

Hallux Rigidus Treatment: Weil's Osteotomy

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Abstract

Introduction: Hallux rigidus pathology affects the first metatarsophalangeal joint causing pain, limited range of motion (ROM) and alter gait pattern in late stages.

Objective: This study shows our experience with Weil's osteotomy in hallux rigidus type 1 and 2.

Methods: Retrospective study level IV, 30 patients with hallux rigidus types 1 and 2 were operated on from 2010 to 2016.

Results: 29 of 30 patients returned to daily activities after hallux rigidus surgical treatment, there were no complications relative to surgical procedure such nonunion, plantar keratosis, central metatarsal stress fractures.

Discussion: Hallux rigidus treatment is controversial, there are many surgical techniques for hallux rigidus treatment, distal osteotomies, proximal osteotomies, but Weil's osteotomy allows range of motion in early stages, very low risk of osteonecrosis, stable osteotomy, shortening and descending first metatarsal head.

Conclusion: Due to results we obtained in this study, we believe Weil's osteotomy is the best surgical technique for treating hallux rigidus types 1 and 2.

Keywords: Hallux Rigidus; ROM; First Metatarsophalangeal Joint

Introduction

Hallux rigidus is a pathology which affects the first metatarsophalangeal joint causing pain, with joint motion, soft-tissue swelling, intolerance of footwear, limited ROM in early stages, and alter the gait pattern in late stages (everted gait). First metatarsophalangeal joint ROM is about 110° (35° plantar flexion and 75° dorsal flexion) [1] (Figure a). The main symptoms are pain, ROM limitation of dorsal flexion in early stages then appears rigidity, finally ankylosis appears. The pain gets worse during walking especially take off hallux phase and heels off. This changes generates over-

loading of the lateral aspect of the feet [2]. It is the second most common condition to affect the first MP joint after hallux valgus .

The cause of hallux rigidus is unknown [3,15], some authors affirm hallux rigidus pathology is caused by a long first metatarsal bone [4], tarsal metatarsal joint instability, elevated first metatarsal bone [5], first metatarsophalangeal joint ankylosis like rheumatoid arthritis, posttraumatic arthrosis, osteochondritis. We found over 100 cases operated from hallux rigidus type 2 and 89% have sesamoid retraction, so it may be a strong relationship between hallux rigidus and sesamoid retraction [6].

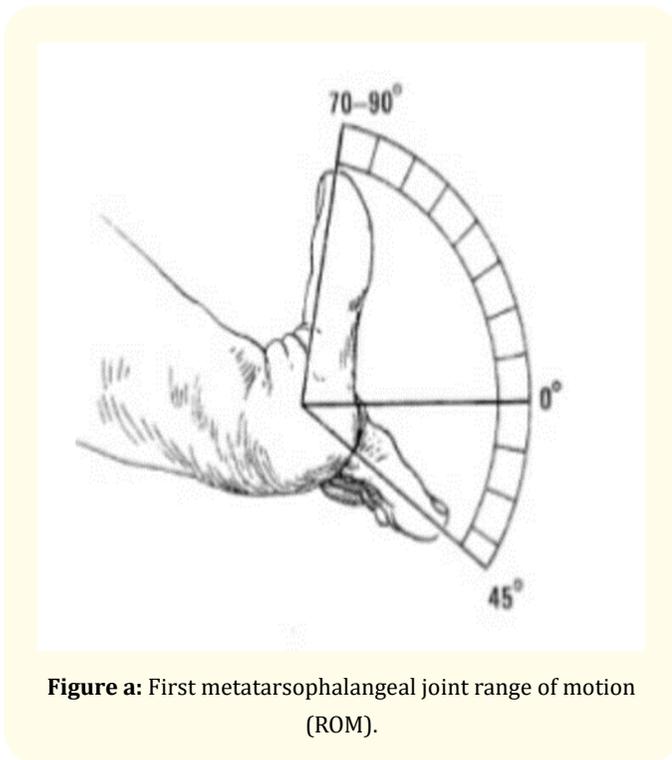


Figure a: First metatarsophalangeal joint range of motion (ROM).

The main complications in hallux rigidus treatment are metatarsalgia⁷, second metatarsal stress fracture by overloading, metatarsophalangeal or interphalangeal pain, first metatarsal bone head osteonecrosis, nonunion, wound infection, osteomyelitis and hardware intolerance.

There are many hallux rigidus classifications [13], we prefer Hattrup and Johnson classification⁸ where hallux rigidus is divided in three types based on X-ray findings (Table 1).

Hattrup and Johnson radiographic classification		N
Grade 1	Mild to moderate osteophyte formation but good joint space preservation	0
Grade 2	Moderate osteophyte formation with joint space narrowing and subchondral sclerosis	16 (53%)
Grade 3	Marked osteophyte formation and loss of visible joint space with or without subchondral cyst formation	14 (47%)

Table 1: Hattrup and Johnson classification [8].

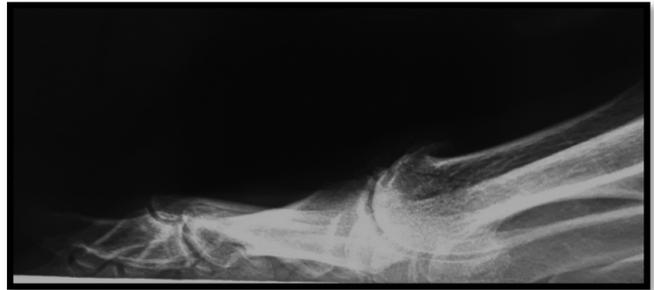


Figure b: Dorsal osteophyte and joint space narrowing.

The patients were selected based on the longitude of first metatarsal bone regard second metatarsal bone. Surgical procedure: under regional anesthesia, medial approach is done center on first metatarsal joint, then capsulotomy is done. All osteophytes are removed medial, dorsal (Figure b) and lateral, then Weil's osteotomy is performed achieving two goals: shortening and descention first metatarsal head (Figure c). So the osteotomy is done from distal and dorsal to proximal and plantar, starts from 2 mm distal first metatarsal cartilage and goes proximal in a plantar way. When it is done, the first metatarsal head moves backwards and the longitude is checked with x-ray (AP view). Then two k-wires from cannulated screws keep the head in position and the osteotomy is fixed with two 2.3 mm canulated screws (Figure d). Wound closure.

Postoperative management: the patient is allowed stand and walk with an orthopedic sandal within 30 days, after 2 weeks stitches are removed. But the most important thing is to move the first metatarsophalangeal joint from the beginning.

Objective

The objective of this retrospective study was To show our experience with Weil's osteotomy for hallux rigidus pathology types 1 and 2 in order to recover joint movility by shortening and descending first metatarsal head and releasing the sesamoid complex. For many years we performed Green – Watermann's osteotomy for hallux rigidus, but we found up to 20% of metatarsalgia with plantar keratosis. So we start doing Weil's osteotomy

Methods

A retrospective level IV study. 30 cases with hallux rigidus types 1 and 2 were operated on from January 2010 to January

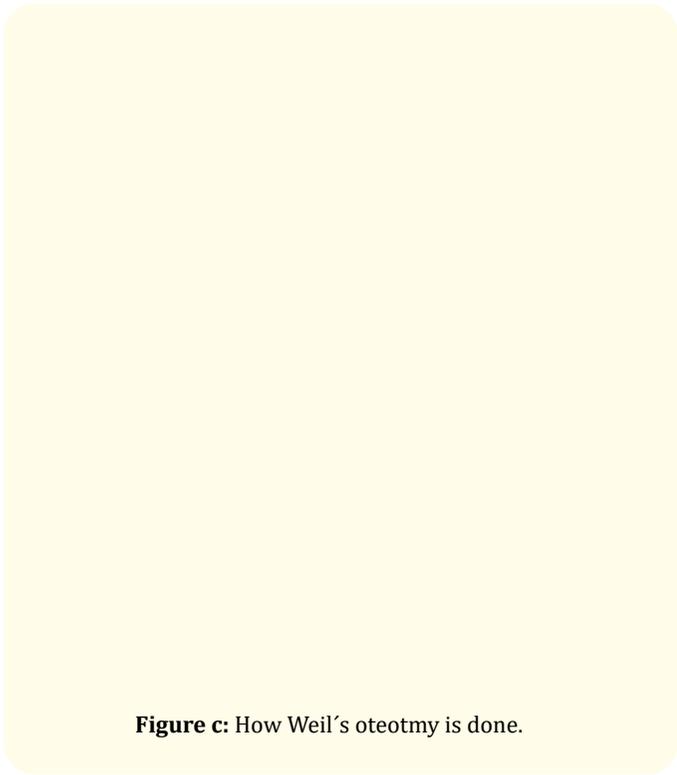


Figure c: How Weil's osteotomy is done.

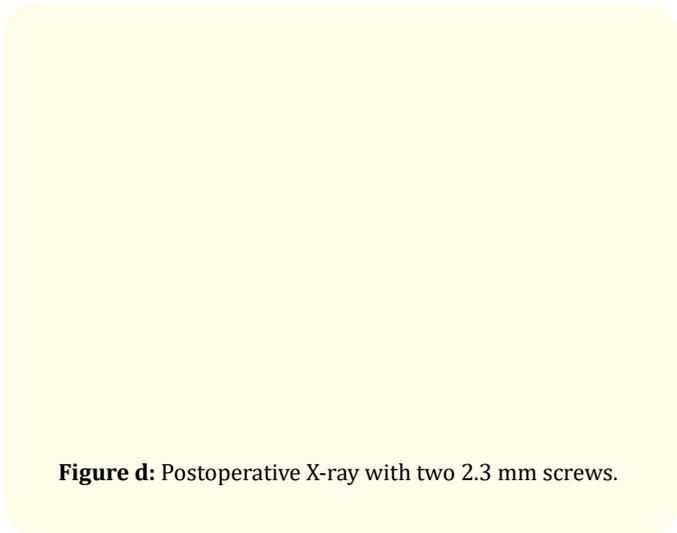


Figure d: Postoperative X-ray with two 2.3 mm screws.

2016, Weil's osteotomy was performed in all cases. AOFAS and VAS scores were used.

Inclusion criteria

- Hallux rigidus types 1 and 2

- Painful hallux rigidus
- No cartilage injury (Figure e).



Figure e: Oblique X-ray shows plantar cartilage first metatarsal head.

Exclusion criteria

- Hallux rigidus type 3
- First metatarsal bone 5 mm or more shorter from second metatarsal bone (Figure f)
- Previous surgeries (first and second metatarsals)

Results

Long term follow up results were analyzed with AOFAS and VAS scores, 30 patients who suffer from hallux rigidus types 1 and 2 were evaluated from January 2010 to January 2016. Great results were found by descending first metatarsal head and joint space recovery, in all cases ROM was improved. There were no surgical revisions and none of all cases presented metatarsalgia due to first

Figure f: First metatarsal bone less 5mm shorter than second metatarsal bone.

metatarsal bone shortening. Only one case presented hardware intolerance. AOFAS score was 85-100 (90.9), VAS score was 0-4 (1.27). 29 of 30 cases return to daily activities after hallux rigidus surgery, only one case has a VAS score of 4 and the main complaint was a painful joint, but no ROM limitation was present and X-ray did not show negative changes. No other complications relative to surgical procedure were presented. Twelve months follow up showed none of the 30 cases had plantar keratosis or pain during gait. The most important complication is overloading central metatarsal bones, and occur when the first metatarsal bone remains too short (excessive shortening) or a high pression over sesamoid complex (more oblique osteotomy). Hardware removal was done in one case.

Discussion

Hallux rigidus treatment is controversial, there are many surgical procedures like Keller or Kessel-Bonney osteotomies, cheilec-

tomy with or without Moberg osteotomy, distal osteotomies [14] (Watermann [10], Green-Watermann, Youngswick [11,16] and Weil [12]) or proximal osteotomies (Scarf, Drago [9]).

Weil's osteotomy allows a very good ROM once the surgery is done, has a very low risk of osteonecrosis, the fixation with two screws improves stability, early ROM and weightbearing as soon as possible. It is essential to control shortening and descending first metatarsal head in hallux rigidus surgical treatment. None of 30 cases suffer from metatarsalgia after 12 months follow up.

Conclusion

There are many surgical techniques for hallux rigidus pathology, and for several years we did Green-Watermann's osteotomy but we were not agree with our results. In order to improve the results we decided to start doing Weil's osteotomy, and compared them. In our experience, we found no metatarsalgia in those patients where Weil's osteotomy was done meanwhile we found up to 20-25% metatarsalgia when Green-Watermann's osteotomy was done.

Due to results we had obtained in this study, we believe Weil's osteotomy is the best surgical technique for treating hallux rigidus types 1 and 2.

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