fig. 1).

If the material is classified according to the two relevant factors, i.e., type of disorder and extent of operation, it falls into four groups with considerable variation in the results of treatment (Fig. 2). In the group of 10 cases without contracture of the foot the operation was without exception limited to one metatarsal head. The results were fairly satisfactory with only one patient showing no improvement, whereas 8 were entirely free from pain. Among the patients with contracted feet, the results were most satisfactory in the group of 13 cases in which the operation involved excision of the second, third and fourth metatarsal heads. All patients in this group showed improvement and 8 of them (62 %) obtained complete relief from pain, despite the fact

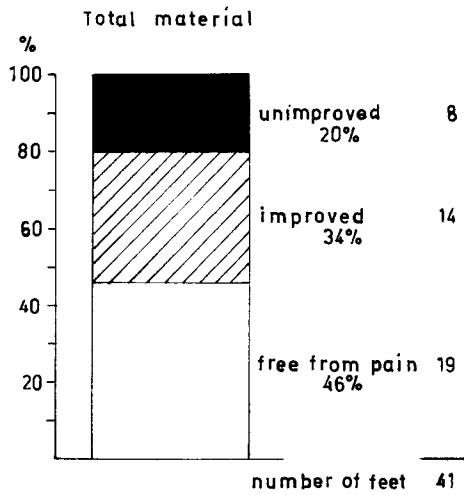


Fig. 1.

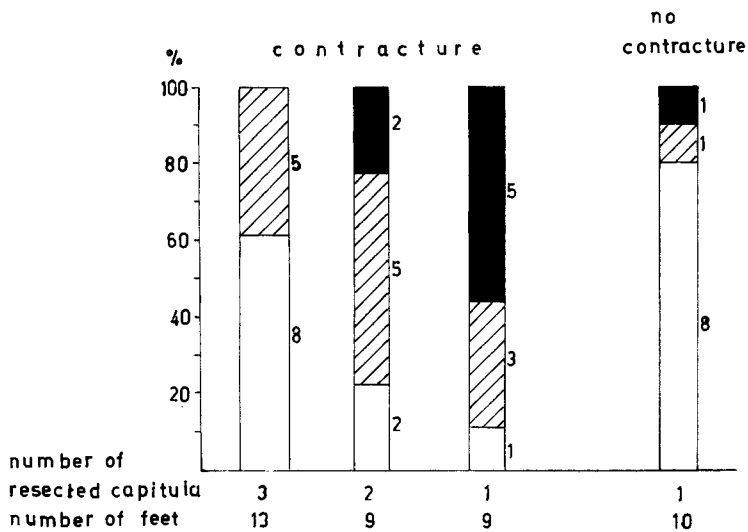


Fig. 2.

that the preoperative deformity tended to most severe in this group. The results were decidedly poorest in the group of 9 patients with this type of foot disorder where only one metatarsal head was removed. 5 patients showed no improvement at all and complete relief from pain was obtained in only 1 case.

DISCUSSION

In the majority of cases with unsatisfactory results, the patients reported that pain from weight-bearing had recurred after an initial improvement during the first few months after operation. The removal of one pressure area had created new ones. It was remarkable that these recurring symptoms in all but one of the cases were localized to the second, third and fourth metatarsal heads. It seemed as though the three middle metatarsal heads in contracted feet formed a functional unit which had to be removed in its entirety. The satisfactory results in the cases where the operation had this extent suggested that primary excision of all metatarsal heads, as recommended by *Hoffmann*, is hardly justified with a view to providing relief from pain. It is, on the other hand, possible that such a more radical operation may produce better cosmetic results with a more flexible foot that is better amenable to correction.

In the one case in the group without contracture where the condition showed no improvement, the residual symptoms were localized to the operation site. Roentgen examination disclosed that part of the metatarsal head had been neglected in the excision. The same omission appeared to be responsible for some cases of residual tenderness over the metatarsal stumps among the patients with contracted feet who, although showing improvement, were not entirely free from pain. This illustrates the importance of being sufficiently generous in the removal of bone in this kind of operation on the forefoot.

Although the available material is not very large, it permits the following preliminary answers to the questions posed at the beginning of this paper:

- 1) Excision of metatarsal heads is a useful procedure for relieving pain under the anterior arch from weight-bearing, both in rigid, deformed feet and in feet without contracture.
- 2) Where the former type of foot is concerned, the operation should include the second, third and fourth metatarsal heads. In non-rigid feet, the excision can be limited to the metatarsal head over the area which is painful with weight-bearing.

SUMMARY

The effect of the excision of metatarsal heads on pain from weight-bearing in the sole of the forefoot is analyzed on the basis of a follow-up examination of 41 feet treated by this operation.

In the group comprising 31 feet with a rigid forefoot, in 19 cases in patients suffering from rheumatoid arthritis, a satisfactory result was achieved if the excision included the second, third and fourth metatarsal heads. With less extensive surgery weight-bearing symptoms in a large number of cases recurred under the remaining heads.

In the smaller group of 10 cases in which the foot was not contracted, it proved sufficient to remove only the metatarsal head over the area affected by pain from weight-bearing.

RESUME

L'effet de l'excision des têtes métatarsiennes en cas de douleur provenant de la charge du poids sur la plante antérieure du pied est analysé sur la base d'examens complémentaires de 41 pieds traités par cette opération.

Dans le groups comprenant 31 pieds avec partie antérieure du pied rigide, il a été obtenu chez 19 malades souffrant d'arthrite rhumatoïde un résultat satisfaisant lorsque l'excision comprenait les 2ème, 3ème et 4ème têtes métatarsiennes. Avec une intervention moins extensive, les symptômes provoqués par la charge du poids réapparaissent sous les têtes qui restent.

Dans le plus petit groupe de 10 cas chez lequel le pied n'était pas contracté, il s'est avéré suffisant de n'enlever la tête métatarsienne qu'à l'endroit où la charge du poids provoquait des douleurs.

ZUSAMMENFASSUNG

Die Wirkung der Exzision von Mittelfussköpfchen auf die Schmerzen, die bei der Belastung in der Sohle des Vorfusses auftreten, wird auf Grund einer Nachuntersuchung von 41 mittels dieser Operation behandelten Füßen, analysiert.

In der Gruppe, die 31 versteifte Vorfüsse, davon 19 Fälle von chronischem Gelenksrheumatismus, umfasst, wurde ein zufriedenstellendes Ergebnis erzielt, wenn die Exzision das zweite, dritte und vierte Mittelfussköpfchen einbezog. Bei weniger ausgedehntem chirurgischem Eingriff traten die Belastungssymptome in einer grossen Anzahl der Fälle unter den zurückbleibenden Köpfchen wieder auf.

In der kleineren Gruppe von 10 Fällen, in denen der Fuss nicht fixiert war, erwies es sich als ausreichend nur das Mittelfussköpfchen im Gebiete des Belastungsschmerzen zu entfernen.

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