

Tensor vastus intermedius: a new muscle discovered

Abstract

In this mini-review, the objective was to present the studies on the tensor vastus intermedius. Quadriceps is an anterior thigh muscle that is formed by four muscles, the three vastus (lateralis, medialis, and intermedius) and the rectus femoris. Quadriceps muscle has several studies, but in 1990, the researchers detected the difference of the vastus lateralis and the vastus intermedius of men versus women. This research studied the quadriceps of 40 cadavers (19 women and 21 men). Then, in a similar study in 2016, researchers discovered a new muscle in the quadriceps and called tensor vastus intermedius. The new muscle has the localization between the vastus lateralis and the vastus intermedius. The origin of the tensor vastus intermedius is in the femur and the insertion in the patella. The researchers detected with magnetic resonance imaging demonstrated a rupture of the aponeurotic tendon of the new muscle of the quadriceps. This injury impaired knee action. Therefore, tensor vastus intermedius has knee action. However, this information cannot be conclusive because the researchers did not study with electromyography (EMG). In conclusion, tensor vastus intermedius is a new muscle that the researchers need more studies.

Keywords: muscle, quadriceps, knee, extension, rectus femoris

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Introduction

Sports training has different contents for the coach elaborates the training.¹⁻⁴ Specific training needs to train the athlete's muscles required in the competition.^{5,6} Several sports the athlete uses the quadriceps muscle during the sports techniques^{7,8} and this muscles the physical trainer needs to prescribe the training.^{9,10}

The quadriceps is a muscle located in the thigh with four muscles¹¹ and your architecture can develop the strength because it is a peniform muscle.¹² The quadriceps is formed by four muscles, the rectus femoris, the vastus medialis, the vastus lateralis and the vastus intermedius.¹³ The rectus femoris is the muscle with greater isometric contraction than the vastus.¹⁴ But the quadriceps literature determined a greater isometric contraction of men versus women¹⁵ and young adults versus the elderly.¹⁶ Therefore, men and young adults have greater isometric contraction.

However, quadriceps muscle has several studies,¹⁷⁻¹⁹ but in 1990, Willan et al.²⁰ detected the difference of the vastus lateralis and the vastus intermedius of men versus women. This research studied the quadriceps of 40 cadavers (19 women and 21 men). Then, in a similar study in 2016, Grob et al.²¹ discovered a new muscle in the quadriceps and called tensor vastus intermedius. In this mini-review, the objective was to present the studies on the tensor vastus intermedius.

Studies on the new muscle in the quadriceps

Quadriceps is an anterior thigh muscle that is formed by four muscles, the three vastus (lateralis, medialis, and intermedius) and the rectus femoris.²² The three vastus have origin in the femur and the rectus femoris has origin in the pelvis.²³ All four quadriceps muscles have insertion on the patella and continue to the tibial tuberosity. Therefore, the insertion is where human practices the movement, how the insertion of the quadriceps is in the patella, this muscle has an ability to knee extension.²⁴ Another quadriceps action is by knee internal rotation and other muscles (sartorius, gracilis, semitendinosus, and semi membranous) practice this action.²⁵ The rectus femoris is the only quadriceps muscle that practices the hip flexion with other the action of other muscles (iliopsoas and tensor fasciae latae).

However, Grob et al.²¹ discovered a new muscle in the quadriceps, the tensor vastus intermedius. But in the study of Cariello et al.²⁶ these authors determined the origin of the tensor vastus intermedius in the femur and the insertion in the patella. Therefore, the origin is equal to the other vastus and the insertion is equal to the quadriceps muscle. Then, it seems that this muscle has an action on the knee extension.

How were the studies of the tensor vastus intermedius?

In 2016, Grob et al.²¹ discovered a new muscle in the quadriceps. The researchers dissected the quadriceps of 26 cadavers and he detected a new muscle, the tensor vastus intermedius. This discovery needs more studies with the objective to detect the localization of the tensor vastus intermedius in other cadavers and the researchers need to detect muscle activation of this muscle with EMG to know in which joint movement it is present. This is very important for the physical trainer prescribes the strength training for the tensor vastus intermedius. Figure 1 presents the localization of this muscle between the vastus lateralis and the vastus intermedius.

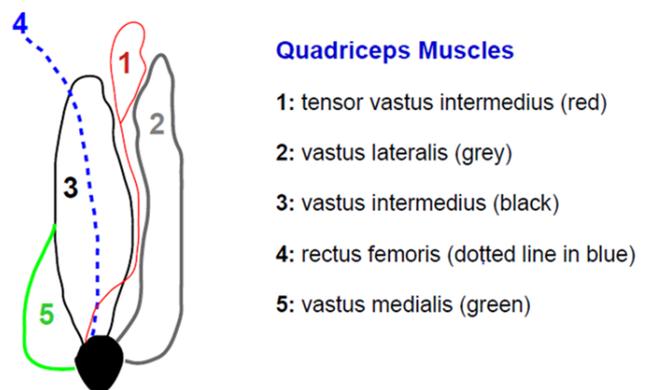


Figure 1 Quadriceps with the five muscles (Adapted of Grob et al.²¹).

In another study that occurred in 2016, Grob et al.²⁷ dissected the quadriceps of 7 cadavers (n=5 men and 2 women) and the researchers

detected the new muscle, the tensor vastus intermedius. Therefore, this study confirmed the new muscle of the quadriceps. Then, the quadriceps need to be called another name because it has five muscles. But researchers need to study with EMG for they determine the action of this muscle. The third article of the same research group on the new muscle was practiced in 2016. Grob et al.²⁸ studied the quadriceps of a slightly obese female of 62 years old (n=1). The researchers detected with magnetic resonance imaging demonstrated a rupture of the aponeurotic tendon of the new muscle of the quadriceps, the tensor vastus intermedius. This injury impaired knee action. Therefore, tensor vastus intermedius has knee action. The last article on the new muscle is of Indian researchers from another research laboratory. Veeramani & Gnanasekaran²⁹ studied the quadriceps of 36 cadavers of the Indian. The researchers detected a length of the tensor vastus intermedius of 145.40±37.55 millimeters (mm). Female tensor vastus intermedius had a length of 162.59±47.41mm (n=9) and the male was of 139.70±32.72mm (n=27). In conclusion, the tensor vastus intermedius is an important muscle for the knee extension.

The mini-review presented the studies on this new muscle, but the researchers need to practice more studies. The studies that the scientists deserve to practice are the electromyographic responses of the tensor vastus intermedius during the joint movements and it is necessary to study the weight training exercises that improve the strength, the velocity of this new muscle. It is also important to determine the type of muscle fiber (type I, type IIa, and IIx) of the tensor vastus intermedius.

Conclusion

In five studies the researchers detected a new muscle in the quadriceps, the tensor vastus intermedius. The quadriceps has five muscles and the name this muscle needs to be changed. However, the researchers need to do more studies about the tensor vastus intermedius for the scientific community to change the name of the quadriceps. Then, scientific studies on EMG, the hypertrophy of the new muscle, fiber type of the new muscle need to be practiced by scientists. Another important study on this muscle it is necessary to discover which strength training exercises more increase muscle strength. Increased strength and power of the tensor vastus intermedius is important to identify which sports techniques achieve greater performance. In conclusion, tensor vastus intermedius is a new muscle that the researchers need more studies.

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Conflicts of interest

The author declares that there are no conflicts of interest.

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