

Abnormal Obturator Artery with Ipsilateral Inferior Epigastric Artery Passed Behind the Femoral Vein

Arteria Obturatriz Anómala con Arteria Epigástrica Inferior
Ipsilateral que Cruza Posterior a la Vena Femoral

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SUMMARY: Clear awareness of the vascular variations is critical in surgeries, which may cause massive hemorrhage during surgical procedures. During educational dissection of a male cadaver, we encountered a combined variation of the left obturator artery and ipsilateral aberrant inferior epigastric artery. The left obturator artery originated from the external iliac artery, then coursed inward, adherent to the superior pubic ramus. The left inferior epigastric artery originated from the femoral artery, and coursed behind the femoral vein. These anatomical variations shown in one person were extremely rare. This is particularly true with regard to these variations while performing pelvic and inguinal region surgeries.

KEY WORDS: Obturator artery; Inferior epigastric artery; Femoral vein; Inguinal region.

INTRODUCTION

According to anatomical textbooks, the inferior epigastric artery originates from the external iliac artery near the midpoint of the inguinal ligament, obliquely upward in the extraperitoneal tissue inside the deep inguinal ring, passes through the transverse fascia of the abdomen and ascends between the rectus abdominis and the posterior sheath of the rectus abdominis, while the obturator artery originates from the internal iliac artery and passes through the obturator canal together with the obturator nerve and obturator vein.

As early as 1942, 640 body-halves' obturator arteries were dissected and reported by James W *et al.* (Pick *et al.*, 1942). As reported by Rajive, A V *et al.*, about 4 % of the obturator artery arose from the external iliac artery. The discovery of variations in the inferior epigastric artery alone has also been reported previously. The aberrant origin of the inferior epigastric artery was generalized by Wong & Merkur (2016). Jakubowicz & Czarniawska-Grzesinska (1996) dissected and calculated that about 8 % of the inferior epigastric artery originates from the femoral artery below the inguinal ligament. A case showed that the inferior epigastric artery, obturator artery, and profunda femoris

arteries could all arise from the common trunk of the external iliac artery was reported by Bilgiç & Sahin (1997). Variations in the inferior epigastric artery and obturator artery are not rare, while no case occurs ipsilaterally in one person.

In this case, aberrant inferior epigastric artery and obturator artery were observed on the left side of a male cadaver. And there was an artery that originated from the inferior epigastric artery and supplied blood to the testis. The artery did not match the arteries known to supply blood to the testicular region (Harrison, 1949; Mostafa *et al.*, 2008). We report this case to alert practitioners to this condition, and to reduce the risk of iatrogenic injury during surgery in the inguinal region.

CASE REPORT

During routine educational dissection in the Human Body Course, a male cadaver presented with abnormal obturator artery and ipsilateral aberrant inferior epigastric artery (Figs. 1,2,3). The specific performance is as follows.

The left obturator artery originated from the external iliac artery at 0.7 cm above the inguinal ligament, and then coursed inward, adherent to the superior pubic ramus, and turned sharply downward in a rectangular shape. The external diameter of left obturator artery was 0.3 cm, and the total length from the starting point to the obturator canal was 4.3 cm. Then the left obturator artery passed through the obturator canal along with the normal left obturator nerve and the left obturator vein.

The left inferior epigastric artery originated from the femoral artery at 1.7cm below the inguinal ligament. The external diameter of the artery was 0.3 cm. It coursed like a fishhook, passed behind the femoral vein, and then crossed the superior ramus of the pubis, and penetrated between the rectus abdominis and the posterior sheath of the rectus abdominis. At about 2.1 cm from the starting point, a small artery with an outer diameter of about 0.1cm coursed inwardly along the lower margin of the inguinal ligament and passed deep to the spermatic cord. About 3.4 cm inward, the artery turned downward to the testicle about 1.4 cm medial to the spermatic cord, and the outer diameter of the artery gradually narrowed. The anastomotic branch was not observed between this artery and the spermatic cord.

The right obturator vascular nerve bundle and the right inferior epigastric artery showed no abnormalities.

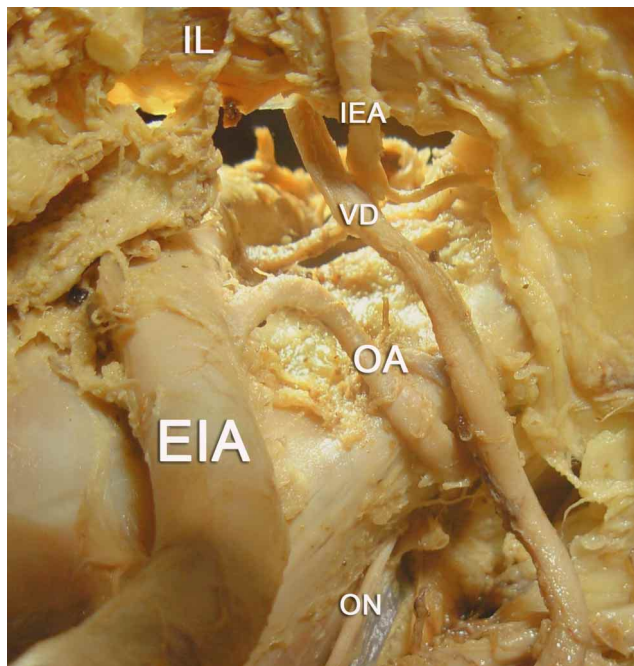


Fig. 1. The obturator artery passed behind the superior pubic ramus. IL: Inguinal ligament. IEA: Inferior epigastric artery. EIA: External iliac artery OA: Obturator artery. ON: Obturator nerve. VD: Vas deferens.

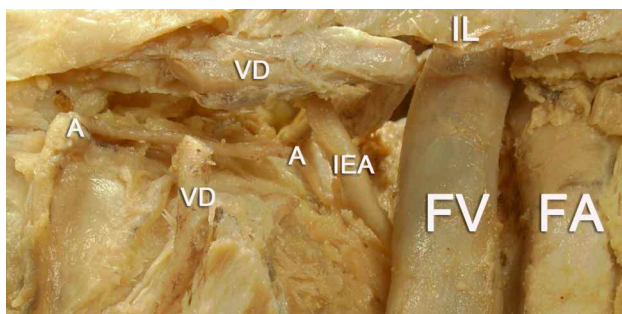


Fig. 2. The inferior epigastric artery passed behind the femoral vein. IL: Inguinal ligament. IEA: Inferior epigastric artery. FA: Femoral artery. FV: Femoral vein. VD: Vas deferens. A: An artery that supplies blood to the testicles.

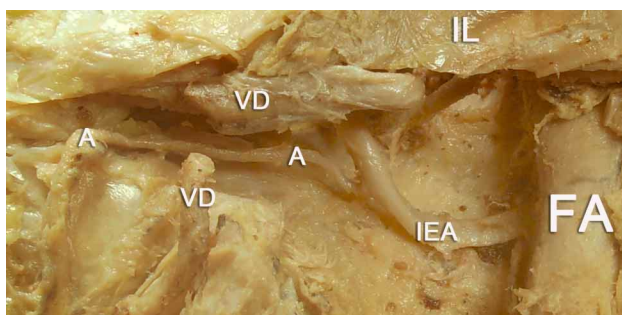


Fig. 3. An artery that supplies blood to the testicles arose from the inferior epigastric artery. IL: Inguinal ligament. IEA: Inferior epigastric artery. FA: Femoral artery. VD: Vas deferens. A: An artery that supplies blood to the testicles.

DISCUSSION

The obturator artery has long been considered a common branch of the internal iliac artery, while the source of origin of the obturator artery was a highly valued variable. Thus, the vascular variant of abnormal obturator artery encountered, should be held in high regard during pelvic surgery, like hernia repairs or pelvic fractures, especially in obstetric surgery. The abnormal obturator artery can easily cause massive hemorrhage during obstetric surgery, which has been the leading cause of obstetrical mortality in the developing world (Cardoso *et al.*, 2021). Therefore, obstetric surgeons must have a full awareness of the internal iliac artery branching patterns and any potential vascular abnormalities.

Inferior epigastric artery injury can also cause serious hemorrhage, pseudoaneurysm, and hematoma (Sobkin *et al.*, 2007; Nordestgaard *et al.*, 1995; Edwards *et al.*, 2015). Surgeons need to determine the course of the inferior epigastric artery. In addition, if the inferior epigastric artery passed behind the femoral vein, like in this case, it might be easily injured in femoral venipuncture. Moreover, for the

testicular function to be efficient, it is imperative to understand the testicular blood supply to avoid ligation of the artery in orchiopexy by intentionally or accidentally ligating (Ellis *et al.*, 2014). Thus, this uncharted artery found in this case that supplies blood to the testicles shouldn't be overlooked. Its injury may cause problems with the testicular arterial supply.

In this case, the obturator artery and the ipsilateral inferior epigastric artery both showed anatomical variations. The abnormal inferior epigastric artery crossed the superior ramus of the pubis, while the abnormal obturator artery was adherent to the superior pubic ramus. Although the two arteries were very close to each other, there was no anastomotic branch between them. Although these variations aren't as tricky as Corona Mortis (Darmanis *et al.*, 2007; Cardoso *et al.*, 2021), it is still important for surgeons to plan an anterior approach to the acetabulum before the actual surgery, such as the ilioinguinal or intrapelvic approaches (modified Stoppa), to avoid injuring these abnormal arteries near the superior pubic ramus (Darmanis *et al.*, 2007). Meanwhile, if a patient develops a fracture of the superior ramus of the pubis, there is also the possibility of injuring these abnormal arteries and causing massive bleeding.

In conclusion, we described a case that combines variational inferior epigastric artery and variational obturator artery and reported an uncharted artery that supplies blood to the testicles. These anatomical variations shown in one person were extremely rare and might cause the occurrence of serious iatrogenic injury. When dissecting the Bogros space and stapling the mesh onto Cooper's ligament, these abnormal arteries are at risk for injury. Therefore, surgeons should keep these variations in mind and take care of cases such as this one.

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RESUMEN: El conocimiento claro de las variaciones vasculares es fundamental en las cirugías, ya que pueden causar una hemorragia masiva durante los procedimientos quirúrgicos. Durante la disección educativa de un cadáver de sexo masculino, encontramos

una variación combinada de la arteria obturatriz izquierda y la arteria epigástrica inferior ipsilateral aberrante. La arteria obturatriz izquierda se originaba en la arteria ilíaca externa, luego discurrió hacia medial, adhiriéndose a la rama púbica superior. La arteria epigástrica inferior izquierda se originaba en la arteria femoral y discurría por detrás de la vena femoral. Estas variaciones anatómicas mostradas en una sola persona son extremadamente raras. Esto es importante de conocer estas variaciones cuando se realizan cirugías de las regiones pélvica e inguinal.

PALABRAS CLAVE: Arteria obturatriz; Arteria epigástrica inferior; Vena femoral; Región inguinal.

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