



Variations of origin of obturator artery

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Abstract

Obturator artery is one of the medium sized parietal branches of the anterior division of internal iliac artery and it supplies the medial side of the thigh. It is the most variable vessel among the branches of the internal iliac artery. The present study was conducted on a total of 45 pelvic halves had been studied, The material consisted of adult subjects between the ages of forty and eighty five, from the dissection hall of department of anatomy. The findings were observed and recorded. Origin of obturator artery was most frequently a direct branch of the anterior division of the internal iliac artery, in 16 specimens (35.55%). It was arising from the inferior epigastric artery in 12 specimens (26.66%). It arose from the common trunk of inferior gluteal and internal pudendal artery in 6 specimens (13.33%) etc. The variations in obturator artery may lead to surgical complications during pelvic surgeries requiring suturing along the pelvic brim. The anomalies affecting the arterial patterns of the limbs are based on unusual selection of channels from primary capillaries. The most appropriate channel enlarges, whilst the others retract and disappear, thereby establishing the final arterial pattern and resulting in variations in the origin. Prior knowledge of the anatomical variations may be beneficial for vascular surgeons ligating the internal iliac artery or its branches and the radiologists interpreting angiograms of the pelvic region.

Key words: Obturator artery, Origin, Variations, Internal iliac.

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Introduction

Obturator artery is one of the medium sized parietal branches of the anterior division of internal iliac artery it inclines antero-inferiorly on the lateral pelvic wall and leaves the pelvic cavity by passing through the obturator foramen. It supplies the medial side of the thigh. It is the most variable vessel among the branches of the internal iliac artery [1].

The presence of organs and other anatomical structures within the closely packed confines of the pelvis makes the study of the vascular patterns and their variations of much importance [4]. The rapid development of surgical and investigatory techniques and expertise, especially in cases involving obstetric procedures or urogenital interventions, makes it essential to understand the vascular tree in the abdomen especially in the pelvis [5].

In 20-30% of subjects the obturator artery is replaced by an enlarged pubic branch of the inferior epigastric; this descends almost vertically to the obturator foramen. Such an abnormal obturator artery is usually near the external iliac vein, lateral to the femoral ring, and is then safe in herniotomy. Sometimes it curves along the edge of the lacunar part of the inguinal ligament, partly encircling the neck of a hernial sac, and may be inadvertently cut during enlargement of the femoral ring in reducing a femoral hernia [1].

The OA has been reported to originate from all the neighboring arteries which includes even the common iliac or any of the branches of the internal iliac artery [14]. Interestingly the ratio of the frequency of the OA originating from the internal iliac artery to those originating from epigastric and external iliac artery has been reported to be 3:1 [7].

Since the variations in the origin of obturator artery are of great surgical and radiological importance, but a detailed study had not been done previously in the local area (Andhra region), it was decided to undertake this present study. Isolation of obturator artery from different sources were done to know more about it than already documented and thereby hoping to add more information to guide the radiologists and operating surgeons.

Materials and methods

A total of 45 pelvic halves had been studied, of which study on 12 pelvis were also included (i.e., 24

pelvic halves) and the remaining 21 being single sides. Of these, 5 were from female (adults), and 40 were from adult males. The material consisted of adult subjects between the ages of forty and eighty five, from the dissection hall of department of anatomy of Alluri Sitarama Raju Academy of Medical Sciences, Eluru, and Andhra Pradesh. The study was carried out in the dissection hall of the above college.

The pelvic viscera were pulled away from the pelvic walls to expose the Obturator artery. The internal iliac vein and its tributaries were removed in some cases to get a clear exposure of the arteries. The origins of obturator artery were dissected carefully.

The observations regarding the origins of obturator artery were recorded carefully. Photography and drawings were made after displaying the different origins of obturator artery. The photographs were made, using Nikon SLR camera with zoom lens.

Results

ORIGIN	MALE		FEMALE		TOTAL	
	NO.	%	NO	%	NO	%
Direct from anterior division	14	35	2	40	16	35.55
Inferior gluteal-internal pudendal trunk	05	12.5	1	20	06	13.33
Inferior gluteal artery	02	5	-	-	02	4.44
Internal pudendal artery	02	5	-	-	02	4.44
Superior gluteal artery	02	5	-	-	02	4.44
Iliolumbar artery	01	2.5	-	-	01	2.22
Direct branch from external iliac	04	10	-	-	04	8.88
Inferior epigastric artery	10	25	2	40	12	26.66
By double origin	-	-	-	-	-	-
Total	40	100	5	100	45	99.7

Table 1

The observations made in 45 pelvic halves were given below.

Obturator artery was most frequently a direct branch of the anterior division of the internal iliac artery, in 16 specimens (35.55%) (Fig: 6). It was arising from the inferior epigastric artery in 12

specimens (26.66%) (Fig: 7). It arose from the common trunk of inferior gluteal and internal pudendal artery in 6 specimens (13.33%) (Fig: 8). In 4 specimens (8.88%), the obturator artery arose as a

direct branch of external iliac artery (Fig: 4). In 2 specimens (4.44%), the obturator artery was arising from the superior gluteal artery (Fig: 5). In 2 specimens (4.44%), the obturator artery was arising from the inferior gluteal artery (Fig: 1). In 2 specimens (4.44%) the obturator artery was arising from the internal pudendal artery (Fig: 3). In 1

specimen (2.22%), the obturator artery arose from iliolumbar artery (Fig: 2).

The findings in 45 pelvic halves were given in Table I, and variations noted in the present study were shown in Fig: 1 -8, and represented diagrammatically in order of frequency in fig.: 9

Origin of obturator artery	Frequencies reported by different workers in %			
	Parsons and Keith(1897)	Pick, ashley and Anson(1942)	Braithwaite(1952)	Present study
Direct from anterior division	39.3	42.6	41.4	35.55
Inferior gluteal and internal pudendal trunk	8.2	10.1	10	13.33
Inferior gluteal	3.2	5.5	4.7	4.44
Internal pudendal	3.2	3.7	3.8	4.44
Superior gluteal	8	6.4	10	4.44
Iliolumbar	4.9	1.8	3.5	2.22
Inferior epigastric	25	21.3	19.5	26.66
Direct form external iliac	1.6	0.9	1.1	8.88
By double origin	-	-	6.5	-

Table 2

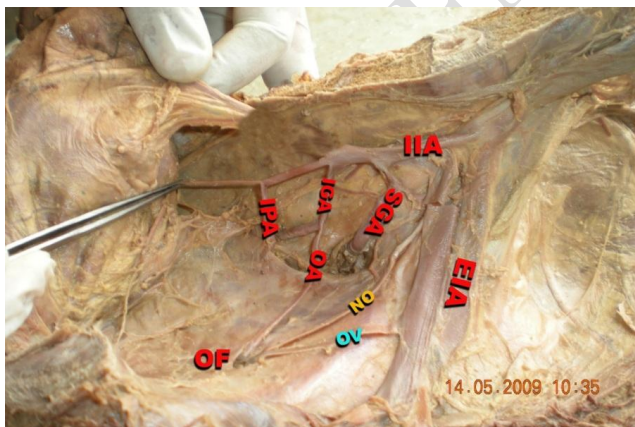


Fig: 1. Obturator artery from inferior gluteal artery

IIA: INTERNAL ILIAC ARTERY, EIA: EXTERNAL ILIAC ARTERY, SGA: SUPERIOR GLUTEAL ARTERY, IGA: INFERIOR GLUTEAL ARTERY, IPA: INTERNAL PUDENDAL ARTERY, OA: OBTURATOR ARTERY, ON: OBTURATOR NERVE, OV: OBTURATOR VEIN, OF: OBTURATOR FORAMEN



Fig: 2. Obturator artery from iliolumbar artery
SGA: SUPERIOR GLUTEAL ARTERY
ILA: ILIOLUMBAR ARTERY
OA: OBTURATOR ARTERY

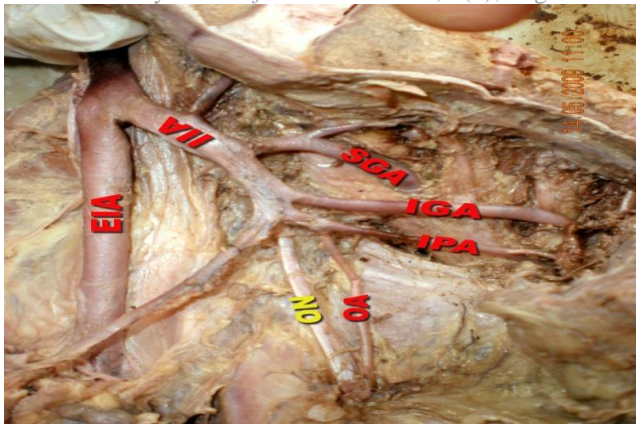


Fig: 3. Obturator artery from internal pudendal artery
 IIA: INTERNAL ILIAC ARTERY, EIA: EXTERNAL ILIAC ARTERY, SGA: SUPERIOR GLUTEAL ARTERY, IGA: INFERIOR GLUTEAL ARTERY, IPA: INTERNAL PUDENDAL ARTERY, OA: OBTURATOR ARTERY, ON: OBTURATOR NERVE

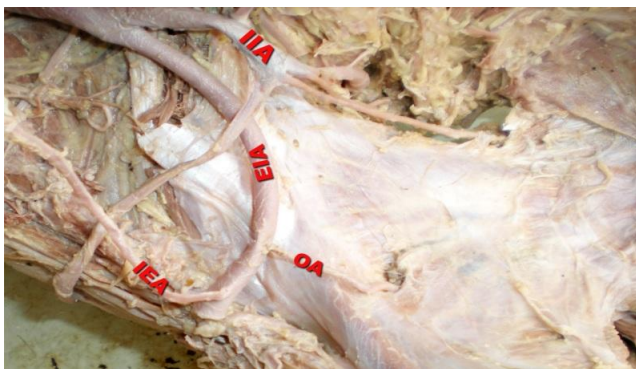


Fig: 4. Obturator artery from external iliac artery
 IIA: INTERNAL ILIAC ARTERY
 EIA: EXTRENAL ILIAC ARTERY
 OA: OBTURATOR ARTERY
 IEA: INFERIOR EPIGASTRIC ARTERY



Fig: 5. Obturator artery from superior gluteal artery
 IIA: INTERNAL ILIAC ARTERY, EIA: EXTERNAL ILIAC ARTERY, SGA: SUPERIOR GLUTEAL ARTERY, IGA: INFERIOR GLUTEAL ARTERY, IPA: INTERNAL PUDENDAL ARTERY, OA: OBTURATOR ARTERY, ON: OBTURATOR NERVE



Fig: 6. Obturator artery from anterior division
 IIA: INTERNAL ILIAC ARTERY, EIA: EXTERNAL ILIAC ARTERY, SGA: SUPERIOR GLUTEAL ARTERY, IGA: INFERIOR GLUTEAL ARTERY, IPA: INTERNAL PUDENDAL ARTERY, OA: OBTURATOR ARTERY, ON: OBTURATOR NERVE



Fig: 7. Obturator artery from inferior epigastric artery
 IIA: INTERNAL ILIAC ARTERY, EIA: EXTERNAL ILIAC ARTERY, IEA: INFERIOR EPIGASTRIC ARTERY, OA: OBTURATOR ARTERY, ON: OBTURATOR NERVE

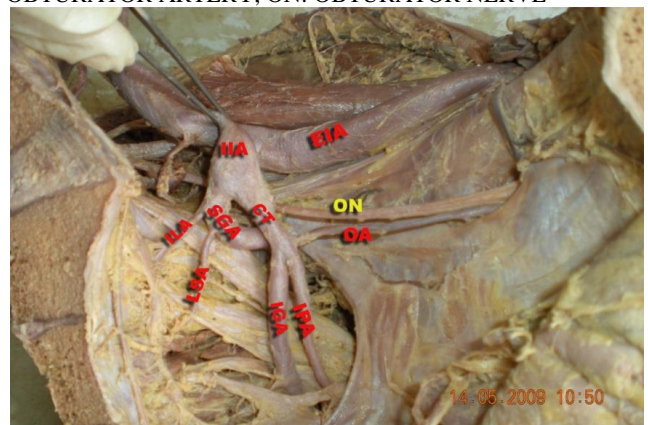


Fig: 8. Obturator artery from the common trunk of inferior gluteal and internal pudendal arteries
 IIA: INTERNAL ILIAC ARTERY, EIA: EXTERNAL ILIAC ARTERY, SGA: SUPERIOR GLUTEAL ARTERY, IGA: INFERIOR GLUTEAL ARTERY, IPA: INTERNAL PUDENDAL ARTERY, OA: OBTURATOR ARTERY, ON: OBTURATOR NERVE, ILA: ILIOLUMBAR ARTERY, LSA: LATERAL SACRAL ARTERY, CT: COMMON TRUNCK OF INFERIOR GLUTEAL AND INTERNAL PUDENDAL ARTERIES

Discussion

The obturator artery was much more variable, several earlier workers including Reid (1836), Parsons and Keith (1897), Dubreuil-Chambadel (1925), Pick, Ashley and Anson (1942), Braithwaite (1952) and more recently, Jakubowicz (1996) had provided extensive data on the variations in the origin of the obturator artery. The variations in the origin of the obturator artery as reported by various workers and the findings observed in the present study were summarized in (Table 2).

All investigators agreed that the most common site of origin of this vessel was from the anterior division of the internal iliac artery as a direct branch. The incidence of the origin of obturator artery directly from the anterior division of the internal iliac artery (35.55%) noted in the present study was in agreement with Parsons and Keith (1897), (39.3%).

In the present study the second highest incidence of the origin of obturator artery was from inferior epigastric artery (26.66%). It was in agreement with Parsons and Keith (1897), (25%). All other incidences of origin of obturator artery were more or less equal to that of Parsons and Keith (1897). In the present study obturator artery origin from double source was not found. Further, in depth study, in large number of cadavers might show more interesting observations on the variations in the origin of artery.

Conclusion

The obturator artery was more variable and arose as a direct branch from the anterior division of internal iliac artery in 35.55% of instances, from the inferior epigastric artery in 26.66%, from the external iliac artery in 8.88%, from the common trunk of inferior gluteal-internal pudendal in 13.33%, from superior gluteal, inferior gluteal, internal pudenda arteries in 4.44% of cases and from iliolumbar artery in 2.22%. The present findings showed an absence of origin from double origin. This was in sharp contrast to previous studies. The present findings showed a higher incidence from the common trunk of inferior gluteal-internal pudendal arteries than previous studies. The clinical implications of these observations were manifold, especially in the context of diagnostic and interventional radiology and pelvic surgery. Care must be taken during surgery of femoral hernia because obturator artery was observed to arise from inferior epigastric artery in 26.66%.

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