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Re-recognizing the pathogenesis of inguinal hernias

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ABSTRACT

Over the past century, there has been a significant increase in the understanding of groin anatomy as it is related to inguinal hernia. But no one really knows the function of iliopsoas in sealing the inguinal canal and promoting defecation in squatting position. This paper presents the hypothesis that iliopsoas plays an important role in iliopsoas-abdominal reflex by strengthening the groin region, and thus offers a new insight into the study of the pathogenesis of groin hernia and defecation in the aged. This discovery may explain why squatting instead of sitting is better for defecation and urination and why the elderly males are more susceptible to groin hernia. Moreover, the colorectal disease might also benefit from this discovery.

Introduction

It is estimated that 5% of the population will develop an abdominal wall hernia. Men are 25 times more likely to have a groin hernia than women. The lifetime risk for inguinal hernia is 27% for men and 3% for women. Most inguinal hernias develop for the first time in patients less than 1 year old and those aged 55–85 [1]. However, in patients with sports hernia the average age at the time of diagnosis is 20–50 [2]. Although we know that increased intra-abdominal pressure and a pre-existing weak spot in the abdominal wall are involved in the pathogenesis of hernia, the determination of the exact procedure remains elusive. We do not know why the incidence of inguinal hernia in men is higher than that in women, in spite of a higher incidence of constipation in women. Neither do we know why the vast majority of sports hernias occur commonly in soccer or rugby players, although ice hockey players instead of weight lifting players [3]? We always emphasize that the spermatic cord passes through abdominal wall, but have never considered that the iliopsoas passes the space deep to the inguinal ligament, which causes a defect in this region (Fig. 1). In view of the above situation, this paper tries to approach the pathogenesis of inguinal hernia from a new perspective, and it might cast some fresh air into the current study.

Hypothesis—the inguinal ligament medially pulled by iliopsoas to seal inguinal canal

A simple test shows that during supine hip flexion (iliopsoas function) the anterior abdominal muscles contract involuntarily-straight legs providing the most resistance. With a slow sit-up, the iliopsoas is felt strength with the palpation of the psoas muscle deep the lateral half of the inguinal ligament. Consequently, we speculate that there is an iliopsoas-abdominal reflex in abdomen, which makes the anterior and posterior abdominal muscle form concurrent force coordinately and strengthen resistance of groin region (Fig. 2).

According to this speculation, the space above inguinal ligament is named as "Tang's lacuna" and defined as following: rectus abdominis (medially), inguinal ligament (inferiorly), horizontal line from the mid-inguinal point (Fig. 1). Both inguinal canal and Hesselbach's triangle lie in this space without any supporting muscles posterior. While sitting-up with hip and knee in maximal flexion, the inguinal ligament is pulled medially and the space above it closes potentially. This can also be proved in squatting position with Valsalva manoeuver, sneezing or coughing. On digital examination, by inserting the index finger to identify the superficial ring while Valsalva manoeuver or during a resisted sit-up, the finger is squeezed between the inguinal ligament and rectus abdominis. Pain can also be elicited and aggravated by Valsalva manoeuver or a resisted sit-up in patients with sports hernia [4]. CT scanning shows spermatic cords are pulled medially during a "half sit-up" and "half hip flexion" (even if the posture is limited) (Fig. 3), which indirectly indicates the inguinal ligament is pulled medially by iliopsoas. If sit-up and hip flexion were complete, the efficacy might be more obvious.

Iliopsoas consists of psoas major and iliacus muscle which blend together. It passes the space deep to the inguinal ligament, inserts on the thigh at the lesser trochanter of the femur, and connects the low back with the upper leg. And its following characteristics should be emphasized; (1) the iliopsoas pulls inguinal ligament medially during hip flexion with Valsalva manoeuver; (2) it is the one and only abdominal muscle that passes through abdominal wall from posterior to anterior with inguinal ligament

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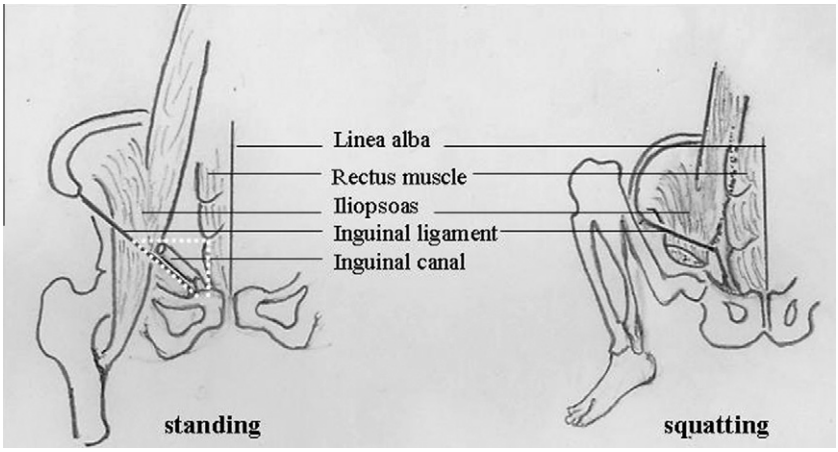

Fig. 1. Iliopsoas passes the space deep to the inguinal ligament and causes a defect. The triangle with dashed line expresses "Tang's lacuna" that is sealed during iliopsoas-abdominal reflex in squatting position.

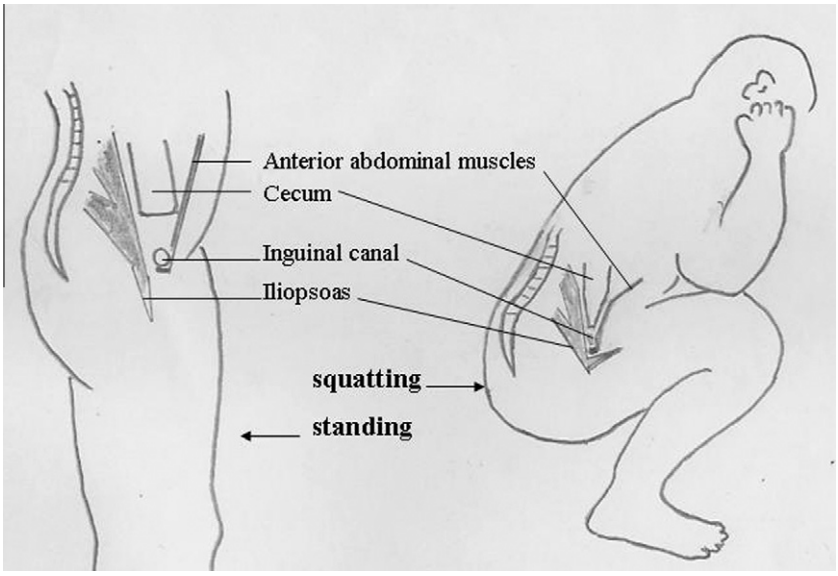

Fig. 2. The cecum is squeezed by iliopsoas and the anterior abdominal muscles and the inguinal canal is closed in squatting position. The triangle with dashed line expresses "Tang's lacuna".

attached to it, and the attachment is the lowest part of abdomen and is only the loose connective tissue; (3) the iliopsoas lateral to the iliopectineal arch fixes the inguinal ligament to superior pubic ramus and limits iliopsoas movement greatly. Violent action might potentially disrupt the iliopectineal arch and result in groin pain; and (4) the iliopsoas muscle may be frequently injured in violent sports such as soccer and rugby [4], which may disorder the iliopsoas-abdominal reflex.

A lesson from sports hernia

The athletic hernia, as an obscure condition of uncertain etiology commonly seen in soccer and rugby players, affects many athletes at all levels of competition. The literature provides no consensus on the definitions of or the pathogenesis for sports hernia as it is probably a multifactor condition for which we may never have a clearly identified cause [3,5]. However, one consensus is certain that chronic groin pain caused by groin injury is common in soccer and ice hockey players, and thus a hot topic in sports medicine [2]. Among professional sports players, the estimated incidence of groin pain is 0.5–6.2%, whereas in the male soccer players it is 18–20% per year [5]. Indeed, as many as 58% of soccer players report a history of groin pain [3]. The estimated incidence of groin and abdominal strain injuries in the elite male hockey players is 13–20% per year [6]. One herniography study revealed that 51% of male and 21% of female patients with groin pain have symptomatic impalpable hernias, and another one reported that 84% of elite athletes with groin pain suffered from hernias [2]. Interestingly, chronic groin pain is not a common sign of hernias in ordinary patients. A study shows that 4000 patients with hernias have no pain complaints, meanwhile, 134 patients with groin pain are verified no evidence of hernias [7]. For this reason, it is more appropriate to speak of "groin disruption syndrome" or "Gilmore's groin" as the only important cause of sports hernias [8],even if most findings shows that about 80–100% of athletes with chronic groin pain suffered from a deficiency of posterior wall of the inguinal canal [2,9]. As a result, it can be concluded that the mechanism of insult to be a complex injury to the flexion/adduction apparatus of the lower abdomen and hip [3].

Hömich introduced an examination method to evaluate adductor muscle-related pain and strength, iliopasoas muscle-related pain, strength and flexibility, abdominal muscle-related pain and