

CLINICAL STUDY

Combination of osteotomy of the first metatarsal according to Frejka with McBride operation procedure in surgical therapy of extreme hallux valgus

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Abstract

Hallux valgus is to be perceived as a complex of deformities of the first ray of the foot, often accompanied by deformity of forefoot. Although, this deformity can be treated with as many as 200 surgical procedures, the authors would like to demonstrate the effect of their own approach.

The authors evaluate the results of hallux valgus surgery combining the operation according to McBride and wedge osteotomy of the first metatarsal (MT) basis in 21 patients (37 surgeries) with post-surgical follow-up lasting from 29 to 45 months (i.e. 3 years in average).

Pre-operative mean intermetatarsal 1–2 angle revealed by radiographs was surgically corrected from 21.7 degrees at the baseline to the mean degree of 8.8. The pre-surgical average 45.9-degree of great toe valgosity proved by radiographs was surgically improved to the mean of 13.5 degrees. 87 % of patients expressed their personal satisfaction with their surgical results.

The authors consider the combination of wedge osteotomy of the first metatarsal basis with the operation according to McBride to be suitable in the therapy of extreme valgosity of great toes with increased metatarsal angle between first and 2nd metatarsal in young patients with minimum of changes in the metatarsophalangeal joint developed due to arthrosis (*Tab. 2, Fig. 6, Ref. 7*).

Key words: hallux valgus, surgical therapy, osteotomy of first metatarsal basis, McBride operation procedure.

Hallux valgus (lateral deviation of the great toe) is to be perceived as a complex of deformities of the first ray of the foot, often accompanied by deformity of forefoot.

Surgical procedures most frequently performed at the First Department of Orthopedics, Comenius University in Bratislava on young patients suffering from hallux valgus include Mitchell's osteotomy modified by Dega (1) and Austin's „chevron“ (2) osteotomy of the neck of the first metatarsal. As to frequency, the latter procedures are followed by operations according to McBride (3) and osteotomies of the first metatarsal basis (4, 5). Their common criteria of indication include minimum or no arthrotic changes of first metatarsophalangeal (MTP) joint, low age of patient (30–60 years) and good MTP joint mobility. The decision on the type of operation is based upon the following criteria:

- 1) Foot length
- 2) Width and redressibility of a transverse arch
- 3) Hallux valgosity evaluations by aspection and possibility of its passive redression

4) Radiographic examination of foot in AP projection (Fig. 1) with measurements of the intermetatarsal 1–2 angle (angle between the long axes of the first and second metatarsals) and hallux angle (angle between the long axes of first metatarsal and proximal phalanx).

Patients and methods

In the studied group we analysed 37 halluces with valgosity (in 21 patients) operated at the First Department of Orthopedics during the period 1994–1997. The patients met the clinical cri-

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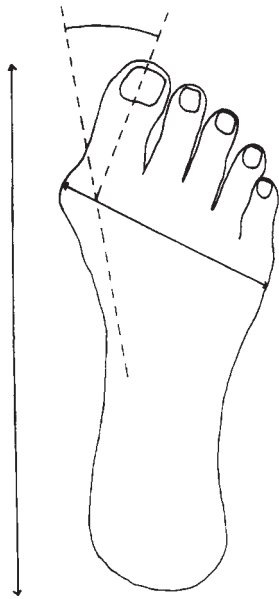


Fig. 1. Intermetatarsal 1–2 angle.



Fig. 2. Skin incisions in combination of osteotomy of first metatarsal with the operation according to McBride.

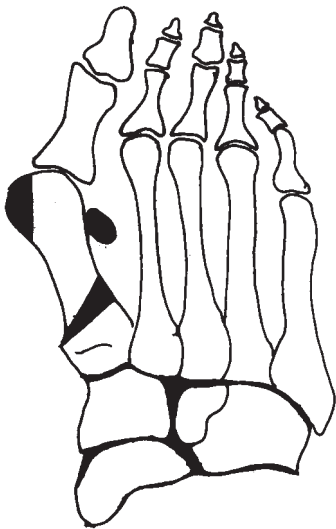


Fig. 3. Extirpation of sesamoid bone, exostosis ablation and wedge osteotomy of the first metatarsal basis.

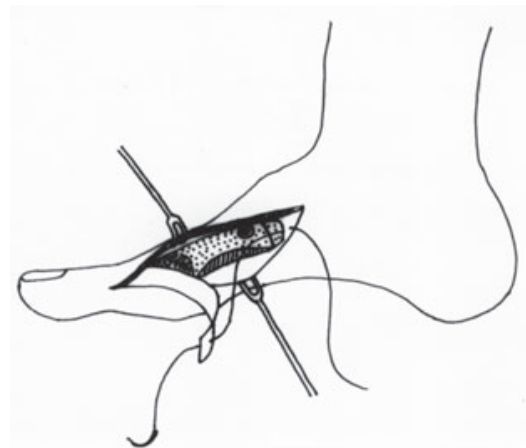


Fig. 4. Correction of remaining valgosity by "U" shape flap traction suture.

teria of extreme hallux valgosity, namely of that of considerably widened transverse arch. The studied group studied comprised 20 women and 1 man at the age ranging from 23 to 49 years (mean age of 36 years) at the time of operation. Pre-operative radiograph in AP projection in most cases showed intermetatarsal 1–2 angle of more than 20 degrees and hallux valgosity exceeding 40 degrees. In these patients it was our decision to perform a combination of McBride operation procedure with osteotomy of the first metatarsal basis according to Frejka.

Operation procedure

In blood-free field (using Esmarch bandage) the first incision was placed on the medial side over the prominent exostosis of the first metatarsal head and led to its basis (Fig. 2). Through the bursa we penetrated the joint capsule, from which a "U" – shaped flap with distal basis was prepared. Then we trimmed the prominent exostosis (Fig. 3). Thereafter we continued with lateral oblique wedge osteotomy of first metatarsal in proximal di-

Tab. 1. Angle of the hallux valgosity.

Patient	Before operation degrees	6 weeks after operation degrees	3 years after operation degrees
1	45	12	12
2	45	14	14
3	38	9	10
4	46	10	10
5	42	11	11
6	45	9	12
7	39	8	13
8	41	9	11
9	80	10	18
10	78	10	18
11	52	19	19
12	57	11	11
13	47	18	18
14	45	14	14
15	45	9	9
16	43	15	15
17	51	19	19
18	40	16	16
19	50	20	20
20	42	15	15
21	45	15	15
22	48	-5	-5
23	41	12	12
24	41	11	11
25	42	9	10
26	46	11	11
27	45	16	15
28	39	16	15
29	43	15	15
30	41	13	13
31	44	12	12
32	43	13	13
33	41	16	16
34	44	17	17
35	39	14	14
36	40	16	16
37	48	15	15
Average angle	45.9	12.8	13.5

Tab. 2. Intermetatarsal angle between 1st and 2nd metatarsal.

Patient	Before operation degrees	6 weeks after operation degrees	3 years after operation degrees
1	18	7	7
2	21	8	8
3	22	6	9
4	23	6	9
5	17	5	8
6	19	6	9
7	20	8	8
8	20	8	8
9	34	11	11
10	35	9	9
11	26	8	8
12	23	8	8
13	19	7	7
14	24	6	6
15	19	7	7
16	18	8	8
17	30	10	10
18	22	7	7
19	28	8	8
20	21	11	11
21	19	8	9
22	26	13	13
23	22	9	9
24	22	9	9
25	19	10	10
26	18	8	8
27	23	10	10
28	23	8	8
29	21	11	11
30	21	8	8
31	19	7	9
32	19	8	9
33	20	10	10
34	17	6	9
35	19	9	9
36	19	10	10
37	20	9	9
Average angle	21.7	8.3	8.8

rection with the wedge basis and in cases of transverse flat foot its direction was also partially plantar. The fixation was performed by either using a POLDI 5-screw or by bone suture.

The second incision led on the dorsum between first and 2nd metatarsals made the distal first metatarsal and lateral sesamoid bone accessible (Fig. 2). This was excised after the release of the hallux adductor, which we stitched to the first metatarsal. By means of the "U"-shaped flap, we balanced the hallux alignment, namely by its stitching in dorsal or plantar direction, as needed to possibly correct the remaining valgosity under a greater traction (Fig. 4). To finish the treatment, the site was fixed with plaster for 6 weeks. After the osteotomy had been healed, the fact of which was checked by radiographic examination and as soon as the full weight-bearing activity of the foot had been restored we extracted the screw.

Results

20 women (16 bilateral operations) and 1 man (unilateral operation) were clinically and radiographically examined prior to operation as well as 6 weeks and 29–45 months after the operation (mean period of 36 months).

Examination criteria comprised subjective feelings of patients (pain, in-shoe pressure and cosmetic appearance of foot) and objective examinations including radiography.

The mean hallux valgosity angle (Tab. 1) being in value of 45.9 degrees before surgery was surgically improved to 12.8 degrees, and 3 years after operation it reached 13.5 degrees (in average). The mean intermetatarsal 1–2 angle (Tab. 2) being of 21.7 degrees prior to operation was surgically corrected down to

the mean of 8.3 degrees, and 3 years after operation it reached 8.8 degrees (in average). Three years after the operation, the loss of correction observed in intermetatarsal 1–2 angle was proved to reach 0.5 degree and in hallux angle of 0.7 degree (in average). In osteotomy of the first metatarsal basis fixed by a screw no loss of correction was shown. In osteotomies fixed only by bone suture and plaster, the loss of correction in hallux angle was of 0–8 degrees (mean value of 4 degrees) and in intermetatarsal 1–2 angle it was in value of 0–3 degrees (mean 1.5 degree). In our group of patients no case of post-operative arthrosis or osteonecrosis was observed.

Subjective patient outcomes following surgery were satisfactory in sense of pain relief and in-shoe pressure elimination. The satisfaction rate was 87 % (32 feet in 18 patients) and 81 % (30 feet, 17 patients), respectively. Cosmetic improvements were achieved in 97 % (36 feet in 20 patients).

Complications included hallux varus (one case) and metatarsalgia related to the shortening of the first metatarsal and to secondary reduction of the transverse arch of the foot (2 cases). In two operations, secondary wound healing was observed.

Discussion

According to Mann (6) in valgosity of the great toe up to 25 degrees and in a congruent joint, “chevron” or Mitchel osteotomy of first metatarsal is performed. In cases of first metatarsopha-



Fig. 5. Pre-operative radiograph of a female patient (age 41 years) with a 15-years history of pedes plani with an extreme hallux valgosity from the left, painful walking and problems in putting on shoes. Pre-operative intermetatarsal 1–2 angle was 19 degrees, hallux angle 45 degrees.



Fig. 6. Post-operative radiograph of the same female patient 6 month following osteotomy of first metatarsal in combination with the operation according to McBride. Intermetatarsal angle was corrected to 6 degrees and hallux angle to 9 degrees. Patient does not report either foot pain in walking or weigh-bearing stress.

langeal joint subluxation he decides for a combination of soft tissue procedures with “chevron” osteotomy or the first metatarsal according to Mitchell. In mild valgosity of the great toe (25–40 degrees) in congruent joint he supplements „chevron“ procedure with proximal phalangeal basis osteotomy. In incongruent joints, he combines soft tissue procedure with proximal first metatarsal osteotomy or performs Mitchell’s osteotomy. In cases of extreme valgosity (25–40 degrees) and congruent joint, he in addition to the latter combination of “chevron” and proximal phalangeal basis osteotomy decides to combine either the first metatarsal osteotomy with proximal phalangeal osteotomy or to combine the wedge osteotomy of the first cuneiform bone with the proximal phalangeal basis osteotomy. In cases of incongruent joints he either combines soft-tissue procedures with proximal first metatarsal osteotomy in arched modification or performs wedge osteotomy of first cuneiform bone.

At our orthopaedic department, the resection arthroplasty according to Brandes–Keller is the most frequent approach in cases of incongruent metatarsophalangeal joints developed due to arthrosis (Fig. 5).

In Trnka’s opinion (7), the technique of wedge osteotomy of the first metatarsal is demanding and entails risks of shortening, malalignment and metatarsalgia. Due to these reasons, in the first metatarsal area he prefers either arched or “chevron” osteotomy.

Conclusion

We consider the combination of wedge osteotomy of the first metatarsal basis and McBride’s operation procedure to be suitable in therapy of extreme valgosity of great toes with increased metatarsal 1–2 angle in young patients with minimum of arthrotic

changes in metatarsophalangeal joint. The surgically treated patients express subjective improvement, painless walking and elimination of problems with putting on their shoes. Our results of satisfaction rate in patients who have undergone similar surgeries are consistent up to about 93% with the findings of Mann (6).

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