



# Variation in the origin of inferior vesical artery from a variant obturator artery

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## Abstract

The obturator artery and inferior vesical artery originate from the internal iliac artery. Variation in their origin may be asymptomatic in individuals and occasionally be detected during routine cadaveric dissections or autopsies. This case reports a variation in the origin of the obturator artery and inferior vesical artery. Here, not only did the obturator artery originate from the external iliac artery, but also gave rise to the inferior vesical branch.

Prior knowledge of the anatomical variations may be beneficial to the vascular surgeons ligating the internal iliac artery or its branches and the radiologists interpreting angiograms of the pelvic region. © *Int J Anat Var (IJAV)*. 2012; 5: 8–10.

**Key words** (obturator artery) (external iliac artery) (inferior epigastric artery) (internal iliac artery)

## Introduction

A severe and potentially lethal complication in pelvic injuries is arterial bleeding involving the branches of the internal iliac artery, namely, the lateral sacral, iliolumbar, obturator, vesical, and inferior gluteal arteries [1]. A sound knowledge of retroperitoneal pelvic vascular anatomy is essential for successful performance of endoscopic total extra peritoneal inguinal hernioplasty [2], as well as for laparoscopic herniorrhaphy. The ideal reconstruction of the floor of the inguinal canal during a herniorrhaphy involves good anatomic dissection and exposure [3], which can only be accomplished by entering the sub-inguinal space of Bogros. Surgeons must be aware of unexpected sources of hemorrhage, such as a variant obturator artery or vein, and unexpected iliopubic vessels and take appropriate precautions to avoid injury to these structures.

Usually, the internal iliac artery originates from the common iliac artery at the level of sacroiliac joint. The internal iliac artery descends posteriorly to the superior margin of the greater sciatic foramen, thereby dividing into anterior and posterior divisions. On each side, the anterior division gives rise to the superior vesical artery, obturator artery, middle rectal artery, inferior vesical artery (replaced by vaginal artery in females), uterine artery (in females), internal pudendal artery and the inferior gluteal artery. The posterior

division of the internal iliac artery is known to give rise to three main branches i.e., iliolumbar artery, lateral sacral artery and the superior gluteal artery [4].

## Case Report

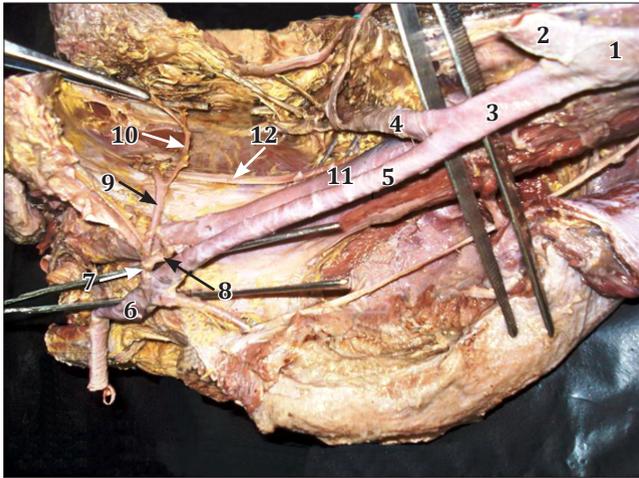
During routine classroom dissection of a middle aged male cadaver, a unilateral (left) variant obturator artery was found, originating from the external iliac artery, by a common stem shared with the inferior epigastric artery. This variant obturator artery further gave rise to an inferior vesical branch (Figures 1, 2, 3 and 4).

## Discussion

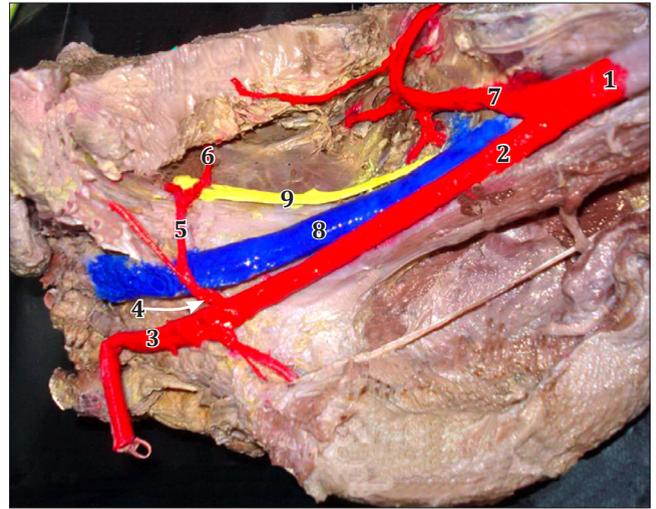
The most common origin of the obturator artery is, as a single branch from the anterior division of the internal iliac artery. However, the literature contains many articles that report variable origins.

*Origin of the obturator artery directly from the external iliac artery*

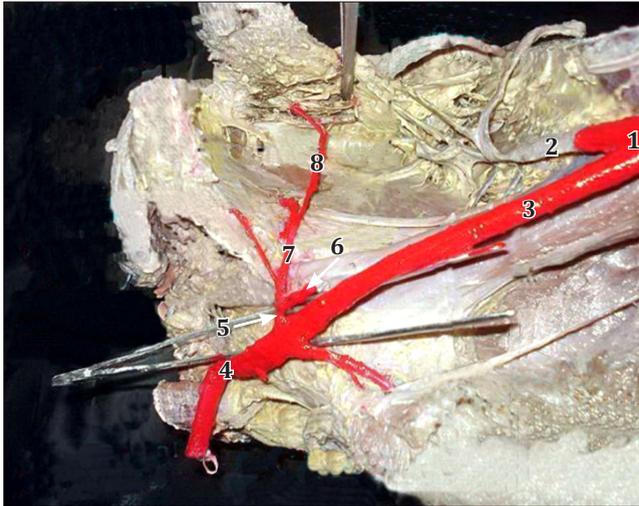
It was reported as 25% by Missankov et al. [5]. Pai MM et al. documented that in 19% [6]. Berberoglu et al. [7] placed this incidence at 7.1%, while Jakubowicz and Czerniawska-Grzesinska [8] reported it in 1.3% of the specimens.



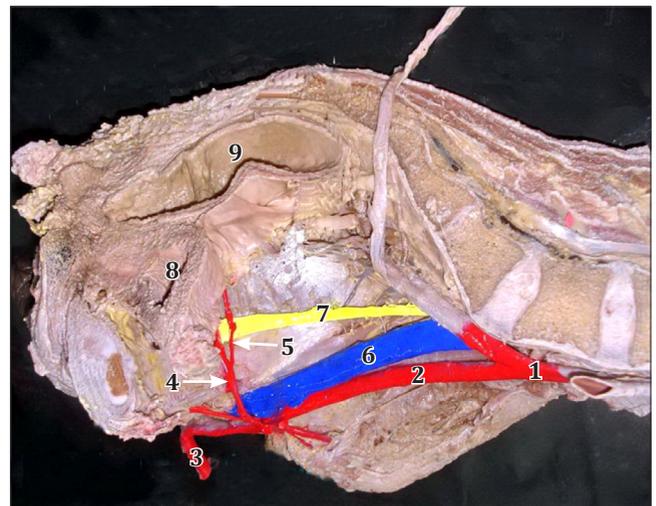
**Figure 1.** Figure shows left hemisection of pelvis along with some branches of internal and external iliac arteries, viewing the iliac surface of pelvis (hip bone). (1: abdominal aorta; 2: right common iliac artery; 3: left common iliac artery; 4: left internal iliac artery; 5: left external iliac artery; 6: left femoral artery; 7: common trunk for epigastric and obturator arteries; 8: inferior epigastric artery; 9: left obturator artery; 10: left inferior vesical artery; 11: left external iliac vein; 12: obturator nerve)



**Figure 3.** Figure shows left hemisection of pelvis along with some branches of internal and external iliac arteries, viewing through front. Arteries are colored in red, veins in blue and nerve in yellow. (1: left common iliac artery; 2: left external iliac artery; 3: left femoral artery; 4: common trunk for inferior epigastric and obturator arteries; 5: left obturator artery; 6: left inferior vesical artery; 7: left internal iliac artery; 8: left external iliac vein; 9: left obturator nerve)



**Figure 2.** Figure shows left hemisection of pelvis along with some branches of internal and external iliac arteries. Branches of external iliac artery are colored in red. (1: left common iliac artery; 2: left internal iliac artery; 3: left external iliac artery; 4: left femoral artery; 5: common trunk for inferior epigastric and obturator arteries; 6: left inferior epigastric artery; 7: left obturator artery; 8: left inferior vesical artery)



**Figure 4.** Figure shows left hemisection of pelvis along with some branches of internal and external iliac artery, viewing from medial wall. Arteries are colored in red, veins in blue and nerve in yellow. (1: left common iliac artery; 2: left external iliac artery; 3: left femoral artery; 4: left obturator artery; 5: left inferior vesical artery; 6: left external iliac vein; 7: left obturator nerve; 8: urinary bladder; 9: rectum)

*Obturator artery originating from inferior epigastric artery*

Missankov et al. [5] found that in 44% of the cases whereas Mahato [9] detected it in only 8%. While in the study performed by Berberoglu et al. [7] only 4% had such origin.

*Common origin of the inferior epigastric and obturator arteries*

Pai et al. [6] reported a high incidence of this variation, 47% in males and 26% in females; Jakubowicz and Czerniawska-Grzesinska [8] reported the occurrence in 2.6% of cases.

Mahato [9] reported it to be only 2%. Our case also reports this occurrence.

*Origin of the obturator artery from the posterior division of the internal iliac artery*

Jusoh [10] studied 34 lower limbs, two specimens (5.8%) showed this variation. This variant obturator artery gave off an inferior vesical branch innervating the prostate gland in both the specimens (5.8%).

Usually, the prostate is supplied by the inferior vesical arteries originating from the anterior division of the internal iliac artery [4]. Operating surgeons who wish to ligate the vessels, should keep in mind this case of the inferior vesical artery originating from the obturator artery as seen in this study,

The embryological explanations for the variations in the arterial patterns of the limbs are based on an unusual selection of channels from a primary capillary plexus, wherein the most appropriate channels enlarge while others retract and disappear, thereby establishing the final arterial pattern [11, 12]. Before the obturator artery appears as an independent blood vessel from the 'rete pelvicum', the blood flow destined for this territory makes an unusual choice of source channels. Instead of arising from the internal iliac artery as usually occurs, it arises from the inferior epigastric artery or directly from the external iliac artery [13].

In cases of ligation of the internal iliac arteries and their branches in women undergoing pelvic surgery, as well as in cases of obstruction of the internal iliac artery due to any cause, the obturator artery (if it arises from the external iliac artery) and its branches will be spared, especially the branch to the head of femur.

The "corona mortis" is an anatomical variant, an anastomosis between the obturator and the external iliac or inferior epigastric arteries or veins, located on the superior pubic ramus. It is significant because hemorrhage may occur if the corona mortis is accidentally cut and achievement of subsequent hemostasis is difficult. Orthopedic surgeons planning an anterior approach to the acetabulum (such as the ilio-inguinal or the intra-pelvic approach –modified Stoppa), must be cautious when dissecting near the superior pubic ramus [14].

General surgeons dealing with laparoscopic herniorrhaphy should be aware of the variant obturator artery that crosses the superior pubic ramus and is susceptible to injuries during dissection of the Bogros space and mesh stapling onto Cooper's ligament. Surgeons dealing with direct, indirect, femoral, or obturator hernias need to be aware of these variations and their close proximity to the femoral ring.

However, Darmanis et al. [14] also state that, despite the high prevalence of these large retropubic vessels in the operating room, surgeons should exercise caution but not alter their surgical approach for fear of excessive hemorrhage. Tracing along the variant vessel can easily identify the obturator foramen, which is an anatomic landmark that indicates an adequate inferior dissection of the pre-peritoneal space [2]. The need to map these vessels is becoming more crucial as surgeons choose various approaches to the space of Bogros and insert a synthetic mesh that requires anchoring during herniorrhaphies [3]. A variant obturator artery originating from the external iliac artery as seen in the present study, if borne in mind, would make the dissection simpler.

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