THE MITCHELL DISTAL METATARSAL OSTEOTOMY FOR HALLUX VALGUS

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Seventy-two Mitchell distal metatarsal osteotomies for hallux valgus performed over a period of 10 years have been reviewed. Sixty-six (92 per cent) were graded as excellent or good. Retrospective radiographic analysis of 29 of these cases showed that the operation had reduced the intermetatarsal angles to within normal anatomical limits. No patient experienced a worsening of symptoms as a result of the operation.

In 1870, Hueter suggested subcapital amputation of the metatarsal head as the treatment for hallux valgus; this operation was later modified and is currently in use as the Mayo procedure. In 1882, the first osteotomy for hallux valgus was performed by Arthur E. Barker on a 19-year-old youth (Barker 1884). This consisted of a trapezoid resection of the neck of the metatarsal with the base on the medial side of the bone. A similar operation was described by Hohmann in 1923 and further modified by Peabody in 1931. Cholmeley (1958) advocated the osteotomy described by Hawkins, Mitchell and Hedrick (1945) and Thomasen’s modification of Hohmann’s osteotomy as the two most satisfactory procedures for hallux valgus in adolescence. Miller (1974) referred to over 80 different operations to correct the symptomatic bunion. We have found the Mitchell procedure very satisfactory, especially for hallux valgus due to metatarsus primus varus. This paper is a short analysis of the results of our experience with this operation.

MATERIALS AND METHODS
The study was a retrospective review of 72 operations for hallux valgus performed on 41 patients (40 women and one man). The average follow-up was five years, with a range of 1 to 10 years. Thirty-nine patients had their feet radiographed, photographed and examined by at least two of the surgeons involved. The remaining two patients replied to a detailed questionnaire and were examined by surgeons not otherwise connected with the study.

All but six of the operations had been on patients between the ages of 13 and 28 years (Fig. 1).

The indications for operation had been pain, functional disability, cosmetic reasons and problems with shoe-fitting. Deformity and pain had been present in 37 patients (63 feet) before operation. In four of these patients (eight feet) the pain had been sufficient to require periods of bed rest. Only five patients (nine feet) had had operations for deformity alone. Routine anteroposterior radiographs of the feet (standing) had been taken before operation. Exact measurements of intermetatarsal angles and angles of hallux valgus had not been used to decide on suitability for operation. Piggott (1960) considered it unjustifiable to base conclusions on comparisons of individual radiographs, and we are also of the opinion that clinical assessment should be the overriding factor in the decision to operate.

The operative procedure had been that first described by Hawkins et al. (1945) and later popularised by Mitchell et al. (1958); the only deviation from the original operation had been that after drilling the distal hole in the metatarsal shaft, the two cuts for osteotomy were made before the proximal hole was drilled. This was found to be technically more accurate. After operation, the same splintage method had been employed, using three padded wooden tongue depressors for the first two weeks. After that time the sutures had been removed and a below-knee walking plaster applied for a further four weeks. The plaster was then removed, the foot was radiographed and full weight-bearing allowed.

RESULTS
The results were assessed as excellent when there was full relief of symptoms and deformity as judged by patient and surgeons, good when the patient was satisfied but still had some mild symptoms, and unsatisfactory when there was a single marked flaw in the result such as metatarsalgia, significant recurrence or hallux varus. Of the 72 operations performed, 51 (71 per cent) were graded as excellent, 15 (21 per cent) were graded as good, and six (8.5 per cent) were considered to be unsatisfactory (Fig. 1). Every patient in the series felt that some degree of improvement had been achieved by the operation.

Range of movement. There was some decrease in range of movement in 32 feet. Plantarflexion only was limited in 22 feet although no symptoms were attributed to this limitation. A limitation of dorsiflexion in a minority of the remaining feet was associated with an inability to wear high-heeled shoes.

Recurrence. Hallux valgus had recurred in nine feet (average follow-up six years); six of these were in the unsatisfactory grade; the other three were graded as good. In two of the latter cases, reviewed five and ten years respectively after operation, the degree of

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recurrence was mild with only slight symptoms whereas both patients had had significant deformity and pain before operation; the third patient, in whom deformity with symptoms had been severe before his operation three years earlier, had a mild recurrence of deformity with no symptoms.

Three toes showed a slight degree of pronation which did not affect their overall result. Another toe had a moderate degree of rotation along with recurrence of hallux valgus and was graded as unsatisfactory.

Hallux varus was not a problem in this series.

Radiographical measurements. Intermetatarsal angles had not been measured before operation, but these measurements were made retrospectively for 29 of the satisfactory (excellent and good) cases, chosen at random. The average deviation of the first metatarsal from the longitudinal axis of the second was found to be 13.4 degrees (range 9 to 24 degrees) before operation and four degrees (range 0 to 9 degrees) after operation (Figs 2, 3 and 4).

The angle of hallux valgus was measured on a similar random selection of radiographs. In those patients who were not classed as having a recurrence, the average deviation before operation was 35.8 degrees (range 24 to 60 degrees) compared to an average of 13 degrees (range 2 to 24 degrees) after operation.

Metatarsalgia. Although 30 feet had some abnormal callus formation, in only 14 of these cases had the patient noticed the callus: eight patients had very mild discomfort which occurred infrequently; five had occasional mild metatarsalgia which they had had before operation; and one patient had pain on jogging. This last patient had not complained of pain before her operation, which was graded as unsatisfactory, but the
discomfort from her bunion had been such that she had avoided exercise.

Non-union and avascular necrosis were not complications in this series. Two patients had slight superficial infection of the wound which responded well to treatment. Both patients had excellent overall results. There was no case of deep infection.

**DISCUSSION**

The overall figure of 92 per cent excellent and good results compared favourably with other reported series in which the Mitchell procedure was used (Mitchell et al. 1958, 82 per cent; Carr and Boyd 1968, 93 per cent; Hammond 1972, 84 per cent; Miller 1974, 90 per cent; Shapiro and Heller 1975, 76 per cent) and with other types of metatarsal osteotomies. Hart and Bentley (1976) compared five different osteotomies used on 77 patients with hallux valgus (130 operations): they recorded 90 per cent satisfactory results with the oblique osteotomy and screw fixation, 78 per cent with the Mitchell procedure, 68 per cent with Hohmann's osteotomy, and lesser figures with basal and cervical wedge osteotomies. Gibson and Piggott (1962) had 80 per cent satisfactory results in a series of 82 modified Hohmann's operations. A detailed comparison with other metatarsal osteotomies was not intended in this review.

**Analysis of unsatisfactory results.** In five of the six unsatisfactory results the problem was recurrence of the deformity; although in two of these cases there was no associated pain the feet showed little or no overall improvement. In the sixth unsatisfactory case the patient suffered from symptoms of metatarsalgia during jogging, and her foot also had mild recurrence of the deformity.

**Range of movement.** These findings concurred with those of Shapiro and Heller (1975) that minor limitation of movement is common and is rarely of itself a source of complaint.

**Radiographical measurement.** Hawkins et al. (1945) considered that the normal angle of deviation of the first metatarsal varied from 2 to 9 degrees, with an average of 5.6 degrees. In this series the measurements fell outside this range before operation and within it after operation. An artificial dividing line of 15 degrees is often used to distinguish between normal and pathological valgus. Piggott (1960) pointed out that no arbitrary angle can be given above which hallux valgus is pathological, for in his congruous or "exaggerated normal" group it reached as high as 28 degrees. A high angle of hallux valgus with congruous articular surfaces would seem to be more common in a foot which has been operated on and this measurement is not a reliable way of assessing the corrected deformity.
Metatarsalgia. There is uniform agreement that failure adequately to depress the metatarsal head will predispose to eventual metatarsalgia (Mitchell et al. 1958; Carr and Boyd 1968; Shapiro and Heller 1975). This would be a serious complication and every effort should be made to avoid it.

Bilaterality. The literature on hallux valgus records a high incidence of bilaterality. In this series, 31 of the 41 patients had bilateral operations, and eight of the other 10 patients had, on review, hallux valgus of the unoperated foot.

Family history. Twenty-eight of our patients (68 per cent) had a definite family history of hallux valgus. For 21 patients (52 per cent) the history involved their immediate family: two were twins, and there were four families where at least three siblings had hallux valgus.

In one family four sisters had bilateral osteotomies; three of these patients had had pain before operation, the fourth had been operated on for deformity alone. The mother of these four girls had recently had bilateral Keller’s arthroplasties for painful hallux valgus. We are not aware of any other series in the literature which describes such a high familial incidence of hallux valgus. The figure of 68 per cent is almost certainly lower than the real figure as many patients are not well informed about their parents’ or relatives’ feet.

REFERENCES


