



CLINICAL ARTICLE

Surgical Management of Monoarticular Rheumatoid Arthritis of the Fifth Metatarsophalangeal Joint

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Objective: To investigate the clinical and radiological outcomes in patients with monoarticular rheumatoid arthritis of the fifth metatarsophalangeal joint after Weil osteotomy.

Methods: From July 2011 to September 2015, 18 feet of 16 rheumatoid arthritis patients who underwent Weil osteotomy of the fifth metatarsal toe with a mean age at the time of surgery of 48.8 ± 7.4 years were reviewed retrospectively. The mean disease duration was 44.6 ± 6.8 months, and the follow-up period was 36 months. Clinical outcomes were evaluated according to the American Orthopaedic Foot and Ankle Society lesser metatarsophalangeal interphalangeal scale (AOFAS), 10-item SF-36 physical functioning and 2-item SF-36 bodily pain, Visual Analogue Scale (VAS), and satisfaction scores. In the radiologic evaluation, fifth metatarsophalangeal angle (MTP-5), lateral deviation angle (LDA), and longitudinal axes of the fifth metatarsal were measured on anterior–posterior (AP) weight-bearing radiographs preoperative and at the last follow-up.

Results: Clinical assessment showed that the total average of AOFAS was significantly increased from preoperative 53.6 ± 9.0 to 98.7 ± 2.0 points, and the VAS score was significantly decreased from preoperative 4.1 ± 1.5 to 1.1 ± 0.8 points at the last follow-up ($P < 0.001$). The total averages of SF-36 physical functioning and SF-36 bodily pain were significantly increased from preoperative 48.9 ± 9.0 to $99. \pm 2.1$ and from 61.4 ± 12.1 to 99.4 ± 2.4 points, respectively, at the last follow-up ($P < 0.001$). Subjectively, the excellent outcome of the surgery results were rated by 13 patients (81.3%) that underwent surgery and three patients (18.7%) were rated as good. Regarding radiographic parameters, the mean MTP-5 significantly decreased from $21.5^\circ \pm 1.2^\circ$ preoperatively to $10.2^\circ \pm 1.2^\circ$, the mean LDA significantly decreased from $7.1^\circ \pm 1.2^\circ$ preoperatively to $-2.4^\circ \pm 1.0^\circ$, and the mean length of the fifth metatarsal was significantly shortened from 71.5 ± 1.4 preoperatively to 67.8 ± 1.5 mm at the final follow-up visit ($P < 0.001$). No malunion, nonunion, necrosis, pseudoarthrosis, or fracture of the fifth metatarsal was found. No exuberant bone growth, perforation of the screw, subluxation, or dislocation was observed. No indications of modification, revision or repeat surgery, or delayed wound healing were observed during follow-up period.

Conclusion: Surgical management of the monoarticular rheumatoid arthritis of the fifth metatarsophalangeal joint can achieve good clinical and radiological outcomes, with pain relief and dislocation reduction, as well as high satisfaction and improvement without recurrence or progression during the follow-up period.

Key words: Fifth metatarsophalangeal angle; Lateral deviation angle; Monoarticular rheumatoid arthritis; Visual analogue scale; Weil osteotomy

Introduction

Rheumatoid arthritis (RA) is a chronic autoimmune disorder that affects the body's joints; it usually causes

pain, swelling, and joint stiffness, and these symptoms decrease with rest. This occurs when the immune system does not function correctly and mistakenly attacks the

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synovium of the joints. RA typically affects the hands, knees, or ankles symmetrically; however, this is not always the case. RA also causes side effects to other organs of the body, including the eyes, skin, heart, lungs, and blood vessels. For unknown reasons, women are affected with RA more often than men, and it usually develops during middle age. Family history of RA may increase the risk of RA development¹. RA affects about 0.2% to 1% of the worldwide population and about 0.42% of China's population².

The problems of the foot are progressively increasing in rheumatoid patients, and approximately 50% of RA patients can suffer from foot involvement, almost 40% to 80% of patients experience forefoot deformity, which seriously affects their quality of life³. Baxter and Mann reported that 15% to 17% of RA patients have foot involvement, and forefoot joint involvement is more common than midfoot or hindfoot joint involvement⁴. For patients with forefoot involvement, the metatarsophalangeal (MTP) joints are the most commonly affected part.

Hulsmans *et al.* reported that MTP joints, especially the fifth MTP joints, are the most common and earliest erosive joints that are affected before the hand joint, and erosion in the fifth MTP joints occurs in 16% of all joints in the hands and feet in the first year⁵. Inanc *et al.* reported that the fifth MTP joint erosions were detected in 67 of 96 feet (69.8%) in the patients with RA⁶.

Monoarticular RA usually occurs in the early stage of rheumatoid arthritis, and progresses gradually to a polyarticular within 3 to 5 years. With the use of antirheumatic drugs the polyarticular RA have turned gradually into monoarticular RA. Although it is monoarticular RA, it still affects the patient's quality of life⁷.

If conservative treatment does not elicit any response, and RA is well-controlled, surgical treatment is suggested to improve the physical function and life quality of patients. RA treatment can relieve joint pain and swelling; it also prevents cartilage damage and joint deformity. Early management of RA may yield better long-term results which may decrease pain and reduce joint erosion that lead to joint arthroplasty⁸.

Many studies have been conducted in rheumatoid forefoot arthroplasty surgery; many names are synonymous with forefoot surgery (e.g. Hoffman, Clayton, and Kates). These arthroplasties vary depending on the type of incision and technique on the MTP joint to the degree of metatarsal ray resection and stabilization method. However, procedural complications were reported, including recurrence of hallux valgus, callosities, hammer toe deformity, osteophytes of the metatarsal stump, and loss of stability and function^{9, 10}.

Another type is joint-preserving surgery in which the MTP joint is preserved to provide a strong stability of the forefoot; this may lead to improvements in patient satisfaction, but recurrence of metatarsalgia and other complications is possible¹¹.

Another common osteotomy, the Weil osteotomy, is commonly used in the treatment of deformities on the head and neck of the metatarsal by using twist-off screws to

control and fix the shortening. In recent years, many studies have been focused on effectiveness and incidence of complications of the Weil osteotomy. However, most of these studies have shown an effectiveness of Weil osteotomy in deformity correction and pain relief; it can preserve MTP joint and yield good clinical results¹².

Therefore, the purpose of the present retrospective study was to: (i) evaluate the clinical outcomes of patients with severe monoarticular RA of the fifth metatarsophalangeal joint after Weil osteotomy using the AOFAS, 10-item SF-36 physical functioning and 2-item SF-36 bodily pain; (ii) to evaluate patients' satisfaction with surgery outcomes according to classification by Coughlin; and (iii) to assess the radiological outcomes using metatarsophalangeal angle (MTP-5), lateral deviation angle (LDA), and longitudinal axes of the fifth metatarsal.

Methods

Inclusion and Exclusion Criteria

The inclusion criteria followed the P (participant), I (intervention), C (comparison), O (outcome), S (study design) principle: (i) Participant: patients with monoarticular fifth MTP joint deformity due to RA, having complete clinical, radiographic, and laboratory data; (ii) Intervention: underwent Weil osteotomy between July 2011 and September 2015; (iii) Comparison: preoperative and last follow-up clinical and radiological evaluations; (iv) Outcome: clinical and radiological improvement; and (v) Study design: a retrospective study. The exclusion criteria were: (i) incomplete medical and radiographic records; and (ii) history of foot surgery.

Study Design

The study was approved by the institutional review board of our hospital (No 2011-16-2). Patients who underwent Weil osteotomy for treatment of severe monoarticular RA of the fifth MTP joint in our institute from July 2011 to September 2015 were reviewed retrospectively. All patients gave written consent for the publication of their individual research data.

Patient Characteristics

A total of 18 feet of 16 women (10 on right foot; eight on left foot; two cases were bilateral) were identified. The mean age was 48.8 ± 7.4 (range, 40 to 60) years at the time of surgery, and the mean disease duration was 44.6 ± 6.8 (range, 39 to 59) months during the 36-month follow-up period. All patients met the 2010 ACR/EULAR classification criteria and the total average was 6.7/10 (range, 6.0/10 to 7.0/10) criteria¹³. The mean level of Anti-cyclic citrullinated peptide (Anti-CCP) was 103.4 ± 69.0 (range, 30 to 240) U/mL (reference normal range: 0–19 U/mL). Pain and deformity with dislocation or subluxation of the fifth MTP joint was the indication for surgery.

Surgical Technique

A single surgeon (M.W.Y) conducted all the operations.

Anesthesia and Position

The patients were placed in the supine position on the operating table with a thigh tourniquet (260 mmHg), under general anesthesia.

Approach and Exposure

A 3 cm longitudinal dorsal skin incision was made over the fifth metatarsal. Then, the subcutaneous tissue was separated and the head of the fifth metatarsal was carried out to expose the fifth MTP joint. Fifth MTP joint capsule was incised to release MTP capsule adhesions and remove synovial tissue as much as possible, the dislocated fifth MTP joint partly reduced and then planar flexion of the toe to expose the head of the fifth metatarsal.

Performing an Osteotomy

A micro sagittal bone saw was used to perform the actual osteotomy at approximately 1.0 mm from the distal to the anterior dorsal margin as parallel to the ground as possible. The plantar fragment was proximally displaced at approximately 3 to 5 mm to achieve the desired degree of shortening and to achieve reduction for the fifth MTP joint dislocation; the procedure was performed carefully to avoid medial or lateral displacement.

Osteotomy Fixation and Wound Closure

A smooth wire (1.1 mm) was used to stabilize the metatarsal osteotomy with care of the plantar metatarsal cortex. Then, a hole (2 mm) was drilled to make a final hole for the fixation screw. Headless cannulated compression screw was used. Typically, the screw measures 10 to 13 mm in length and 2.5 mm in diameter (Fig. 1), the screw was tightened, the temporary smooth wire was removed, and the resulting protuberance was removed (Fig. 2). Finally the bone of the osteotomy site was sutured with absorbable suture. The incision was then irrigated with sterile saline and closed layer by layer using a 3-0 vicryl suture.

Postoperative Care

Postoperatively, patients were placed with compression dressing with heal non-weight bearing shoes. Analgesia, anti-infection, and detumescence were provided to all patients. Sutures were removed 2 weeks postoperatively, and patients were able to wear normal footwear usually 4 weeks postoperatively (after the initial visit).

Clinical and Radiological Assessments

All patients were followed up in the outpatient clinic for 36 months. Clinical and radiological assessments were conducted. Furthermore, patients were clinically examined to evaluate the presence of symptoms, such as pain and residual toe deformities.

American Orthopaedic Foot and Ankle Society (AOFAS)

Lesser MTP-Interphalangeal Scale

Clinical evaluations were performed preoperatively and 36 months postoperatively. To evaluate subjective and

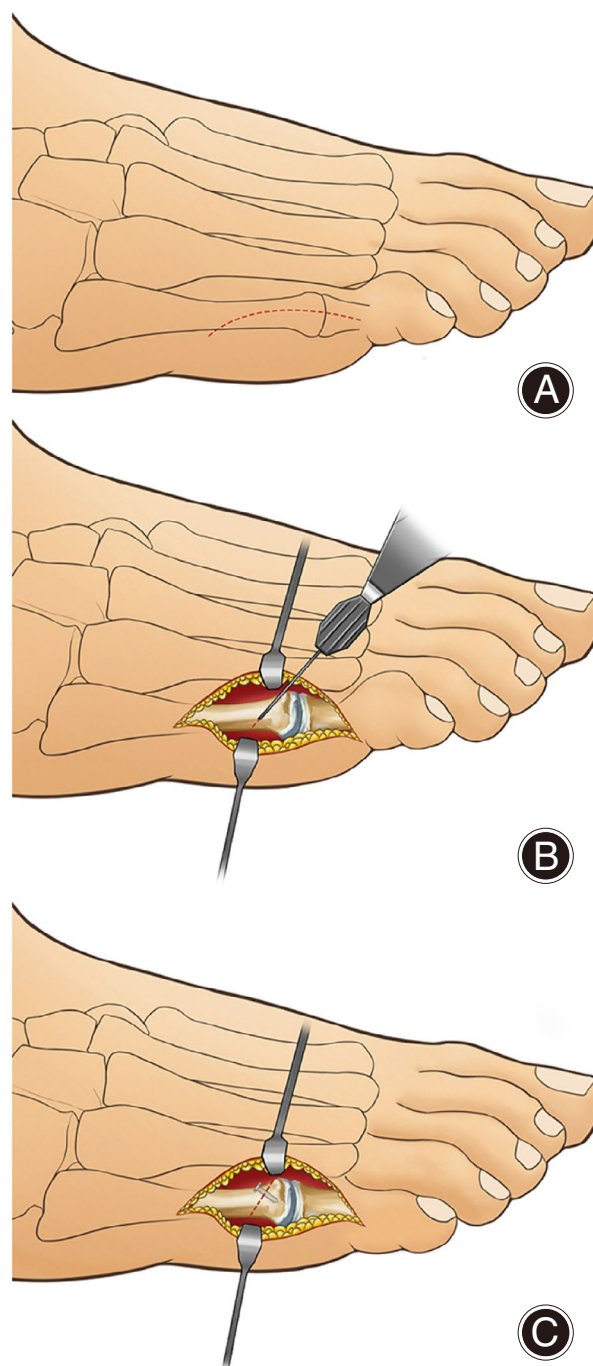


Fig 1 The Weil procedure: linear incision that made overlying the fifth metatarsal (A), separating subcutaneous tissue by retractor to expose the fifth MTPJ and perform Weil- Osteotomy, then, hole (2 mm) was drilled to make a final hole for the fixation screw (B), then fix the screw (C).

functional outcomes, a modified version of the 100-point American Orthopaedic Foot and Ankle Society Scale for Lesser Metatarsophalangeal Procedures (AOFAS) was used.

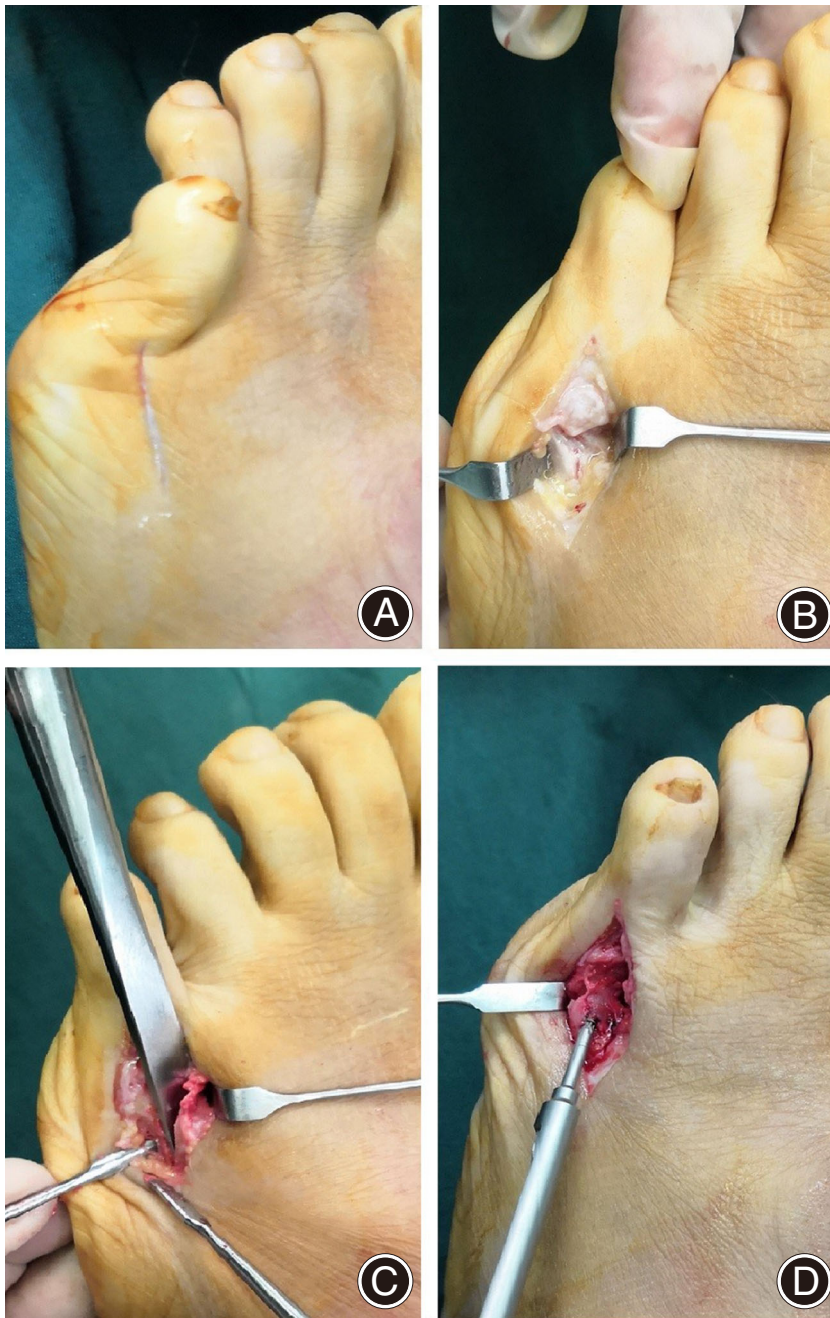


Fig 2 Intraoperative figures: showing 3 cm linear incision that made overlying the fifth metatarsal (A), separating subcutaneous tissue by retractor to expose and perform synovectomy of the fifth MTPJ (B), then perform Weil osteotomy (C), fixation the screw (D).

This assessment included 40 points for presence of pain; 45 points for function; and 15 points for alignment. The results were: 90–100 points graded as excellent; 80–89 points graded as good; 70–79 points graded as fair; and < 70 points graded as poor¹⁴.

Visual Analogue Scale (VAS)

We performed the visual analogue scale (VAS) to measure the effect of RA of the fifth MTP joint. VAS was as following: 0 indicate no pain; 1–3 mild pain that the patient can withstand; 4–6 moderate pain that the patient can cope with

and is able to sleep; 7–10 severe pain that the patient cannot tolerate¹⁵. Painless patient with full range of motion and stability of MTP joint, no limitation of footwear or daily activities, and good alignment may score 0 out of 10 points.

36-Item Short Form Survey (SF-36)

The 10-item SF-36 physical functioning and 2-item SF-36 bodily pain were used to evaluate the pain and quality of life of the patients. Assuming each scale is converted to a scale of 0 to 100, and each question has the same weight, the greater the score, the higher the ability¹⁶.

Satisfaction Scores

At the last follow-up, all patients were asked to complete a questionnaire for each operated foot. We handed out the questionnaire at the outpatient clinic to rate their satisfaction degree as excellent, good, fair, or poor, as described by Coughlin¹⁷.

Radiographic Evaluation

Radiologically, fifth metatarsophalangeal angle (MTP-5), lateral deviation angle (LDA), and longitudinal axes of the fifth metatarsal were measured on anterior–posterior (AP) weight-bearing radiographs preoperatively and at last follow-up.

- (i) The MTP-5 was measured by the axes of the proximal phalanx and fifth metatarsal and fifth metatarsal lateral deviation angle¹⁸.
- (ii) The LDA was measured as a line across the midpoint of the articular surface of the fifth metatarsal head and neck and line adjacent and aligned with the medial aspect of the proximal fifth metatarsal described by Fallat *et al.*¹⁹.
- (iii) The longitudinal axis of the fifth metatarsal was measured by drawing a line upon the axis of the fifth MTP in AP foot radiographs²⁰.
- (iv) The destruction severity of the fifth MTP joint was determined using the grading scale of Larsen *et al.*²¹.

Statistical Analysis

Statistical analysis was performed using the software SPSS (version 23.0; SPSS IBM Corp., Chicago, IL, USA). Data conforming to a normal distribution were expressed as mean \pm standard deviation (SD). The differences in the AOFAS, VAS, SF-36 score, MTP-5, LDA score, and fifth MT length between preoperative and last follow-up were analyzed by a paired samples *t*-test because these values were normally distributed. The AOFAS, VAS, and 10-item SF-36 physical functioning and 2-item SF-36 bodily pain were compared at five time points (preoperatively and at 6, 12, 24 and 36 months postoperatively) using One-Way ANOVA. *P*-value <0.05 was considered as statistically significant.

Results

Baseline and Follow-up

In this study, 18 feet of 16 patients (10 on right foot; eight on left foot; two cases were bilateral) who underwent a Weil osteotomy were included and followed up for 36 months (Table 1).

Intra-Operative Results

The mean operation time was 27.6 ± 2.1 minutes, and blood loss was 8.1 ± 3.1 mL. After fifth MTP joint capsule was exposed, synovial fluid was observed and synovial membrane was removed. All 18 feet were fixated with headless cannulated compression screw that were 10 to 13 mm in length

TABLE 1 Demographic data of the patients (N = 18 feet in 16 patients)

Variable	Data
Gender (M/F)	0/16
Feet no (R/L)	10/8
Mean age (year)	$48.8 \pm 7.4^*$
Mean disease duration (month)	$44.6 \pm 6.8^*$
Follow up period (month)	36

M, Male; F, Female; R, Right; L, Left.
* Values are expressed as mean \pm standard deviation.

and 2.5 mm in diameter. Neither fractures nor cracking of the fifth metatarsal occurred when performing osteotomy or drilling screw holes.

Clinical Evaluation Results

American Orthopaedic Foot and Ankle Society (AOFAS)

Lesser MTP-Interphalangeal Scale

Clinical assessment showed that the total average of AOFAS scores at 36 months after surgery were significantly higher than that before surgery by 45.1 points (Table 2). AOFAS scores increased from 53.6 ± 9.0 preoperatively to 93.4 ± 5.0 , 96.1 ± 3.7 , 97.0 ± 2.5 and 98.7 ± 2.0 points, 6, 12, 24, 36 months, respectively, postoperatively ($P < 0.001$).

Visual Analogue Scale (VAS)

The 36 months postoperative VAS scores were significantly lower than those before the surgery by 3.0 points (Table 2). VAS scores decreased from 4.1 ± 1.5 preoperatively to 2.2 ± 0.8 , 1.8 ± 0.8 , 1.3 ± 0.4 and 1.1 ± 0.8 points, 6, 12, 24, 36 months, respectively, postoperatively ($P < 0.001$).

36-Item Short Form Survey (SF-36)

The 36-months postoperative SF-36 physical functioning and SF-36 bodily pain were significantly higher than that before the surgery by 50.1 and 38.0 points respectively (Table 2). The total averages of SF-36 physical functioning and SF-36 bodily pain were increased from preoperative 48.9 ± 9.0 to 90.8 ± 9.6 , 96.1 ± 2.1 , 98.0 ± 2.5 and 99.0 ± 2.1 , and from 61.4 ± 12.1 to 91.7 ± 9.8 , 96.4 ± 3.4 , 98.1 ± 3.1 and 99.4 ± 2.4 points, 6, 12, 24, 36 months, respectively, postoperatively ($P < 0.001$) (Table 3).

Satisfaction Scores

Subjectively, the excellent outcome of the surgery results were rated by 13 patients (81.3%) that underwent surgery, and three patients (18.7%) were rated as good, indicating satisfactory and successful completion of the surgery outcomes.

TABLE 2 Preoperative and 36 months postoperatively clinical parameters (N = 18 feet in 16 patients)

Variable	Preoperative	36 months postoperatively	t-test	P-Value
AOFAS (total)	53.6 ± 9.0	98.7 ± 2.0	0.025	< 0.001*
VAS	4.1 ± 1.5	1.1 ± 0.8	0.005	< 0.001*
SF-36				
PF	48.9 ± 9.0	99.0 ± 2.1	0.001	< 0.001*
BP	61.4 ± 12.1	99.4 ± 2.4	0.172	< 0.001*

AOFAS, The American Orthopedic Foot and Ankle Society (AOFAS) lesser MTP-interphalangeal scale; VAS, visual analogue scale; SF-36, MOS 36-item short-form health survey; PF, physical functioning; BP, bodily pain.
* Statistically significant ($P < 0.05$).; Values are expressed as mean ± standard deviation.; t-test, student's t-test.

Radiological Assessment Results

Fifth Metatarsophalangeal Angle (MTP-5)

The 36-months postoperative MTP-5 was significantly smaller than that before the surgery by 11.3° . Radiological assessment showed that the mean MTP-5 decreased from $21.5^\circ \pm 1.2^\circ$ preoperatively to $10.2^\circ \pm 1.2^\circ$ at the final follow-up visit ($t = 0.148$, $P < 0.001$).

Lateral Deviation Angle (LDA)

The 36-months postoperative LDA was significantly smaller than that before the surgery by 9.5° . The mean LDA decreased from $7.1^\circ \pm 1.2^\circ$ preoperatively to $-2.4^\circ \pm 1.0^\circ$ at the final follow-up visit ($t = 0.923$, $P < 0.001$).

MTP-5 and LDA improvement indicated reduced dislocation of the fifth metatarsal heads and restoration of deformities.

Fifth Metatarsal Longitudinal Axis

The 36-months postoperative LDA was significantly shorter than that before surgery by 3.8 mm. The mean length of the fifth metatarsal was shortened from 71.5 ± 1.4 preoperatively to 67.8 ± 1.5 mm at the final follow-up visit ($t = 0.00$, $P < 0.001$), indicating no limitation of footwear and stability of the fifth MTP (Table 4).

Complications

No malunion, necrosis, pseudarthrosis, or fracture of the fifth metatarsal was observed. No exuberant bone growth, perforation of the screws, subluxation, or dislocation. No indications of modification, revision or repeat surgery and delayed wound healing were observed during follow-up period (Fig. 3).

Discussion

In this study, we found an improvement in AOFAS and VAS scores; this implies functional improvement and pain reduction after reconstructing the fifth metatarsal by repositioning of the MTP joint, preserving the metatarsal head (distal fifth metatarsal) weight-bearing area, as well as MTP joint function and metatarsal length. It also contributes to the transverse metatarsal arch reconstruction.

The 10-item SF-36 physical functioning and 2-item SF-36 bodily pain have improved significantly at the last follow-up visit, which means improving the quality of life of patients and participation in everyday activities.

Patients' subjective assessments of surgery outcomes were generally satisfactory. Satisfaction was rated as excellent by 83.3% (15 feet) and good by 16.7% (three feet) of the patients. Subjective assessments of patients were recently shown to be important tools for evaluating the postoperative outcomes in patients with RA. Thus, further studies should be conducted, including subjective evaluation.

TABLE 3 AOFAS, VAS, and SF-36 preoperative and during 6, 12, 24 and 36 months (N = 18 feet in 16 patients)

Variable	Preoperative	6 months	12 months	24 months	36 months	F value	P Value
AOFAS	53.6 ± 9.0	93.4 ± 5.0	96.1 ± 3.7	97.0 ± 2.5	98.7 ± 2.0	259.552	< 0.001*
VAS	4.1 ± 1.5	2.2 ± 0.8	1.8 ± 0.8	1.3 ± 0.4	1.1 ± 0.8	28.38	< 0.001*
SF-36							
PF	48.9 ± 9.0	90.8 ± 9.6	96.1 ± 2.1	98.0 ± 2.5	99.0 ± 2.1	216.492	< 0.001*
BP	61.4 ± 12.1	91.7 ± 9.8	96.4 ± 3.4	98.1 ± 3.1	99.4 ± 2.4	84.45	< 0.001*

AOFAS, The American Orthopedic Foot and Ankle Society (AOFAS) lesser MTP-interphalangeal Scale; VAS, visual analogue scale; SF-36, MOS 36-item short-form health survey; PF, physical functioning; BP, bodily pain.
* Statistically significant ($P < 0.05$).; Values are expressed as mean ± standard deviation.; F value, F-statistic test.

TABLE 4 Preoperative and 36 months postoperatively radiographical parameters (N = 18 feet in 16 patients)

Variable	Preoperative	36 months postoperatively	t-test	P-Value
MTP-5 angle (°)	21.5 ± 1.2	10.2 ± 1.2	0.148	< 0.001*
LDA (°)	7.1 ± 1.2	-2.4 ± 1.0	0.923	< 0.001*
Fifth metatarsal length (mm)	71.5 ± 1.4	67.8 ± 1.5	0.000	< 0.001*

MTP-5 angle, fifth metatarsophalangeal angle; LDA, lateral deviation angle.
*Statistically significant ($P < 0.05$).; Values are expressed as mean ± standard deviation.; t-test, student's t-test.

Increasing of the MTP-5 and LDA are combined with the fifth metatarsal deformities caused by the destruction or dislocation of the fifth MTP joint¹⁷. Fallat *et al.* reported the average normal of LDA at approximately 2.6°, whereas 8° were noted in the pathologic foot¹⁹. Nestor *et al.*, and Steel *et al.* reported an average of MTP-5 angle 10.2°, and 14° or less in 90% of normal cases, respectively^{18, 22}. An average of 16° was reported by Coughlin and Nestor *et al.* in feet with bunionettes^{17, 18}. In our study, the average values change of MTP-5 and LD angles were 11.3° and 9.5° at the final follow-up visit, respectively.

Minimum shortening of the metatarsal is preferred according to the MTP joint dislocation and destruction; this is because the metatarsal length can result in stable weight bearing and forceful toe postoperatively. The rheumatoid joint conditions also changed due to the shortening of the fifth metatarsal¹². In our study, the mean range amount of the fifth metatarsal bone shortening was 3.7 (range 3.0 to 5.0) mm.

All patients were treated with cs-DMARDs and b-DMARDs (Prednisolone, $n = 15$; Infliximab, $n = 1$) between preoperative and postoperative. To prevent preoperative and postoperative infectious complications, antirheumatic drugs were stopped 1 day before surgery and started on the third

day after surgery²³. Synovial fibroblast proliferation conduces to the rheumatoid arthritis pathogenesis, and to avoid RA recurrence, synovium resection was required to remove rheumatoid nodules and relieve the pathologic pressure of joints²⁴. However, early studies reported progression to polyarticular RA over 3 to 4 years in most cases⁷. None of our 16 patients evolved into polyarticular RA or had a new joint involvement during the follow-up period.

Rheumatoid arthritis treatment is always challenging due to its multifocal nature and untreated RA can cause short- and long-term complications with an increase in morbidity and mortality. Clinical examination and a good history with appropriate diagnostic assessment are useful for confirming the diagnosis. We used the 2010 ACR/EULAR classification criteria to help in diagnosing and to identify the number of involved joints and durations of symptoms. Anti-citrullinated cyclic peptide (anti-CCP) assay sensitivity and specificity are 74% and 98%, respectively. Thus, anti-CCP is a more specific serologic marker for RA diagnosis⁷.

Surgical treatment is recommended when conservative treatment fails and rheumatoid arthritis is well controlled. Surgery can reduce joint damage and improve the quality of life of patients, which is beneficial to those with RA disease. Different surgical procedures for the treatment of

Fig 3 Standard weightbearing anteroposterior radiographs of the right foot for 44 years old female with Monoarticular rheumatoid arthritis of the fifth MTPJ; the disease duration was 52 months. Preoperative view showing the destruction severity and swollen of the fifth MTPJ with Larsen grade 5 (A), 36 months postoperatively; shows the total replacement of the deformities and dorsal luxation, the patient had a stable forefoot with correction of fifth metatarsal toe deformities and complete resolution of pain AOFAS and SF-36 improved from 42 to 98 and 35 to 97.5 points, respectively, at the last follow-up (B).



rheumatoid forefoot have been developed and described; however, metatarsalgia and other complications are possible. Hence, Weil procedure is a substitute for the rheumatoid fifth MTP joint, because it can preserve weight-bearing area of the metatarsal head. Headless cannulated compression screws were used for all 18 feet due to their fixation force, and there is no need to remove screws. Partially threaded cancellous screws were not used due to their instability. External fixation (Kirschner wire) was not used due to its unsteady nature. Moreover, it could lead to complications that may delay bone union and wound healing and could cause infection. In the absence of K-wire, the early exercise for the fifth MTP joint becomes available, thereby improving the function of the feet postoperatively²⁵.

Osteoporosis is a common feature in patients with RA, which can increase the rate of intraoperative complications, such as fracture or cracks in the bone. Hence, careful handling is required when performing Weil osteotomy, and screw holes should be drilled through the guide wire as described by Yano *et al.*²⁵. Care must be taken when tightening the screw also. However, if issues occur during surgery, such as fracture or cracks in the bone, then plaster bandages should be used postoperatively. The indications to perform Weil osteotomy were based on the fifth MTP joint

conditions, such as severity of the fifth MTP joint destruction and controlled disease activity of RA; such an approach provides excellent outcomes and reduces the recurrence of the deformity and postoperative complication.

Limitations

Our study limitations included the following. Firstly, few sample size of patients are eligible for meta-analysis. Secondly, the indication to perform the Weil osteotomy procedures was depend on the severity of fifth MTP joint destruction, and monoarticular RA disease activity.

However, in our opinion, based on experience as foot and ankle surgeons treating patients with rheumatoid arthritis, the longer the duration of disease and the more severe joint destruction, the worse the functional recovery. Further research is required to clarify this hypothesis.

Conclusions

In summary, surgical management of the monoarticular RA of the fifth MTP joint can achieve good clinical and radiological outcomes with pain relief and dislocation reduction, as well as high satisfaction and improvement without recurrence or progression during the follow-up period.

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