



## Phalangeal Toe Open Osteotomy and Fixation for Deformity Correction

**Adnan A FARAJ\***

*The Orthopaedic Department, Scarborough Hospital, Scarborough, England*

**\*Corresponding Author:** Adnan A FARAJ, The Orthopaedic Department, Scarborough Hospital, Scarborough, England.

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### Abstract

Toe deformity can cause pressure, pain, ulceration and shoe wear problems. The surgical options available to correct deformity commonly, are proximal interphalangeal fusion, metatarsal osteotomy, and amputation as a salvage procedure. Phalangeal osteotomy is described for the valgus 2nd toe.

We report 6 patients (9 toes) who underwent osteotomy and fixation of the proximal phalanx in eight cases, and the middle phalanx in one, after the correction of coronal, sagittal and multi- plane toe deformity. The outcome was satisfactory.

This paper describes the technique and recommends the procedure which maintains the proximal interphalangeal joint movement.

**Keywords:** Osteotomy; Fixation; Toe; Proximal; Phalanx

### Introduction

Deformities of the lesser toes are very common and usually described in the sagittal plane as claw, hammer, curly or mallet toes, using the terms defined by Coughlin and Stainsby [1-6]. Valgus deformities of the lesser toes can cause functional issues and may be a factor in recurrent hallux valgus deformity although there is limited evidence to support this. Moreover, most of the literature is devoted to varus coronal plane deformity leading to medial crossover of the second toe and there is a scarcity of literature regarding the management of valgus coronal plane deformities of the lesser toes [2,6]. Techniques developed for sagittal plane deformities such as interphalangeal arthrodesis, flexor to extensor transfers and metatarsal osteotomies can lead to unsatisfying and unpredictable results with high complications [2,3].

Coronal plane, or varus and valgus deformity is also common, and management can be very challenging with unpredictable results [4,5].

Proximal phalanx base metaphyseal closing wedge extracapsular osteotomies of lesser toes to correct coronal plane deformity is considered to be a useful adjunct to first-ray corrective surgery and is associated with high levels of patient satisfaction [1-6].

The current series of cases, are reported illustrate the satisfactory outcome of toe phalanges osteotomy correcting various deformities of the toe without sacrificing the interphalangeal joints.

### Material and Methods

Five female and one male patient (mean age of 52, range 19-69 years) underwent in 8 proximal phalanx closed wedge de rotational osteotomy and one middle phalanx closed varus wedge osteotomy and fixation to correct various toe deformity without sacrificing the proximal interphalangeal joint. Headless 2.7 headless screws are used to secure the new position.

At a mean follow-up of 6 months 8-52 weeks. Manchester Oxford foot score was used for the assessment of the foot and radiographs to check for healing. The outcome was satisfactory and pleasing to the patients without any recorded complications.

### Technique

Standing AP and lateral radiographs are taken to check for the dynamic toe deformity, measure the angles of the deformity and the degree of close wedge resection required to correct the deformity. The base of the close wedge osteotomy is equal to the angle

between the long axis of phalanx to and from the centre of deformity.

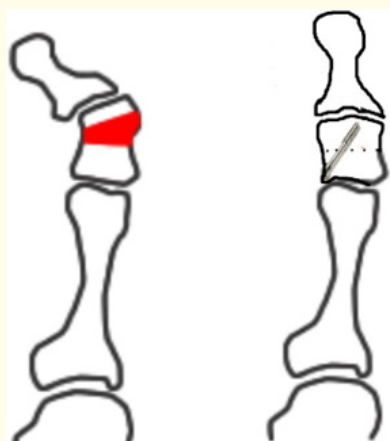
Incision is longitudinal protecting the neurovascular bundle and the extensor mechanism, at the site of the closing wedge osteotomy, FRS 2.7 or 3.5 headless screws is used for fixation under C-arm guidance.

The patient is allowed full weight bearing in flat and wedge shoe.

**Results and Discussion**

An open closing-wedge “Akinette” osteotomy of the base of the proximal phalanx of the second toe (and other lesser toes) has been described for coronal plane deformities by Davis, *et al.* [7]. This was described as a technique, and no long-term results of the procedure were given. Kilmartin, *et al.* [8] described a similar but open, closing-wedge osteotomy using an oscillating saw.

The deformities treated in this series, were mainly coronal deformities. The technique followed was to adapt the deformities in the metatarsophalangeal and proximal interphalangeal joint without fusing the interphalangeal joints. Fusion of the proximal interphalangeal joint deemed unpredictable addressing the deformity which partly was thought to be caused by soft tissue contracture around the joint. Joint soft tissue release is renowned to have an unpredictable outcome.



**Figure 1:** Diagrammatic representation of the procedure.



**Figure 2:** Pre and post osteotomy x rays of a patient with a valgus toe.



**Figure 3:** Postoperative x-ray of the left foot after varus osteotomy for the left 2<sup>nd</sup> and 3<sup>rd</sup> toe.

Toe involved	Deformity	Osteotomy	Outcome
Left third	Valgus on weightbearing	Closing medial wedge with fixation	Good
Right hallux	Extension of hallux	Plantar closing wedge	Good
1 and 2 <sup>nd</sup> toe left foot	Hallux and toe varus	Reverse akin, hallux and 2nd toe	Also had hind foot Surgery
Rt 2 <sup>nd</sup> toe	Varus toe	Lateral closing wedge	Good
rt 2 <sup>nd</sup> toe	S shaped multiplanar	Proximal lateral and middle medial closed wedge osteotomy	Good
Left 2 <sup>nd</sup> and 3rd	Valgus deformity	Varus closed wedge osteotomy and fixation	Good

**Table 1:** Deformities, surgery and outcome.

## Conclusion

The osteotomy and soft tissue correction are claimed to be successful in treating curlytoe and cross over deformity [9,10].

Several deformities in the current case reports have been managed with this technique, aiming at improving the shape of the toe without interfering with the joints. The toes were aesthetically appealing to all the patients in this series.

## Bibliography

1. Coughlin MJ. "Common causes of pain in the forefoot in adults". *The Journal of Bone and Joint Surgery. British Volume* 82.6 (2000): 781-790.
2. Klinge SA., et al. "Modification of the Weil/Maceira metatarsal osteotomy for coronal plane malalignment during crossover toe correction: caseseries". *Foot and Ankle International* 35.6 (2014): 584-591.
3. Myerson MS and Jung HG. "The role of toe flexor-to-extensor transfer in correcting metatarsophalangeal joint instability of the second toe". *Foot and Ankle International* 26.9 (2005): 675-679.
4. Hobizal KB., et al. "Extensor digitorum brevis transfer technique to correct multiplanar deformity of the lesser digits". *Foot and Ankle Specialist* 9.3 (2016): 252-257.
5. Robbie Ray., et al. "Valgus Second Toe Deformity Treated with a Percutaneous Extracapsular Closing-Wedge Osteotomy of the Proximal Phalanx Tech". *Foot and Ankle Surgery* 7.1 (2008): 41.
6. Klinge SA., et al. "Modification of the Weil/Maceirametatarsal osteotomy for coronal plane malalignment during crossover toe correction: caseseries". *Foot and Ankle International* 35.6 (2014): 584-591.
7. Davis WH., et al. "Proximalphalanx basilar osteotomy for resistant angulation of the lesser toes". *Foot and Ankle International* 18.2 (1997): 103-104.
8. Kilmartin TE and O'Kane C. "Correction of valgus second toe by closing wedge osteotomy of the proximal phalanx". *Foot and Ankle International* 28.12 (2007): 1260-1264.
9. Lee DJ., et al. "Deformity". *Foot Ankle Surg* 27.1 (2021): 60-65.
10. Graziano TA. "Correction of crossover second toe deformity". *Clinics in Podiatric Medicine and Surgery* 13.2 (1996): 269-278.