

# The knee joint muscle: a morphological analysis

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## Abstract

**Introduction:** Firstly described in 1699 by Dupré, the muscle of knee joint (MAJ) is small and flat and consists of several muscular bundles that originate in the previous surface of the distal part of the femur and are inserted in the proximal part of the synovial membrane of the articulation of the knee, and function in the retraction of the suprapatellar synovial bursa during the extension of the leg, avoiding that the pleats inside this articulation are pressed between the femur and the patella. The objective of the present study valued the morphological aspects as for the format, fixation, sense and proximal and distal position of the muscular bundles of the MAJ. **Materials and methods:** Five knees of human corpses (being two left and three right ones, previously fixed with formaldehyde to 10% and glycerin) of both genders of the Institute of Anatomy of the University Severino Sombra were analyzed. An average (size,value,etc.) was calculated and obtained through the length and width of the MAJ through the use of a caliper ruler of polyethylene. **Results:** The total length of the MAJ varied from five to eleven cm (medium = 8,3 cm). Three anatomic presented morphology of the trapezoidal type, one presented morphology of the rectangular type and another presented morphology not found in the classification of Didio (2002). **Conclusion:** Our study established the presence of this muscle as a different muscular structure from the quadriceps femoral muscle, observing a morphological type not described in the literature.

**Keywords:** knee, muscle to articulate the knee, suprapatellar stock market, joint of the knee, muscle.

## 1 Introduction

The muscle of the knee joint (MAJ) is a small flat muscle that originates from the mesenchyme derived from the somatic layer of the lateral mesoderm (DIDIO, 2002) located below the vastus intermedius muscle (GRAY, 1988, 1995; MOORE and DALLEY 1994, 2001, 2005; SMITH, WEISS and LEHNRKUHL, 1997; AHMAD, 1975), sat up superiorly at the bottom of the anterior and posterior femur, inferior to the synovial membrane of the knee joint and the wall of the bursa (KINCAID, RUMPH, GARRETT et al., 1996; MOORE and DALLEY, 2005). Firstly described in 1699 by Dupré (DIDIO, 2002), its name comes from the Latin, articularis genus (MOORE and DALLEY, 2005), also called subcrural (TESTUT and LATARJET, 1969; GRAY, 1988; SMITH, WEISS and LEHNRKUHL, 1997). The aim of this study was to evaluate the morphological features, in terms of frequency and format, setting the direction and position of the proximal and distal muscle bundles of MAJ.

## 2 Materials and methods

We analyzed five knees of human corpses (being two left and three right ones, previously fixed with formaldehyde to 10% and glycerin) of both genders of the Institute of Anatomy of the University Severino Sombra. Each anatomical specimen was sectioned transversely on the distal femur and proximal tibia and fibula showing all structures

preserved. The pieces presented crossed sections at the level of the middle of the third part of the femur and proximal tibia and fibula. With the aid of cable scalpel (n° 4), scalpel blade (n° 24) and mouse-tooth forceps, anatomical analysis of fourteen cm lateral, medial and longitudinal incisions were made on the quadriceps muscle in order to view the MAJ. We calculated the median (size/length/etc) obtained from the length and width of the MAJ by using a caliper polyethylene (Marberg, RJ, Brazil).

## 3 Results

The total length of MAJ ranged from five to eleven centimeters (median = 8.3 cm). Three anatomic parts studied are trapezoidal type morphology (Figure 1), showed a rectangular morphology (Figure 2) and another one had a morphology not found in the classification of Didio (2002) (Figure 3).

Our study showed that the knee joint muscle might be characterized as having a separate origin of the quadriceps muscle in all specimens analyzed. It was difficult to distinguish it, the fact of being deep or acceded to the vastus intermedius muscle. Kimura and Takahashi (1987) showed that the muscle fibers were inserted into the knee joint laterally on the connective subsynovial tissue after analysis on 44 human cadavers. Puig, Dupuy, Sarmiento et al.



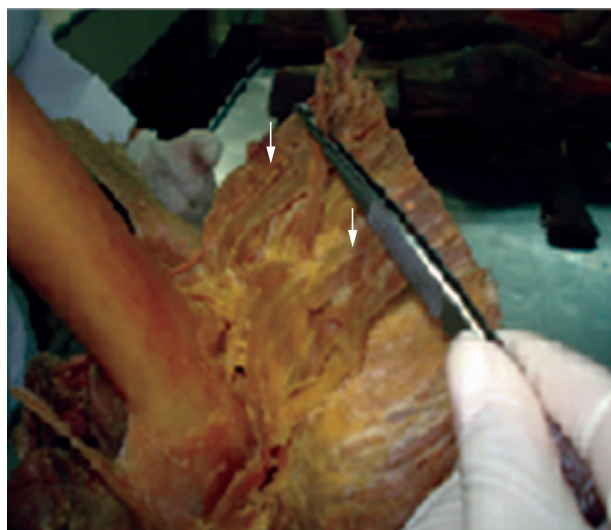
**Figure 1.** Morphological trapezoidal type, showing fibers arranged in parallel converging into a single point below the *vastus intermedius* muscle, in frontal view.



**Figure 2.** Morphological type on regular rectangular arrangement of fibers in parallel and single strap muscles, front view.

(1996) studied the characteristics of MAJ through MAJ and identified it as an independent structure, separate from the vastus intermedius muscle in five healthy volunteers. In recent studies of Toscano, Moraes and Almeida (2004), after fifteen-knee analyses, suggested that the size of the MAJ and its relations with the bursa could be related to the rest of the muscle mass of each individual, and associated their contraction with the contraction of the quadriceps muscle and the length of the front knee.

We found a morphological type of MAJ not described in the literature. As this does not fit into any geometric shape previously described, we suggest a classification as an irregular type, with two handles and a bilateral crossed handle. Some authors associate it with the MAJ contraction of the quadriceps muscle, so that muscle length changes during extension and flexion of the leg in order to remain in a proper position during the movements (TOSCANO, MORAES and ALMEIDA, 2004; KIMURA and TEKAHASHIS, 1998;



**Figure 3.** Irregular morphological type, the fibers do not follow a standard layout, with different shapes and orientations. The arrows point to two different types of orientation and the other to a vertical slant.

SMITH, WEISS and LEHRKUHL, 1997). Other authors even consider it as an unimportant muscle (GARDNER, GRAY and RAHILLY, 1988). However, the literature is sparse and unclear about their morphology, as well as its relations with the bursa (TOSCANO, MORAES and ALMEIDA, 2004).

#### 4 Conclusion

Our study established the presence of the MAJ as a different muscle structure of the quadriceps muscle, observing a morphological type not yet characterized.

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