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Research Article

Surgical Importance of Insertional Variation of Fibularis Brevis Tendon

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ABSTRACT
Fibularis brevis is a muscle of lateral compartment of leg. Originates from lateral surface of fibula bone and inserted into tuberosity of fifth metatarsal bone. It is innervated by superficial peroneal nerve. The main action of the muscle is eversion of foot. During routine undergraduate dissection in the Department of Anatomy, St Peter's Medical college hospital and Research institute, Hosur, we found an atypical variation of insertional pattern of fibularis brevis muscle in a male and female cadaver. Based on these variations, we studied other cadaver's lower limbs available in the department (totally 52 lower limbs). We observed 4 insertional variation of fibularis brevis tendon totally. Measurements of variant tendons were done and adequate photographs were taken. The insertional variation of the muscle plays an important role in ligament reconstructive surgeries. The insertional variations are important factor for biomechanical changes that leads to weakening of the action of muscle and predisposing factor for sprain and ligament injuries.

Keywords: Fibularis Brevis, Tendon, Insertion, Reconstructive Surgery.

INTRODUCTION

Fibularis brevis (FB) is a lateral compartment muscle of leg. It is also called as peroneal compartment. It is fusiform shaped, bipennate muscle. It originates from anterior half of middle one third and whole width of lower one third of lateral surface of fibula. It inserts into lateral side of base of the 5th metatarsal bone (styloid process). Main action of this muscle is eversion of the foot, also it will weak plantar flexion of the ankle and maintains the lateral longitudinal arch. Fibularis brevis muscle lies deep to the fibularis longus muscle.[1,2,3,4]
The superficial peroneal (fibular) nerve ((musculocutaneous nerve of lower limb, Root value -L5 and S1) is responsible for motor innervation of the FB and for the blood supply the superior and inferior branches of the anterior tibial artery are responsible.[5]
The additional tendons of the muscle play an important role in ligament reconstructive surgeries. The insertional variations of fibularis brevis are important factor for biomechanical changes of walking. It leads to weakening of the muscle actions and one of the predisposing factors for sprain and ligament injuries of ankle. [6,7,8]
Based on the importance of this additional tendon (variant), we planned our aim, to study the fibularis brevis muscle insertion and observe the different pattern of insertion in cadavers.

MATERIALS AND METHODS

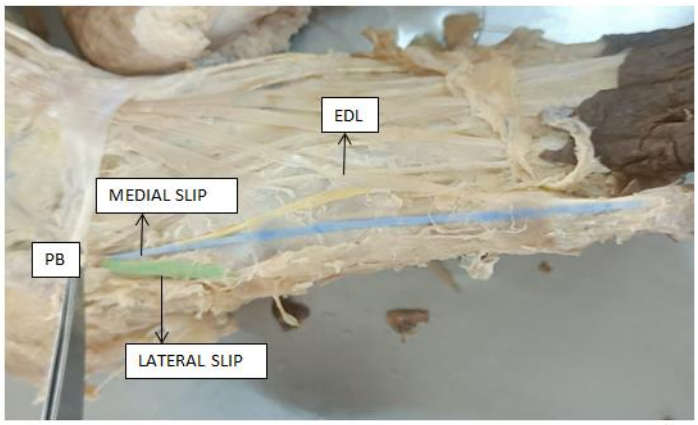
Study Design: Observational study
Study Population: 52 lower limb formalin fixed specimens (26 right and 26 left sides)
Study Setting: Department of Anatomy, St. Peter's Medical College Hospital and Research Institute, Hosur, Krishnagiri, Tamil Nadu.
Inclusion Criteria: both male and female cadavers, irrespective of age cadavers
Exclusion Criteria: short lower limbs, surgical interventional limbs
Study Duration: 3 months

Sampling Technique And Sample Size: conventional sampling and total 52 in number
Data Collection Procedure: the study was conducted during routine undergraduate lower limb dissection period. The leg and dorsum of foot compartment was dissected carefully till the tip of the toes and observed the fibularis brevis insertion pattern. The variations were carefully observed and noted. The adequate photographs were taken.
Study Tools: Digital vernier caliper was used for measurement of length and width of the tendon
Ethical Considerations: Consent from Head of the department was obtained, and the confidentiality of the cadavers was maintained.

Ethical Committee Clearance: The institutional ethical committee clearance was obtained. (SPMCH/IEC/AP/055/2025-26)

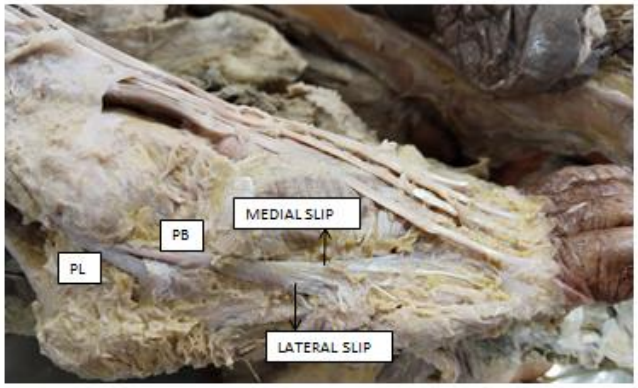
RESULTS

Fibularis brevis tendon inserts normally at the lateral side of base of the 5th metatarsal bone (styloid process).
Variation 1: Fibularis brevis divides into thin medial and thick lateral slips. Lateral slip inserts into styloid process of 5th metatarsal bone. Medial slip, again divides into 2 parts, short medial slip merges with fibularis tertius, long lateral slip inserts into base of the proximal phalanx of 5th toe.



PB- Peroneus brevis, EDL- Extensor digitorum longus,

Variation 2: In 1 specimen, Fibularis brevis divides into thin medial and thick lateral slips. Lateral slip inserts into lateral side of base of 5th metatarsal bone. Medial slip merges with Lateral most tendon of extensor digitorum longus.



PL- Peroneus longus, PB- Peroneus brevis,

Variation 3: In 2 specimens, we observed that the medial thin slip of tendon of Fibularis Brevis gets attached to fibres of Fibularis Tertius tendon and forms the Fibularis Digiti Quinti.

DISCUSSION

The present study variation 1, insertion of Fibularis Brevis muscle is unique. The insertional variation can change the biomechanics of the muscle (eversion) power.

The muscle power is slightly lower than normal due to unusual insertion of variant FB tendon. It is supported by Henry Gray [1,]

In the study of Ruzik et al., the tendon of Fibularis Brevis muscle gets attached to fibres of Fibularis Tertius tendon and forms the Fibularis Digiti Quinti [1,2,3,4] but, in the present study the variation 1, the tendon splits into thick and thin divisions, then the thin division splits further into medial and lateral divisions - medial gets attached to lateral most tendon of EDL, lateral gets attached to base of the distal phalanx of little toe, " UNIQUE VARIATION ", FIRST ONE TO BE REPORTED. The variation 3 same like variation (Fibularis Digiti Quinti) reported by Ruzik et al.[6,12]

Thomas W Kaminski et al., concluded that weakened eversion leads to repeated sprains and injuries (ligament tears) in medial ligaments of ankle [7]. But there is an advantage for this kind of additional tendons of fibularis brevis (like the present study), it will be helpful for ligament reconstructive surgeries as grafting material.[8]

Sammarco G.J et al., in their study concluded that this kind of split tendons (variation) can be used for lateral ankle ligament reconstructive surgeries. In our study, both the variations are splited tendons are noted. These may be used for reconstructive surgery and through MRI these kinds of variations easily visualized, this will helpful for treating the patients effectively.[9, 10, 11]

Eleazar S M O et al from brazil reported a case report like our present study variation 2 pattern.[13]

CONCLUSION

The insertional variations of fibularis brevis is play an important role in altered biomechanical changes of walking mechanism and it leads to one of the predisposing factor for repeated sprain and lateral side ankle ligament injuries. Repeated sprain in ankle patients are suggested to do MRI foot for finding this kind of variations, for better and proper management with reconstructive surgeries. Additional tendons of this kind of variation are useful for grafting purpose in lateral ankle ligament reconstructive surgeries.

Scope of Study: Similar objective radiological study can be done through repeated sprain patients with laterality and sex.

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Conflicts of Interests: All named authors hereby declare that they have no conflicts of interest to disclose.

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