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Morphology and Morphometry of Psoas Minor- A Cadaveric Study

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ABSTRACT

Psoas minor is a slender muscle of posterior abdominal wall, having short fleshy belly and long tendon, lying anterior to Psoas major muscle and covered by iliopsoas fascia and anterior layer of thoraco-lumber fascia. Psoas minor muscle belongs to the category of vestigial muscle. The anatomy of the psoas minor muscle in human beings has frequently been correlated with ethnic and racial characteristics. The present study was done on 30 embalmed cadavers in the Department of Anatomy of S.M.S. Medical College, Jaipur (Rajasthan) to investigate the anatomy of the psoas minor muscle, by observing its occurrence, distal insertion points and the relationship between its tendon and muscle portions. In this study presence of psoas minor muscle was 36.67% in which bilateral presence was 81.81% and unilateral was 18.19%. In most of the cases, muscle originated from the sides of bodies of T12 & L1 vertebrae & their intervening intervertebral disc. In some cases it also takes origin from subdiphargmatic fascia, medial arcuate ligament and corresponding crus of diaphragm and also from the psoas major muscle. This muscle inserted at iliopubic eminence and pecten pubis and in the iliac fascia. In this study average length of proximal tendon was 26.097mm, average length of fleshy belly was 87.702mm and average length of distal tendon was 135.797mm. Average width and thickness of fleshy belly were 16.231mm and 3.518mm respectively. In some cases fibers of psoas minor muscle and psoas major muscle were interdigitated with each other. In some cases psoas minor muscle was pierced by genitofemoral nerve.

KEYWORDS: Insertion, Morphology, Psoas minor muscle, Tendon.

INTRODUCTION

Psoas minor muscle is a muscle of posterior abdominal wall. Psoas minor is often absent but, when present, lies anterior to the psoas major muscle[1, 2]. This muscle is large and well developed in quadruped animals and in brachiaters[3]. This muscle present as an expansion on the medial border of the psoas major muscle[4]. Although its function is considered to be extremely subtle, it aids in bending of the lumber spine and also provides stabilization to the hip joint. When it contract unilaterally it cause flexion of trunk[1]. It has clinical significance in sports medicine, in football players it get strain with feet off the ground[5]. It arises from the sides of the bodies of the 12th thoracic and first lumbar vertebrae and from the intervertebral disc between them[6, 7]. This muscle inserted by a long, flat tendon to the pectineal line and iliopectineal eminence of hip bone and, laterally, to the iliac fascia[8-10]. It is innervated by ventral ramus of L1 spinal nerve. There is racial and morphometric variations in the presence of psoas minor muscle[11, 12].

The aim of this study to investigate the morphology and morphometric of psoas minor muscle and establishing the frequency of its occurrence according to sex and also the determining the proportional relationship between the tendon and muscular parts of the psoas minor.

MATERIALS AND METHODS

This study was carried out in the Department of Anatomy of S.M.S. Medical College, Jaipur (Rajasthan). 30 embalmed cadavers were used for the present study. All the viscera of abdomen were removed to exposure of this muscle in the posterior abdominal wall. The muscle was cleaned from its origin to insertion. In all the cadavers following variables were evaluated- presence of psoas minor muscle (unilateral or bilateral), length of muscle, length of origin and insertion tendon, length of muscle belly, width and thickness of muscle belly, piercing of genitofemoral nerve and anatomical variations related to origin and insertion of muscle. All measurements were collected with the help of varnier

caliper, measuring tape, thread and scale. Obtained data were tabulated in Microsoft excel sheet.

OBSERVATIONS

In this study morphology and morphometric of psoas minor muscle was studied. Psoas minor muscle was present in 11 cadavers (36.67%) out of 30 cadavers. In 81.81% (9 cadavers) cases psoas minor muscle was present bilaterally and in 18.19% cases muscle was unilaterally. In this study in unilateral cases psoas minor muscle always lies on left side. Psoas minor muscle lies on the anterior aspect of psoas major muscle. PMM was covered by psoas fascia and anterior layer of thoraco-lumber fascia.

Fig1: Showing bilateral psoas minor muscle.

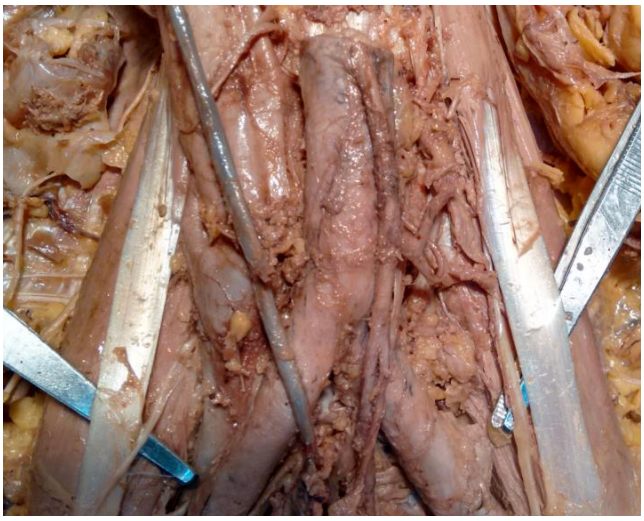

Fig 2: Showing position of bilateral psoas minor muscle with respect to psoas major muscle.

Fig 3: Showing unilateral psoas minor muscle.

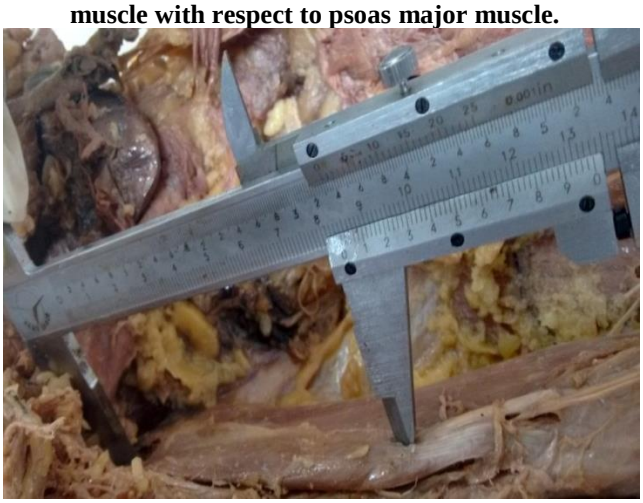

Fig 4: Measurement of length of psoas minor muscle.

Table 1: Showing various parameters of psoas minor on both side.

Side		Total length	Length of fleshy belly	Length of origin tendon	Length of insertion tendon	Width of muscular abdomen	Thickness of muscular abdomen
left(N=11)	Mean	267.22	89.83	25.23	134.90	15.94	3.31
	SD	22.62	22.13	9.02	23.20	3.55	1.61
right(N=9)	Mean	263.10	85.10	27.16	136.89	16.59	3.78
	SD	21.42	26.61	12.34	26.44	4.47	1.47
Total(N=20)	Mean	265.37	87.70	26.10	135.80	16.23	3.52
	SD	21.61	23.70	10.39	24.06	3.89	1.53

Psoas minor muscle takes origin as a flat tendon from the sides of T12 & L1 vertebrae and the intervening intervertebral disc. It also takes origin from the sub diaphragmatic fascia and medial arcuate ligament. Some fibers of muscular belly also take origin from the corresponding crus of diaphragm. Psoas minor muscle

inserted as a long tendon at the iliopubic eminence and pecten pubic. It is also inserted in the iliac fascia. In this study the average length of origin tendon was 26.097mm, length of muscular belly was 87.702mm and length of insertion tendon was 135.797mm. Average width and thickness of fleshy belly were 16.231mmand 3.518mm respectively. In this study we found that Psoas minor muscle of females were thin, narrow and having long insertion tendon then males.

PMM shows a wide variation with respect to piercing of genitofemoral nerve. In a case genitofemoral nerve also pierces the psoas minor muscle in both sides. In some cases the deep fibers of Psoas muscle and superficial fibers of psoas major muscle were interdigited with each other. PMM shows a wide variation with respect to piercing of genitofemoral nerve. In a case genitofemoral nerve also pierces the psoas minor muscle in both sides. In some cases the deep fibers of Psoas muscle and superficial fibers of psoas major muscle were interdigited with each other.

DISCUSSION

In this study the psoas minor muscle was present in 36.67% cadavers. This proportion is approximately similar to Kraychete et al. (2007), who found psoas minor muscle in 30% cases. According to Danilo Ribeiro Guerra psoas minor muscle was present in 59% of the human fetuses which is similar to Snell's finding (60%).

In this study the tendon of psoas minor muscle got inserted at the iliopubic eminence and pecten pubic also in the iliac fascia which was also stated by Gardener et al. (1988) and by Guerra. Bergman and Afifi (1997) showed variations of insertions on the inguinal ligament, femoral neck and lesser trochanter of the femur together with the Psoas Major Muscle. Macalister (1875 Apud Tellez & Acuña, 1998) and Ledouble (1897 Apud Tellez & Acuña, 1998) stated that, with respect to the origin, the tendon may be split and send an extension to the fifth lumbar vertebra and first sacral vertebra, and another one to iliopectineal line; in addition, its insertion may also be continuous with the pelvic fascia or directly with the iliac fascia.

CONCLUSION

The present study was conducted on 30 embalmed cadavers in the Department of Anatomy, S.M.S. Medical College, Jaipur (Rajasthan). This study shows the presence of psoas minor muscle in 36.67% cases (11 in 30 cadavers): bilateraly 81.81% (9 in 11) and unilateraly 18.19% (2 in 11). In a case PMM is pierced by genitofemoral nerve. In some cases the deep fibers of Psoas muscle and superficial fibers of psoas major muscle were interdigited with each other. Concerning the morphometry, our study reports the total length variables of the muscle, length of proximal and distal fixation tendon, width and thickness of the muscular abdomen as well as length from origin to piercing of genitofemoral muscle to psoas major muscle or psoas minor muscle or both.

CONFLICT OF INTEREST: None Declared.

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