

**A RARE INCIDENCE OF ABNORMALLY BROAD TENDON OF INSERTION
OF TIBIALIS ANTERIOR- A CASE REPORT**

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ABSTRACT: The objective of our study is to report a rare variation of insertion of tibialis anterior. It was fan shaped insertion on dorsal aspect of all the three cuneiforms, navicular and base of first metatarsal both on its medial and lateral side. The extension of the tendon on second and third cuneiforms has not yet been previously reported in literature. This communication and study of insertion of this muscle may be of importance to the orthopedicians since tibialis anterior is an important muscle because of its function and use in tendon transfer which is a common surgical procedure performed for the correction of paralytic equinovarus deformity of the foot, recurrent congenital clubfoot deformities in cerebral palsy and arthroscopy.

Key words: Cuneiform, clubfoot, metatarsal, tendon.

INTRODUCTION

Several muscles pass through the ankle via tendons, the ones carrying the largest forces one of them being the muscle tibialis anterior. [1] The tibialis anterior runs parallel to the tibia and is the primary muscle used for dorsiflexion of the foot. This dorsiflexion is key in the swing phase of the gait cycle, so that your foot remains off the ground while your gastrocnemius rotates the femur externally. [2] Tibialis anterior has a quadrangular prismatic belly that arises from the lateral condyle of tibia, proximal $\frac{1}{2}$ to $\frac{2}{3}$ of lateral surface of tibial shaft, anterior surface of interosseous membrane, deep surface of fascia cruris and intermuscular septum. [3] Normal insertion of the tendon of tibialis anterior is on medial side of dorsal aspect of medial cuneiform and base of first metatarsal. The fascial extensions forwards to the phalanges of the great toe and backward to navicular, talus and calcaneus may reproduce phylogenetic history. [4] This muscle is of interest to the foot surgeons because knowledge of the variations will assist surgeons in performing anterior tibial tendon transposition for recurrent congenital club foot. Abnormality of tibialis anterior may be related with flat foot or hallux valgus deformity. [5, 6] This muscle is often affected in poliomyelitis than any other muscle of the body. [7] The tibialis anterior tendon transfer has been used in the treatment of recurrent congenital clubfoot and paralytic equinovarus foot deformities in cerebral palsy. It is important to determine the optimal site of tibialis anterior tendon insertion for ankle and foot motion and to compare the split and whole tendon transfer. [8] Structure of Tibialis anterior.

The presence of fibrocartilage within gliding tendons is a functional adaptation to compressive and shearing forces. In contrast to reports from the literature about the structure of gliding tendons wrapping around a bony pulley, the gliding zone of the tibialis anterior tendon has only a narrow layer of chondroid cells and proof of type II collagen is lacking. [9]

CASE REPORT

During routine cadaveric dissection of a middle aged male, a variation was observed in the tendon of tibialis anterior muscle unilaterally on the left side. The muscle was dissected carefully to expose it from its origin, course and insertion. We observed a broad fan shaped tendon of tibialis anterior which was inserted on the navicular bone, all the three cuneiforms and base of 1st metatarsal. (Figure 1) The length of fleshy belly of tibialis anterior found in present study was 25.0cm, tendon length was 12.0 cm and the width of the tendon at its insertion site was 2.5cm.

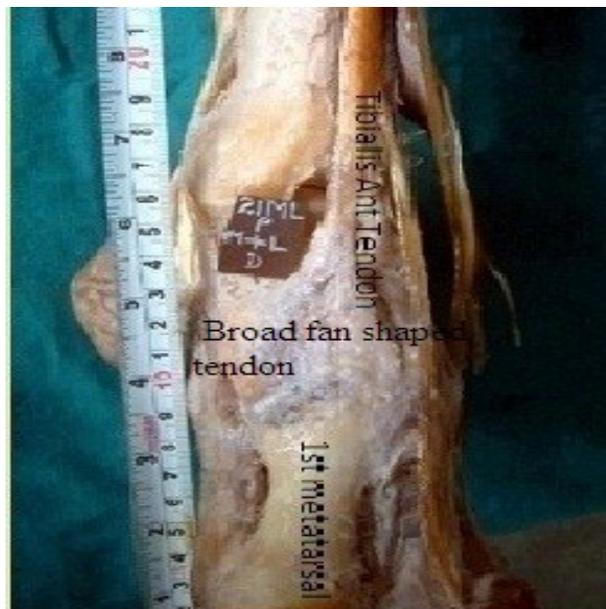


Figure 1 showing broad fan shaped tendon of tibialis anterior which is inserted on the navicular bone, all the three cuneiforms and base of 1st metatarsal.

DISCUSSION

Findings similar to the present study had been previously reported by Macalister who observed the fan shaped insertion of tendon on navicular, first cuneiform and the first metatarsal. [10] It was almost similar to the present case but the extension of the tendon on second and third cuneiforms has not yet been previously reported in literature. Tibialis anterior insertion has been reported to display variations with regards to its extension on the neighbouring bones. Research studies have described multiple variations of some similarities but in the present case, there was a rare variation of its kind. These types of variations are only incidental findings and we do admit that regarding these anomalies, a series of observations over a sufficient number of years in multiple cadavers are sure to add more vigor to the existing knowledge.

Anson observed accessory slips to cuneiforms, metatarsals and phalanges. [11] The slip of the tendon may go to other bones such as talus, head of first metatarsal or base of proximal phalanx of hallux. [12] In a study the insertion of the tibialis anterior tendon was very abnormal, not on the medial side of the foot but on the lateral side. [13]

According to a study on 76 cadavers, in 57.9% limbs, the tibialis anterior tendon was inserted by two unequal slips; of these the larger slip was attached to medial cuneiform bone and the smaller one to the base of the first metatarsal bone. [14]

In the present study, tendon of tibialis anterior got inserted on all the cuneiforms, navicular and first metatarsal. The comparison of insertion of tibialis anterior muscle as described by various authors is given in Table 1.

**Table 1 VARIATIONS IN INSERTION OF TIBIALIS ANTERIOR
(COMPARATIVE STUDY)**

YEAR	AUTHOR	VARIATION
1875	Macalister	Tendon inserts on navicular, Ist cuneiform and Ist metatarsal.
1966	Anson	Accessory slips to cuneiforms, metatarsals and phalanges.
2002	Brenner	Insertion on medial cuneiform only or on Ist metatarsal only
2002	Hussain	Insertion by two slips of equal or unequal lengths
2005	Ikiz	Insertion of tendon on lateral side of foot
2010	Present study	Insertion of tendon wide, inserted on all the cuneiforms, navicular and base of Ist metatarsal

SUMMARY AND CONCLUSION

In the present study a variation in which insertion was wide i.e. on all the cuneiforms, navicular and base of first metatarsal which was observed in one cadaveric limb only. Abnormal insertions of tibialis anterior tendon may be related to certain changes of foot skeleton such as flat foot. The insertion of muscle may be related to pathologic changes of the foot particularly hallux valgus.

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