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Current Issues in Pharmacy and Medical Sciences

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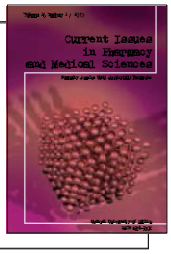

The origin of the deep circumflex iliac artery in relation to the inguinal ligament in various period of human life

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ABSTRACT

Morphology of the external iliac artery and its branches express great anatomical variation in humans. The aim of the study was to evaluate the level of origin of the deep circumflex iliac artery in relation to the inguinal ligament at various stages of human life. The study was conducted on 220 non-fixed cadavers of both sexes including 110 male and 110 female bodies at the age of 7 months of intrauterine life to 82 years. Examined corpses showed no pathological abnormalities within pelvis. Three variations of the origin of deep circumflex iliac artery were observed: above, at the level, and below the inguinal ligament. In males aged up to 20 years of age the deep circumflex iliac artery mostly arose above the ligament whereas in individuals over 20 years of age the deep circumflex iliac artery branched off below the ligament (47%). In females younger than 20 years, the artery originated mostly at the level (54%), while in older persons it originated below the ligament (57%). Variations of the origin of deep circumflex iliac artery showed no significant differences depending on the side of the body. In conclusion, the origin of the deep circumflex iliac artery differs thought the prenatal and postnatal life in both sexes. However, in adults it is usually located below the inguinal ligament.

Keywords: deep circumflex iliac artery, external iliac artery, pelvis, inguinal ligament

INTRODUCTION

Variability of vascular topography, origin of branches and their size are important in various medical specializations, in particular for surgeons, radiologists or gynecologists. Despite dynamic development of visualization methods such as ultrasonography, angiography, angio computer tomography or magnetic resonance, a direct analysis of morphology of a particular vessel remains a standard procedure in anatomical investigations (5, 6, 14).

A deep circumflex iliac artery (DCIA) is a branch of the external iliac artery (Fig. 1). It usually follows towards the back or slightly above the inguinal ligament to the anterior superior iliac spine. The deep circumflex artery lies in the fissure between the iliac fascia and transversal fascia. In the final part of DCIA it is connected with ascending branches lateral circumflex femoral artery. (1, 2, 4, 9, 15).

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DOI: 10.12923/j.2084-980X/26.3/a.16

MATERIALS AND METHODS

The study was performed according to the Polish law, on human bodies after a routine medical or coroner autopsy at the Pathomorphology Department and Forensic Medicine Department of the Medical University of Lublin, as well as Forensic Medicine Department of the Warsaw Medical University in 1987-1999. Unfixed human bodies of both sexes aged from 7 months of prenatal period to 82 years of life were examined. Any macroscopical abdominal or pelvis abnormalities and congenital cardiovascular malformations observed during autopsy excluded the body from further analysis. The analyzed population (110 male, 110 female) was divided into 19 groups according to their age (Table 1-3).

External iliac vessels and their branches underwent direct preparation. On examination, the location of the origin of deep circumflex iliac artery was assessed in relation to the inguinal ligament and age of individual.

RESULTS

The analysis of the origin of the external iliac artery showed great variety in relation to the inguinal ligament

and age (Table 1-2). Three variations of the deep circumflex iliac artery origin were observed above, at the level, as well as below the ligament (Fig. 1).

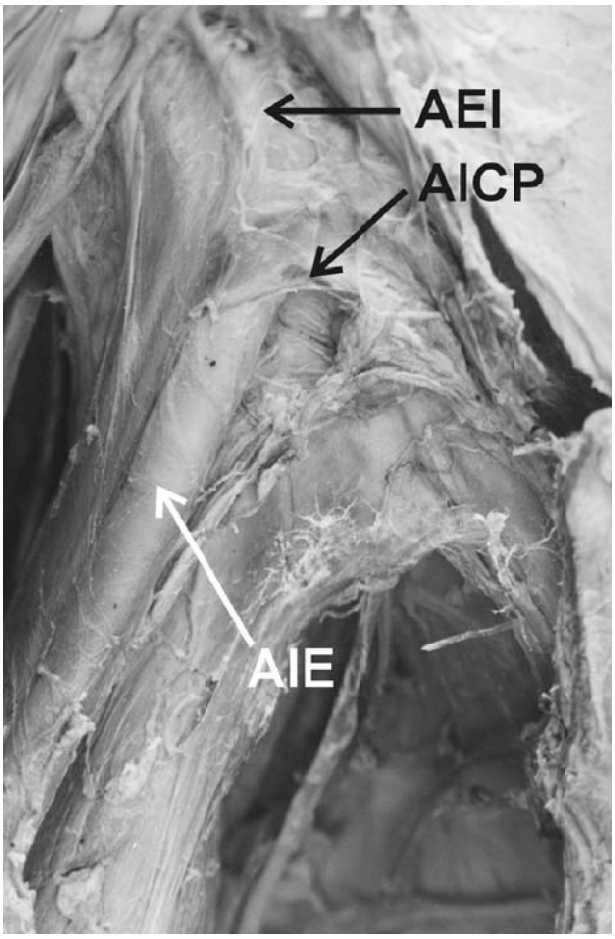

Fig. 1. Origin of the inferior epigastric artery (AEI; *a. epigastrica inferior*) and deep circumflex iliac artery (AICP; *a. iliaca circumflexa profunda*) from the external iliac artery (AIE; *a. iliaca externa*) in 55-year-old female

In males under 20 years of age, the deep circumflex iliac artery most frequently arose from the external iliac artery above the inguinal ligament (in 48% of cases on the right and on the left side). Less commonly, the origin was observed at the level of the ligament or rarely below the ligament (in 12% of cases on the right and in 20% on the left) (Fig. 2). In males over 20 years of age the artery originated mostly below the inguinal ligament (in 47% of cases on the right and in 40% on the left), less commonly it was found above the ligament (in 30% of cases on the right and in 35% of cases on the left). In remaining cases, it branched off at the level of the ligament (in 23% of cases on the right and in 25% of cases on the left) (Fig. 2).

In females up to 20 years of age, the deep circumflex iliac artery branched off at the level of the inguinal ligament (in 54% of cases on the right and on the left side). Less commonly it was found above (in 40% of cases on the right and in 34% of cases on the left) or sporadically below the ligament (in 6% of cases on the right and in 12% of cases on the left) (Fig. 2). In females over 20 years of age, the discussed artery branched off mostly below the inguinal ligament (in 57% of cases on the right and in 58% of cases on the left). Less commonly, the origin was found at the level of the ligament (in 33% of cases on the right and in 27% of cases on the left). Occasionally, the artery arose above the inguinal ligament (in 10% of cases on the right and in 15% of cases on the left) (Fig. 2).

DISCUSSION

The deep circumflex iliac artery, the second of major branch of the external iliac artery, arises from the lateral side of the native vessel and travels towards back or slightly above the inguinal ligament (1-15). Its proximal diameter is about 2.3 mm according to Schroeter's (12) and 2.2-2.5 mm according to Testut's (15). Adachi (1) and Bochenek (4) state that the origin of the examined artery is

Table 1. The origin of the deep circumflex iliac artery in relation to the inguinal ligament in men. (miu.-months of intrauterine life, new. – new-born child, y – year) N – above the ligament; W – at the level of the ligament; P – below the ligament

GROUP	n	RIGHT						LEFT					
		N		W		P		N		W		P	
		n	%	n	%	n	%	n	%	n	%	n	%
7 miu.	4	2	50	1	25	1	25	4	100	-	-	-	-
8 miu.	3	1	33.33	2	66.67	-	-	1	33.33	-	-	2	66.67
9 miu.	3	-	-	3	100	-	-	2	66.67	-	-	1	33.33
new.	10	8	80	2	20	-	-	4	40	2	20	4	40
1–3 m.	2	-	-	1	50	1	50	2	100	-	-	-	-
4–6 m.	5	2	40	1	20	2	40	2	40	3	60	-	-
7–11 m.	3	2	66.67	1	33.33	-	-	2	66.67	1	33.33	-	-
1–3 y.	4	2	50	2	50	-	-	2	50	2	50	-	-
4–6 y.	3	1	33.33	2	66.67	-	-	1	33.33	2	66.67	-	-
7–9 y.	3	1	33.33	2	66.67	-	-	2	66.67	1	33.33	-	-
10–12 y.	2	2	100	-	-	-	-	—	—	1	50	1	50
13–16 y.	3	-	-	2	66.67	1	33.33	1	33.33	1	33.33	1	33.33
17–19 y.	5	3	60	1	20	1	20	1	20	3	60	1	20
20–29 y.	10	6	60	-	-	4	40	3	30	1	10	6	60
30–39 y.	10	3	30	3	30	4	40	4	40	2	20	4	40
40–49 y.	10	2	20	1	10	7	70	6	60	4	40	-	-
50–59 y.	10	5	50	1	10	4	40	3	30	-	-	7	70
60–69 y.	10	2	20	4	40	4	40	3	30	5	50	2	20
≥ 70 y.	10	-	-	5	50	5	50	2	20	3	30	5	50

Table 2. The origin of the deep circumflex iliac artery in relation to the inguinal ligament in females. N – above the ligament; W – at the level of the ligament; P – below the ligament. (miu. – months of intrauterine life, new. – new-born child, y – year)

GROUP	n	RIGHT						LEFT					
		N		W		P		N		W		P	
		n	%	n	%	n	%	n	%	n	%	n	%
7 miu.	2	1	50	1	50	-	-	-	-	2	100	-	-
8 miu.	6	3	50	2	33.33	1	16.67	1	16.67	5	83.33	-	-
9 miu.	2	2	100	-	-	-	-	1	50	1	50	-	-
new.	10	4	40	6	60	-	-	3	30	6	60	1	10
1–3 m.	4	2	50	2	50	-	-	3	75	1	25	-	-
4–6 m.	3	2	66.67	1	33.33	-	-	1	33.33	2	66.67	-	-
7–11 m.	3	1	33.33	2	66.67	-	-	3	100	-	-	-	-
1–3 y.	6	2	33.33	3	50	1	16.67	3	50	2	33.33	1	16.67
4–6 y.	2	-	-	1	50	1	50	1	50	1	50	-	-
7–9 y.	2	-	-	2	100	-	-	1	50	1	50	-	-
10–12 y.	3	1	33.33	2	66.67	-	-	-	-	1	33.33	2	66.67
13–16 y.	1	-	-	1	100	-	-	-	-	-	-	1	100
17–19 y.	6	2	33.33	4	66.67	-	-	-	-	5	83.33	1	16.67
20–29 y.	10	-	-	3	30	7	70	1	10	2	20	7	70
30–39 y.	10	1	10	5	50	4	40	2	20	3	30	5	50
40–49 y.	10	3	30	1	10	6	60	-	-	4	40	6	60
50–59 y.	10	-	-	2	20	8	80	3	30	1	10	6	60
60–69 y.	10	-	-	7	70	3	30	2	20	3	30	5	50
≥ 70 y.	10	2	20	2	20	6	60	1	10	3	30	6	60

Table 3. The origin of the deep circumflex iliac artery in relation to the inguinal ligament in various period of human life in group over and below 20 years of age depending on gender and part of the body. (N – above the ligament; W – at the level of the ligament; P – below the ligament)

AGE	n		♂												♀											
			RIGHT						LEFT						RIGHT						LEFT					
			N		W		P		N		W		P		N		W		P		N		W		P	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<20	50	100	24	48	20	40	6	12	24	48	16	32	10	20	20	40	27	54	3	6	17	34	27	54	6	12
>20	60	100	18	30	14	23	28	47	21	35	15	25	24	40	6	10	20	33	34	57	9	15	16	27	35	58

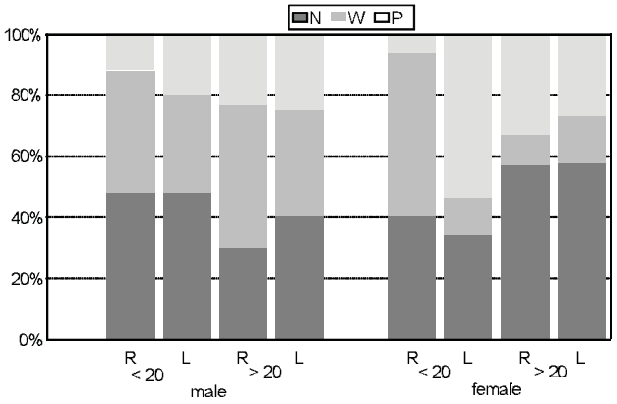

Fig. 2. The origin level of the deep circumflex iliac artery in relation to the inguinal ligament within the age groups under and over 20-year-olds depending on gender and the side of the body (N – above the ligament; W – at the level of the ligament; P – below the ligament)

usually above (26% of cases), at the level (34%) or below the inguinal ligament (40%). Bitter et al. (3) also confirmed such origin of the artery. According to Stied, who was quoted by Adachi's (1), the described artery very rarely branched-off from the common iliac artery (4 in 42 cases). Moreover, its origin of the described vessel is commonly slightly below the origin of the inferior epigastric artery. According to Bochenek (4) the common origin for both arteries is seldom observed. Adachi (1) compared the levels at which both major branches of the external iliac artery originate in relation to one another. In 55 cases (out of 69) the deep circumflex iliac artery arose from a lower level than the inferior epigastric artery. In remaining 9 and 5 cases it branched at the same level or above the inferior epigastric artery, respectively. Higher incidence was reported by Benningohoff (2), Łysenkow (7), Marciniak (8), Rogalski (9) and Sieglauber (10) and Testut (15).

Adachi (1) reported 5 cases (out of 105) with a double deep circumflex iliac arteries. In 3 cases both arteries originated above, and in remaining ones at the level or below the inguinal ligament. According to Bochenek (4), double arteries are observed only in 5% of cases. Such rare anomalies were not observed in the current study.

The origin of the deep circumflex iliac artery differs thought the prenatal and postnatal life in both sexes. However, in adults it is usually located below the inguinal ligament.

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