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CASE REPORT

TROCHANTERIC ATTACHMENT OF PSOAS MINOR MUSCLE IN 52 YEARS OLD FEMALE CADAVER IN ALKHARJ, SAUDI ARABIA

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ABSTRACT

The anatomical variations of psoas minor muscle (PMM) vary greatly in terms of agenesis, attachments and morphology based on race and gender. In the current study, we report an extremely rare condition of distal attachment of psoas minor muscle during our routine dissection of a 52-year-old female body cadaver. We observed that the psoas minor muscle insertion was unique where it was inserted to the lesser trochanter of the femur. We believe that understanding these variations is essential to the effective execution and planning of radiological and surgical procedures and the correlation with many clinical conditions.

KEY WORDS: Psoas Minor Muscle; Female; Cadaver; Muscles; Lesser Trochanter; Abdominal Wall; Vertebra.

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INTRODUCTION

Psoas minor (Psoas Parvus) is fusiform slender muscle with a long thin tendon and short muscular flashy belly that belongs to the posterior abdominal wall. It is attached proximally to thoracic vertebra 12, lumbar vertebra 1, and their intervertebral fibrocartilage discs. Its thin tendon descends downward to be attached distally onto iliopectineal eminence, the pubic pectineal line and laterally into the iliac fascia.[1,2] The action of psoas minor muscle (PMM) is to assist in flexion of the lumber spines and body trunk.[3,4] The PMM is supplied by the first lumber nerve.[2] Developmentally, it is reported that PMM showed the greatest chance of agenesis (56%) compared to other body muscles.[2] According to literature it has been reported that PMM was found in 40% of individuals.[2] The extant literature did not offer a clear view of PMM distal attachment variations.[5,6] The sports medicine field reports accounts of the muscle's clinical significance.[6] The previous studies revealed some morphological and racial variations.[7]

The main objective of this report was to shed light on this relatively obscure muscle and its extremely rare insertion site variation to promote well comprehension of its clinical importance for embryologists, radiologists and surgeons.

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CASE PRESENTATION

During our routine undergraduate gross dissection in the right lower limb region of a 52-year-old female body cadaver (168 cm in length and 73 kg weight) at the Anatomy Department, College of Medicine, Prince Sattam bin Abdulaziz University, AlKharj, Kingdom of Saudi Arabia. It was revealed that PMM originated from the posterior aspect of the abdominopelvic region more precisely from the lateral surface of vertebral bodies from 12th thoracic to first lumbar vertebrae and intervertebral discs. The fleshy part of the muscle as well as the tendon descended

downward parallel with the medial border of the psoas major muscle. Furthermore, the muscle insertion was unique in that the distal end of the muscle merged with the conjoint tendon of the iliopsoas muscle (i.e. psoas major and the iliacus muscles) and was inserted into the lesser trochanter of the femur. No further anatomical variations were found in this cadaver. (Figure 1)

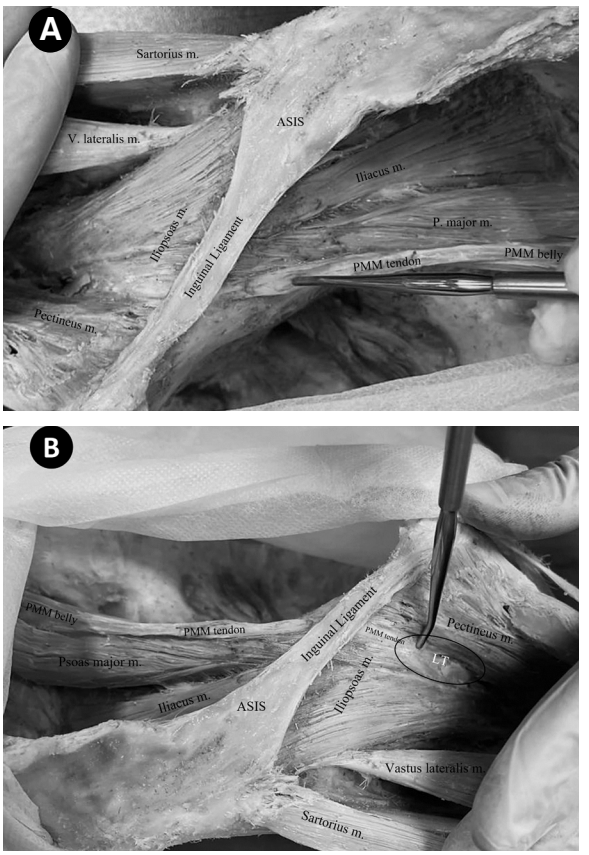

Figure 1: Anterior aspect of the inguinal region. Distal attachment of psoas minor muscle seen with Sartorius muscle retracted. **A:** Psoas minor muscle and its slender tendon running anterior to psoas major muscle and **B.** Psoas minor tendon passing posterior to the inguinal ligament to take its insertion at the lesser trochanter of the femur.

DISCUSSION

Psoas minor is a vestigial, weak flexor of the pelvis in humans. It is well developed in apes and quadrupeds animals to accommodate its advance use in these animals. The presence of muscle is widely variable across individuals and is of significance to radiologists, orthopaedists, surgeons and physiotherapists when applying clinical or surgical interventions; thin tendon of PMM may be mistaken for genitofemoral nerve. The presence of PMM is also vital in some professions such as sports, and it might get injured during certain activities.[6] In some sports, inguinal pain arises from the strained thin tendon of PMM, which results from hyperextension of the hip joint, where both feet off the ground tense the muscle-tendon. In such cases, if the pain is spread to the abdominal wall and perineum, it would be a cause of psoas minor syndrome. Palpation of the strained tendon worsen the pain in slim patients, and it could be mistaken for appendicitis or diverticulitis.[8] Also, the presence of PMM with its variable morphology can be misdiagnosed during MRI, where it may appear like certain tumours.[9]

The PMM displays many variations in terms of agenesis, morphology and attachments based on race and gender.[10]

Presence of PPM: Authors reported the presence of PMM muscle in 40% [(11)] and 26.66% of the studied cases.[11] A range of variations in the presence of PMM has been mentioned in the literature, varying notably from 33.4% to 52%.[1] The PMM was found in 35% of the north Indian population.[12]

Agenesis: Anatomical agenesis among populations remains unclear, with variations involving but not limited to complete absence or bilateral or unilateral presence. In the present case, PPM was found to be unilateral. Different ethnic groups showed a wide range of PMM absence; according to literature, Sachin mentioned the absence varying from 48% in Russians to 73.33 % in Brazilian.[12] Hodgens reported a 100% (complete absent) in the Blacks, 59% in the Whites and 50% in the Hispanic/White individuals with no sex significant influence on the presence or absence of the PMM muscle of the study cases.[13] The muscle was bilateral in the male cases and unilateral in the female cases.[10,12] PMM was present bilaterally in 35% of cases and unilaterally in 5% cases.[11]

Morphology and attachments: According to the literature, the muscle showed a wide variation in its muscle belly, length, and proximal and distal attachments. The present case displayed the typical origin and morphological features of the PMM that have been mentioned in the literature. In addition, however, it showed a unique insertion variation as it joined the conjoint tendon of the iliopsoas muscle to be inserted into the lesser trochanter of the femur. In addition, Protos mentioned a rare case of PMM originating by two heads from the body of L1 and the bodies of L4-L5 and intervening disc, respectively, with the genitofemoral nerve emerging between them.[14]

Ojha reported different sizes of the muscle belly and variable modes of insertion; in some cases, the psoas minor showed a thick belly with short and broad tendon inserted into iliopectineal eminence and pecten pubis. In other cases, the muscle belly was thin, had long tendon that fanned out near iliopectineal eminence which merged with obturator as well as iliac fasciae, respectively.[7] In addition, a fleshy muscle belly with extending origin from T12, L1 to the subdiaphragmatic fascia in addition to medial

arcuate ligament was described in 15% cases. Also, a wide variation at insertion was noted.[11]

CONCLUSION

The importance of this rare case report is to highlight the rarity of the trochanteric attachment of psoas minor muscle. It is immensely significant to understand such variation since it plays a critical role in radiological diagnosis and surgical procedures. A better understanding of embryogenesis and the likely variations of this muscle can be quite beneficial in limiting unexpected injuries and eliminating considerable clinical conditions. Furthermore, it provides us with a lot of information concerning limb and joint movements.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	MHKA
Acquisition, Analysis or Interpretation of Data:	MHKA, MAA, JMA, NMB, AYE, KMT
Manuscript Writing & Approval:	MHKA, MAA, JMA, NMB, AYE, KMT

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.