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STUDY OF MORPHOMETRY OF PLANTARIS MUSCLE AND ITS CLINICAL RELEVANCE

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ABSTRACT

Background: Aim of the study was to provide morphometric data on the anatomy of plantaris muscle.

Material and Method: Forty legs from twenty embalmed cadavers were examined and morphometric measurements such as length of the muscle belly, length of the tendon inside the muscle belly, width of the tendon and total length of the tendon and muscle tendon ratio were measured.

Result: Mean length of the tendon extending into the muscle was 3.52 cm and the tendon has a mean width of .537 cm in the belly of the muscle. The mean length of the muscle belly was 8.15 cm the mean length of the plantaris tendon was 31.31cm. The mean muscle belly tendon ratio was .264 cm.

Conclusion: These findings might help in important surgical procedures such as tendon grafting, A-V valve repairs etc.

Key Words: Plantaris, Tendon grafting, Belly, Muscle tendon ratio

INTRODUCTION

Plantaris muscle is a small flexor group muscle with a short belly and a long thin tendon. It is one of the superficial muscles of the posterior compartment of the leg along with soleus and gastrocnemius. Plantaris arises from the lower part of the lateral supracondylar line and the oblique popliteal ligament. Its small fusiform belly is 7 to 10cm long and ends in a long slender tendon which crosses obliquely in an inferomedial direction between gastrocnemius and soleus, then runs distally along the medial border of calcaneal tendon and inserts just medial to tendo Achilles (1,2) It is innervated by tibial nerve(S1,S2). It is a weak plantar flexor of the ankle joint and flexor of the knee joint. The tendon of the plantaris provides proprioceptive feed back information to the central nervous system regarding the position of the foot(3) The aim of the present study was to study the morphometry of the plantaris and to discuss the functional significance of plantaris muscle. The topographic anatomy of plantaris assumes importance for orthopaedic surgery intervention. This may also be of academic interest and serve as a standard manual data.

MATERIALS AND METHODS

40 legs from 20 adult male embalmed cadavers were dissected out of which 20 were right and 20 were left legs. The cadavers belonged to anatomy department of MVJ Medical College. Cadavers that presented pathological deformities in the legs were excluded. The measurements were made using a digital callipers by marking the below shown points and finding were statistically analysed.



a-b: belly length, b-c: tendon within the muscle, c-d: tendon length, a-d: total length of plantaris.

RESULTS

Plantaris muscle was present in all the legs studied. The tendon of the plantaris passed obliquely downwards be-

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tween the gastrocnemius and soleus to get inserted into the medial aspect of calcaneum. Mean length of the tendon extending into the muscle was 3.52 cm and the tendon has a mean width of .537 cm in the belly of the muscle. The mean length of the muscle belly was 8.15 cm the mean length of the plantaris tendon was 31.31cm.The mean muscle belly tendon ratio was .264 cm.

DISCUSSION

Plantaris varies in its mode of origin and more frequently in its insertion .The muscle may arise from the fascia of popliteus, the origin of the lateral head of gastrocnemius, the fibula between peroneus longus and flexor hallucis longus. Distally it frequently joins the tendo Achilles or ends in the fascia of the leg or tibial collateral ligament of the ankle (4). A variant, tensor fascia plantaris arises from the oblique line of tibia and inserts in the fascia overlying the calcareous (5).

Table: 1 Comparison of Morphometry of Plantaris from Previous Study

Authors	Muscle Belly Length	Tendon Length	Tendon Width	Length of Tendon Inside Muscle	Muscle Tendon Ratio
Aragao Et Al	11.38	33.26	.70	5.5	1.3
Our Study	8.15	31.31	.537	3.52	1.26

When the morphometric parameters were compared by previous study by Aragao et al, it was found that all the parameters showed increased values in their study. This could account because of racial differences as the study was done in Brazil. Standard textbook of anatomy have reported the fact that the muscle may sometimes be absent or it may be double. In our study we did not observe absent plantaris or double head of plantaris. This finding is similar to what was described by Osny et al(6). Despite its small size injuries of the plantaris muscle and the tendon(Tennis leg)is quite common. The plantaris muscle may be injured during any tear and the diagnosis can be confirmed only by obtaining MRI or USG. Plantaris muscle can be used as an excellent graft for reconstruction of anterior talofibular and calcaneofibular ligaments(7). The tendon of plantaris has also been successfully used for flexor tendon replacement of hand and even for atrioventricular valve repair(8).

CONCLUSION

Since very few studies are available on the morphometry of plantaries and plantaries tendon is clinically impor-

tant for various surgical procedures, this study may be helpful for reconstructive surgeries.

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