

Case Report

UNILATERAL VARIANT IN ORIGIN, POSITION AND COURSE OF PUBIC ARTERY ASSOCIATED WITH A VARIANT OBTURATOR ARTERY AND VEIN

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ABSTRACT

Increased frequencies on variations in the origin, course and branching of retropubic vessels has brought an increased attention to anatomists, surgeons and radiologists. Pubic arterial supply normally originates from branches of; obturator artery before it leaves the pelvic cavity at the obturator foramen, and inferior epigastric artery. Branches from these two vessels usually anastomoses to supply the pubis. We observed a unique variation of pubic artery presenting unilaterally during a routine dissection in an 85-years-old male cadaver. A single unilateral variant left pubic artery was seen arising from a variant left obturator artery that originated from external iliac artery in a common trunk with inferior epigastric artery. On its way to the pubic region it gave a branch that provides arterial supply to the rectus sheath. To date this is a rare entity, thereby important to pelvic surgeons and radiologists undertaking routine procedures involving the retropubic space (space of Bogros).

KEY WORDS: Left pubic artery, Obturator artery, Inferior epigastric artery, External iliac artery, Variations.

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INTRODUCTION

Normally, the obturator artery (OA) originates from anterior division of the internal iliac artery and inclines antero-inferiorly on the lateral pelvic wall and leaves the pelvic cavity through the obturator foramen [1]. Variations in the origin, course and branches of the obturator artery and vein are not uncommon and have

been reported previously due to severe and potentially lethal complication involving arterial bleeding in pelvic injuries or in routine procedures that require accomplishment by entering the space of Bogros [2, 3, 4]. OA is documented to branch directly from common or external iliac arteries, anterior or posterior divisions of internal iliac artery, or inferior/

superior gluteal artery, or internal pudendal artery, or inferior epigastric artery, or common trunk with inferior epigastric artery [5, 6, 7].

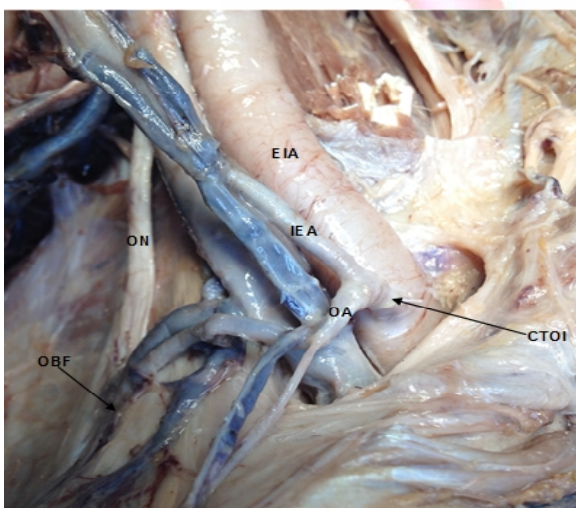
Pubic arterial supply normally has two origins; a branch from OA just prior to its passage through the obturator foramen and passes superiorly on the posterior aspect of the pubis to anastomose with a contralateral partner; and a pubic branch from inferior epigastric artery [1] medially to the deep inguinal ring that runs medial to the femoral ring onto posterior pubis. The two branches more often anastomose to supply the pubic region.

However, in the present case the clinical implications of a variant origin of a single unilateral OA arising from the common trunk with inferior epigastric artery, and a single left pubic artery originating from the variant OA observed during the routine dissection class of the undergraduate medical students are being discussed.

CASE REPORT

Pelvis was dissected in the pelvic and retro pubic inguinal region displaying the vascular supply during routine dissection classes of undergraduate medical students at Iwate Medical University, single left pubic artery associated with a variant left OA was observed in 85-years-old male cadaver.

Fig. 1: Photograph from 85-years-old embalmed male cadaver showing vascular supply of the left side of the pelvis.



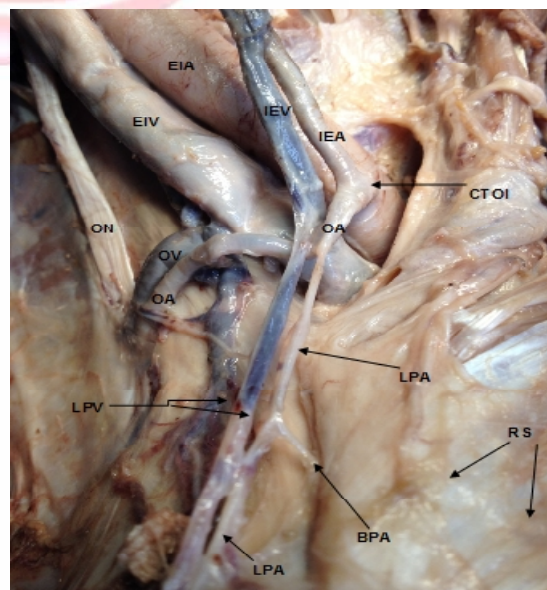
Note the left obturator artery (OA) originated from the common trunk (CTOT) with the inferior epigastric artery (IEA). The CTOT arises from the external iliac artery (EIA). ON: obturator nerve, OBF: obturator foramen.

Obturator-inferioepigastric trunk: Obturator-inferioepigastric arterial trunk was observed originating from the left external iliac artery 1cm from the inguinal ligament. It ascends cranial medially and measured 1.8cm long before giving off two equal branches; left obturator artery and left inferior epigastric artery (**Figure 1**).

Left Obturator artery and left pubic artery: The left obturator artery originated from the left external iliac artery as a branch from Obturator-inferior epigastric trunk and descends inferomedially to the upper part of the obturator foramen together with the obturator vein that drains into the external iliac vein. On its way the OA gave off a pubic branch; 1.5 cm from bifurcation with inferior epigastric artery, and 5.5 cm from its entrance into the upper part of the obturator foramen (**Figure 1**). The pubic artery (PA) measured 1.5 mm in calibre descends the pubis and gave a branch to supply inferior parts of the rectus sheath and the pyramidalis muscle (**Figure 2**) before it anastomoses with the opposite vessel.

Other observations: The venous drainage was observed to follows the same pattern taken by

Fig. 2: Photograph displaying the left side of a pelvis showing the origin.



left pubic artery (LPA) from the variant obturator artery (OA). The PA gave a branch (BPA) that supplies the inferior aspect of the rectus sheath (RS) and pyramidalis muscle (not shown). LPV: pubic veins, OV: obturator vein, ON: obturator nerve, CTOT: common trunk for OA and inferior epigastric artery, EIA: external iliac artery, EIV: external iliac vein, IEA: inferior epigastric artery, IEV: inferior epigastric vein.

the counter arteries. No variations were observed from the right side.

DISCUSSION

Variations involving origin and course of the blood supply to the pelvic region and the lower limbs are not uncommon and have been linked with their embryologic derivation from the unusual selection of vascular channels, and have long received the attention of both anatomists and surgeons dealing with retropubic region.

Although the anterior division of the internal iliac artery is the most common source of origin of obturator artery, the literature contains many reports on variations on its origin [6, 8, 9]. *Corona mortis* is a terminology, which indicates the presence of both the normal and variant obturator artery and venous communication [10] on the same side of the pelvis. On the contrary, in the present case a single variant obturator artery originates from the external iliac artery in a common trunk with inferior epigastric artery was observed, thus it was not a *corona mortis*.

Existence of a common trunk of the obturator and inferior epigastric arteries has been previously documented [6,8,11], however, in all the reports did not observe a pubic branch coming from a variant obturator artery at the level 1cm from the common trunk or just above the external iliac vein.

The pubic branch of obturator artery is commonly given off just before the obturator artery leaves the pelvic cavity through the obturator foramen, and ascends the pubis and anastomoses with the opposite vessel and pubic branch of inferior epigastric artery [1]. In contrary, in the present case a single left pubic artery originated individually from a variant left obturator artery just after it was bifurcated from the common trunk with inferior epigastric artery and descends to the pubis. There was no pubic branch from the inferior epigastric artery. Concurrent presence of a branch arising from the variant pubic artery that supply the inferior aspect of the rectus sheath and pyramidalis muscle is a rare entity and to our knowledge not yet documented. Thus, a thorough understanding on variations in pelvic vessels is essential for surgeons during pelvic surgeries and also to radiologists since it would result in

erroneous interpretation of angiograms following ligation.

In case of pelvic fractures, this variant pubic branch or its branch to rectus sheath could be the source for massive extraperitoneal haemorrhage. Thus, surgeons and endovascular specialists managing pelvic injury, direct or indirect femoral or obturator hernias [12] should keep in mind as a potential source of prolonged and could be precarious haemorrhage.

It has been stated that, despite high prevalence of large retropubic vessels in the operating room, surgeons should exercise caution but not alter their surgical approach for fear of excessive haemorrhage [13]. However, due to these frequently observed variations on the retropubic vessels, it is significant for surgeons to be more cautious in approaches involving the pubic ramus or the space of Bogros because massive hemorrhages may occur following accidental cut of these variant branches from high pressure vessels.

Embryological note: Variations in the vascular supply for the pelvic and lower limb are not uncommon and maybe due to: the choice of unusual paths in the primitive vascular plexuses; the persistence of vessels normally obliterated; the disappearance of vessels normally retained; incomplete development; or additional and replacing a vessel [8, 14].

Inferior epigastric artery arises as a result of longitudinal ventral anastomoses between the tips of the ventral rami of the dorsal intersegmental arteries in the lower lumbar body wall. It then anastomoses with the external iliac artery [14]. It has been reported that, OA arise late in the development [15]. In correspondence to the present case, the OA could be developed as an additional vessel that persisted and enlarged from the inferior epigastric artery before it joined the external iliac artery, as it was previously explained that definitive vessels are largely additional or replacing vessels. Thereafter, this OA gave a branch that persisted as a definitive PA before it descends towards the obturator foramen.

Another possibility is that, the vascular channels destined for the OA from the anterior division of the internal iliac artery have disappeared;

hence compensation was obtained from the unusual channel that persisted from external iliac artery that normally obliterated. It enlarges and thereby establishing the final definitive OA.

CONCLUSION

Even though variations involving the origin, course and branches of the OA have been described, the presence of a single unilateral variant OA originating from external iliac artery in a common trunk with inferior epigastric artery thereby giving rise to a single unilateral pubic artery supplying the pubis and rectus sheath is a rare entity. Awareness of such anatomical variations is of clinical important for surgeons and radiologists undertaking routine procedures involving the retropubic space.

List of abbreviations

OA –Obturator artery

PA –Pubic artery

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Conflicts of Interests: None

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