

## Hallux Flexus: Sequela of Residual Clubfoot

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### Abstract

A dorsal bunion, also known as hallux flexus, is a deformity where the 1st metatarsal is in a dorsiflexed position and the proximal phalanx of the hallux is in a plantarflexed position usually articulating with the plantar aspect of the 1st metatarsal head. Multiple etiologies exist for this condition; the one most evaluated has been the occurrence of hallux flexus following clubfoot surgery. The following is a case report on a patient that is skeletally mature and developed hallux flexus following soft tissue correction of a clubfoot. This deformity was surgically corrected with an arthrodesis of the 1st metatarsal phalangeal joint (MTPJ). The patient was followed for 3 years following surgery and has returned to all activities. This case report illustrates that an arthrodesis of the 1st MTPJ can be performed as a corrective procedure of hallux flexus.

**Keywords:** Dorsal bunion; Clubfoot; Deformity; Hallux flexus

### Introduction

A dorsal bunion, or hallux flexus, is a deformity where the 1st metatarsal is in a dorsiflexed position and the proximal phalanx of the hallux is in a plantarflexed position usually articulating with the plantar aspect of the 1st metatarsal head. There are a variety of etiologies for this condition; the one most evaluated has been the occurrence of a dorsal bunion following clubfoot surgery [1-14]. Docquier noted an incidence of 16% of dorsal bunions in his series, while Kuo noted only 4.4% in his series [6,9]. This deformity is evaluated by physical exam including muscle strength, reducibility of the deformity and radiographic evaluation. Treatment options for a dorsal bunion vary from soft tissue correction, to wedge osteotomies to arthrodesis [1-16]. We present a case report on a patient that is skeletally mature and developed a dorsal bunion following soft tissue correction of a clubfoot, which we surgically corrected with an arthrodesis of the 1st metatarsal phalangeal joint (MTPJ).

### Case Report

This is the case of a 25-year-old male who presented with left foot deformity and pain in the left hallux. He had a past medical history of bilateral clubfoot initially treated at birth with casting and later had numerous surgical procedures to address this. After the soft tissue release as a child, he remained in corrective shoe wear for several years. He presented with a residual flat foot deformity bilaterally and flexion of his left hallux. The deformity caused difficulty with gait and the patient was unable to perform his daily activities given he was unable to comfortably fit into standard shoe-gear. On physical exam he had significant limitation of rearfoot and midfoot motion, however he had no pain at the mid and hindfoot. There was pronounced elevation of the left first metatarsal with rigid plantar flexion at the 1st MTPJ with the left hallux approximately in 90 degrees of flexion to the first metatarsal (Figure 1).



**Figure 1:** Lateral view of left foot at presentation.

There was elevation of the 1st ray on the Manuscript Click here to download Manuscript Hallux Flexus. Doc left with no ground contact with the first metatarsal head. Radiographs were obtained, the lateral view can be seen in Figure 2.



**Figure 2:** Weight bearing lateral radiograph of the left foot.

The x-rays were reviewed with the patient and a discussion was held as to treatment options available including non-operative measures as well as surgical intervention with either isolated first MTPJ arthrodesis versus rearfoot arthrodesis along with 1st MTPJ arthrodesis. The patient wanted to proceed with an isolated 1st MTPJ arthrodesis and not a more extensive rearfoot arthrodesis as his pain was isolated to the 1st MTPJ. In addition, he has had multiple surgeries in the past and did not want a large procedure. He ultimately decided to proceed with correction of the hallux flexus deformity so his foot could fit into shoes. The patient was consented for a 1st MTPJ arthrodesis with possible 1st TMTJ arthrodesis. A dorsal incision was made over the 1st MTPJ and a linear capsulotomy was performed. The head of the metatarsal and the base of the proximal phalanx were then denuded of cartilage with reamers. The 1st MTPJ was difficult to reduce given the long-standing contractures in the joint. The plantar adhesions were

released with a McGlamry elevator and reduction of the 1st MTPJ was obtained. The appropriate anatomic position was obtained and maintained with a guide-wire at the level of the 1st MTPJ. There was a noted improvement in position of the 1st ray. This was fixated and given his intraoperative improvement with the isolated 1st MTPJ arthrodesis, the 1st TMTJ arthrodesis was unneeded for the outcome desired by the patient. He healed uneventfully throughout his post-operative course. He returned to all of his activities without pain and was able to wear regular shoes without pain.

## Discussion

The dorsal bunion, or hallux flexus deformity, has been described in the literature since 1867 and was given the name “dorsal bunion” by Lapidus in 1940 [5,11]. The etiology of the deformity has been discussed by several authors but there are two biomechanical avenues by which the deformity can occur [8]. The first is by a strong anterior tibialis muscle which overpowers its antagonist peroneus longus and the 1st metatarsal is pulled into a dorsiflexed position and as a result the hallux hyperflexes [10]. The second occurs with weak dorsiflexors of the foot and toes with strong plantar flexors of the hallux and calf muscles. The base of the proximal phalanx subluxes plantarly under the head of the 1st metatarsal and pushes the 1st metatarsal dorsally causing dorsiflexion of the 1st metatarsal and a dorsal bunion [3]. These two scenarios usually unfold due to congenital clubfoot, paralytic deformities, severe congenital talipes planovalgus, hallux rigidus, or iatrogenically while trying to treat these conditions [8]. The etiology most studied in the literature is a dorsal bunion following clubfoot surgery [1-16]. The procedures performed for clubfoot correction are soft tissue releases and then the patient develops residual deformity in the years to come. There are several procedures described in the literature to correct a dorsal bunion. These procedures range from soft tissue correction to arthrodesis. One of the first procedures proposed for the correction of a dorsal bunion was a resection of the base of the first proximal phalanx which was proposed by Hohmann in 1934 [15]. McKay described a soft tissue procedure to correct dorsal bunions in children while the deformity is still flexible [12]. This procedure involves transfer of the abductor hallucis, flexor hallucis brevis, and the transverse and oblique heads of the adductor hallucis to the neck of the first metatarsal. A capsulotomy of the 1st metatarsal phalangeal joint is also performed along with excision of the sesamoids. In order to prevent post-operative flexion deformity of the first interphalangeal joint, an arthrodesis of the first interphalangeal joint can be performed or tenodesis of the flexor hallucis longus to the base of the proximal phalanx, if needed [12]. McKay reports 100% success rate in 16 cases 81 of correcting dorsal bunions with his procedure [12]. Lapidus described using a plantarflexory wedge osteotomy at the first cuneiform 83 metatarsal joint and if necessary also at the first cuneiform-navicular joint [11]. Kuo described a “Reverse Jones” procedure for flexor hallucis longus transfer to the first metatarsal head [16]. Yong studied the reverse Jones procedure coupled with a plantar-flexory osteotomy of 1st metatarsal and of the 18 patients none had a recurrence. In the same study they also had patients who had the Reverse Jones procedure without an osteotomy and of the 15 patients that underwent this procedure 5 of them needed a secondary procedure for recurrence of deformity (Figure 3).



**Figure 3:** Lateral view of the left foot at 4-week postoperative visit.

Besse discusses treatment of dorsal bunions in adulthood and advises tendon transfer and/or fusion as these patients complain of osteoarthritis, pain, and stiffness [2]. Besse states that arthrodesis is needed for fixed deformities, for flexible deformity tendon transfers and osteotomies are recommended [2]. The discussion concerning surgery was to perform a plantarflexory Lapidus versus a metatarsal phalangeal joint arthrodesis or combine the two procedures. An intraoperative decision was made against combining a Lapidus procedure and the 1st MTPJ arthrodesis as adequate plantarflexion of the first metatarsal was achieved with an isolated 1st MTPJ arthrodesis. We postulate that a 1st MTPJ arthrodesis in these types of cases works well to reduce the dorsiflexed 1st metatarsal in a similar fashion that a 1st MTPJ arthrodesis works well to reduce an intermetatarsal 1-2 angle in hallux abductovalgus surgery. By maintaining the soft tissue attachments on the proximal phalanx, these attachments aid and assist with stabilization and reduction of the deformity.

## Conclusion

This study described a dorsal bunion which occurred following a clubfoot deformity. This deformity was corrected with a 1st metatarsal phalangeal joint arthrodesis, which has only been mentioned in the literature. The patient received adequate correction of the deformity and is currently pain free and has returned to full activity. The

arthrodesis described should not be performed on all hallux flexus patients but should remain an option to correct this problem. There are multiple procedures which can be performed to correct hallux flexus and arthrodesis of the 1st MTPJ is a viable option.

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