

PROXIMAL METATARSAL OSTEOTOMY IN HALLUX VALGUS

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In order to obtain an optimal correction of hallux valgus and to prevent its recurrence, the authors have applied a surgical technique which combines a proximal valgus osteotomy of the first metatarsal bone with an excision of the pseudoexostosis and a distal soft tissue plasty at the first metatarsophalangeal joint. The procedure is based on an etiological theory regarding metatarsus primus varus as the primary cause of the deformity, which is in accordance with the opinion of many other authors. The osteotomy corrects the malposition of the first metatarsal bone thereby reducing the deformity and preventing its recurrence. The soft tissue plasty alleviates secondary contractures that prevent a full correction of the big toe. A series of 43 consecutive patients (46 feet) with a follow-up period of 5–44 months and extracted from a total number of 99 operated cases is presented. The result was excellent in 78 per cent, good in 11 per cent and poor in 11 per cent. The reason for a less than excellent result was almost always inadequate correction of the deformity, at the level of the first metatarsal bone, or the big toe, or both.

Key words: hallux valgus; intermetatarsal angle; metatarsal osteotomy; metatarsus primus varus

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Hallux valgus is one of the most common orthopaedic conditions. Numerous theories as to the cause of the deformity have been presented such as flatfoot (pes planus and transversoplanus), increased length of the first metatarsal bone or the big toe, muscular imbalance and arthritis of the first metatarsophalangeal (MTF I) joint. Improper shoes, previously incriminated, are now considered to be of less importance, but may provoke the symptoms. There are, in addition, certain constitutional factors such as heredity, female sex and advanced age. Most authors, however, believe that an increased varus position of the first metatarsal bone (metatarsus primus varus) is of major importance in most cases. The cause of this malposition is considered to be either abnormal shape or oblique setting of the first tarsometatarsal (TMT I) joint, wedging of

the lateral sesamoid bone against the head of the second metatarsal bone, or a medially directed pressure from the laterally deviated proximal phalanx of the big toe. More than 150 surgical procedures for correction of hallux valgus have been described, reflecting differences in opinions as to the pathogenesis and lack of effect in correcting the deformity or in preventing a relapse. Operations are classified as soft tissue procedures, osteotomies, resection arthroplasties or arthrodeses. The aim of most osteotomies is to correct the varus position of the first metatarsal bone, thus attacking the probable cause of hallux valgus. In this study we present the results of a surgical technique which combines a proximal valgus osteotomy of the first metatarsal bone with an excision of the pseudoexostosis and a distal soft tissue reconstruction at the MTF I joint. This

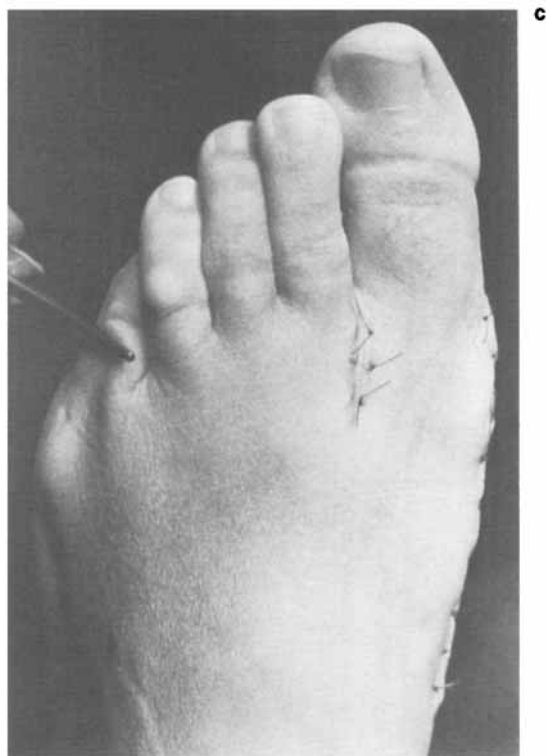
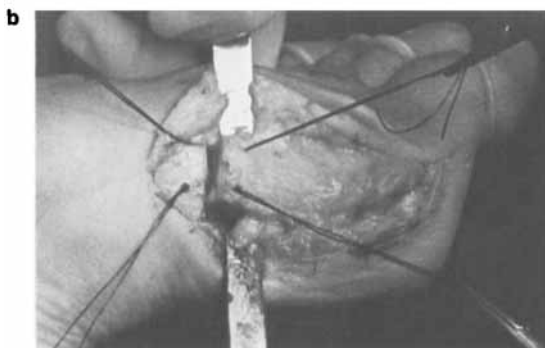
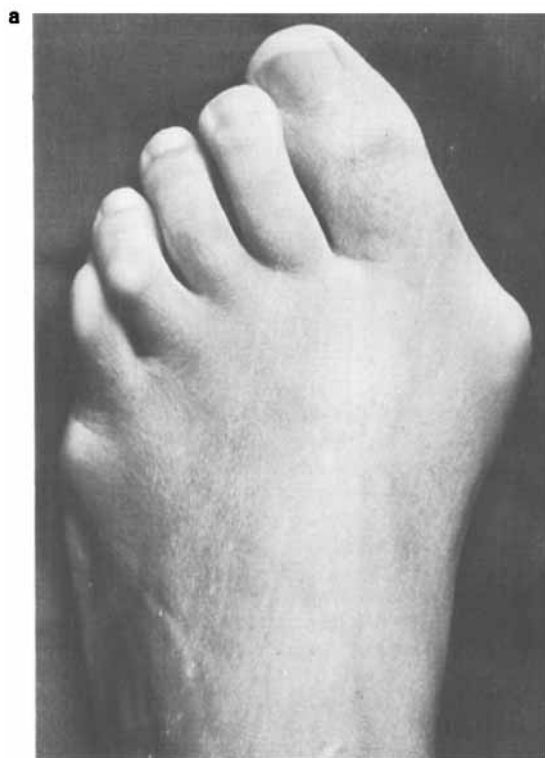


Figure 1. *a*, Preoperative condition. *b*, The osteotomy is about to be secured with two sutures inserted through drill-holes. *c*, Postoperative appearance.

method involves the treatment of the primary cause of the deformity as well as the secondary soft tissue contractures that otherwise would prevent a full correction (Bonney & Macnab 1952).

PATIENTS AND METHODS

Surgical procedure (Figures 1 and 2)

The operation is performed under epidural or general anaesthesia and in a bloodless field. The joint capsule,

collateral ligament and the tendon of the adductor hallucis muscle are divided on the lateral side of the MTF I joint through a small separate dorsal incision. A larger, longitudinal incision is made medially beginning at the bunion and extending proximally to the first tarsometatarsal joint. A V-shaped flap, attached distally to the proximal phalanx of the big toe, is fashioned from the medial capsule of the MTF I joint. The pseudoexostosis is thereby exposed and can be excised. The proximal part of the first metatarsal bone is exposed subperiosteally and a wedge with a lateral base of 5–10 mm, a little less than 10 mm distal of the TMT I joint, is prepared with a power saw. The wedge is removed and the osteotomy closed and secured with two or three sutures of a nonabsorbable material inserted through drill-holes (Figure 1b). In a few elderly, osteoporotic patients this proved to be difficult, necessitating an internal fixation with two Kirschner wires. Finally a plastic repair with shortening of the medial joint capsule is performed with the big toe forcibly abducted to obtain a slightly overcorrected position. In a few cases with severe deformity and pronounced cartilage destruction we did a resection arthroplasty (Keller



Figure 2. *a*, Preoperative X-ray showing marked valgus deformity of the big toe as well as metatarsus primus varus (same patient as in Figure 3). *b*, Postoperative X-ray. Full correction is achieved. Note the osteotomy proximally on the first metatarsal bone and the strip of plaster along the medial border of the foot.

1904) instead of the soft tissue reconstruction. Occasionally we have also lengthened the long extensor tendon if necessary for full correction. In some cases of advanced metatarsalgia we resected the metatarsal heads. In other cases of bothersome hammertoes the proximal interphalangeal joints of the lesser toes were removed. Postoperatively the big toe and the first metatarsal bone are immobilized with a strip of plaster along the medial border of the foot (Figure 2b). The patient is allowed to put weight on the heel and the outside part of the foot, which greatly facilitates mobilization in the postoperative period. Radiographic examination of the osteotomy is performed postoperatively and when the plaster is removed after 6 weeks.

Patients

Ninety-two patients (99 feet) were operated during the period from September 1975 to November 1981 of which the first 43 patients (46 feet) are included in the follow-up, all of them operated before June 1979. The mean age was 56 years with a range of 31–81 years. There were 38 women and five men. Three cases of rheumatoid disease are included.

Method

All patients were examined by the same person (M.Å.) The average follow-up period was 19 months with a range of 5–44 months. The patient's opinion regarding residual pain from the bunion, problems with metatarsalgia or swelling and the cosmetic result were registered. Since many patients complained of metatarsalgia unrelated to the operation we also recorded the patient's general opinion regarding the big toe alone as compared with the entire foot. Furthermore the examiner made an appraisal of the foot with special reference to mobility and pain on movement of the MTF I joint, swelling, tenderness at the site of the osteotomy and the cosmetic appearance. A simple system of classification has been used where "excellent" means no residual symptoms and normal or almost normal shape of the foot, "good" a definite improvement and "poor" unaltered or increased symptoms and an unsatisfactory cosmetic result. The intermetatarsal angle and the valgus angle of the big toe (Hawkins et al. 1945, Houghton & Dickson 1979) have been measured preoperatively and at follow-up using a standardized radiographic technique with a frontal projection of the forefoot bearing full weight.

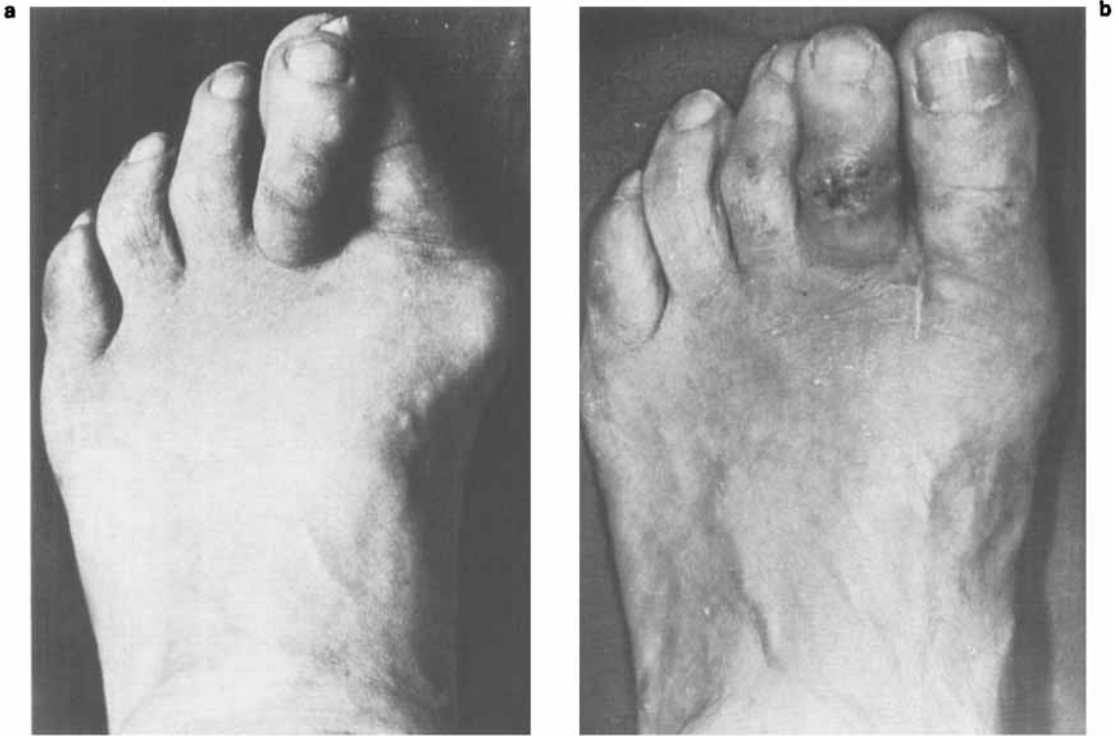


Figure 3. *a*, Pronounced hallux valgus in a woman, 76 years old (same patient as in Figure 2). *b*, One year postoperatively. A good correction is maintained. A hammer toe-deformity of the second toe has recently been operated with a resection of the proximal interphalangeal joint.

RESULTS

As regards the big toe the result was excellent in 36 feet (78 per cent), good in five feet (11 per cent) and poor in five feet (11 per cent). Considering the entire foot 60 per cent of all patients were completely satisfied whereas 40 per cent had various complaints, half of which were unrelated to the operation. Preoperatively the mean valgus angle was 43.5° and the mean intermetatarsal angle 15.7° . At follow-up the angles were 23.2° and 9.9° . This equals a correction of 47 per cent and 37 per cent, respectively. Wound infections occurred in three cases. One of them developed into an osteitis which caused a pseudarthrosis in the osteotomy, necessitating reoperation. Delayed union was discovered incidentally in two cases, 8 and 13 months postoperatively. Deep venous thrombosis occurred in one patient.

DISCUSSION

Together with hallux valgus a number of other deformities occur in the foot such as increased splaying of the forefoot, plantar keratosis corresponding to the metatarsal heads and hammer-toes. Metatarsalgia is a common symptom in addition to the mechanically induced discomfort at the pseudoexostosis with its bunion. All these signs and symptoms are well explained by the concept of a weakened transverse metatarsal arch which we regard as the basic cause of the disease. Metatarsus primus varus causing hallux valgus occurs as a part of this phenomenon and should not be considered to have an independent status. The importance of metatarsus primus varus as a predisposing factor in hallux valgus has been emphasized by many authors (Lapidus 1934, Hawkins et al. 1945, Bonney & Macnab 1952), which is in accordance with our own experience. The

concept of a weakened metatarsal arch has been criticized (Kelikian 1965) since all metatarsal heads normally are in contact with the ground which implies that an anterior transverse metatarsal arch does not exist. In our opinion, however, this concept is justified because it offers a uniform, intelligible explanation for all the deformities simultaneously occurring in the foot. Moreover there are clinical facts pointing to at least a functional equivalent of a resilient anterior transverse arch. In view of these facts a valgus osteotomy of the first metatarsal bone appears to be the most logical approach to hallux valgus. It gives not only a good effect on the deformity but also affords protection against a relapse contrary to a soft tissue plasty (McBride 1954), which probably will not withstand the test of time (Carr & Boyd 1968). Many surgical techniques based on an osteotomy of the first metatarsal bone have been described. Most of them are performed distally in the subcapital area or on the diaphysis of the first metatarsal bone. From a theoretical standpoint, however, a deformity is most effectively corrected at its origin, which in hallux valgus should be as far proximal as possible (Lapidus 1934). Hence a proximal osteotomy should give the best result, but is seldom used. Osteotomies have been recommended primarily in younger patients since healing time is relatively long and the foot must be immobilized in plaster (Carr & Boyd 1968). Our results prove that the proximal metatarsal osteotomy is well suited even for the oldest age groups (Figure 3a and b). The method corrects the malposition of the big toe effectively and provides a narrow foot which will fit more easily in normal shoes. All age groups should benefit from this. Our results are in good agreement with those of others (Carr & Boyd 1968, Helal et al. 1974, Rokkanen et al. 1978). However, the rather advanced mean age and pronounced average deformity of our patients should be noted. A poor result in our follow-up (five cases) was mostly due to an insufficient correction, in accordance with the opinion stressed by Bonney & Macnab (1952). The pseudarthrosis and both cases of delayed union were found in the group with good result (five cases). Persisting metatarsalgia was the dominating symptom among the patients who were satisfied with the big toe but

not with the foot in general (nine cases). The postoperative appearance or increase of already existing metatarsalgia, noted in a few cases, was probably due to an inaccurate orientation of the osteotomy in the sagittal plane with a shift of balance in the anterior transverse metatarsal arch (Carr & Boyd 1968, Auerbach 1970, Helal et al. 1974). Excessive shortening of the first metatarsal bone will also provoke these symptoms (Lapidus 1934, Hawkins et al. 1945, Carr & Boyd 1968), but is, in our opinion, not likely to happen after a correctly performed wedge osteotomy. Hallux valgus is one of the most common conditions causing metatarsalgia. Due to the deformity the toes, especially the big toe, show a decreased ability to relieve the normal pressure on the metatarsal heads (Kelikian 1965). Hence a stable, well corrected big toe should be able to reduce the pressure on the anterior metatarsal arch and thereby relieve these symptoms (Raymakers & Waugh 1971). Unfortunately, however, we have not been able to register a dependable effect of our procedure in this respect. The importance of good range of movement in the MTF I joint postoperatively was stressed by Helal et al. (1974). Among our patients restricted movement in this joint was seldom a major complaint even though the majority of cases with full movement were found among the satisfied patients.

Summarizing our study, a proximal valgus osteotomy of the first metatarsal bone combined with an excision of the pseudoexostosis and a distal soft tissue plasty has proved to be an effective surgical procedure against hallux valgus, even in older patients. The postoperative treatment is greatly simplified by immediate weight bearing and a minimal plaster immobilization. This technique has been used in our department since 1975 and is now predominantly used in all cases of advanced hallux valgus.

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