

A Tendinous Slip of the Flexor Hallucis Longus for the Second Toe: An Anatomical Variation

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ABSTRACT

Anatomical variant of the flexor hallucis longus tendon are clinically imperative because their special role in reconstructive surgery of Achillis tendinopathies. The present study reports of the tendinous slip of the flexor hallucis longus for the second toe and the tendinous slip merge with the tendon of flexor digitorum longus. The tendon of flexor hallucis longus and flexor digitorum longus with lumbricals were cut at the calcaneus specifically observe the flexor hallucis longus and flexor digitorum longus tendon of second toe. The tendon of flexor hallucis longus divide into two slips. A connecting slip from flexor hallucis longus was found and inserted into the flexor digitorum longus tendon of the second toe. The first lumbrical took origin from the flexor hallucis longus and from tibial side of flexor digitorum longus tendon for second toe. These extra tendinous slips can be fairly used in the reconstruction.

KEYWORDS: Flexor hallucis longus, tendinous slip, tendon, flexor digitorum longus, anatomical variation, Reconstructions

INTRODUCTION

Flexor hallucis longus muscle is one of the three deep muscles of the posterior compartment of the leg. It arises from posterior surface of the lower two third of fibula, lateral to medial crest. The tendon passes downwards in a groove under the sustentaculum tali, finally it is inserted itself into the base of the base of distal phalanx of great toe. The flexor digitorum longus arise from the medial part of posterior surface of tibia and is divided into four tendons for the lateral four toes which are inserted into the distal phalanx of the corresponding toes. The action of flexor hallucis longus is flexion of all joints of the great toe (hallux). When the foot is off the ground, this muscle together with flexor digitorum longus, flexes the toes and the distal phalanges.¹

The FHL tendon is frequently used to treat Achilles' tendinopathy. It is also the preferred choice for the surgical treatment of chronic posterior tibial tendon deficiency (PTTD).²

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In this study we demonstrated an anatomical variation of the interconnection which will be useful for various surgeries and biomechanical research. This type of study is useful for surgeons performing tendon graft operation.

In this case a connecting tendinous slip of flexor hallucis longus merge with the tendon of Flexor digitorum longus and first lumbrical also took origin from flexor hallucis longus tendinous slip.

The action of flexor hallucis longus is flexion of all joints of the great toe (hallux). When the foot is off the ground, this muscle together with flexor digitorum longus, flexes the toes and the distal phalanges.

VARIATION: The connecting slip of tendon of flexorhallucis longus to flexor digitorum longus continuous into the tendon for the second toe.

CASE REPORT: During regular dissection classes for the BAMS Graduates, an Anatomical variation in

right sole of a female cadaver was seen. The dissection was done in the dissection hall of the Sharir Rachana (Anatomy) department in national institute of Ayurveda Jaipur. We dissect the first layer of foot, three muscle are present 1. Flexor digitorum brevis 2. Abductor hallucis 3. Abductor digiti minimi. After that we dissect second layer of foot, four muscles are there 1. tendon of flexor hallucis longus 2. tendon of flexor digitorum longus 3. Quadratus plantae 4. lumbricals. Then we identified and clean the tendon of flexor hallucis longus. It split into

tendinous at the level of proximal one third and distal two third of the sole. The connecting slip of flexor hallucis longus crossed medially to the tendon of the flexor digitorum longus and finally merge with the tendon of flexor digitorum longus and insert the distal phalanx of second toe and first lumbrical was bipinnate in origin with fibers of originate from tibial side of flexor hallucis longus and from the tibial side of the flexor digitorum longus tendon to second toe. (figs.1 and 2)

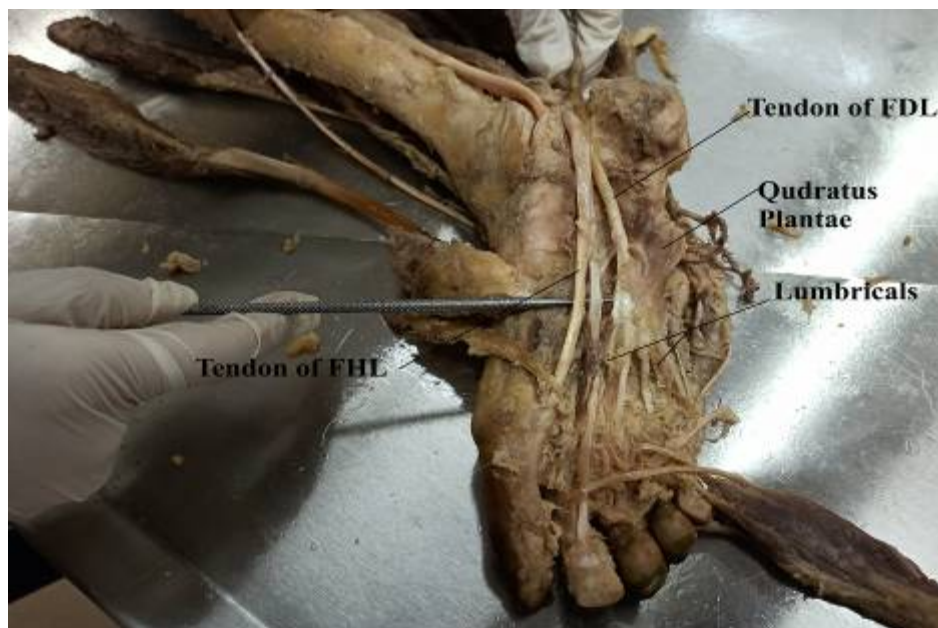


Figure1: Dissection of foot showing second layer of sole, Abbreviations: FHL (flexor hallucis longus), FDL (flexor digitorum longus)

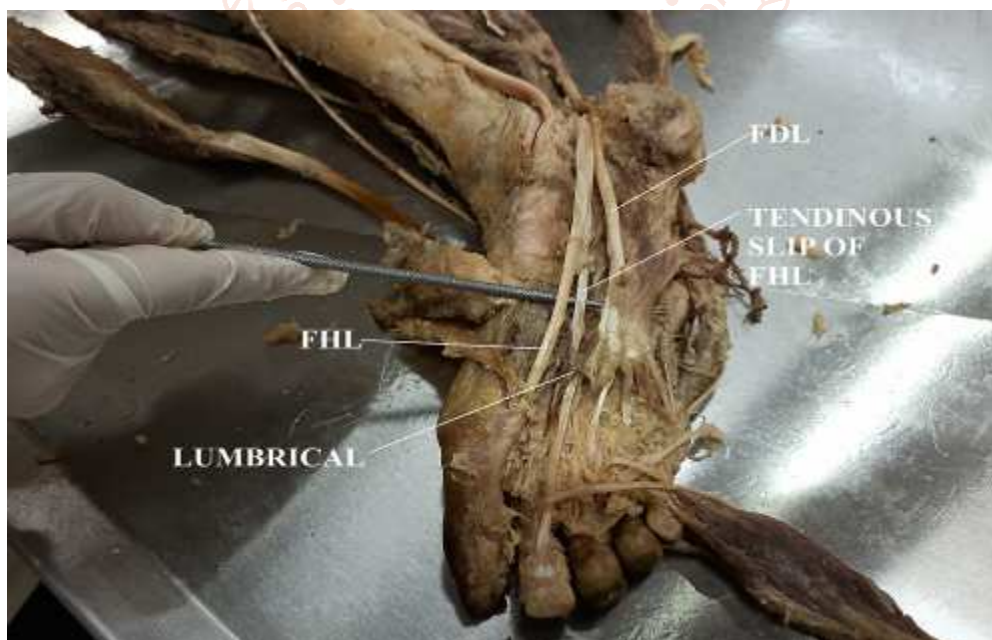


Fig.2: Dissection of foot showing the tendinous slip of flexor hallucis longus for the second toe, and 1st lumbrical took origin from the tendinous slip of flexor hallucis longus and the tendon of flexor digitorum longus. Abbreviations: FHL, flexor hallucis longus; FDL, flexor digitorum longus

DISCUSSION

The tendinous slip of the flexor hallucis longus and have been reported in the literature. This interconnectedness was classified in type 1st, in

which there is a slip from FHL to FDL; type 2nd, crossed slips between them that is form FHL to FDL, From FDL to FHL, type 3rd; from the FDL to FHL

and type 4th there is no slip between them³⁴. Type 1st, is further classified based on the tendon of which it is connected; there is type I-a in which the slip is attached to the second toe tendon; type I-b -slip is attached to 2nd and 3rd toe tendon; type I-c-slip involved to the 2nd, 3rd and 4thtendon, type Id in which the slip is attached to the tendon of all tendon of all toes, except for great toe. In a study conducted on 64 limbs, it was found that the percentage of type 1st was 100%; type 2nd corresponded to 60.9%, type 3rd corresponded to 7.8%; type 4th corresponded to 0%.out of the 64 cadavers, type I-a was 31.3 %, type I-b was 60.9%and type I-c was present in 7.8%.⁵ According to the above description, the present case falls under the I-a category however it is novel that the tendon of FHL also gave origin to the first lumbrical muscle.

Posterior tibial tendon deficiency (PTTD) is frequently treated with FDL tendon graft transfer along with associated bony procedures. A few authors have previously reported successful results with this procedure.⁶⁷⁸

The FHL tendon is frequently used in the treatment of chronic Achilles' tendinopathy. It has been suggested that after FHL tendon grafting, the distal portion of the FHL should be sutured to the FDL to preserve the flexion function of the hallux.⁹ The tendinous slip of FHL, surgical transfer of any of these tendons would be a challenge, more so the one with anatomical variations. Unusual attachment of the FDA to the connecting slip of the FHL may interfere in the normal biomechanics of the FDL and FHL. Complex morphological variations involving the FHL, FDL, FDA and first lumbrical reported here may be useful for tendon reconstruction surgeons while planning surgical repair of Achilles tendon rupture and PTTD.¹⁰

CONCLUSION:

The positioning of the divergent tendon of FHL may increase the flexion factor of the second toe. This case study might be useful for surgeons performing tendon graft operations. If a surgeon is completely aware of incidences of variation in FHL he can perform well while transplanting flexor tendons.

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