

OBLIQUE DISPLACEMENT OSTEOTOMY ACCORDING TO CRAWFORD ADAMS FOR HALLUX VALGUS

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Correction of hallux valgus by oblique displacement osteotomy *ad modum* Crawford Adams was carried out in 54 cases, of which all but 3 were examined clinically and radiologically 1 year or more after the operation. The median age was 32 years. Seventy-eight per cent were satisfied with the operation, and 64 per cent were totally free of pain. A feeling of stiffness in the first metatarso-phalangeal joint and/or intermittent pain during walking was found in 22 per cent of the patients, all of whom were dissatisfied with the operation. Adams' osteotomy was found to give a satisfactory correction of the deformity of hallux valgus, but the length of the first metatarsal bone could not be maintained.

Key words: Crawford Adams; displacement osteotomy; hallux valgus

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In the treatment of hallux valgus more than 130 different operations have been described, most of these implying an osteotomy of the first metatarsal bone (Helal et al. 1974). Distal displacement osteotomies of the first metatarsal bone have been described by Hohmann and modified by Thomasen (Mygind 1952, Dovey 1969), by Mitchell et al. (1958) and by Wilson (1963). All three methods imply a shortening of the first metatarsal bone. In 1971, Crawford Adams described an oblique displacement osteotomy of the first metatarsal neck, which did not involve a shortening of the first metatarsal bone. The results of the Crawford Adams operation have not been reported previously.

PATIENTS AND METHOD

During the period 1972-1979 osteotomy according to Crawford Adams was performed on 54 feet in 44 patients. In all cases the indication for operation was hallux valgus with a painful bunion and associated func-

tional disability. Three patients - all with a unilateral operation - refused to participate in the follow-up examination. In 39 women and 2 men the median age was 32 years (range: 15-61 years). The median of the follow-up period was 42 months (range: 12-89 months).

In the postoperative period one patient developed a deep infection and one a major skin necrosis.

The operation is performed in a bloodless field. The neck of the first metatarsal bone is exposed subperiosteally through a longitudinal dorsi-medial incision. The metatarsal bone is divided with an oscillating saw. In the proximal fragment a solid lateral and plantar bone-spike is fashioned by removing a groove of bone around the spike. A hole is created in the dorsal and medial part of the capital fragment. The metatarsal head is displaced in a plantar and lateral direction and impacted on the spike of the proximal fragment (Figure 1). The position is secured by chromic catgut sutures passed through bore holes in the dorsal cortex. The medial corner of the proximal fragment is cut off and placed subperiosteally on the lateral side of the osteotomy site (Figure 1). After closure of the incision a padded circular plaster of Paris is applied from the tip of the big toe to just above the ankle joint. The plaster and stitches are removed 6 weeks after the operation. The foot is then radiographed and full weight-bearing allowed in rigid-soled shoes.

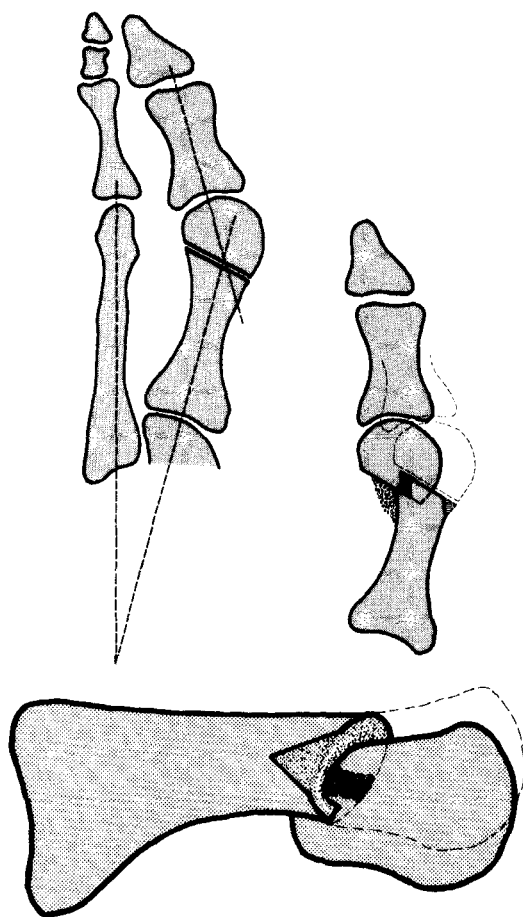


Figure 1. Diagrammatic presentation of the oblique displacement osteotomy of the first metatarsal neck. The angle of hallux valgus and the intermetatarsal angle are shown with dotted lines.

RESULTS

The patients' assessment of the operation is given in Table 1. In 19 cases (37 per cent) the result was excellent with no symptoms at all. In 14 cases (27 per cent) the patients complained of a feeling of stiffness of the first metatarso-phalangeal joint, but they had no pain. These patients were classified as good. The result was rated only as improved in 7 cases (14 per cent) because of intermittent pain during walking.

In 11 cases (22 per cent) the patients were dissatisfied with the result of the operation. In 7

cases this was due to pain during walking, and in 4 cases it was related to stiffness of the first metatarso-phalangeal joint only.

At the follow-up examination several patients drew our attention to the fact that the postoperative period of walking disability had been long, and that in 3 cases it had lasted for more than 1 year.

Before operation, 8 feet had a dorsi-flexion of less than 25 degrees in the first metatarso-phalangeal joint. Postoperatively, this was found in 22 feet (43 per cent), and 18 of these complained of stiffness of the first metatarso-phalangeal joint.

Preoperative radiographic pictures were compared to those taken at the follow-up (Figure 2). The angles of hallux valgus and the intermetatarsal angles between the first and the second metatarsal were measured (Figure 1). The median angle of hallux valgus before operation was 31 degrees (range: 18–44 degrees) compared to a median of 14 degrees (range: 2–26 degrees) after the operation. The median of the intertarsal angle was 12 degrees (range: 2–22 degrees) before the operation and 4 degrees (range 1–17 degrees) after the operation. A shortening of the first metatarsal bone was found in 46 cases. The median shortening was 6 mm (range: 1–10 mm, excluding the patient with deep infection, who ended up with a shortening of 18 mm).

In 3 cases – all in the excellent group – the first metatarsal bone maintained its length after the operation. The length of the first metatarsal bone

Table 1. The patients' evaluation in 51 cases of hallux valgus treated with oblique displacement osteotomy *ad modum Crawford Adams*

	Inter- mittent pain	Feeling of stiff- ness	Number of cases	Per cent
Excellent	0	0	19	37
Good	0	14	14	27
Improved	7	2	7	14
Dissatisfied	7	8	11	22
Total	14	24	51	100
Per cent	27	47	100	



Figure 2. Radiographs of hallux valgus treated with oblique displacement osteotomy. A: before operation, B: immediately after the operation, and C: after bone union.



was increased in two cases by 2 and 3 mm, respectively. Both of them had a dorsi-flexion of less than 25 degrees in the first metatarsophalangeal joint, accompanied by a feeling of stiffness in one. At the follow-up all the osteotomies were radiologically united. In one patient, however, the consolidation of bone included only half of the diameter of the metatarsal bone.

DISCUSSION

A lateral displacement of the capital fragment in an osteotomy of the first metatarsal neck causes a relaxation of the tendon of adductor hallucis and the lateral head of flexor hallucis brevis. By this lateral shift in the axis of the first metatarsal

bone, subluxation of the metatarso-phalangeal joint can be partly or completely reduced (Gibson & Piggott 1962, Edgar 1976). Like other distal osteotomies (Mygind 1952, Dovey 1969) Crawford Adams' operation includes a plantar displacement of the first metatarsal head. This is necessary in order to avoid excessive strain on the heads of the lesser metatarsals, which may produce metatarsalgia (Mitchell et al. 1958).

Crawford Adams (1971) indicated that the oblique osteotomy could prevent a shortening of the first metatarsal bone. This was not confirmed in the present study in which 90 per cent of cases had a shortening at the follow-up (median: 6 mm). These results are in accordance with the findings after other subcapital displacement osteotomies, in which the average shortening of the first metatarsal bone varied from 6.0 to 6.6 mm (Mitchell et al. 1958, Gibson & Piggott 1962, Søjbjerg & Sommer 1980).

In normal feet the average hallux valgus angle and intermetatarsal angle are 15.7 and 8.5 degrees, respectively (Edgar 1976). At the operation the hallux valgus angle was reduced from 31 to 14 degrees (medians), i.e. from abnormal to normal values. Glynn et al. (1980) found similar figures after Mitchell's operation.

In contrast to earlier reports (Gibson & Piggott 1962, Wilson 1963, Glynn et al. 1980) we found a reduced dorsi-flexion in 43 per cent of cases and a feeling of stiffness of the metatarso-phalangeal joint in 47 per cent of cases. This may seem surprising because the shortening of the first metatarsal bone in this study did not differ from other distal osteotomies.

In other distal osteotomies good results have been reported in 73 to 92 per cent of cases (Mitchell et al. 1958, Gibson & Piggott 1962, Wilson 1963, Dovey 1969, Glynn et al. 1980,

Søjbjerg & Sommer 1980). We found good results in 64 per cent of the osteotomies, but comparison with the above-mentioned authors is difficult because of differences in the recording of the clinical findings. However, it appears that Crawford Adams' operation offers the same correction of the deformity as other distal displacement osteotomies, but our results also indicate that Crawford Adams' operation may be encumbered with more postoperative discomfort than other osteotomies.

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