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Early results of distal metatarsal osteotomy with K-wire fixation in the treatment of tailor's bunion

Budak AKMAN[1], Adem ŞAHİN[2], Yalçın TURAN[2], Korhan ÖZKAN[2], Abdullah EREN[2], Namık Kemal ÖZKAN[2]

[1]Department of Orthopedics and Traumatology, Artvin State Hospital, Artvin, Turkey;
[2]Department of Orthopedics and Traumatology, Göztepe Training and Research Hospital, İstanbul, Turkey

Objective: Tailor's bunion deformity is a lateral side bone and soft tissue prominence of the fifth metatarsal bone. The aim of our study was to assess the clinical and radiographic results of distal metatarsal osteotomies in patients with tailor's bunion deformity.

Methods: This study included 24 feet of 14 patients with tailor's bunion who were treated with distal metatarsal osteotomy of the 5th metatarsal between 2006 and 2009. The mean follow-up time was 24.45 (range: 12 to 47) months. Patients were evaluated clinically and radiographically, using the American Orthopaedic Foot and Ankle Society (AOFAS) scoring system with weight-bearing anteroposterior and lateral foot radiographs.

Results: Average AOFAS scores of the patients were 64.83 preoperatively and 91.62 at the final follow-up. Three patients had complications; avascular necrosis, delayed union, and superficial wound infection.

Conclusion: Distal metatarsal osteotomy is a safe and easy treatment option for the painful tailor's bunion deformity and provides patient satisfaction rate of up to 96%.

Key words: Fifth metatarsal bone, foot deformity, osteotomy, tailor's bunion.

Tailor's bunion was first described by Davies in 1949, as a protrusion of the bone and soft tissue at the lateral edge of the fifth metatarsal head.[1] Although various etiologies have been proposed, including the wearing of tight, narrow shoes, a prominent lateral condyle, short metatarsals, the adhesion of adductor tendon, and an increased lateral deviation angle of the fifth metatarsal, no definitive source has been determined and is thought to be caused by multiple factors.[2,3]

Tailor's bunion deformity is encountered in conjunction with other foot deformities, such as primary hallux valgus.[4] Surgical treatments should be performed for painful feet only when conservative methods, such as a change in footwear, metatarsal pad, or anti-inflammatory drugs fail.[5]

Metatarsal osteotomies, metatarsal head resection, excision of the bunion or even amputation are possible surgical corrections.[4,6,7] Fallat divided the tailor's bunion deformity into four types.[8] Type 1: enlargement of the lateral surface of the fifth metatarsal head, Type 2: lateral deviation of the distal portion of the fifth metatarsal head, Type 3: the increase at the intermetatarsal angle between the fourth and the fifth metatarsals, and Type 4: a combination of two or more of the above-mentioned deformities.

Correspondence: Budak Akman, MD. Artvin Devlet Hastanesi, Ortopedi ve Travmatoloji Klinigi, Artvin, Turkey
Tel: +90 532 - 485 58 77 e-mail: drbudakakman@hotmail.com

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In this study, we assessed the clinical and radiographic results of distal metatarsal osteotomies in patients with tailor's bunion deformity.

Patients and methods

Distal metatarsal osteotomy with medial shifting and K-wire fixation was carried out on 22 patients with painful tailor's bunion deformity, between 2006 and 2009. Included in this study were 24 feet of 14 female patients (mean age: 54.20; range: 44 to 64 years) who completed the follow-up of a minimum of 1 year. Four patients (28.57%) underwent operation on one-foot and 10 patients (71.42%) on both feet simultaneously. The hallux valgus deformity present in all patients and the hammer toe deformity present in six feet were corrected in the same session. The mean follow-up was 24.45 (range: 12 to 47) months. Anteroposterior and lateral radiographs were taken with full weight-bearing (Figs. 1 and 2). The feet were then categorized under Fallat classification.[8] Accordingly, six feet were Stage 1 (25%), 14 feet were Stage 2 (58.33%), and 4 feet were Stage 3 (16.66%).

The patients were evaluated clinically and radiographically using the American Orthopaedic Foot and Ankle Society (AOFAS) scoring system[2] with weight-bearing anteroposterior and lateral foot radiographs taken preoperatively, 6 weeks postoperatively, and in the final follow-up. On the radiological examination, the intermetatarsal angle between the 4th and 5th metatarsals (4-5 IMA), the lateral deviation angle (LDA) showing deviation in the distal 1/3 and the medial 1/3 of the fifth metatarsal, and the metatarsophalangeal angle (MPA) between the proximal phalanx and the fifth metatarsal were measured (Table 1).[9] An intermetatarsal angle between the 4th and 5th toes > 8°, a lateral deviation angle between distal 1/3 and mid 1/3 in bunion deformity >7° (normal: 0° -7°), a 5th metatarsophalangeal angle >14°, or a widening of the metatarsal head (metatarsal head >13 mm) were considered as pathological.[5] Weight-bearing dorsoplantar and lateral radiographs were evaluated at the final follow-up (Fig. 3).

Fig 1. Preoperative anteroposterior X-ray.

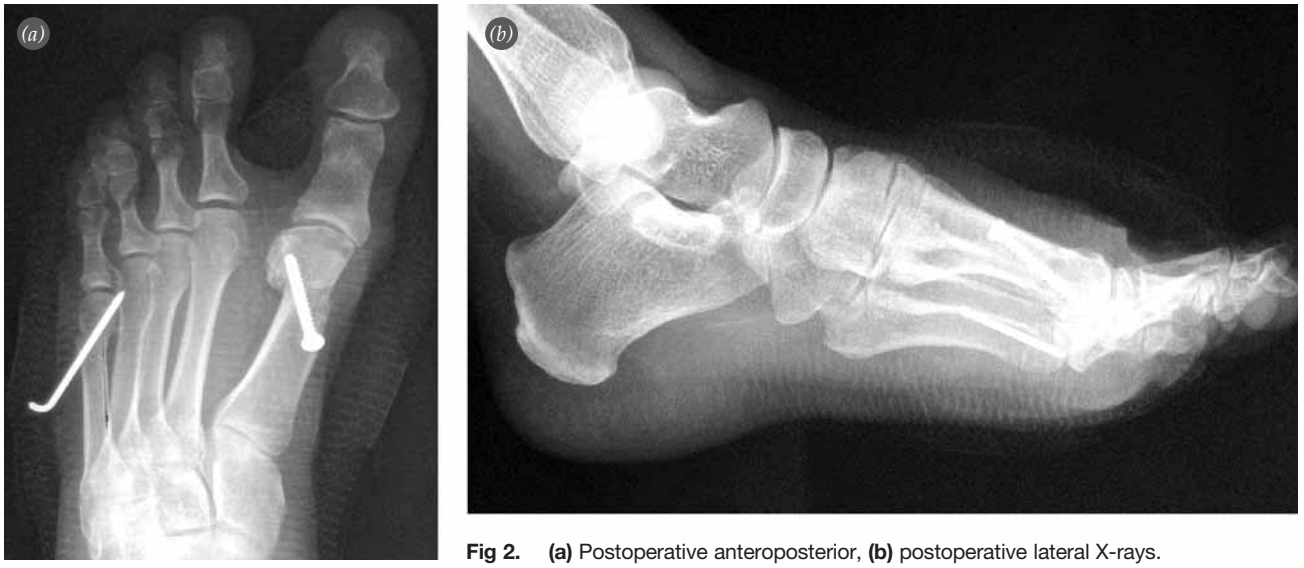

Fig 2. **(a)** Postoperative anteroposterior, **(b)** postoperative lateral X-rays.

The operation was carried out under spinal anesthesia with the patient in the supine position. After injecting IV Cefazol® (Turkey) a supramalleolar tourniquet was applied and inflated up to an average of 300 mm Hg. We used a dorsal 3 cm long longitudinal incision over the 5th metatarsal. The metatarsal head was exposed with medial capsular release and lateral subcapsular dissection. Bunionectomy was carried out through the lateral margin of the metatarsal neck and metatarsal head. Osteotomy was carried out at the metatarsal shaft in the 10° transverse 20° coronal plane with the help of blade saw. The distal portion was shifted medially the osteotomy was fixed with a K-wire after correction. The surgery was ended following the capsuloplasty.

A universal forefoot bandage was applied and mobilization with the support of a crutch was begun on the first postoperative day. With the exception of a patient with delayed union (10 weeks), K-wires were removed approximately six weeks after surgery, following radiographic evidence of union.

Results

The mean preoperative AOFAS score for the 24 feet of 14 patients was 64.8 (range: 50 to 74) and was 91.6 (range: 75 to 100) postoperatively. Results were graded as: very good (90 to 100 points), good (80 to 89 points), sufficient (70 to 79 points) and poor (less than 70 points). Based on this, 18 feet (75%) had very good scores, 4 feet (16.7%) had good scores, and 2 feet (8.3%) had sufficient scores.

In four feet (16.7%) with Type 3 deformity, the mean pre-operative IMA decreased from 17° (range: 10° to 18°), to 10.5° (range: 10° to 12°) at the final follow-up. In fourteen feet (58.3%) with Type 2 deformity, the mean preoperative LDA value was 6.85° (range: 5° to 8°) and 2.07° (range: 1° to 3°) at the final assessment. In the overall series, preoperative mean MPA decreased from 17.04° (range: 9° to 25°) to 5.41° (range: 2° to 10°).

A superficial wound infection was observed in one patient as an early complication and was treated with oral antibiotics. Avascular necrosis of the fifth metatarsal head was seen in a patient with a Fallat Type 3 bunion and the postoperative AOFAS score was 76. Delayed union was seen in a patient with a Fallat Type 2 bunion, in whom union was completed at the 10th postoperative week. Similar clinical and radiological results were obtained in patients undergoing unilateral or bilateral surgery at the same session. At the final follow-up there were no patients with limited daily activities excepting the patient with avascular necrosis (Table 1).

Fig 3. X-ray at final follow-up.

Postoperative IMA, LDA, MPA averages were significantly lower than the preoperative averages (p=0.0001). In addition, postoperative average AOFAS scores were significantly higher than the preoperative scores (p=0.0001) (Table 2).

No statistically significant difference was observed in terms of percentage of improvement of IMA, MPA, AOFAS scores of Type 1, Type 2 and Type 3 groups (p=0.391, p=0.818, p=0.702) (Table 3).

However, as for LDA, there was a significant difference in terms of angle improvement between the groups (Table 3). Type 1 patients showed better improvement, compared to Type 2 and Type 3 patients. There was no significant difference in percentage in terms of angle improvement between Type 2 and Type 3 patients (Table 4).

Discussion

The purpose of tailor's bunion treatment is to correct deformity, reduce pain, prevent the occurrence of the deformity, achieve excellent cosmetic and functional results, and return patients to daily activities through a short rehabilitation period.

Table 1. Epidemiological data of patients and angle measurements.

Age	Side	IMA		LDA		MPA		Follow-up period	Complication
		Preop	postop	Preop	Postop	Preop	Postop		
49	Right	18	10	9	3	25	9	47	None
	Left	16	12	7	3	16	8		Avascular necrosis
62	Right	16	10	6	2	23	4	12	None
	Left	18	10	6	2	22	5		
61	Right	12	8	6	1	10	2	20	None
	Left	12	8	6	1	9	3		
44	Right	14	8	6	2	20	5	19	None
	Left	12	8	6	2	15	4		
62	Right	18	8	7	3	14	4	17	None
	Left	14	10	7	3	18	3		Delayed union
48	Right	18	10	6	1	23	6	36	None
	Left	16	10	8	2	16	5		
48	Right	22	8	7	2	20	5	12	None
	Left	16	5	6	2	20	5		
64	Right	12	5	7	2	10	7	33	None
	Left	12	5	6	2	8	7		
60	Right	10	4	9	3	16	6	36	Superficial infection
58	Right	12	6	9	3	20	10	20	None
46	Right	14	8	5	3	24	3	20	None
	Left	14	10	5	0	24	7		
50	Right	12	6	5	0	14	6	24	None
	Left	12	5	4	0	12	4		
55	Right	16	8	7	2	14	6	24	None
60	Right	15	8	6	3	16	6	30	None

IMA: Intermetatarsal angle, LDA: Lateral deviation angle, MPA: Metatarsophalangeal angle

The tailor's bunion refers to the prominence of soft tissue and bone seen lateral to the 5th metatarsal. The main complaint is pain and cosmetic problems. Pain occurs as a result of the contact of the 5th protruding metatarsal with footwear and a painful bursa develops on the metatarsal head due to friction. Tailor's bunion is often seen in adolescents and adults. In a study by Hannson, the mean age of patients (six female patients, three male patients) who received surgery was 15 to 25 years.[10] Of the 124 patients operated by Fallat and Buckholz,[11] 86 patients (69.4%) were females and 38 (30.6%) were males (2:1). Female to male ratios have been reported at 1:1 to 10:1 in the literature. In our series, all patients were female and the mean age was 54.2 (range: 44 to 64) years.

In bunionectomies, only the excision of the bunion and painful bursa is performed and osteotomy to correct metatarsal axis is not carried out. Kitaoka and Holiday[12] achieved excellent results in 15 patients, good results in 3 patients, and poor results 3 patients. Poor results were attributed to inadequate resection, metatarsophalangeal subluxation, and the enlargement of the front of the foot. Metatarsal head resections can be applied as a salvage operation after failed surgeries or in the presence of advanced osteopenia and joint degeneration. In our opinion, bunionectomy alone is not sufficient.

Osteotomies for tailor's bunion may be distal, proximal or diaphyseal. Ajis et al. proposed proximal osteotomy for Type 3 deformities with increased intermetatarsal angle for restoration of the intermetatarsal angle.[13] Requirements for the proximal osteotomy include a uniform deformity present over the metatarsal, the absence of arthritis in metatarsophalangeal joint, and an intermetatarsal angle of more than 9°.[13] In our series, all patients were treated with distal metatarsal osteotomy. Although preoperative intermetatarsal angle was 17° (range: 10 to 18°) in Fallat Type 3 patients undergoing surgery, the post-

operative intermetatarsal angle was 10.5° (range: 10° to 12°). Recurrence was not noted in follow-ups.

Although proximal osteotomies have the advantage of better correction of high angle deformity, they have significant disadvantages. Shereff et al.[14] showed that extraosseous arteries supplying the metatarsal are located in the medial proximal metatarsal regions. It was reported that the interruption at the junction point cause delayed union and non-union.

Patrick et al.[15] carried out proximal corrective osteotomies in 33 feet, 20 of which required additional excision due to incomplete correction of the metatarsal head. They found that AOFAS scores were better in patients undergoing additional excision. In the same study, the bilateral procedure was applied to 8 of 24 patients for whom the modified Coughlin procedure was performed. Pain recurred in two of the cases and three of the six patients whose implants were removed were included in the bilateral group. The author does not recommend bilateral procedure due to its complications and long rehabilitation period. In the 10 patients in our study who received bilateral procedure, only one patient developed avascular necrosis and the other patients had delayed union. In our series, both bunionectomy and osteotomy are carried out with the same incision.

In distal osteotomy, every 1 mm of medial displacement results in 1° of improvement in the intermetatarsal angle. If more than 50% displacement is necessary for sufficient reduction then proximal osteotomy should be performed.[8]

In diaphyseal osteotomies, oblique osteotomies are often preferred. Although this method provides high degrees of correction, it has higher rates of delayed union and nonunion than the metaphyseal osteotomies.[7]

In a study of 30 feet in 21 patients who underwent medial shift osteotomy, Stefan et al.[16] achieved good and excellent long-term results in 81% of the patient and poor results in 19%. Pin tract infection was detected in three patients and delayed union in one. In addition, reoperation was necessary due to transfer metatarsalgia in one patient and recurrence of symptoms in another patient. Delayed union was ascribed to the old age of the patient and therefore the poor quality of the soft tissue. For this reason, they did not recommend advanced correction in elderly patients. In all our patients, we achieved union (delayed in one) and did not observe any recurrence.

Table 2. Preop and postop angle averages and AOFAS scores.

	Preop±SD	Postop±SD	p
IMA	14.63±2.86	7.92±2.13	0.0001*
LDA	6.5±1.29	1.96±1	0.0001*
MPA	17.04±5.1	5.42±1.95	0.0001*
AOFAS	64.83±5.37	91.63±7.36	0.0001*

*p<0.05. IMA: Intermetatarsal angle, LDA: Lateral deviation angle, MPA: Metatar-sophalangeal angle

Table 3. Degree of improvement in percentage.

Degree of improvement	Stage 1±SD	Stage 2±SD	Stage 3±SD	p
IMA	53.93±9.98	52.29±13.2	62.15±9.17	0.391
MPA	33.04±11.4	35.9±20.13	31.53±14.59	0.818
LDA	73.1±31.17	29.85±8.59	35.71±4.76	0.01*
AOFAS	69.21±2.67	71.15±4.7	72.61±9.27	0.702

*p<0.05. IMA: Intermetatarsal angle, LDA: Lateral deviation angle, MPA: Metatar-sophalangeal angle

Table 4. Comparison of improvement percentages between Type 1, 2, and 3 deformities.

Dunn's multiple comparison test (Lateral inclination angle)	p
Type 1/Type 2	0.006*
Type 1/Type 3	0.048*
Type 2/Type 3	0.171

*p<0.05. IMA: Intermetatarsal angle, LDA: Lateral deviation angle, MPA: Metatar- sophalangeal angle

Distal metatarsal osteotomies implemented for treatment of tailor's bunion deformity are usually successful and good results of up to 96% have been reported in various studies.[17-19] Kitaoka et al. reported a decrease from the preoperative 13.4°, to postoperative 8.4° in the average IMA. Similarly, Radl et al.[20] stated that the average IMA regressed to 9° from 14° after distal metatarsal osteotomies of 21 feet in 14 patients. In our study, the preoperative IMA of 14.6° was noted as 7.9° postoperatively, in line with other findings in the literature. Metatarsalgia and plantar hyperkeratosis were not observed in postoperative follow-ups.

In conclusion, we believe that distal metatarsal osteotomy with K-wire fixation may be considered an alternative to more complex interventions in the treatment of tailor's bunion.

Conflicts of Interest: No conflicts declared.

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