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ORIGINAL RESEARCH PAPER

INCIDENCE OF PERONEUS QUARTUS MUSCLE

KEY WORDS: Peroneal Muscles, Peroneus Quartus Muscle, Muscles of the Body, Leg Muscles.

Anatomy

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Introduction: In the Leg region of Lower Limb, in the Lateral compartment, Muscles present are: Peroneus Longus, Peroneus Brevis. In Anterior compartment of leg, Peroneus Tertious is present as part of Extensor Digitorum Longus. Likewise We become curious, is there any additional muscle slip of Peroneus? So out of Curiosity, We decided to Study this topic.

Materials and Methods: This Study has been done on 32 cadaveric Leg specimens. Incidence of Peroneus Quartus, Origin, Insertion was noted. Length of Muscle was measured by using Sliding Vernier Caliper.

ABSTRACT Observations and Results: Peroneus Quartus was present in 15 out of 32 Specimens(46.8%). Total length of Muscle on average was 9.5 cm on the Right side and 12.6 cm on the Left side.

Discussion and Summary: Presence of Additional slip of Muscle provides insight into more exploration of the Body Muscles. That gives more Knowledge to Anatomists, Which can be inculcated to Student fraternity. Also Peroneus Quartus Muscle can be utilized in Treatment of Peroneal Tendon Tear.

Introduction:

The peroneus quartus is the most common supernumerary muscle of the foot and ankle[1]. The peroneus quartus is a rare muscle which classically arises from the posterior aspect of the fibula between the peroneus brevis and flexor hallucis longus muscles, and inserts onto the peronel trochlea on the lateral aspect of the calcanium, between the course of the peroneus longus and brevis tendons. Morgagni (1953) was perhaps the first to report the presence of this muscle in 1723, and Otto (1962) in 1816 was the first to apply the name "peroneus quartus" [2].

Injuries of the peroneal tendon complex are common and should be considered in every patient who presents with chronic lateral ankle pain[3]. Peroneal tendon disorders are a cause of hindfoot and lateral foot pain. There are three primary disorders of the tendons; peroneal tendonitis, peroneal subluxation, and peroneal tendon tears; These conditions are a cause of lateral ankle pain and may lead to ankle instablility[4]. The typical clinical presentation of peroneal tear is retro-malleolar pain , in some cases associated with palpable swelling around the fibular malleolus, pain during activities and difficulty in walking [5].

In a cadaveric model of peroneal tendon tears, 33% of remaining peroneal tendon could resist high tenslie forces, above the physiologic threshold[6]. Recurrent dislocation of peroneal tendons is a relatively rare ankle problem with numerous described surgical treatments which make the orthopaedic surgeons baffled in choosing the appropriate procedure[7]. Understanding the anatomy of the peroneal tendons and knowledge of current treatment approaches for peroneal tendon tears, subluxation and dislocation of the tendons, and peroneal tenosynovitis are of great importance in achieving a favorable outcome[8].

Peroneal tendon pathology is a commonly reported cause of lateral ankle pain[9]. Staged reconstruction with excision of the remaining portion of the peroneal tendons and reconstruction with a Hunter rod and FHL transfer has been shown to be an effective long-term treatment for chronic

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peroneal tendon ruptures[10]. Lateral transfers of the flexor hallucis longus(FHL) or flexor digitorum longus(FDL) tendons have been described for treatment of concomitant, irreparable peroneal tears[11].

Snapping peroneal tendons is a rare cause of lateral ankle pain[12]. To investigate the fundamental principles inherent in muscular anomalies which may be regarded as Nature's experiments on the proving ground of actual functioning mechanisms[13]. Muscles are the Motors of the Body. Their presence in full Strength provides full range of Movements. Additional slip of Muscle is advantageous for more forceful & more wider range movements. That's why this study was conducted to note additional slip of Peroneal Muscle.

Materials and Methods:

Study Design: Observational Study

Study has been done in the Department of Anatomy. Total 32 cadaveric specimens of leg region were selected. Specimens in good condition only were included for study. Specimens were washed thoroughly. Using Dissection instruments, Specimens were explored properly. First Peroneus Longus, Peroneus Brevis muscles were noted. Then Peroneus Tertious muscle was noted . And then on every specimen, presence of Additional slip of muscle, that is Peroneus Quartus was noted. It's Origin & Insertion was noted. Total length of Peroneus Quartus muscle was measured by Sliding Vernier Caliper.

Results were analyzed Statistically.



Fig 1: Photograph showing Peroneus Quartus Muscle (Depicted by Orange Colour Ring)

PARIPEX - INDIAN JOURNAL OF RESEARCH | Volume-9 | Issue-6 | June - 2020 | PRINT ISSN No. 2250 - 1991 | DOI : 10.36106/paripex

Observations & Results:

Fig 1 shows Photograph of Peroneal Muscles. Peroneus Longus Muscle is Depicted by Green Colour Ring, Peroneus Brevis Muscle is Depicted by Blue Colour Ring, Peroneus Tertious Muscle is Depicted by Black Colour Ring, and , Peroneus Quartus Muscle is Depicted by Orange Colour Ring(Fig 1).

Peroneus Quartus muscle was present in 15 out of 32 Specimens. Percentage of Presence of Peroneus Quartus muscle was 46.8 %. Out of 15, Muscle was present in 8 specimens on Right side. And in 7 specimens on the Left side(Table-1).

Table - 1: Sidewise Presence of Peroneus QuartusMuscle.

Side	Present (out of total 15)	Percentage
Right	8	53.3
Left	7	46.6

Origin of Peroneus Quartus muscle in all 15 specimens was from Lower third of Lateral surface of Fibula. Major insertion of Peroneus Quartus muscle was on Lateral surface of Calcaneus in 11 specimens. While insertion was on Lateral surface of Cuboid bone in 4 specimens.

Average length of Peroneus Quartus muscle was 9.5 cm on the Right side and 12.6 cm on the Left side(Table - 2).

Table – 2:Total Ler	gth of Peroneus (Quartus Muscle(cm)
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Right	Left
11.5	17.2
8	8
9.5	12.6
1.29	3.9
	Right 11.5 8 9.5 1.29

Inference:t=2.20;

P=0.05, Statistically Significant.

DISCUSSION & SUMMARY:

Additional slips of Muscle should be observed to check any clinical significance.

In Present study, We observed adddinal slip of Peroneus muscle. Apart from usual Peroneal muscles like Peroneus Longus, Peroneus Brevis and Peroneus Tertious. We got presence of Peroneus Quartus Muscle in 15 specimens out of Total 32 Specimens .So presence of Peroneus Quartus Muscle was 46.8%.Which is quite Significant.

As per the study of Sergio Ricardo Rios Nascimento, The fourth fibularis muscle was found to be present in 7.62% of the examinations[14]. While Tun Hing Lui reported incidence of Peroneus quartus muscle between 6.6% and 22%[1]. According to Mustafa et al, The peroneus quartus muscle, with a number of different attachments was present in 5.2% (6/115) of the legs[15]. As Mihra noted A peroneus quartus muscle was found in 15% o9f 65 ankles in asymptomatic volunteers[3]. As per the study of J. Zammit, The peroneus quartus, with a number of different attachments, was present in 6.6% of the legs[16]. According to Hee Jin Park et al, Peroneus quartus is found in 13-22% of the population[17]. As noted by Pimpimol Dangintawat et al, Accessory peroneal muscles were found in 48 of 109 cases(44%). and found 13(12%) PQ(Peroneus Quartus) muscle[18].

In Our Study, Out of 15, Muscle was present in 8 specimens on Right side. And in 7 specimens on the Left side. Average length of Peroneus Quartus muscle was 9.5 cm on the Right side and 12.6 cm on the Left side. Length of Peroneus Quartus muscle, as compared to Right and Left side, is of Statistically Significant difference (P=0.05). Origin of Peroneus Quartus muscle in all 15 specimens was from Lower third of Lateral surface of Fibula. Major insertion of Peroneus Quartus muscle was on Lateral surface of Calcaneus in 11 specimens. While insertion was on Lateral surface of Cuboid bone in 4 specimens.

As per the study of Hee Jin Park et al , insertion of Peroneus quartus muscle is into the retrotrochlear eminence of the lateral side of the calcaneus or onto the peroneal tubercle[17]. According to Pimpimol Dangintawat et al, insertion of Peroneus quartus muscle is into the retrotrochlear eminence of the lateral side of the calcaneus or 5th metatarsal or on cuboid[18]. As per the study of Mark Sobel et al, The peroneus quartus muscle was present in 27 legs(21.7% of specimens). Its origins, insertions, and size varied. In 17 legs (63%) the muscle originated from the muscular portion of the peroneus brevis, and inserted on the peroneal tubercle of the calcaneus[19]. According to Gray's Anatomy, Fibularis Quartus arises posteriorly and inserts into the calcaneus or into the cuboid[20].

According to Johnson, Peroneus quartus muscle was seen infrequently by the 19th Century anatomists. And was considered quite a rarity. Wood(1991) reported its occurrence twice in 70 cadavers(3%). Gruber(1924) found the peroneus quartus in 124 of 982 extremities(12.6%), ans in a more recent study Hecker (1929) noted its occurrence 6 times in 47 cadavers(13%). The attachments of peroneus quartus muscle are highly variable. It can arise from the fibula, from the peroneus brevis or even from the peroneue longus. Although classically this muscle inserts onto a tubercle on the os calcis, it can insert into the superior or inferior peroneal retinacula[2].

According to S.A. Athavale et al, The PQ(peroneus quartus) muscle was found in 21% of the limbs[21]. As statement by Mustafa, Peroneus quartus muscle is related to many pathologic conditions in the lateral ankle compartment but also it can be used as a tendon graft for reconstructive procedures[15]. As noted by Pimpimol Dangintawat et al, The presence of a peroneus quartus (PQ) muscle has the potential to create attrition or tear of the peroneal tendon at retromalleolar groove[18].

According to S.A. Athavale et al, The frequent occurrence of Peroneus quartus muscle in humans is suggestive of a progressive evolutionary change to evert the foot to assume a bipedal gait[21]. As told by Scott Carlis et al, Intraoperatively, a peroneus quartus muscle was appreciated, resected, and used as an autograft in the repair of the peroneus brevis tendon[22]. According to Dong-Soo Kim et al, Orthopedic Surgeons should consider the possible presence of Peroneus quartus tendon in a differential diagnosis of chronic lateral ankle pain[23].

So considering all above factors, It can be said that, Presence of Peroneus Quartus muscle is Significant. Therefore the Anatomist, while doing their usual dissections, should always keep in mind the above fact and accordingly always explore the presence of Peroneus Quartus muscle during Dissections. Secondarily, this knowledge about Peroneus Quartus muscle is helpful for Orthopedic Surgeons, to understand the etiology of Chronic lateral ankle pain and also this knowledge is helpful during Surgeries on Foot and Ankle.

Conflict of Interest:

There is no conflict of interest amongst authors.

Acknowledgement:

We acknowledge great help given by Department of Preventive and Social Medicine.

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PARIPEX - INDIAN JOURNAL OF RESEARCH | Volume-9 | Issue-6 | June - 2020 | PRINT ISSN No. 2250 - 1991 | DOI : 10.36106/paripex

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