

Correction of valgus of fifth metatarsal and varus of the fifth toes by percutaneous distal osteotomy

B. Martinelli, R. Valentini *

Azienda Ospedaliero-Universitaria di Trieste, Department of Orthopedics, Rehabilitation and Labour Medicine, Cattinara Hospital, Trieste, Orthopaedic and Traumatological Clinic, Italy

Abstract

In this paper, the Authors suggest the performance of percutaneous distal osteotomy of the fifth metatarsal neck by a rapid, mini-invasive technique, without joint capsule procedures for the correction of fifth ray deformities with a valgus fifth metatarsal and a varus fifth toe. The procedure was carried out in 25 feet who underwent surgery between January 2002 and May 2005, with an 8-month to 4-year follow-up. The clinical results were evaluated by the AOFAS score which identified an improvement of the obtained score, with over 90% of the results classified between excellent and good.

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Keywords: Varus fifth toe; Percutaneous distal metatarsal osteotomy

1. Introduction

Fifth ray deformities with a valgus fifth metatarsal and a varus fifth toe are usually congenital forms, which occasionally progress during adolescence; in the acquired forms – which are often bilateral, pure or associated with hallux valgus generally requiring surgical treatment – the formation of a triangular foot can be observed. The overload on the central metatarsals leads to an insufficiency of the first metatarsal, with a varus deviation of the same and a valgus deviation of the fifth metatarsal. This is ascribable to the characteristics of the Lisfranc joint, allowing greater mobility of the first and fifth metatarsals in comparison to the central ones.

The clinical examination shows an axial deformity of the fifth metatarsal which can manifest with diaphyseal valgus bending, causing prominence of the fifth metatarsal head laterally in the foot.

These aspects can be fully assessed in the dorso-plantar projection of a radiograph of the weight-bearing foot.

The clinical inspection clearly shows a widening of the fourth metatarsal space with abduction of the fifth metatarsal

and a varus fifth toe which can be overlapping or underlapping the fourth toe.

The projection of the fifth metatarsal condyle can cause difficulties in wearing shoes, especially in the presence of keratomas or reactive bursitis.

The extensor tendon appears retracted and deviated medially to form a cord in the fourth space.

Palpation can identify an elastic form of deformity, which can be manually corrected, as well as a fixed and irreducible form: both can require surgical treatment with the aim of restoring the fifth ray axis, correcting the divergence between the fourth and fifth metatarsal, and stabilising the correction.

The surgical treatment of passively reducible deformity includes section of ligaments between fourth and fifth metatarsal heads, tenoplasty to lengthen the extensors and the pedium, arthrolysis of the fifth MT-P joint, trimming of condyle of the fifth MT head and finally capsulorrhaphy to bring the fourth and fifth metatarsal heads closer together.

The surgical treatment of those with fixed deformity is by osteotomy, either distally at the fifth metatarsal neck, or proximally through the base of the fifth metatarsal, according to the technique of Regnaud [8] or the technique of de Wulf [9].

Our preference is for percutaneous distal osteotomy of the fifth metatarsal, as it can be performed by a rapid,

* Corresponding author.

E-mail address: roberto.valentini@aots.sanita.fvg.it (R. Valentini).

mini-invasive technique [1–7], having to resort to joint capsule procedures.

2. Surgical technique

This technique uses distal local anaesthesia of the lateral side of the foot or an ankle block.

Through a small lateral cutaneous access (5–6 mm) on the fifth metatarsal neck, introduce a 1.5 mm K-wire on a handpiece, and passing it distally making it slide alongside the dorso-lateral side of the fifth metatarsal head and the little toe phalanges, to emerge at the lateral side of the little toenail. After elevating the thin periosteum surrounding the fifth metatarsal neck, an oscillating saw is used to perform osteotomy perpendicular to the metatarsal axis immediately proximal to the epiphysis and to the capsular insertion, while ensuring protection of the vascular-nervous bundles (Fig. 1). With an appropriate orientation of the saw angle on the diaphysis, ray lengthening or shortening can be achieved as well as dorsalisation or, rather, plantarisation of the fifth metatarsal head.

Subsequently, after manual correction of the varus of the little toe, the K-wire is passed retrograde through the cut surface of the fifth metatarsal neck, and passed proximally up the fifth metatarsal shaft under X-ray image intensifier control (Fig. 2) thereby holding the correction.

After suturing, taping of the fifth toe is carried out with semi-adhesive elastic bandages.

The patient will be able walk with a post-op shoe just a few hours after surgery.

An antibiotic and antithrombotic prophylaxis should always be carried out.

The K-wire are removed, generally, at 4 weeks from surgery.

The considerable displacement of the metatarsal head gives this surgical technique an important potential to correct the valgus fifth metatarsal deformity.

Osteotomy shall be stabilised but not synthesized since the K-wire guides the epiphysis self-centering on three planes, thereby allowing the alignment of the diaphyseal stump of the fifth metatarsal with the fifth toe.

This correction allows the restoration of the altered parameters by correcting the valgus fifth metatarsal, realigning the metatarsal phalangeal joint and the extensor apparatus.

3. Materials and methods

Our case study includes 20 patients who underwent surgery between January 2002 and May 2005, with an 8-month to 4-year follow-up, mean of 28 months.

In five cases, both feet were operated on, the assessment will include a total of 25 feet. In 8 feet, a distal linear osteotomy



Fig. 1. Pre-op radiograph and follow-up at 2 months in a 60-year-old male patient.



Fig. 2. Pre-op radiograph and post-op follow-up in a female patient aged 63.

of the first MT was also associated, in order to correct a concomitant hallux valgus, while in 2 feet osteotomy on the fifth MT was associated with the application of a bioabsorbable spacer for the surgical correction of a hallux rigidus.

In two cases, surgery was also carried out in patients with rheumatoid arthritis at an initial stage.

The female sex representation prevailed with a total of 12 cases (60%).

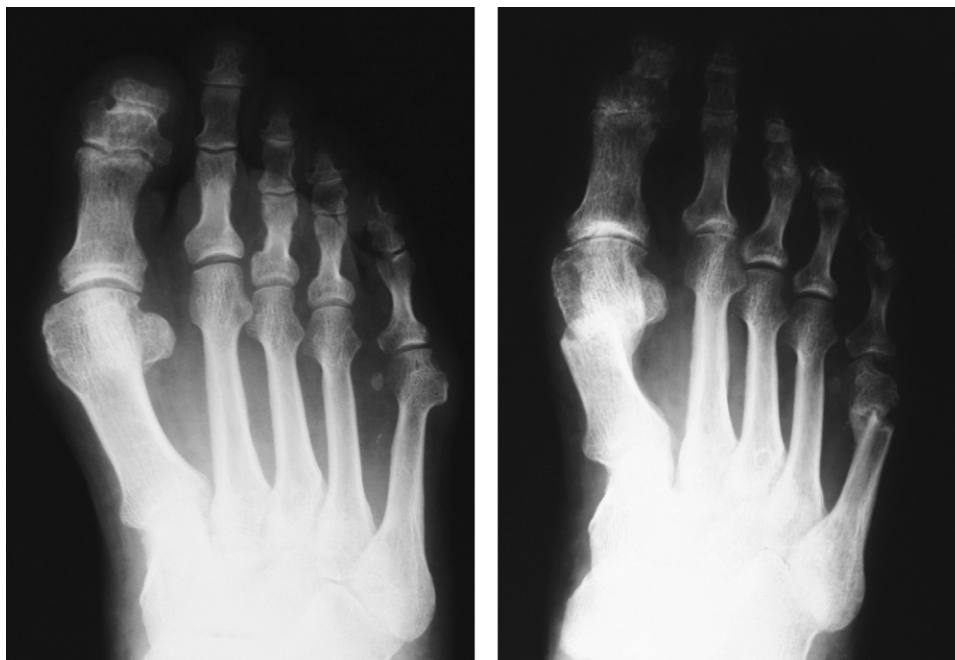


Fig. 3. A male patient aged 58: radiographs of pre-op and follow-up at 3 months.



Fig. 4. Radiographic control at 1 year post-op of patient of Fig. 3.

The right foot was involved in 60% of the cases.

Radiographs of the weight-bearing feet were carried out before surgery, immediately after surgery, after 2 months and during the examination carried out for this clinical study (Fig. 3).

4. Results

The clinical and radiological healing time was approximately 60 days.

Two local complications were observed, i.e. cutaneous superinfection and delay in the consolidation of the surgical wound. However, the clinical and radiological patterns did not lead to a lengthening of the healing time.

Hypertrophic non-unions occurred in one patient treated with a bilateral procedure.

The clinical results were evaluated by the AOFAS score which identified an improvement of the obtained score, with over 90% of the results classified between excellent and good. Only two patients had very moderate pain at the time of review.

All patients were satisfied of procedure and they said that they really would repeat it. Moreover all of them, included the patient with mal-union, found an improvement and relief of pain and that they have any difficulty with shoes or during walking or running.

All post-op follow-up radiographs showed an improvement of the fourth and fifth IM angle.

5. Conclusions

Patients benefited from a considerable regression of pain, hyperkeratosis and bursitis of the fifth metatarsal phalangeal joint, with a very high rating of subjective satisfaction (Fig. 4).

All of which was achieved by surgery with an extremely low level of invasiveness.

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