Wilson shaft osteotomy for hallux valgus

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The results of a modified Wilson shaft osteotomy for hallux valgus in 77 feet of 51 patients were excellent or good in 62 feet after 2 to 4 years. The correction of the hallux valgus angle and intermetatarsal angle was excellent or good in 69 feet. The operation is technically simple provided dorsal angulation of the distal fragment is avoided in the early postoperative period.

The original Wilson (1963) osteotomy for hallux valgus was modified by Helal et al. (1974) to prevent a tendency of the distal fragment to shift dorsally. After their favorable report, the operation was introduced at our department.

Patients and methods

From May 1980 to November 1981, the modified Wilson shaft osteotomy was performed in 89 feet of 59 patients above the age of 14 years and without painful arthrosis of the hallux rigidus; radiographic arthrosis did not in itself alter the choice of procedure. Fifty-one patients (77 feet), 46 women and 5 men with a mean age of 46 (15–70) years, participated in the follow-up study. Six patients refused or could not participate, and 2 patients were excluded – 1 had recently sustained fractures of the foot in an automobile accident and the other had a severe mental disorder.

Preoperatively, all but 1 patient complained of pain and discomfort from the bunion. All but 1 had problems with normal footwear. In 13 feet, metatarsalgia from the lateral toes was described as the main problem. Twenty-two feet had radiographic signs of arthrosis of the first metatarsophalangeal joint (MTP 1).

Surgical procedure (Figure 1). In a bloodless field the neck of the first metatarsal bone is exposed through a longitudinal dorsomedial incision. The bone is sectioned with an oscillating saw close to the exostosis, which, if large, is removed. The original Wilson osteotomy (1963) was modified by Helal et al. (1974), so that the saw is directed 45° to the longitudinal axis of the metatarsal bone

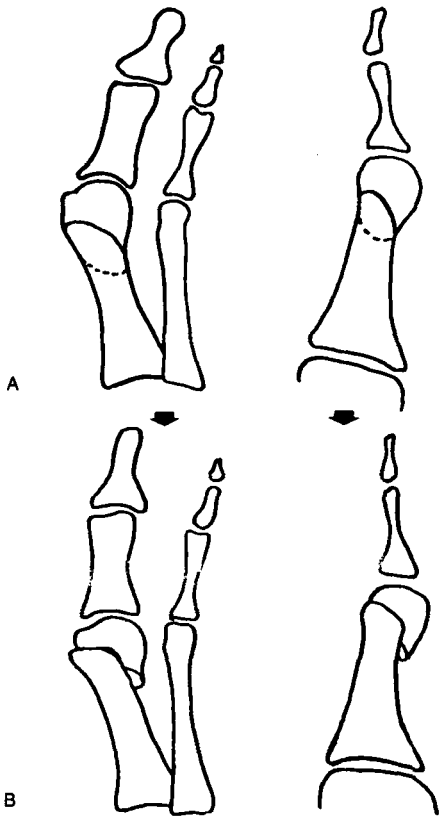

Figure 1. Surgical procedure:
A. Direction of osteotomy. The exostosis may be cut off.
B. The osteotomy has been completed with combined lateral and plantarwise displacement. Removal of the projecting spike from the proximal fragment is recommended. Frontal and lateral views.

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proximally from the dorsomedial side. The distal fragment is displaced laterally and plantarwise along the osteotomy line. The projecting spike of the proximal fragment may be cut off to narrow the forefoot further. The foot is bandaged with the great toe in slight varus position. One week later, the sutures are removed and a below-knee walking cast is applied for another 5 weeks. The desired position is maintained by a plaster projection between the first and second toes.

The median follow-up period was 3 (2–4) years. At the follow-up the foot was examined regarding cosmetic appearance, recurrence of the deformity, callosities, and range of motion in the MTP 1. The result was classified by the patient as excellent when there were no symptoms and satisfactory appearance, good when there was a definite improvement, and poor when the condition was unchanged or worse. Radiographs taken preoperatively were compared with those taken at the follow-up. Radiographic analyses consisted of the following: 1) hallux valgus, the angle between the longitudinal axis of the shaft of the first metatarsal and proximal phalanx; 2) intermetatarsal angle, the angle between the longitudinal axis of the first and second metatarsal bone; 3) width of the forefoot, measured as the widest first metatarsal and proximal phalanx; 2) intermetatarsal angle, the angle between the longitudinal axis of the first and second metatarsal bone; 3) width of the forefoot, measured as the widest distance between the outer cortex of the first and fifth metatarsal heads; 4) shortening of the first metatarsal bone; 5) subluxation of the first metatarso-phalangeal joint (Piggott 1960); 6) degenerative changes in MTP 1; 7) the position of the first metatarsal head postoperatively related to the longitudinal axis of the metatarsal preoperatively, thus dividing the osteotomies into three groups: plantarly, neutrally, and dorsally angulated osteotomies.

For statistical analyses, we used the Student's *t*-test, chi-square test, Fisher's exact test and rank test for class intervals.

Results

Forty-five feet were classified as excellent, 17 feet as good, and 15 feet as poor. Forty-five feet were painless, 21 were occasionally painful, and 11 were often painful. Eleven of 13 patients with preoperative metatarsalgia had excellent or good results. At the follow-up, 62 forefeet showed some flattening. In 14 of these feet the patients suffered from minor metatarsalgia without any functional restriction, and in 11 feet classified as poor the patient suffered from more severe metatarsalgia. Six of these 11 feet were initially good, but the pain slowly progressed after 12–30 months. Five of the six feet had unmistakably a dorsal shift of the distal fragment. From the radiographs of 72 feet, it was possible to determine the position of the head in relation to the preoperative position (Table 1). Of nine feet with a residual bunion classified as poor, eight had recurrence of the hallux valgus deformity. Two feet had pain from the first interphalangeal joint and one from the MTP 1 and were classified as poor. Eight feet had minor discomfort from the second toe, which the patients felt was too long in relation to the great toe. There was a tendency of the active plantar flexion to become restricted. The median flexion at follow-up was 7° (0–15°). Only a few patients had noticed this and nobody complained about it. One great toe had an active dorsiflexion less than 35°.

Of the 22 feet with radiographic signs of arthrosis in the MTP 1, nine were classified as excellent, seven as good, and six as poor – no different from

Table 1. Relation of results to postoperative position of the first metatarsal head in 72 feet. It was found that the result depended upon the angulation ($P > 0.05$, rank test for class intervals) and further that the result was poorer for the dorsally angulated metatarsal heads ($P < 0.007$, Fisher's exact test)

	Angulation of distal fragment		
Result	Plantar	Neutral	Dorsal
Excellent	20	23	0
Good	10	7	0
Poor	4	3	5

Table 2. Radiographic measurements. The hallux valgus angles and the intermetatarsal angles were reduced after operation ($P < 0.001$, Student's *t*-test). Mean (range)

	Preoperatively	At follow-up
Hallux valgus angle (degrees)	31 (14–46)	19 (0–40)
Intermetatarsal angle (degrees)	12 (2–24)	8 (0–17)
Decrease in width of the foot (mm)		5 (0–13)
Shortening of the first metatarsal (mm)		8 (2–15)

the nonarthrotic feet. The mean hallux valgus angle was reduced from 31° to 19°, and intermetatarsal angle from 12° to 8°. The mean decrease in width of the forefoot was 5 mm, and the mean shortening of the first metatarsal was 8 mm (Table 2). No correlation was found between advanced age and poor results.

Complications. One superficial wound infection healed in 2 weeks. Eight feet had a tendency for 3 months to become edematous. Two delayed unions, discovered respectively after 5 and 6 months were healed at the follow-up without further treatment. One nonunion was reoperated on with a lag screw after 8 months. At follow-up, 1 patient had bilateral nonunion; the result was classified as good by the patient.

Discussion

The modified Wilson osteotomy corrects the hallux valgus deformity leaving the MTP 1 untouched and restores a satisfactory function. The lateralization of the protruding distal fragment narrows the forefoot, and along with the shortening of the first metatarsal, relaxes the conjoined tendon of adductor hallucis, thus reducing the deviation in the MTP 1 (Gibson and Piggott 1962). The distal fragment is displaced plantarwise to diminish the pressure on the lateral metatarsal heads producing metatarsalgia (Mitchell et al. 1958, Søjbjerg and Sommer 1980). Our 62 excellent or good results in 77 feet compare well with other reported series of metatarsal displacement osteotomies (Mitchell et al. 1958, Gibson and Piggott 1962, Hart and Bentley 1976, Søjbjerg and Sommer 1980, Helal 1981, Cedell and Åström 1982). The most valued features were the freedom from pain and the ability to wear a normal shoe. The appearance of the foot seemed less important. Even patients with some recurrence of the deformity were satisfied. In feet with a relatively long second toe preoperatively, a shortening of the toe should be considered along with the osteotomy. The results in 22 feet with radiographic signs of arthrosis do not indicate an alternative procedure. Mitchell et al. (1958) showed the relation of metatarsalgia to postoperative position of the first metatarsal head. In so-called neutral osteotomy when the metatarsal head was neither moved dorsally nor plantarwise, 9 of 33 patients suffered from metatarsalgia. Along with the shortening of the metatarsal, a neutral osteotomy will result in a slight dorsal displacement of the first metatarsal head as compared with the lateral metatarsals. This is due to the orientation of the metatarsals in the weight-bearing foot as seen in a lateral view, and this is probably a contributing cause of the flattening of the forefoot in most of the feet. To avoid this, some plantar displacement is essential. Søjbjerg and Sommer (1980) recommended a plantar shift of at least 3 mm to prevent metatarsalgia. In our series the distribution of the results and the tendency to contract metatarsalgia was equal in the plantarly angulated and neutral osteotomies (Table 1). The modification of Wilson's procedure did not prevent five incidents of dorsal angulation of the distal fragment. Like Gibson and Piggott (1962), we believe that this is a technical error and that the shift takes place during the operation, most likely during bandaging and plastering. The modified Wilson displacement osteotomy is in itself a technically simple procedure to perform, but utmost care must be taken during the early postoperative management to retain the intended displacement.

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