



Anomalous Obturator Arteries with Multiple Pelvic Branches: A Urogynecological Approach

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Program Number: 779.1

Introduction

The knowledge of vascular distribution within the pelvis of the obturator artery is crucial during embolization and revascularization procedures. Therefore, the common frequency of anatomical variations turns the attention toward surgeons, anatomists, and radiologists [1].

The obturator artery (OA) is known to often present multiple anatomical variations. These can be due to atypical origin, variable anastomosis, or abnormal course within the pelvis [2].

The embryological basis for abnormalities in arterial patterns of the lower limbs is thought to be based on unusual selection of channels from a primary capillary plexus [3]. This study aimed to report a rare arterial variation in a Puerto Rican female cadaver that showed two abnormal obturator arteries with multiple pelvic branches. Clinical significance lies in the fact that several gynecological and urological procedures carry the risk of pelvic vascular injury. Currently, there have been no extensive reports of obturator vasculature variants in the elderly female population and their correlation to gynecologic procedures.

Case Report

An anatomical variation was found in an elderly adult female cadaver with proliferous pelvic branching in its course prior to exiting the pelvic cavity through the obturator foramen (**Fig. 1**).

Examination of the right hemipelvis showed an external (EIA) and internal iliac artery (IIA) following their respective course. After coursing over the pelvic brim, the IIA divided into an anterior and posterior division (**Fig. 2**), with the anterior branch giving off the UA obliterated to the median umbilical ligament (MUL) and superior vesical arteries (SVA), OA, MRA, IGA, IPA, and the visceral VA and UA (not visualized in figures).

Halfway in its course through the pelvic lateral wall the OA gave off two abnormal lateral branches AOAI and AOAII (**Fig. 2**). First, AOAI subdivided into three smaller branches 1 to 3, then AOAII subdivided into two smaller branches, 4 and 5 (**Fig. 2**). No vascular anomalies were observed on left OA or any other IIA branches.

Methods



Acknowledgments

The authors of this case report would like to recognize the Anatomy and Cell Biology Department (UCC – SoM) for providing the funding and materials for this project. Lastly, we are thankful for the body donors who have gifted their bodies to medical science.

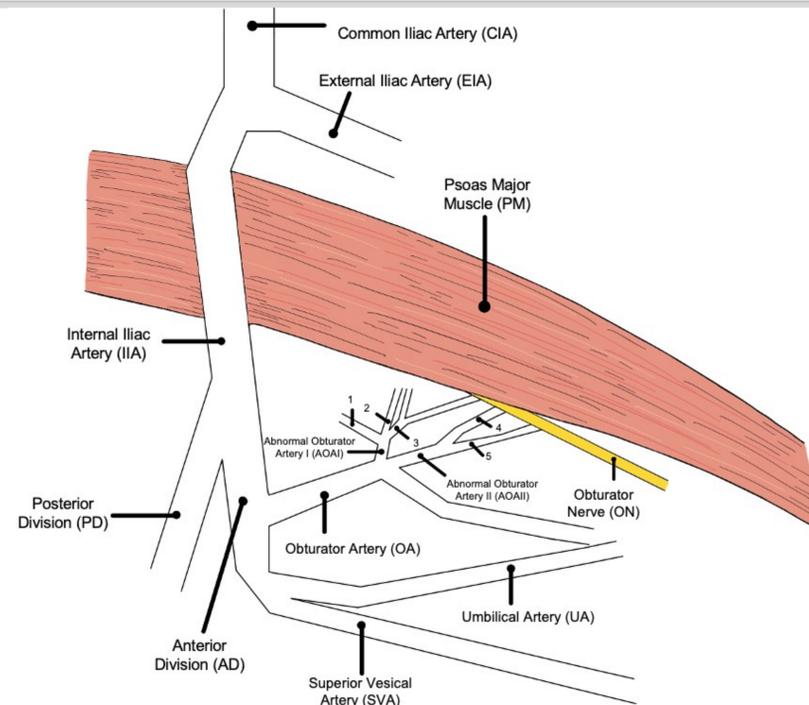


Figure 1. Illustration showing the findings in the pelvic region presented in the case report. An anatomical variation was found with multiple pelvic branching in its course before leaving the pelvic cavity through the obturator foramen. The atypical obturator artery provided two anatomically variant branches: abnormal obturator artery I (AOAI) gave rise to three branches, while abnormal obturator artery II (AOAII) gave rise to two branches.

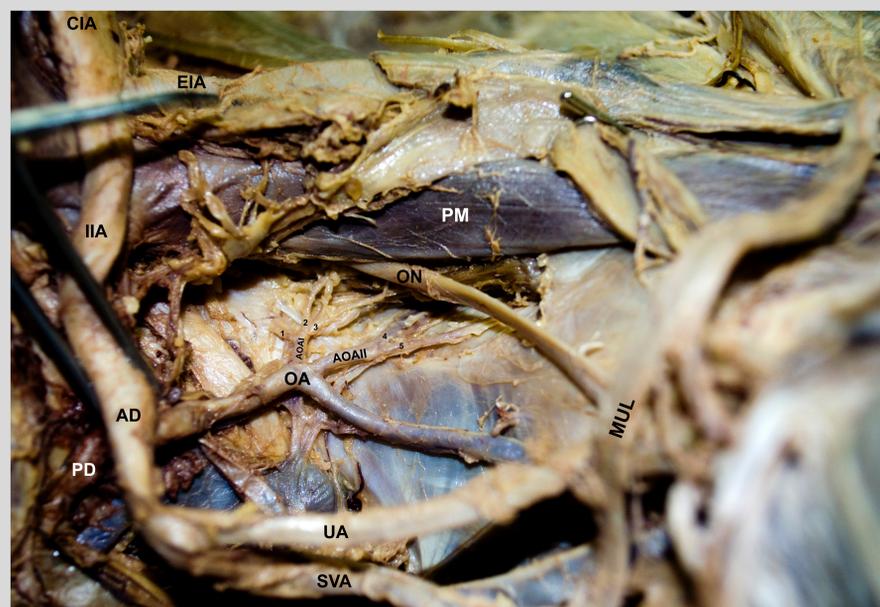


Figure 2. Variation of branching found in the pelvic region. The common iliac artery (CIA) divides into the external iliac artery (EIA) and internal iliac artery (IIA). The IIA divides into the anterior division (AD) and posterior division (PD). The AD gives rise to the obturator artery (OA) which provides the atypical obturator arteries (AOAI and AOAI). The AOAI gives rise to AOAI – 1, 2, 3, and AOAI – 4, 5. In addition, we observe the obturator nerve (ON); umbilical artery (UA); medial umbilical ligament (MUL); superior vesical artery (SVA); psoas major muscle (PM).

Discussion

Among the OA variations, its atypical origins have been extensively described and correlated to hemorrhagic risks in the pelvic surgical field. A meta-analysis by Sañudo et al. reporting the incidence of variations in OA origin showed that it can arise from the anterior trunk or posterior trunk of the IIA, inferior epigastric artery, external iliac artery, or very rarely the femoral artery [4]. Previous reports have established the incidence of these anatomical variations to range between 30% to 69%. Similarly, an anastomosis between the OA and the EIA or the inferior epigastric artery (IEA), called “corona mortis”, has been largely reported due to the possible complications encountered during general, orthopedic, or gynecologic surgeries. The incidence of this anastomotic vessel in multiple reports was inconsistent and ranged from 10 - 43% [5].

Embryologically, these anomalies can be hypothesized to be due to an unusual selection of channels from a primary capillary plexus that establishes the final arterial pattern [3]. Variations in branching pattern have also been proposed to result from abnormal angiogenesis [6]. These inadequate IIA system vessels may have underlying vascular pathologies associated with aging.

The reported anatomically variant branches could be at risk of injury during gynecological oncology procedures including lymphadenectomy in the obturator and external iliac region. While urogynecology applications include stress incontinence procedures. These can also be at risk during other surgical procedures like vaginal wall descent, uterovaginal prolapse and neovaginal reconstruction.

Conclusion

Advancing age and predisposing vascular pathologies may lead to the development of collateral vessels contributing to the OA findings in the population. Understanding of variants such as the herein reported and their clinical implications for pelvic floor surgeries is crucial to advance medical knowledge and subsequently the prevention of adverse surgical outcomes in gynecological interventions.

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