

Surgical Correction of Checkrein Deformity Following Malaligned Distal Tibia Fracture: A Case Series

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ABSTRACT

Introduction: Checkrein deformity is rarely seen following fracture in the leg bones. The surgical treatment is the method of choice but the site of release at the fracture site or at the midfoot are debatable. Since the deformity is rare the literature is scarce. We evaluated two cases of such deformity after releasing the tendon at mid-foot level.

Methods: Two patients were followed after releasing the tendon and performing Z plasty lengthening at mid-foot level.

Results: We achieved full correction of the deformity with satisfaction in all the two case and had no recurrence with minimum 2 years following surgery.

Conclusion: The method described is simple, effective with less learning curve however larger series is required to compare it in a randomised control manner.

Key Words: Checkrein Deformity, Complications of Fracture Healing, Mid-Foot Level

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INTRODUCTION

Checkrein deformity is defined as the dynamic flexion deformity of the hallux due to tethering of flexor hallucis longus tendon, after the fracture of lower limb either due to callus or due to sub clinical compartment syndrome, (Fig.1) clinical test is simple. Planter flexion causes correction of the deformity while as dorsiflexion aggravates it. The deformity occurs secondarily to non-surgical or surgical correction of fractures of the distal tibia and has been observed after fibular, calcaneal, and talar fractures or the removal of fibular grafts.¹⁻⁴

Radiographic imaging has suggested that the deformity can result from entrapment of the FHL in callus formation at a fracture site or within scar tissue.⁵ In general, deformities present with flexion contracture at the interphalangeal (IP) joint of the hallux with extension contracture of the metatarsophalangeal joint and occasionally affect the second and third toes. Complications of compartment syndrome can also cause contracture of the deep posterior muscle compartment and produce a fixed length phenomenon of the long toe flexors inducing the checkrein deformity.⁶ Pain related to the deformity is normally elicited in the posteromedial ankle upon dorsiflexion of the ankle or hallux, inducing tension on the FHL.¹ Passive dorsiflexion about the ankle enhances the deformity at the hallux, while plantarflexion at the ankle partially corrects the deformity. Case series have described different surgical interventions for the checkrein

deformity such as release of adhesions at the fracture site, Z-plasty lengthening of the FHL tendon at the fracture site with release of adhesions, and Z-plasty of the FHL at the midfoot without release of adhesions.⁵ A paucity of information exists on this rare deformity and available surgical techniques used for correction. The aim of this study was to report the etiology of a checkrein deformity case, describe the method of treatment, and provide and compare operative results of the case with other treatment modalities in the literature.

CASE 1

A 22-year old male presented at a right foot and ankle clinic with a flexion deformity at the IP joint of his right hallux. The deformity had progressed over the past five years since treatment of a distal tibia fracture, which had healed in a malaligned position. Patient denied sudden 'lock up', snapping sensation, clicking sensation, 'catching' during movements, feeling of instability, joint looseness, or feelings of displaced joints in affected toes. The patient was unable to actively straighten the deformed joints, and admitted pain upon palpation and ambulation. Stiffness was noted in the right great toe joint. The IP joint of the hallux were only partially reducible with passive reduction. The flexion deformity was enhanced with dorsiflexion of right ankle and was partially corrected with plantarflexion. All remaining joints of right foot and

ankle maintained normal range of motion. No neurological deficits were noted upon examination and no visible swelling of right forefoot. Right leg radiographs were obtained, with right leg lateral radiograph (Fig.2). Clinical examination of non-weight bearing right foot illustrated a checkrein deformity while loaded foot when dorsiflexed (Fig. 3) revealed increased deformity. Surgical correction of deformity was explained to patient and parent as well as risks and benefits of surgical procedures. Both parties agreed

and elected to proceed with surgical intervention. Patient was placed in supine position in operating room and put under spinal anesthesia. The right lower extremity was prepped and draped in normal sterile fashion. Release was done at mid-foot level under tourniquet cover. All the structures were first identified following by the release of FHL (fig. 4). Zplasty Lengthening was done in all cases. Slipper boot cast was applied post operatively to hold the corrected position.



Fig. 1: Showing diagrammatic representation of FHL tendon along its course with easy identifiable behind the medial malleolus



Fig. 2: Right foot lateral radiograph



Fig. 3: Checkrein deformity



Fig. 4: Surgical Procedure (case 1)

CASE 2

A 25 -year old male presented at a foot and ankle clinic with a flexion deformity at the IP joint of his left hallux and proximal IP joints of the left second and third toes. The IP joint of the hallux as well as the proximal IP joint of second and third toes were only

partially reducible with passive reduction. All remaining joints of left foot and ankle maintained normal range of motion. Radiographs were obtained, with left leg lateral radiograph (Fig.5) Clinical examination of non-weight bearing left foot illustrated a

checkrein deformity while loaded foot when dorsiflexed (Fig. 6). Surgical correction of deformity was explained to patient and parent as well as risks and benefits of surgical procedures. Patient

was placed in supine position in operating room and put under spinal anesthesia. The left lower extremity was prepped & draped in normal sterile fashion. Surgical procedure same as case 1.



Fig. 5: Left foot lateral radiograph (case 2)

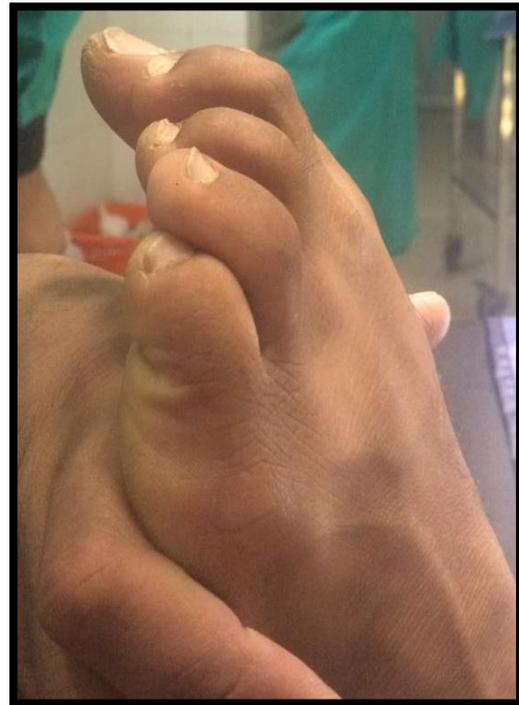


Fig. 6: Checkrein deformity (case 2)

DISCUSSION

Checkrein deformity is one of the less common deformities associated with the fractures of lower limbs. Although most common involved tendon is the flexor hallucis longus tendon, involvement of flexor digitorum longus is also mentioned in literature. Very rarely hypotrophy of Extensor hallucis longus can also present in similar way.^{7,8}

Previously regarded as the rare deformity of FHL following fracture of tibia (Clawson)⁹ it was also reported after fracture fibula by Leitsuh¹⁰ who found the tendon adherent to the healed fracture. Carr¹ reported such deformity after fracture of calcaneum and mentioned the use of computed tomography to locate the entrapped tendon in callus. The flexor hallucis longus tendon arises from the inferior two-thirds of the posterior surface of the fibula and interosseous membrane which makes it vulnerable to entrapment.

Lee et al⁵ analysed two types of surgical repair for checkrein deformity, one with release of adhesions and Z-plasty lengthening at the musculotendinous junction above the ankle at the fracture site and the other technique involving lengthening of the flexor hallucis longus in the midfoot. The authors noted prolonged success with the latter procedures while the more proximally-based procedures had varying degrees of recurrence to the formation of new adhesions. However the scar formed at the midfoot can lead to chronic morbidity as it impairs the foot wear or weight bearing.¹¹⁻¹³ So the procedure done at the site which is in between the above two is better in a way that the structures are easily identified and the procedure is simple. No fracture exposure is required and the morbidity caused by the sole scar can be avoided.

CONCLUSION

In the above mentioned series of two cases, correction was achieved in all and we did not find any recurrence till now. Checkrein is a rare deformity caused by traumatic injury to the posterior aspect of the foot and ankle leading to impingement of FHL and occasionally FDL tendons. So the procure is easy, safe and has less learning curve.

However a larger series is needed to see the effectiveness of such procedure and a randomised control trial is needed to compare the three methods.

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