

A CADAVERIC STUDY OF VARIABILITY IN THE ORIGIN OF OBTURATOR ARTERY

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ABSTRACT

Background: The origin of obturator artery (OA) is important clinically because of its vascular role. The OA is one of the branches of the anterior division of the internal iliac artery. The source of OA has been documented from all possible neighboring arteries. So the course and ramification of the OA have received attention for gynecologists and surgeons.

Materials and Methods: Study was conducted on 30 bisected pelvises specimens in Department of Anatomy, Gulbarga Institute of medical sciences, Gulbarga The pattern of origin of the obturator artery was identified. The obturator artery was traced from its origin to it extends till the obturator foramen.

Results: In 80% (24 sides) the origin of obturator artery was from the internal iliac artery. In 76.7% (23 specimens), the obturator artery was originated from anterior division of internal iliac artery. Out of these, 46.7% (14 specimens), the obturator artery arises as a single and direct branch of the anterior division of the internal iliac artery while variation in its origin as a common trunk was observed in 30% (9 specimens). In 20% (6 sides), it arises from the external iliac artery i.e. from an inferior epigastric artery.

Conclusion: Anomalous origin of OA may injure during surgical repair of hernia and fracture of superior ramus of pubis. The sound knowledge on anatomical variations of OA is very important to the general and vascular surgeons for successful outcome of the above mentioned surgical procedures and will help them to avoid unnecessary complication.

KEY WORDS: Internal iliac artery, Anterior Division, Pelvic vessels, Inferior epigastric artery.

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INTRODUCTION

The retro pubic space is the most common targeted area for gynecologists and surgeons during intra-abdominal therapeutics procedures to avoid hemorrhagic complication. The origin of obturator artery (OA) is important clinically because of its vascular role. The OA is one of

the branches of the anterior division of the internal iliac artery. It passes downwards on the lateral pelvic wall to reach and passes through the obturator foramen. It is the chief artery which supplies hip joint and muscles of adductor compartment as well as it gives branches to urinary bladder and twigs to ilium and pubis

within pelvis [1].

The vascular variations of origin of OA have been well acknowledged in the literature. The source of OA has been documented from all possible neighboring arteries i.e. common iliac, external iliac or from any branch of the internal iliac in both sexes. So the course and ramification of the OA especially in the pelvis and retro pubic space have received attention for gynecologists and surgeons because the anomalous origin of OA and its variation are the main etiology of bleeding [2].

MATERIALS AND METHODS

Thirty formalin-fixed specimens were selected irrespective of side and sex from 50 human cadaveric bisected pelvises during the routine dissection in the Department of Anatomy, Gulbarga Institute of medical sciences, Gulbarga. The dissected method was employed for the study in each half of the pelvis. After the locating the common iliac artery, the branches of the internal and external iliac artery were dissected. The pattern of origin of the obturator artery was identified. The obturator artery was traced from its origin to it extends till the obturator foramen.

Statistical analysis: The data was entered and analyzed in Microsoft office excel 2007. The generated data was summarized as percentages.

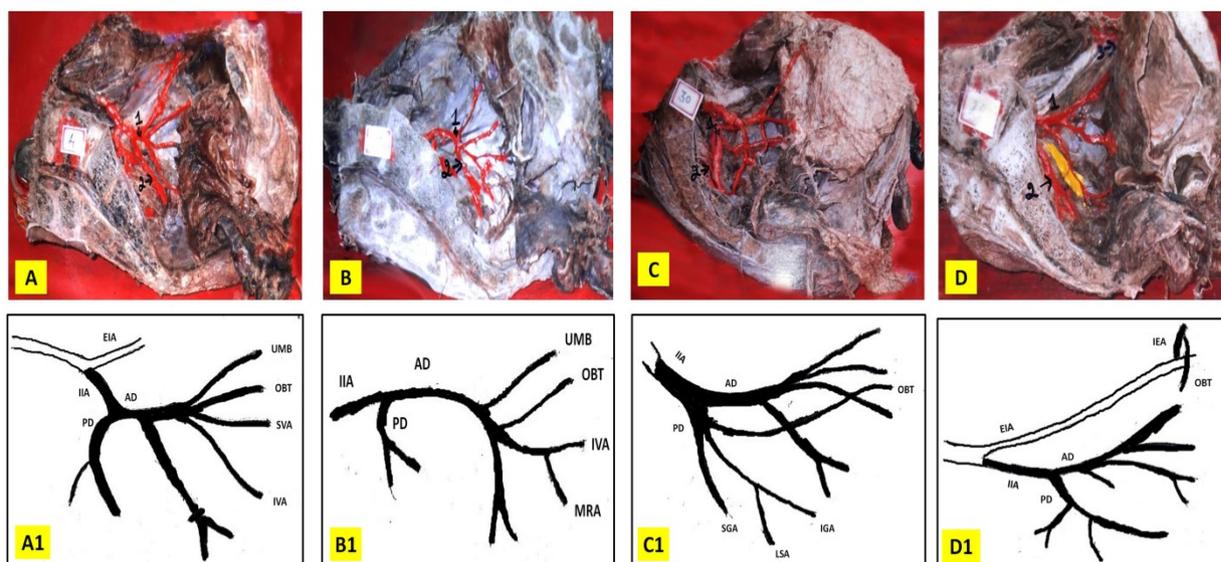
RESULTS

An observation concerning the different sources of origin of obturator artery was shown in tab.1. Out of 30 formalin fixed bisected pelvic specimens studied, 53.3% (16 specimens) were found variation in the origin of obturator artery either from an internal iliac artery or from the external iliac artery. In 80% (24 sides) the origin of obturator artery was from the internal iliac artery whereas, in 20% (6 sides), it arises from the external iliac artery.

In 76.7% (23 specimens), the obturator artery was originated from anterior division of internal iliac artery. In the majority of these 46.7% (14 specimens), the obturator artery arises as a single and direct branch of the anterior division of the internal iliac artery while variation in its origin as a common trunk was observed in 30% (9 specimens).

In 3.3% (one specimen), obturator artery had its origin from the posterior division of the internal iliac artery as a common trunk with superior and inferior gluteal artery. The assessment of gender and laterality of variations in the origin of obturator artery was not considered as the study was conducted on bisected pelvises available in the Department of Anatomy. In the present study, we observed that the first most common

Fig. 1: Dissection images and Schematic representation of variability of OA origin.



A) & B) shows the origin of OA other than the anterior division proper, C) Shows the origin of OA from Posterior Division of IIA, D) shows the origin of OA from IEA. IIA- Internal iliac artery, EIA- External iliac artery, AD- Anterior Division, PD- Posterior Division, UMB-Umbilical artery, OBT- Obturator artery, SVA- Superior vesical artery, IVA- Inferior Vesical artery, MRA= Middle rectal artery, IEA- Inferior Epigastric artery

Table 1: Shows the incidence of different sources of origin of obturator artery.

Artery	Origin	Incidence N (%)	
Internal Iliac artery	Anterior division proper	14 (46.7)	
	Common trunk with superior vesical artery & Umbilical artery	01 (3.3)	
	Common trunk with inferior vesical artery	01 (3.3)	
	Common trunk with superior vesical, inferior vesical & umbilical artery	02 (6.7)	
	Common trunk with uterine, internal pudendal & inferior gluteal artery	02 (6.7)	
	Common trunk with internal pudendal artery & inferior gluteal artery	03 (10)	
	Posterior Division	Common trunk with superior and inferior gluteal artery	01 (3.3)
External Iliac artery		Inferior epigastric artery	06 (20)

Table 2: Comparison of present study findings with the previous studies.

Origin		Authors (%)					Present study
		Tirupathi Rao et al. [4]	Sakthivel [5]	Braithwaite [6]	Pai [7]	Kumari S [8]	
Internal Iliac artery	Anterior Division proper	35.5	36.67	41.4	60	66	46.7
	Other than Anterior Division Proper	22.43	0	18.5	0	3.3	30
	Posterior Division	6.66	30	13.5	8	16.6	3.3
External Iliac Artery	Inferior Epigastric artery	26.66	25	19.5	14	3.3	20

origin of Obturator artery (OA) was from the anterior division of internal iliac artery (IIA) followed by the inferior epigastric artery (IEA).The variability of origin of obturator artery is summarized in Table 2. Dissection images and Schematic representation of variability of OA origin is depicted in the Figure 1.

DISCUSSION

The exposure to the lower abdominal region is important during various operative, diagnostic and intra-abdominal therapeutics procedures. The most common source of origin of obturator artery is a single branch arising from the anterior division of the internal iliac artery. However, variability in the origin of obturator artery had been documented from all possible neighboring arteries i.e. common iliac, external iliac or

from any branch of the internal iliac in either sex [3]. The course and ramification of such variant vessels create an eye opener for the gynecologists and surgeons during intra-abdominal therapeutics procedures.

The incidence of obturator artery (OA) arising from the anterior division of internal iliac artery (IIA) in the literature varies from 35% to 66% [4-8]. The present study findings and the Previous studies findings on the variability of origin of obturator artery are summarized in Table 2.

In the present study, the incidence of obturator artery arising from the anterior division of internal iliac artery was found in 46.7% of specimens. Our finding was similar and close to Braithwaite et al who also reported in 41.4% of cases. [6]. But Kumari S et al had reported the highest

incidence in 66% of specimens [8]. Another study conducted by Tirupathi Rao et al reported the incidence of OA arising from the anterior division of IIA in 35.5% which is significantly lower than our finding [4].

In our study, OA was arising from the posterior division of internal iliac artery (IIA) in 3.3% of specimens. It arises as common trunk along with superior and inferior gluteal artery. It was observed by previous authors to arise from the posterior division of internal iliac artery (IIA) varies from 6%-30% [4-8]. But the highest incidence was reported by the Sakthivel et al (30%) [5]. In the present study, we have not documented the origin of OA directly from the common iliac artery and external iliac artery. But in literature, many have been reported the incidence of origin of OA from the external iliac artery. A study conducted by Tirupathi Rao et al reported the highest incidence of OA arises from an external iliac artery in 8.8% specimens. Various other authors reported an incidence ranging from 1.1% - 9% [4-9]

However, we document the percentage of obturator artery (OA) arising indirectly from the external iliac artery i.e from an inferior epigastric artery (IEA). This origin is documented as second most common variation in the present study. In our study, the incidence of OA arising from the IEA was found in 20%. A similar finding was reported by Braithwaite et al and Sakthivel et al who had recorded the incidence of OA arising from the IEA in 19.5% and 25% respectively [6, 5]. Another study conducted by Tirupathi Rao et al reported the incidence of OA arising from the IEA in 26.6% which is significantly higher than our finding [4] Additionally, other sub-variants such as the common stem of OA with another branch of the anterior division of IIA were also observed in our study. Various authors reported an incidence of origin of OA other than anterior division ranging from 3.3% - 22.43% [4-8].

In our study, the incidence of common stem of OA with superior vesical and umbilical artery was found in 1 specimen (3.3%), with inferior vesical in 1 specimen (3.3%), with superior vesical, inferior vesical & umbilical artery in 2 specimens (6.7), with Common trunk with uterine, internal pudendal & inferior gluteal artery

in 2 specimens (6.7%) and with Common trunk with internal pudendal artery & inferior gluteal artery in 3 specimens (10%). But the highest incidence was reported by the Tirupathi Rao(16.67%) [8].

In the literature, the incidence of dual obturator artery or aberrant obturator artery was reported. Sonje et al observed the dual origin of obturator artery from external and internal iliac in 2.85% [9] while Braithwaite et al and Maneesha S were reported in 6.5% and 6.67% respectively [6,11]. Embryological explanation regarding the variation in the origin of obturator artery may be due to the unusual selection of channels from the primary capillaries consequences in forming the abnormal arterial patterns [3]. The most appropriate channels enlarges, whilst the others retract and disappear, thereby establishing the final arterial pattern and resulting in variation in the origin [12].

CONCLUSION

With the expansion of modern surgical procedures and investigatory techniques involved in obstetric procedures or urogenital interventions, it is necessary to understand the course and ramification of the vessels of the abdomen especially pelvis. Anomalous origin of OA may injure during surgical repair of hernia and fracture of superior ramus of pubis. Variability in the origin of OA may be a source for complication or misdiagnosis. The sound knowledge on anatomical variations of OA is very important for successful outcome of the above mentioned surgical procedures. This study will be of great use to the general and vascular surgeons and will help them to avoid unnecessary complication.

ABBREVIATIONS

OA- Obturator artery
IEA - Inferior epigastric artery
IIA - Internal iliac artery
EIA- External iliac artery
AD- Anterior Division,
PD- Posterior Division
UMB- Umbilical artery,
SVA- Superior vesical artery
IVA- Inferior Vesical artery
MRA- Middle rectal artery

Conflicts of Interests: None

REFERENCES

- [1]. Williams PL. Gray's Anatomy. The Anatomical Basis of Clinical Practice. 38 Ed. Edinburgh, Churchill Livingstone. 1995: 1560.
- [2]. Condon, re. and Nyhus, Im. Complicaciones de la h ernia inguinal. 3rd ed. In nyhus, Im. And condon, re. (eds). Hernia. 3rd ed. Philadelphia: lippincott, 1991.
- [3]. Arey, L.B. The development of peripheral blood vessles. In the peripheral blood vessles (Ed Orbison J L & Smith D E), 1-16, Baltimore: Wiliams and wilkins, 1963.
- [4]. Tirupathi Rao V, Srinivasarao Y, Dorai Raj SJ. An anomalous origin of obturator artery and its clinical importance in humans. *Int J Anat Res*. 2013;1:2-6.
- [5]. Sakthivel, Priyadarshini S. Variability of origin of Obturator artery and its clinical significance. *Int J Anat Res* 2015; 3(4): 1704-1709
- [6]. Braithwaite JL. Variations in origin of parietal branches of internal iliac artery. *J Anat*. 1952; 86:423-30.
- [7]. Pai MM, Krishnamurthy A, Prabhu LV, Pai MV, Kumar SA, Hadimani GA. Variability in the origin of the obturator artery. *Clinics*. 2009; 64(9):897-901.
- [8]. Kumari S, Gowda MT. A study of variations of origin of obturator artery: Review in south Indian population. *Journal of the Anatomical Society of India*. 2016 Aug 31;65:S1-4.
- [9]. Biswas S, Bandopadyay M, Adhikari A. Variation of origin of obturator artery in eastern Indian population. *J Anat Soc India*. 2010; 59(2):168-172.
- [10]. Sonje PD, Vatsalaswamy P. Study of variations in the origin of obturator artery. *Indian Journal of Vascular and Endovascular Surgery*. 2016 Oct 1;3(4):131.
- [11]. Maneesha S, Tripta S, Richhpal S, Kaur AA. Variations of obturator artery in man. *Anat Physiol*. 2012;2(105):2161-0940.
- [12]. Fitzgerald MJT. *Human Embryology*. New York: Harper International; 1978:38-56.

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