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Original Research Article

BILATERAL VARIATION IN THE ORIGIN OF OBTURATOR ARTERY, ITS DIMENSIONS, PHYLOGENY AND CLINICAL SIGNIFICANCE: A CADAVERIC STUDY AND REVIEW

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ABSTRACT

Introduction: Obturator artery usually arises from anterior division of internal iliac artery. Variations in its origin and course can lead to unnecessary exploratory surgery and complications during laparoscopic herniorrhaphy procedures.

Aim: The aim of the present study is to observe the variations in the origin and course of Obturator artery.

Material and methods: Forty (40) adult human pelvic halves of known sexes were studied to note down the variations in the origin, course and dimensions of Obturator artery.

Results: In 39 (97.5%) of the specimens Obturator artery was found to be arising normally from the anterior division of internal iliac artery, were as in one (2.5%) of the specimen it was found to be arising bilaterally from the posterior division of internal iliac artery.

Conclusions: A good knowledge about the normal anatomy and the variation in the origin and dimensions of the Obturator artery is essential as it reduces the surgical complications during pelvic surgeries.

KEY WORDS: Obturator artery, variations, posterior division of internal iliac artery, clinical significance.

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INTRODUCTION

Normally, the internal iliac originates from common iliac artery at the level of sacroiliac joint. The internal iliac artery descends and later divides into anterior and posterior divisions. On each side, the anterior division gives superior vesical artery, inferior vesical artery, middle rectal artery, vaginal artery, Obturator artery, internal pudendal artery & inferior gluteal artery branches. The posterior division of internal iliac artery gives three branches i.e. iliolumbar artery, lateral sacral artery and the superior gluteal artery [1-3]. Usually, Obturator artery arises from the anterior division of internal iliac artery [4]. Previous studies have shown that the Obturator artery to be arising from all the neighbouring arteries which includes common iliac artery or any of the branches of internal iliac arteries [5,6]. According to the past literature, Obturator artery has been shown to

be arising from the posterior division of internal iliac artery in 10% of the cases [7].

Hence, a good amount of knowledge of pelvic vascular anatomy plays a very important role in reducing the surgical complications during endoscopic & laparoscopic surgical procedures [8-10]. In the present study, the clinical implications of abnormal origin of Obturator artery from the posterior division of internal iliac artery are being studied.

MATERIALS AND METHODS

The present study was conducted on forty (40) adult human pelvic halves of embalmed cadavers of known sex in the department of anatomy. The branches of internal and external iliac arteries were dissected in the pelvic region. The Obturator artery was identified and traced from its origin to its exit at the Obturator canal. Photographs were taken to document the variations.

RESULTS

In the present study all the specimens showed the division of common iliac artery into external and internal iliac arteries (Table-1).

Table 1: Distance between the bifurcation of common iliac artery and the division of internal iliac artery into anterior and posterior divisions.

Features	Right side	Left side
Distance between the bifurcation of common iliac artery and the division of internal iliac artery into anterior and posterior divisions	3-5cm	3-5cm

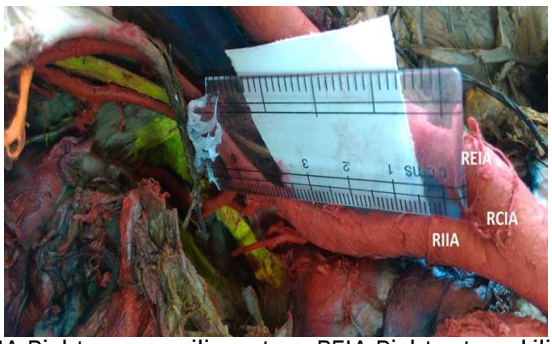
Out of the forty (40) specimens dissected, only one (2.5%) specimen showed the bilateral anomalous origin of Obturator artery from the posterior division of internal iliac artery (tab-2)

Table 2: Distance between the origin of Obturator artery and the point of bifurcation of internal iliac artery into anterior and posterior divisions

Features	Right side	Left side
Distance between the origin of Obturator artery and the point of bifurcation of internal iliac artery into anterior and posterior divisions	12mm	25mm
Length of Obturator artery from the point of origin till it entered the Obturator canal	70mm	50mm

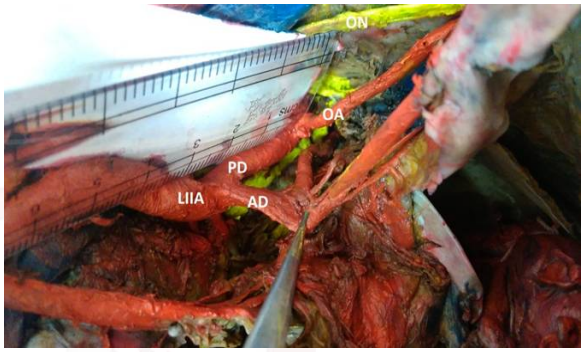
No other associated anomalies related to the Obturator artery were noted.

Fig.1: Right side: Dimension of RIIA.



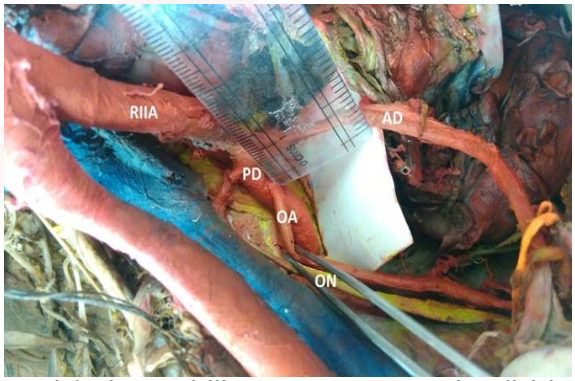
RCIA-Right common iliac artery; REIA-Right external iliac artery, RIIA-Right internal iliac artery

Fig.2: Left side: Dimension of LIIA.



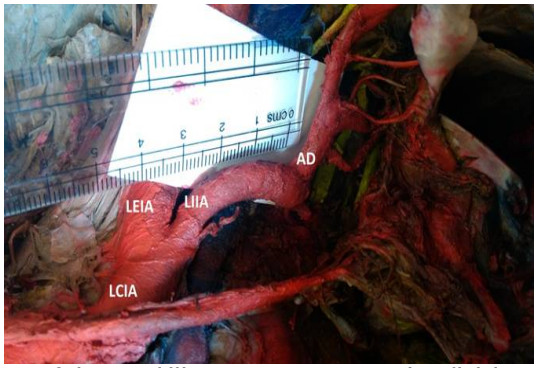
LCIA-Left common iliac artery; LEIA-Left external iliac artery; LIIA-Left internal iliac artery

Fig.3: Right side: Point of origin of Obturator artery from PD of RIIA.



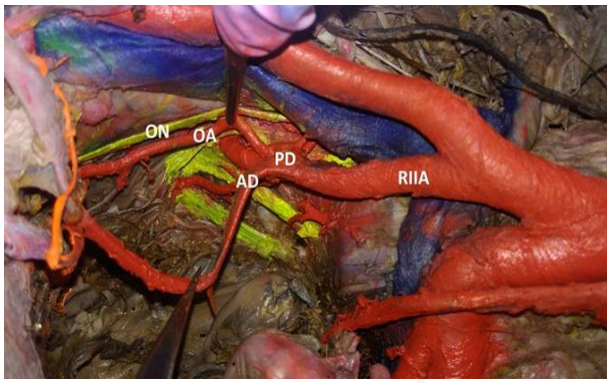
RIIA-Right internal iliac artery; AD-Anterior division; PD-Posterior division; OA-Obturator artery; ON-Obturator nerve

Fig. 4: Left side: Point of origin of Obturator artery from PD of LIIA.



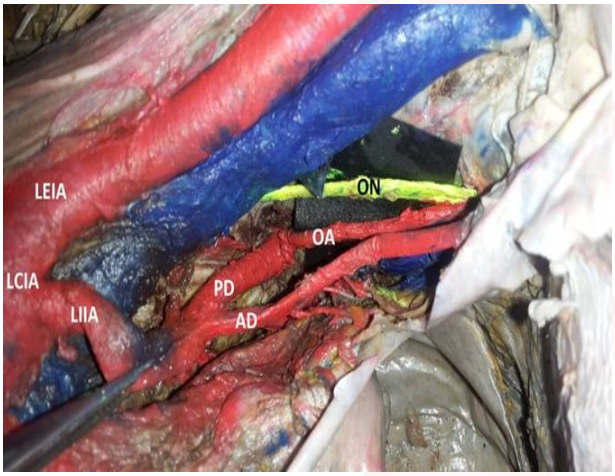
LIIA- Left internal iliac artery; AD- Anterior division; PD- Posterior division; OA- Obturator artery

Fig. 5: Right side: Relations of OA with the ON.



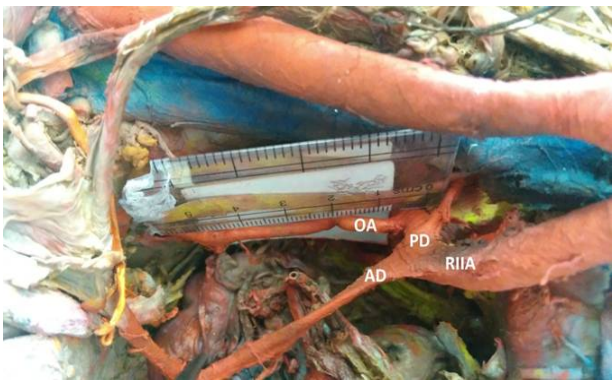
RIIA-Right internal iliac artery; AD-Anterior division; PD-Posterior division; OA-Obturator artery; ON-Obturator nerve

Fig.7: Left side: Relations of OA with ON.



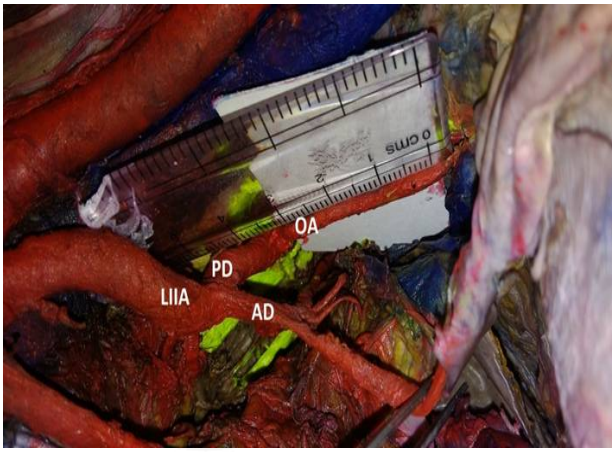
LCIA- Left common iliac artery; LEIA- Left external iliac artery; LIIA- Left internal iliac artery; AD- Anterior division; PD- Posterior division; OA- Obturator artery; ON- Obturator nerve

Fig. 6: Right side: Dimension of OA.



RIIA-Right internal iliac artery; AD-Anterior division; PD-Posterior division; OA-Obturator artery

Fig.8: Left side: Dimension of OA.



LIIA- Left internal iliac artery; AD- Anterior division; PD- Posterior division; OA- Obturator artery

DISCUSSION

Normally, the Obturator artery arises from the anterior division of internal iliac artery, it courses along with the Obturator nerve and vein as its relations [11-14]. As per the previous literature, it has been shown that the inferior epigastric and Obturator arteries as having common origin in 20-30% of the cases [6]. In 41% of the cases the Obturator artery has been shown to be arising from anterior division of internal iliac artery and in 20% of the cases Obturator artery was noted to be arising separately from inferior epigastric artery [15]. It has also been reported that the Obturator artery to be arising from external iliac artery [16-18]. In 10% of the cases the Obturator artery was shown to be arising separately from the superior gluteal artery as well as from the posterior division of internal iliac artery [19, 6]. As it is evident in the present study only one specimen (2.5%) showed bilateral anomalous origin of Obturator artery to be arising from posterior division of internal iliac artery.

Embryologically, the anomalous origin of Obturator artery from the posterior division can be explained by certain factors. As per previous research, the arterial pattern of limbs are based on unusual selection of channels from the capillary plexus, among the above only the appropriate channels enlarge and rest of them disappear and hence establishing the final arterial pattern [20]. Comparatively, Obturator artery arises late in development, which is joined by axial artery of the lower limb that accompanies the sciatic nerve [21]. The origin of Obturator artery from the posterior division of internal iliac artery is due to the persistence of vascular channels in relation to the posterior division that might have given rise to Obturator artery, while the vascular channels related to

the anterior division of internal iliac artery destined for the formation of Obturator artery might have disappeared [22].

Hence, ligation of internal iliac artery and its branches in women who undergo pelvic surgeries has shown the development of functional collateral channels in angiograms [23]. Previous studies have shown that ligation of internal iliac artery was used to control the haemorrhage during pelvic surgeries [24]. Simultaneously, studies have also shown that efficacy of ligation of internal iliac artery in pelvic surgeries ranged from 40-75% only [25, 26]. Hence, the most ideal point of ligation of internal iliac artery would be distal to its posterior division, since proximal ligation has been associated with buttock claudication and necrosis [27].

As in the present study, bilateral anomalous origin of Obturator artery from the posterior division of internal iliac artery would make the case more complicated, at the same time would also result in erroneous interpretation of angiograms post-operatively.

Conflicts of Interests: None

REFERENCES

[1]. Williams PL, Bannister LH, Berry MM, Collins, Dyson M, Dussek JE, Ferguson MWJ, Gray's Anatomy. The anatomical basis of medicine and surgery.38th Ed. Churchill Livingstone, Edinburgh, 1995;1560.

[2]. Snell's RS. Clinical anatomy for students.6th Ed. Lippincot, Williams and Wilkins, Philadelphia, 2000;292-293.

[3]. Sinnatamby CS, Last's anatomy. Regional and applied.10th Ed. Churchill Livingstone, Edinburgh, 2000;291.

[4]. Hollinshead HW. Blood vessels in the pelvis in anatomy for surgeons. Hoeber-Harper II, 1958;681-686.

[5]. Arey LB. the development of peripheral blood vessels. Orbison JL, Smith DE. The peripheral blood vessels. Williams and Wilkins, Baltimore, 1963;1-16.

[6]. Bergman RA, Thompson SA, Afifi AK and Saadeh FA. Compendium of human anatomic variation: catlog, atlas and world literature. Urban and schwazenberg, Baltimore and Munich, 1988; 40-41.

[7]. Kumar D, Rath G. Anomalous origin of Obturator artery from the internal iliac artery. Int J morphol. 2007;25(3):639-641.

[8]. Prabhu LV, Pillay M and Kumar A. Observation on the variations in origin of the principal branches of internal iliac artery. Anat Karnataka.2001; 1: 1-10.

[9]. Chandler FA, Seidler F. Intrapelvic Extraperitoneal resection of the Obturator nerve. Surg. Gyn.obs.1939;100-102.

[10]. Lau H, Lee F. A prospective endoscopic study of Retropubic vascular anatomy in 121 patients under going endoscopic Extraperitoneal inguinal hernioplasty. Surg Endosc.2003;17:1376-1379.

[11].Standring s. Cardiovascular system in Gray's anatomy, Edinburg, London, 2005; 1316.

[12]. Sinnatamby CS. Last's anatomy regional and applied. Edinburgh, London, Newyork, Oxford, Philadelphia, Toronto, 2006;320.

[13]. Anson BJ. The cardiovascular system in Morris human anatomy. A complete systematic treatise. The Blakiston division McGraw Hill book company, Newyork, Sydney, London, 1966;752-766.

[14]. Sarikeioglu L, Sindel M. Multiple vessel variations in the Retropubic region. Folia morphol(warsz). 2002;61(1):43-45.

[15]. Braithwaite JL. Variations in origin of peripheral branches of internal iliac artery. J Anat. 1952;86(4):423-430.

[16]. Iwasaki Y, Shoumura S, Ishizaki N, Emura S, Yamahira T, Ito M, Irono H. The anatomical study on the branches of internal iliac artery-comparisiosn of the findings with Adachi's classification. 1987;62(6):640-645.

[17]. Pick JW, Anson B, Ashley FL. The origin of Obturator artery, a study of 640 body halves. Am J Anat. 1942;70:317-343.

[18]. Roberts WH, Krishinger GL. Comparitive study of human internal iliac artery based on Adachi's classification. Anat Rec. 1967;158(2):191-196.

[19]. Maneesha sharma, Tripta sharma, Richhpal singh, Antarpreet kaur. Variation of Obturator artery in man. Anat physiol. 2012;2(3):1-4.

[20]. Fitzerald MJT. Human embryology, New york, Harper international, 1978:38-56.

[21].Sanduno JR, Roig M, Rodriguez A, Ferreira B, Domenech JM. Rare origin of Obturator artery, inferior epigastric and femoral arteries from a common trunk. J. Anat. 1993;183: 161-163.

[22]. Dinesh kumar and Gayatri rath. Anomalous origin of Obturator artery from the internal iliac artery. Intl.J.Morphol.2007;25:939-41.

[23].Bleich AT, Rahn DD, Wieslander CK, Wai CY, Roshanravan SM, Corton MM. Posterior division of the internal iliac artery:Anatomic variations and clinical applications.Am J Obstet Gynecol. 2007;197(6): 658.e1-5.

[24]. Kelly HA. Ligaation of both internal iliac artery for hemorrhage in hysterectomy for carcinoma uteri. Bull Hopkins Hosp, 1894;53-54.

[25]. Das Bn, Biswas AK. Ligation of internal iliac arterires in pelvic hemorrhage. J Obstet Gynaecol Res. 1998; 24(4):251-254.

[26]. Papp Z, Toth-pal, Papp C, Sziller T, Gavai M, Silhavy M, Hupuczi P. Hypogastric artery ligation for intractable pelvic hemorrhage. Intl J Gynaecol Obstet. 2006; 92(1):27-31.

[27]. Ilipoulos JI, Howanitz PE, Pierce GE, Kueshkerian SM, Thomas JH, Hermreck AS. The critical hypogastric circulation. AM J Surg. 1987;154(6):671-675.

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