



## VARIABLE BRANCHING PATTERNS OF RIGHT AND LEFT INTERNAL AND EXTERNAL ILIAC ARTERIES AND ITS CLINICAL SIGNIFICANCE IN NORTH INDIAN POPULATION

**\*Dr. MUKTYAZ HUSSEIN**

Assistant Professor, Department of Anatomy, Govt. Medical College Ambedkar Nagar U.P. India

**Dr. ARUN KR. SHARMA**

Lecturer, Department of Anatomy, Govt. Medical College Ambedkar Nagar, U.P. India

**Dr. MAHBOOBUL HAQUE**

Associate Professor, Department of Anatomy, S.R.M.S. Institute of Medical Sciences, Bareilly U.P. India.

**Dr. NEMA USMAN**

Associate Professor, Department of Anatomy, J.N.Medical College Aligarh, U.P., India

### Abstract

A severe and potentially lethal complication in pelvic injuries is arterial bleeding commonly involving the branches of internal iliac artery namely the obturator artery, Ilio lumbar artery, Lateral sacral artery, Superior and inferior vesical and inferior gluteal artery. The materials used for this work comprised of 108 hemipelves of 54 embalmed cadavers (78 male and 30 female) during routine dissection classes for medical undergraduate students over a period of five years from North Indian origin. Objectives of our study is to find out variable branching patterns of right and left Internal and External Iliac arteries and its clinical significance in North Indian Population. In present study we found variations of obturator artery in 37.9% (41 hemipelves) and normal origin from anterior division of internal iliac artery in 62.0% (67 hemipelves) out of 108 hemipelves. variations from Internal Pudendal artery 10.1% (11), Iliolumbar artery 9.2% (10), Inferior gluteal artery 8.3% (9), Inferior Epigastric artery 6.4% (7), Lateral sacral artery 4.6% (5) and Superior Gluteal artery 1.8% (2). Unexpected presence of the variant vessels in the retro pubic region can become a matter of great concern and the findings of the study may be gainfully utilised by imaging specialists, orthopaedic surgeons, urologists, gynaecologists and general surgeons.

**Key Words:** Variations, Pelvis, External and Internal Iliac arteries and obturator artery.



**Dr. MUKTYAZ HUSSEIN**

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### INTRODUCTION

Anatomical variations of vessels have always been a subject of controversy, as well as curiosity, because of clinical significance. The Internal and External Iliac arteries branches divided from common iliac artery although variations have been reported. A severe and potentially lethal complication in pelvic injuries is arterial bleeding commonly involving the branches of internal iliac artery namely the Ilio lumbar artery, Lateral sacral artery, obturator, superior and inferior vesical and inferior gluteal

artery reported by Dondelinger RF et al 2002 [1]. Obturator artery (OBA) a branch of anterior division of internal iliac artery normally runs anteroinferiorly on the lateral pelvic wall to upper part of the obturator foramen and leaves the pelvis via obturator canal where it divides into anterior and posterior branches to supply medial compartment of thigh [2]. A sound knowledge of vascular anatomy in pelvic region is necessary for successful performance of endoscopic total extraperitoneal inguinal hernioplasty, and for laparoscopic Herniorrhaphy [3]. The trans-abdominal

approach is unfamiliar to most general surgeons. The ideal reconstruction of the floor of the inguinal canal during a Herniorrhaphy requires good anatomic dissection and exposure which can only be accomplished by entering the sub inguinal space of Bogros [4]. The embryological explanations for the anomalies which affect the arterial patterns of the limbs are based on an unusual selection of channels from a primary capillary plexus wherein the most appropriate channels enlarge while others retract and disappear, thereby establishing the final arterial pattern reported by Arey, 1963; Fitz Gerald, 1978 [5,6].

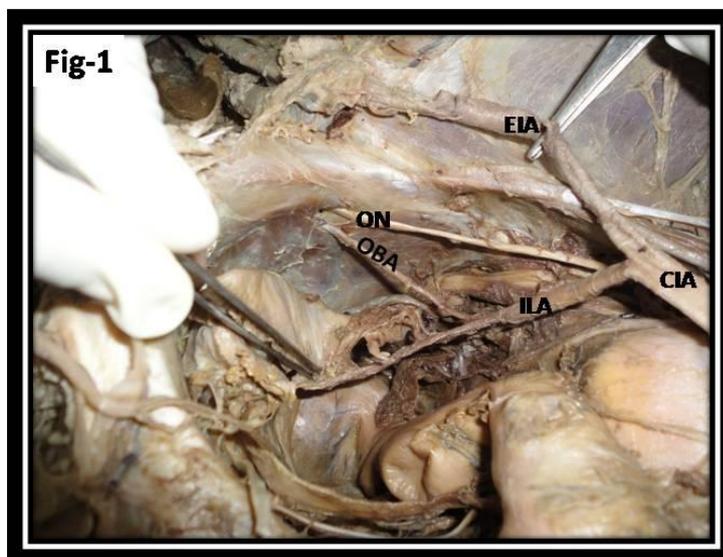
#### MATERIALS AND METHODS

The present study was carried out in the department of Anatomy Govt. Medical College Ambedkar Nagar U.P., Shri Ram Murti Smarak Institute of Medical Sciences Bareilly U.P. and J.N. Medical College Aligarh U.P. India. The materials used for this work comprised of 108 hemipelves of 54 embalmed cadavers (39 male and 15 female) during routine dissection classes for medical undergraduate students over a period of five years from North Indian origin. The embalmed cadavers were dissected in the pelvic and retro pubic inguinal region. The branches of Inte

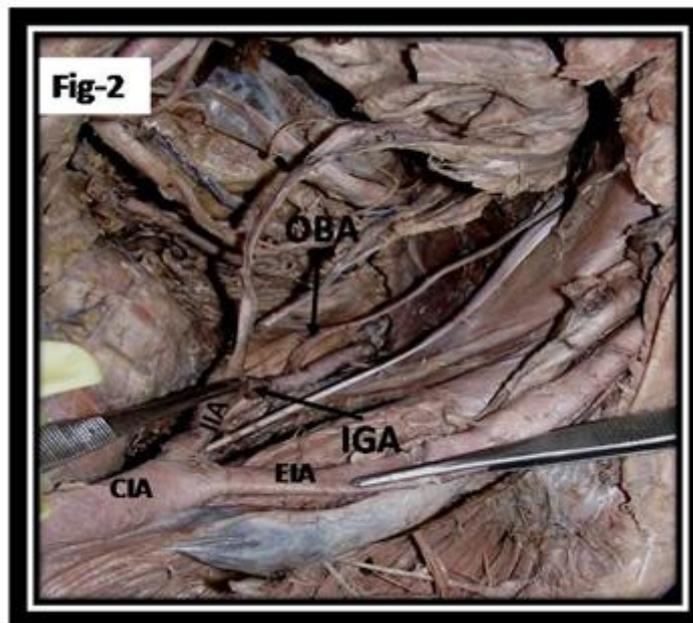
course of branches of Internal and External Iliac artery was identified and traced. The variations of Internal and External Iliac arteries were photographed and the findings were appropriately documented.

#### RESULTS

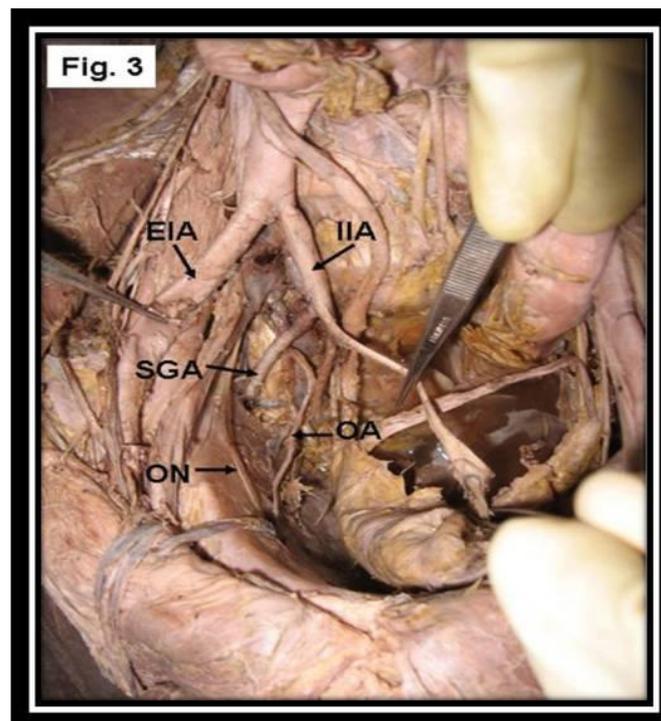
When assessing the result of our dissections, we found variations of obturator artery in 37.9% (41 hemipelves) and normal origin from anterior division of Internal iliac artery in 62.0% (67 hemipelves) out of 108 hemipelves (Figure; 1). The obturator origin from inferior gluteal artery (figure; 2), superior gluteal artery (figure; 3), direct branch from External iliac artery (figure; 4), common trunk for obturator artery and Inferior epigastric artery from external iliac artery (figure; 5), from Inferior epigastric artery (figure; 6) and bilateral variable origin of obturator from External iliac artery (figure; 7). In our study we observed percentage incidence of variations from Internal Pudendal artery 10.1% (11), Iliolumbar artery 9.2% (10), Inferior gluteal artery 8.3% (9), Inferior Epigastric artery 6.4% (7), Lateral sacral artery 4.6% (5) and Superior Gluteal artery 1.8% (2) out of 108 hemipelves in North Indian population are given in Table:1.



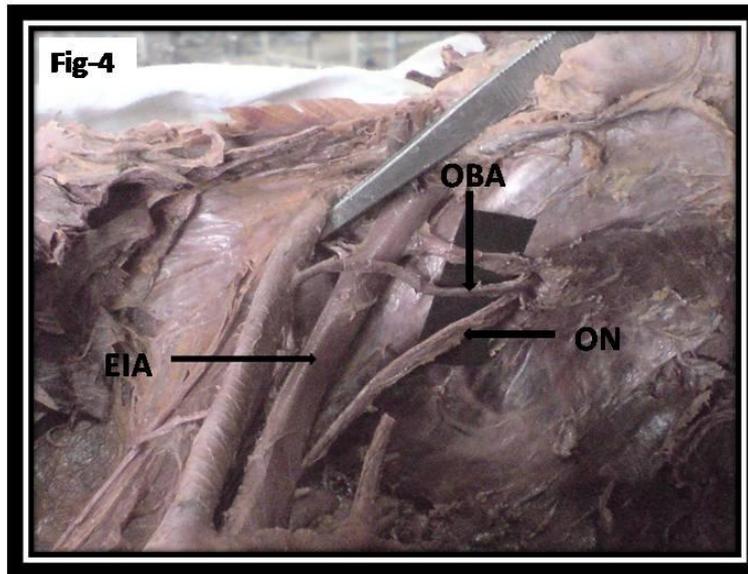
**Figure-1** Right sided pelvis showing normal origin of obturator artery from anterior division of Internal Iliac artery. (OBA- obturator artery, IIA- internal iliac artery, EIA- External iliac artery, ON- obturator nerve, CIA- Common iliac artery).



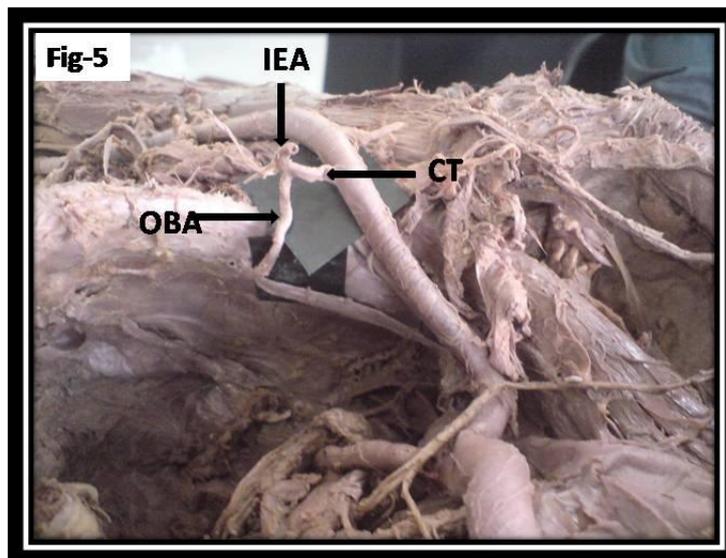
**Figure-2** Right sided pelvis showing origin of obturator Artery from Inferior Gluteal Artery. (Right side pelvis shows CIA- Common Iliac Artery, EIA- External Iliac Artery, IIA- Internal Iliac Artery, OBA- Obturator Artery, IGA- Inferior Gluteal Artery).



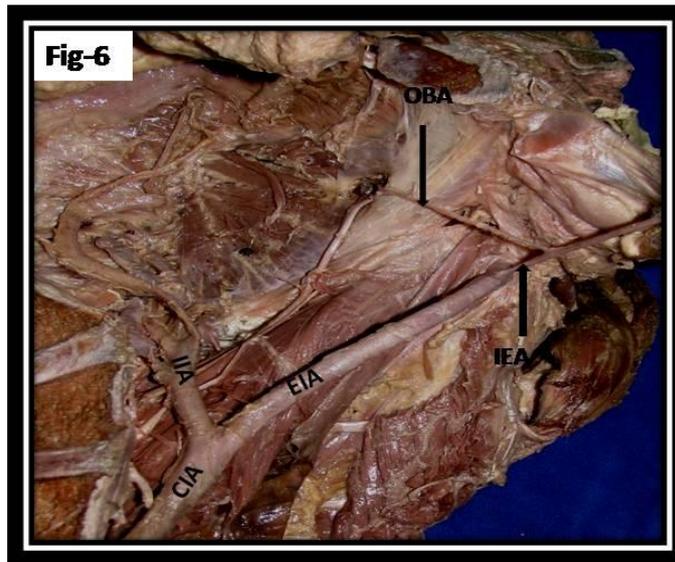
**Figure-3** Right sided pelvis showing origin of obturator artery from superior gluteal branch of posterior division of Internal Iliac artery. (EIA- External iliac artery, ON- Obturator nerve, IIA- Internal iliac artery, OBA- Obturator artery).



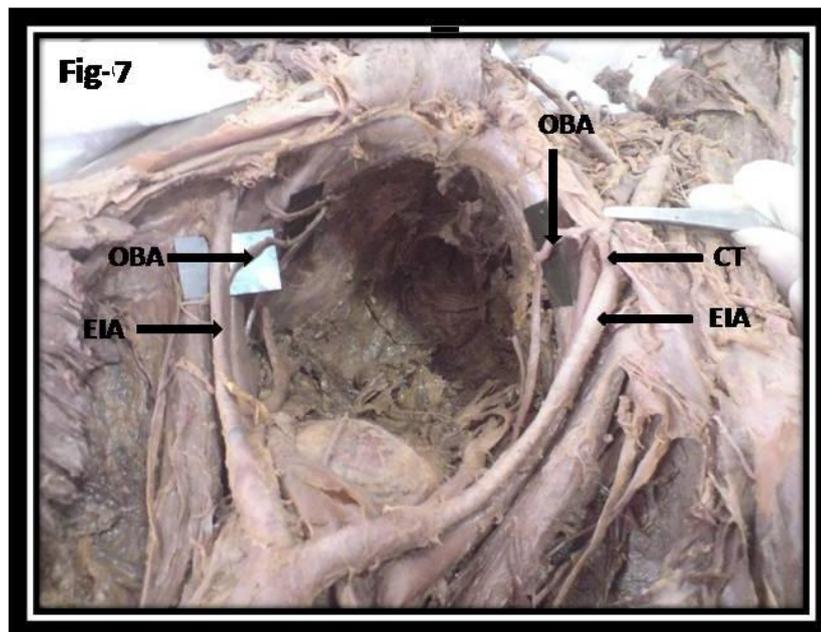
**Figure-4** Left sided pelvis showing origin of obturator artery directly from External iliac artery .OBA- Obturator artery, EIA- External iliac artery, ON- Obturator nerve).



**Figure-5** Left sided pelvis showing origin of obturator artery shares common trunk with inferior epigastric artery. (OBA- Obturator artery, IEA- Inferior epigastric artery, CT- Common trunk).



**Figure-6** Right sided pelvis showing origin of obturator Artery from Inferior Epigastric Artery. (CIA- Common Iliac Artery, EIA- External Iliac Artery, IIA- Internal Iliac Artery, OBA- Obturator Artery, IEA- Inferior Epigastric Artery).



**Figure-7** Showing bilateral variation in origin of obturator artery. Left side-OBA arising directly from EIA, Right side- OBA arising as common trunk with IEA.

**Table 1:** Percentage incidence of variations of Internal and External Iliac arteries branches out of 108 hemipelves from North Indian population.

Variable origin of arteries	Male (78)		Female (30)		Total No. of Hemipelves	Total Variations in Percentage%
	Right (37)	Left (43)	Right (12)	Left (16)		
Obturator	17	13	6	5	41	37.9%
Internal Pudendal	4	4	2	1	11	10.1%
Ilio-lumber	5	3	1	1	10	9.2%
Inferior Gluteal	2	4	2	1	09	8.3%
Inferior Epigastric	4	2	0	1	07	6.4%
Lateral Sacral	1	2	0	2	05	4.6%
Superior Gluteal	2	0	0	0	02	1.8%

**DISCUSSION**

The superior border of the iliopubic ramus is an area of considerable concern for a variety of surgical sub specialists, as it serves as an anchoring site for inguinal and femoral hernia repairs, Gilroy A.M. Hermey et al [7]. The obturator artery has reported by Arey, 1963 [5] arising from all possible neighbouring arteries, i.e. common iliac, external iliac, from any branch of internal iliac in either sex. The most common type of variation is anastomosis between OBA of internal iliac artery origin & inferior epigastric of external iliac origin. Out of these only in 30% of cases this anastomosis opens up to become accessory obturator artery, replacing the normal branch from internal iliac artery, Bergman et al [8]. The OBA arises comparatively late in development as a supply to a plexus which in turn is joined by the axial artery of lower limb that accompanies the sciatic nerve studied by Sanudo JR et al, 1993 [9]. The origin of OBA from posterior division of IIA is due to vascular channels in relations to the posterior division that might have resulted in giving rise to OBA, whereas the vascular channels related to the anterior division of the internal iliac artery destined for the OBA got obliterated reported by Kumar & Rath 2007 [10]. In the cases of ligation of internal iliac arteries and their branches in women undergoing pelvic surgery, on postoperative angiography, it is seen that collateral channels start functioning soon after surgery studied by Chiat et al, 1968 [11]. Also in cases of obstruction of the anterior division of internal iliac artery due to any cause, there will be sparing of OBA and its branches especially the branch to the head

of femur. The parietal branches of OBA are important collaterals in aortoiliac and femoral arterial occlusive diseases. In the majority of these (83/100) specimens, the obturator artery was a branch of the anterior division of the internal iliac artery, and in the other 17 specimens, it was a branch of the posterior division. Jakubowicz and Czerniawska-Grzesinska [11], studied variability in origin and topography of the inferior epigastric and obturator arteries and found that in 4% of cases, there was a common trunk for inferior epigastric artery in 2.6% of their cases and the EIA in 1.3% of their cases.

**CONCLUSION**

The present study described variations of Internal and External Iliac arteries branches that could be a cause of serious medical interventions because of unexpected presence of the variant vessels in the retro pubic region can become a matter of great concern and the findings of the study may be gainfully utilised by imaging specialists, orthopaedic surgeons, urologists, gynaecologists and general surgeons.

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