Section: Anatomy

Original Research Article

# A CADVERIC STUDY OF ANATOMICAL VARIATIONS OF INTERTENDINOUS CONNECTION BETWEEN FLEXOR HALLUCIS LONGUS TENDON AND FLEXOR DIGITORUM LONGUS TENDON

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*Received* : 24/11/2024
*Received in revised form* : 01/01/2025
*Accepted* : 16/01/2025

*Keywords:*
*FHL – Flexor hallucis longus, FDL – Flexor digitorum longus, MKH – Master knot of Henry, FDA – Flexor digitorum accessories (Quadratus plantae).*

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DOI: 10.47009/jamp.2025.7.1.113

Source of Support: Nil,
Conflict of Interest: None declared

*Int J Acad Med Pharm*
2025; 7 (1); 585-588

## Abstract

**Background:** In the sole of the foot, the Flexor hallucis tendon passes forwards in the second layer crosses the tendon of flexor digitorum longus, then flexor hallucis brevis to reach the interval between the sesamoid bones under the heads of first metatarsal. The connecting slip to flexor digitorum longus varies in size. In the mid-foot region, the two tendons of FHL and FDL crossed in Master Knot of Henry (MKH), having the two tendons covered by fibrous tissue and slips communicating each other. Connections between FHL and FDL tendons is utmost important for harvesting tendon grafts. **Materials and Methods:** Study done in 18 specimens collected in Department of Anatomy, Thanjavur Medical College, Thanjavur in the year March 2022 to March 2023. **Result:** This study Showed variation of connection between FHL and FDL. According to O Begar et al classification Type IV connection seen in 11.1%, Type IV in 88.9%. **Conclusion:** The most important advantage of these connections is that they act as a natural tenodesis during harvesting tendon grafts from proximal to MKH. Knowledge of morphological variation of FHL muscle in this study will provide some benefits in tendon harvesting and transfer.

## INTRODUCTION

Flexor hallucis longus originates from the distal two-thirds of the posterior surface of the fibula (except lowest 2.5 cm), the interosseous membrane and the posterior crural intermuscular septum and also fascia covering the tibialis posterior. It runs obliquely, grooves the posterior aspect of tibia, posterior surface of talus, inferior surface of sustentaculum tali of the calcaneus. In the sole of the foot, the tendon passes forwards in the second layer like a bowstring. It crosses the tendon of flexor digitorum longus, then flexor hallucis brevis to reach the interval between the sesamoid bones under the heads of first metatarsal. It runs in an osseo- aponeurotic tunnel to get attached to the plantar aspect of the base of the distal phalanx of the great toe. The connecting slip to flexor digitorum longus varies in size.[1,2] Flexor hallucis longus supplied by branches of fibular artery, tendon is supplied by arteries of ankle and foot. It is innervated by tibial nerve ( L5, S1,S2).[1,3]

Flexor digitorum longus arises from the posterior surface of the tibia below the soleal line, from the fascia covering the tibialis posterior. The common tendon after the crossing of FHL splitted and inserted to the lateral four toes. Before splitting FDA attached to it's lateral side.

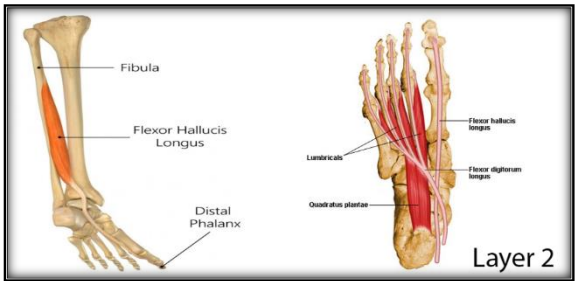



**Figure 1: Flexor hallucis longus**

**Review of Literature:** In the mid-foot region, the two tendons of FHL and FDL cross each other deep to the abductor hallucis muscle, the zone of crossing named as the Master Knot of Henry (MKH), having the two tendons covered by fibrous tissue and slips communicating each other.[4] The term, "Master Knot by Henry, or equivalently used Henry's Knot " was first identified as referring to the intersection territory, where the tendon of flexor digitorum longus (FDL) crosses over the tendon of flexor hallucis longus (FHL).[5] Tendon grafts of FHL and FDL are commonly used in reconstructive foot and ankle surgery. Despite the literature offers the descriptions of several techniques for harvesting these tendon grafts, there is a limited data based on the tendon graft lengths.[5-9] Connections between FHL and FDL


ISSN (O): 2687-5365; ISSN (P): 2753-6556

tendons is utmost important for harvesting tendon grafts.[10] Connections between FHL and FDL classified according to previous studies.[9,10,13,14]

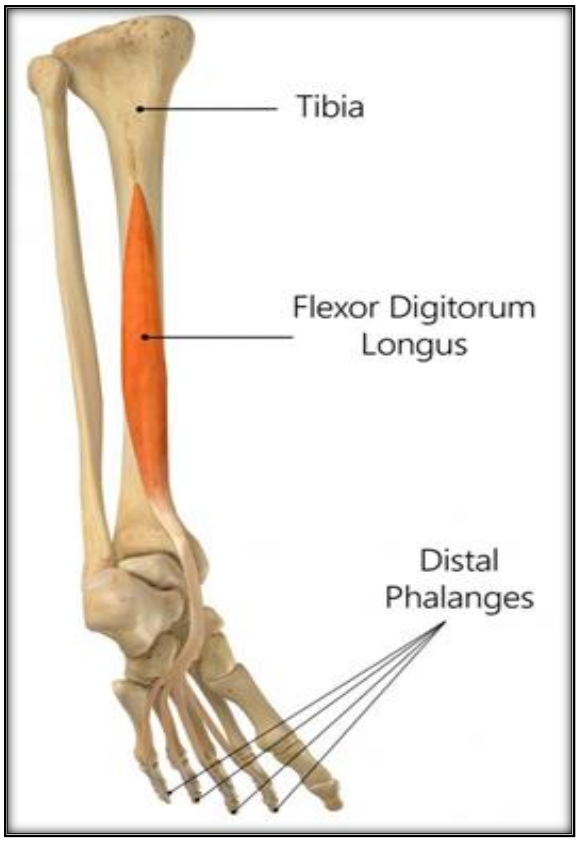



**Figure 2: Flexor digitorum longus.**

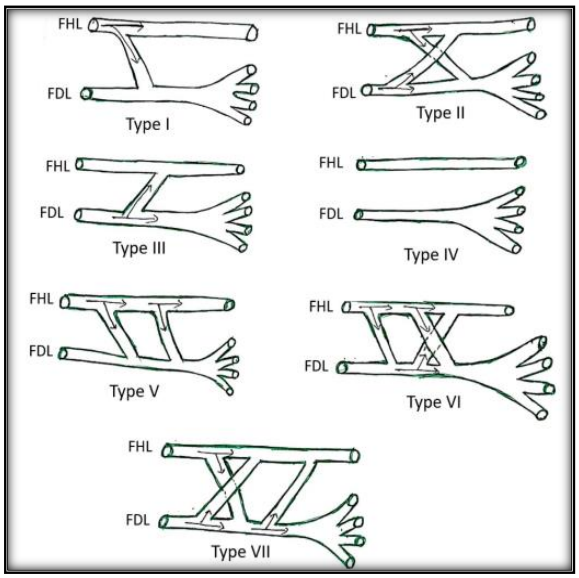



**Figure 3: This illustration shows connections between the FDL and FHL and it's types of connections- according to O.Begar et al -2018 15.**

**Aim and objectives of the Study:** To find the anatomical variations in the inter tendinous connection between Flexor hallucis longus tendon and Flexor digitorum longus tendon

**Primary objective:** To find the variation of inter tendinous connection between the FHL and FDL tendons.

## MATERIALS AND METHODS

Done in the Department of Anatomy, Thanjavur Medical College, thanjavur during the period of March 2022 to March 2023. Donated bodies, embalmed and formalin fixed cadavers during this period are dissected irrespective of sex. 18 specimens are dissected as routine according to Cunningham dissection manual. Out of 18 specimens, 9 were left side and 9 were right side limb specimens.

## RESULTS

This study showed distal to the Master Knot of Henry, separate slip of tendon connecting from FHL to FDL found in two specimens. Others showed no connection between the two tendons. This study showed type I (beggar et al classification) of 11.1 % and type IV are 88.9%

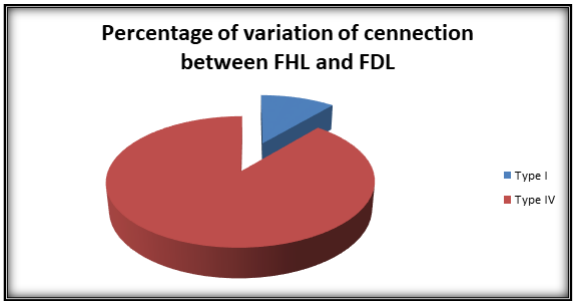
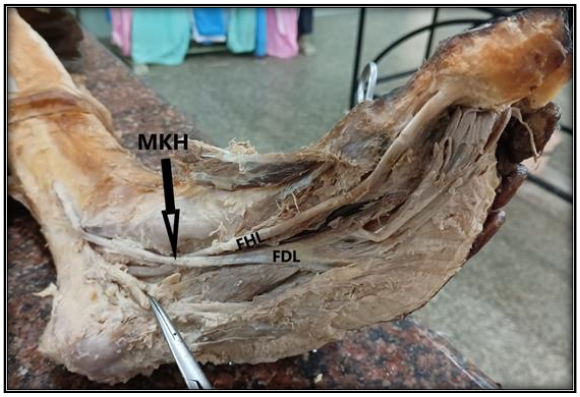



**Chart 1: Percentage of variation of connection between FHL and FDL**





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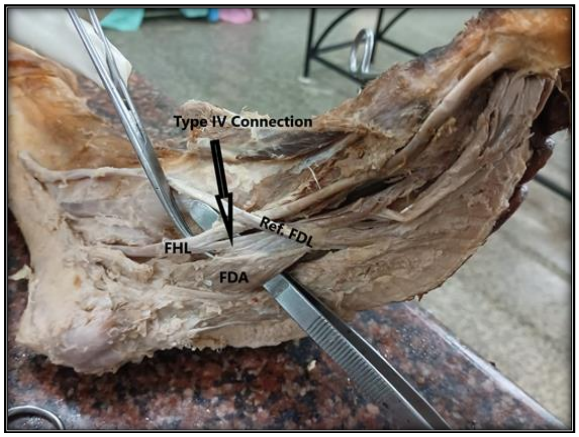


**Figure 4: Variation in connection between FHL and FDL – Type I – Specimen I**

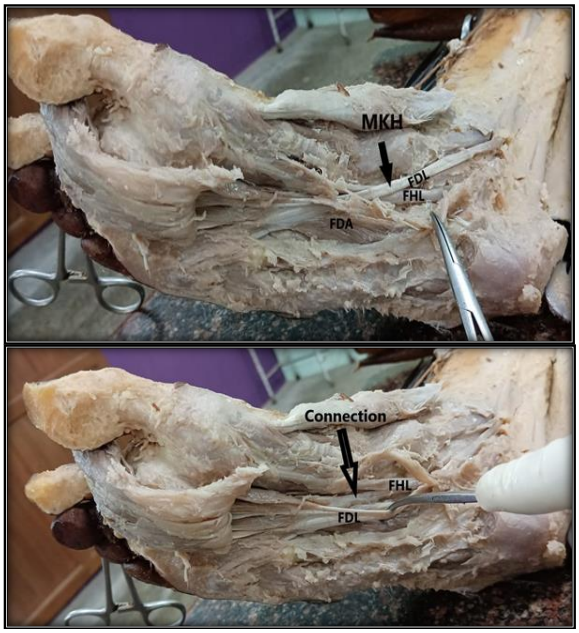


**Figure 5: Variation in connection between FHL and FDL – Type I – Specimen II**

**Table 1: variation in connection between FHL and FDL.**

| Ser. No | Connection between FHL and FDL (Begar et al Classification) | Specimens (out of 18 specimens) | Percentage (%) |
|---|---|---|---|
| 1 | Type I | 2 | 11.1 |
| 2 | Type IV | 16 | 88.9 |

## DISCUSSION

The most important advantage of these connections is that they act as a natural tenodesis during harvesting tendon grafts from proximal to MKH16. Achilles tendon ruptures occur approximately at 2–6 cm above the calcaneal insertion and the blood supply in this region might be reduced 17. FHL tendon transfer can cover the soft tissue defect and improve blood supply. Knowledge of morphological variation of FHL muscle in this study will provide some benefits in tendon harvesting and transfer18.

## CONCLUSION

FHL morphological connection with FDL showed 11.1 % of Type I O Begar et al Classification with 88.9 % of Type IV. This Variation would help in tendon transfers in foot surgeries.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556

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ISSN (O): 2687-5365; ISSN (P): 2753-6556