

## A Study on type of Branching Pattern of Internal Iliac Artery in the Spontaneously Aborted Human Foetus Specimens

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Received: 07-11-2022 / Revised: 13-12-2022 / Accepted: 24-12-2022

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Conflict of interest: Nil

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### Abstract

**Background:** Internal iliac artery is considered as the prime artery of the pelvic region. Angio-architecture of this artery is clinically significant in many surgeries, interventional procedures and also in recent advances. Despite its remarkable significance, in India very few literatures are available to learn the morphology of the branches of internal iliac artery.

**Aim and Objectives:** To know branching pattern of internal iliac artery in the spontaneously aborted human foetus specimens.

**Materials and Method:** This is an observational descriptive study conducted in the Department of Anatomy, Bhaskar Medical College, Moinabad, 60 Spontaneously aborted foetuses Specimens were included after following inclusion and exclusion criteria. As per the Piersol guidelines (1930), spontaneously aborted foetal specimens of the internal iliac artery were categorised into four types. They were type I, type II, type III and type IV.

**Results:** Study included 60 spontaneously aborted foetus, among which 44 were males and 16 were females. Type I branching pattern of the internal iliac artery was found in 50% of the specimens, followed by Type II, Type III and Type IV.

**Conclusion:** In the study most significant type was type I and the insignificant one was type IV. The variations in the arterial branching pattern may be due to the defective arteriogenesis during 3rd to 4th month of intrauterine life.

**Keywords:** Internal Iliac Artery, Piersol Guidelines, Spontaneously Aborted Human Foetus etc.

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### Introduction:

Internal iliac artery is derived from Latin word, "Arteria iliaca interna" since it is present in the iliac region of the abdomen. Internal iliac artery is exhiled from the proteus satellite as per the Greek mythologist (Taylor2017) [1]. Internal iliac

artery is considered as the prime artery of the pelvic region. Angio-architecture of this artery is clinically significant in many surgeries, interventional procedures and also in recent advances. The surgeries in which the internal iliac artery is important are haemorrhoids, rectal malignancy,

embolus, tumors, uncontrolled postpartum haemorrhage, transurethral resection of prostate, aorto-iliac aneurysm, intractable pelvic haemorrhage, post urethral laser surgery for non-healing penis ulcer, systemic vascular disease, amputation of leg in peripheral arterial disease, total hip Arthroplasty[2], endoscopic total extra peritoneal inguinal hernioplasty, Wertheim extended colpohysterectomy, tension free vaginal tape procedure.

The internal iliac artery is short, compact firm vessel considerably smaller in size than the external iliac artery. It mainly supplies the pelvic walls, pelvic viscera, perineum, gluteal region and medial compartment of the thigh. It arises anterior to the lumbosacral articulation and runs inferiorly to the upper quarter area of greater sciatic foramen. It runs posterior to the ureters and vas deferens in males and fallopian tube and ovaries in females; anterior to the sacroiliac articulation, the origin of the piriformis muscle, internal iliac vein and lumbosacral trunk; medial to the external iliac vein, lateral to the parietal peritoneum and tributaries of internal iliac vein; superior to the obturator nerve. The internal iliac artery divides into two main trunks namely, anterior and posterior trunk. From the anterior trunk eight branches originate in the hierarchy of inferior gluteal artery, middle rectal artery, uterine artery, obturator artery, inferior vesicle artery, superior vesicle artery, vaginal artery and internal pudendal artery. From the posterior trunk it gives off three branches namely iliolumbar artery, lateral sacral artery and superior gluteal artery.

Despite its remarkable significance, in India very few literatures are available to learn the morphology of the branches of internal iliac artery. Hence the present study is done to fulfil this interim and helps to enhance the knowledge about the gross anatomy of internal iliac artery.

### Materials and Method

**Study Design:** This is Observational descriptive study.

**Study Period:** For the period of One year

**Study Place:** Department of Anatomy, Bhaskar Medical College, Moinabad.

**Study Samples:** A total of 60 Spontaneously aborted fetuses Specimens.

### Inclusion Criteria:

- Spontaneously aborted fetuses of gestational age from 20 weeks to 40 weeks.
- Foetuses without any congenital malformation of pelvis.
- Foetuses without any arteriovenous malformations.
- Non disruption of internal iliac artery branches.
- Foetuses without any pelvic pathology.

### Exclusion Criteria:

- Spontaneously aborted fetuses of gestational age less than 20 weeks.
- Macerated foetuses.
- Foetuses with congenital malformation syndrome of pelvis.
- Foetuses with arteriovenous malformations.
- Disrupted internal iliac artery branches.

### Method

In 60 aborted foetal specimens, morphology of the internal iliac artery branching pattern were noted. The foetal study was done based on Piersol classification [3]. This study mainly focused on 3 large branches of internal iliac artery namely superior gluteal artery, inferior gluteal artery and internal pudendal artery. In this study 4 different angioarchitectural pattern of internal iliac artery was noted based on its anatomic location and distribution.

The dissection of internal iliac artery was done using transabdominal approach. The following steps were used in the dissection

of the aborted fetuses to reach internal iliac artery:

Skin incision was made on the either side of inguinal ligament by connecting the most prominent elevation of anterior superior iliac spine on either side of the iliac bone with aid of scalpel and toothed forceps. This uninterrupted incision was observed over the supra pubic region (step 1 and 2). Skin incision was made on the mid axillary line which was extended from the lower border of 10th rib up to the iliac crest with the assistance of scalpel (step 4). After the skin incision, superficial fascia was exposed with the aid of curved artery forceps. Stroke incision was made over the lateral wall of abdomen on the either sides of midaxillary line with the aid of scissor (step 4). Thereby three abdominal muscles (external oblique, internal oblique and transverse abdominis muscle) were excised along with transversalis fascia (step5). With the assistance of scissor and non-toothed forceps another incision was made on the rectus abdominis muscle in the supra pubic region. The contents of the abdominal cavity were pushed up and the intestines were clamped cut and removed near the lumbosacral angle along with the mesentery. The abdominal aorta and inferior vena cava were exposed. The terminal bifurcation of the common iliac artery was tracked near the sacroiliac joint. The connective tissue covered the ureter and psoas major muscle was excised. The ureter was nicked with the aid of scalpel near the vesicourethral junction on either side. The tough connective tissue presented over the two vessels namely external and internal

iliac artery was cleared. Then the superior vesicle artery was traced in the upper segment of urinary bladder. By holding the superior vesicle artery near the vesicouretric junction; the superior gluteal, inferior gluteal and internal pudendal arteries were easily tracked, with the help of non-toothed forceps and straight artery forceps. The full clearance of connective tissue over these arteries was obtained by keeping the soaked glycerine cotton in the pelvic cavity for an overnight. So the next day internal iliac artery was traced. Its morphological distribution was noted and documented.

### Observation and Results

The internal iliac artery was found to be twice in size of the external iliac artery since it developed from the umbilical artery. As per the Piersol guidelines (1930), spontaneously aborted foetal specimens of the internal iliac artery were categorised into four types. They were type I, type II, type III and type IV.

In type I, two large trunks had an origin from the internal iliac artery, the posterior one gave rise to the superior gluteal artery and the anterior trunk gave rise to the internal pudendal and inferior gluteal arteries. In type II, all the three vessels took origin independently from the internal iliac artery. In type III, superior gluteal and inferior gluteal arteries were arising from a common trunk, the internal pudendal artery took origin from the internal iliac artery along with its other branches. In type IV, all three vessels were arising from a common stem.

**Table 1: Gender distribution among the study population.**

Gender	Frequency	Percentages
Male	44	73.3
Female	16	26.7

**Table 2: Distribution of different types in the branching pattern of internal iliac artery in spontaneously aborted foetal specimens.**

Type	Frequency	Percentages
Type I	30	50
Type II	19	31.7
Type III	10	16.7
Type IV	1	1.7
Total	60	100

**Table 3: Distribution of different types in the branching pattern of internal iliac artery in spontaneously aborted male foetal specimens**

Type	Male	
	Frequency	Percentages
Type I	25	56.8
Type II	11	25.0
Type III	7	15.9
Type IV	1	2.3
Total	44	100.0

**Table 4: Distribution of different types in the branching pattern of internal iliac artery in spontaneously aborted female foetal specimens.**

Type	Female	
	Frequency	Percentages
Type I	5	31.3
Type II	8	50
Type III	3	18.8
Type IV	0	0
Total	16	100

## Discussion

The different types in the branching pattern of the internal iliac artery in spontaneously aborted foetal specimens were compared with the previous studies.

In the present study, the type I branching pattern of the internal iliac artery was found in 50% of the specimens and noted as the most prominent type. The findings of the above study was correlated with the study done by Hoshiai (1938) [4], who observed this type in 55.1% of the specimens and reported this type as the most common type.

The study conducted by Sumathilatha Sakthivelavan (2010) [5], confirmed type I as the most common type. According to the author Morita (1974) [6], type I branching pattern was the most prominent type and reported it in 49.1% of the specimens

The type II arrangement in the branching pattern of the internal iliac artery was found in 31.7% of the specimens in the present study and noted as the second most prominent type. The findings of the above study was correlated with the study done by Morita (1974)[6] and observed that 22.5% of the specimens belonged to this type which was considered to be the second most common type. According to the author Hoshai (1938)[4], the arrangement of type II was found in 16.1% of the specimens. The study conducted by Sumathilatha Sakthivelavan (2010)[5], observed that the type II was the least common among all the types.

The type III arrangement was observed in 16.7% of the specimens in the present study. The findings of the above study was correlated with the study done by Morita

(1974)[6], who observed this type in 21.7% of the specimens. According to the author Hoshiai (1938)[4], the type III arrangement was found in 26.1% of the specimens and noted it to be the second most prominent type, which was found to be contradictory to the present study.

In the present study, the type IV was in 1.7% of the specimens. Unlike the present study, Hoshiai (1938)[4] and Morita (1974)[6] observed this arrangement in 2.6% and 6.7% of the specimens respectively.

### Conclusion

After all observation of the specimens was done based on the branching patterns of three large branches of internal iliac artery and those were the superior gluteal artery, inferior gluteal artery and internal pudendal artery as per the Piersol guidelines, the analysis of one hundred spontaneously aborted foetus specimens was done. And it can be concluded that, most significant type was type I and the insignificant one was type IV. The variations in the arterial branching pattern may be due to the

defective arteriogenesis during 3rd to 4th month of intrauterine life.

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