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Original Research Article

Variable Branches of the Common Iliac Artery

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Abstract: The description of the common iliac artery and its branches varies significantly in various anatomic references. The results of the observations of several authors are discussed. A study of 143 cadavers in which the branches of the common iliac arteries are investigated is reported. In this study 93 cases (65%) showed no branch from the common iliac artery. In 50 cases (35%) a lateral branch was found. Out of these 50, 18 were given off from the right side, 16 from the left and 16 from both sides. The average diameter of the branch lumen was about 3 mm. The branches supplied the iliopsoas muscle (in addition to the iliolumbar artery), occasionally the ureter, lymph- nodes or kidney. In operative procedures near the bifurcation of the abdominal aorta, it is necessary to look for lateral branches of the common iliac artery.
Keywords: Common iliac artery, Abnormal branches, Variations of arteries.

INTRODUCTION

Recent advances in vascular surgery have led to an increase in operative procedures on the abdominal aorta and its branches, and these are not always performed by vascular surgeons. In these procedures, it is often necessary to dissect the common iliac artery and its bifurcation. It is therefore of paramount importance to have a precise knowledge of the variations of the branches of that vessel, to avoid unnecessary blood-loss or delay in the procedure. Moreover, preservation of such a branch could help in avoiding impending ischemia of another organ.

A detailed review of the literature about the lateral branches of the common iliac artery will be given. Followed by the results of a study of 143 cadavers.

MATERIAL AND METHOD

One hundred and forty-three cadavers were embalmed by injection of a formalin-alcohol solution into the femoral artery. They were investigated in the Anatomical Institute of the University of Cologne. The arteries were dissected without the use of radiographic and corrosion methods. The findings are represented by drawings because of the poor quality of photographs of anatomical dissections.

RESULTS AND DISCUSSION OF REFERENCES

The description of the right and left common iliac artery varies widely in anatomic textbooks. Braus [1] stated that the common iliac artery had no branches. This was also the conclusion of a number of other authors; Broesike [2]; Grosser [3]; Maisonnet [4]; Sieglbauer [5]; Kahle *et al*. [6] and Tondury [7].

No lateral branches are mentioned by many authors: Spalteholz [8]; Broesike [9]; Dubreuil-Chambardel [10]; Pernkopf [11]; Corning [12]; Alverdes [13]; Spalteholz and Spanner [14]; Hafferl [15]; Benninghoff and Goerttler [16]; Lang and Wachsmuth [17]; Frick *et al*. [18] and Tischendorf [19]. Further Gegenbaur [20]; Sobotta [21]; Rouviere [22]; Voss and Herrlinger [23]; Starck and Frick [24] indicate no noteworthy branch of this vessel.

Only a few authors have described in detail lateral branches of the common iliac artery. In 1860 Hollstein [36] reported unnamed branches to the ureter, iliopsoas muscle and neighboring lymphnodes. Henle [25] described as variations, besides a high division of the abdominal aorta, lateral branches of the common iliac artery: the lumbar arteries and branches to the colon or kidney.

Beside small branches to neighboring lymph-nodes, Tandler [26] stated that in exceptional cases a lateral branch to the kidney arises from the common iliac artery. Heitzmann [27] described lateral branches to the abdominal wall, iliopsoas muscle and rectum.

An exact description of possible lateral branches of the common iliac artery has been given by only 6

authors (see Table 1). It is obvious from the above review that only a few authors have given much attention to these lateral branches. Hyrti, who himself described these lateral branches, gave them no practical importance, stating in 1878 that "in the abdomen, at the places where these blood-vessels are found, no operations are performed".

Furthermore, in most textbooks of anatomy used until now, the branches of the common iliac artery are not mentioned or are even unknown to many authors.

In the arteriographic literature lateral branches are not mentioned [28] or, if indicated, are listed as supernumerary or not noteworthy [29].

Table-1: Lateral branches of the common iliac artery

	Hyrtl [30]	Rauber/ Kopsch [31]	Adachi [32]	Testut [33]	Paturet [34]	Gray [35]
Name of branch:						
Renal artery	×	×	×	×	×	×
Lumbar artery (3.,4.,5.)				×	×	
Medial sacral artery	×		×	×		
Lateral sup. Sacral artery				×		
Iliolumbar artery		×	×	×	×	×
Obturator artery				×		
Inf. mesenteric artery	×			×		
Umbilical artery				×		
Lateral branches to the following structures:						
Lymph-nodes		×		×	×	
Ureter		×		×	×	×
Iliopsoas muscle		×		×	×	×
Peritoneum						×

Table-2: Structures supplied by lateral branches of the common iliac artery

a) Only one lateral branch	
Structure	No
Iliopsoas muscle	43
Ureter	10
Lymph-nodes	1
Ureter and kidney	1
Iliopoas muscle and ureter	5
Iliopsoas muscle and lymph-node	1
Iliopsoas muscle, ureter and kidney	1
Total	62
b) Double lateral branches	
Structure	No
Iliopsoas muscle	1
Iliopsoas muscle and ureter	1
Iliopsoas muscle and lymph-nodes	2
Total	4

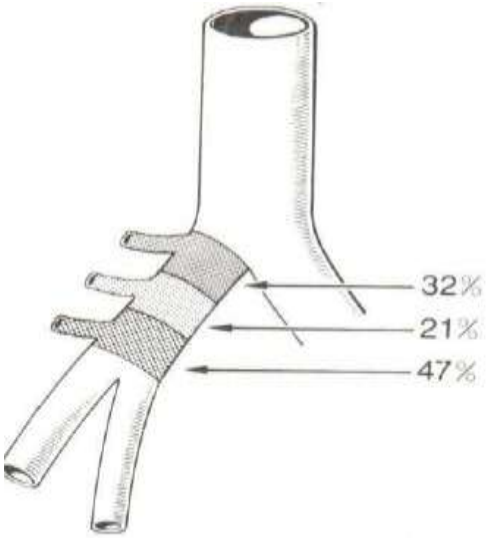

Fig 1: Incidence of the lateral branch arising from the proximal. middle and distal thirds of the common iliac artery.

RESULTS OF DISSECTION AND DISCUSSION

One hundred and forty-three cadavers in the Anatomical Institute of the University of Cologne were investigated: 59 males and 84 females. In 93 cases (35 males and 58 females), i.e. 65%, no lateral branch of the common iliac artery was found. In 50 cases (24 males and 26 females), i.e. 35%, we found lateral branches of the vessel.

In 16 cases there was a lateral branch arising from both common iliac arteries, in 18 cases one arising from the right and in 16 cases, one from the left common iliac artery. In other words, there were lateral branches arising from 66 iliac arteries in these 50 cases.

Twenty branches arose from the proximal third (32%). 13 from the middle third (21%) and 29 from the distal third (47%) of the common iliac artery (see Fig. 1). In 4 cases we found double branches arising from each common iliac artery: twice from the proximal and distal thirds, both from the distal third in one case, and once from the middle and distal thirds (The double branches are not included in Fig. 1).

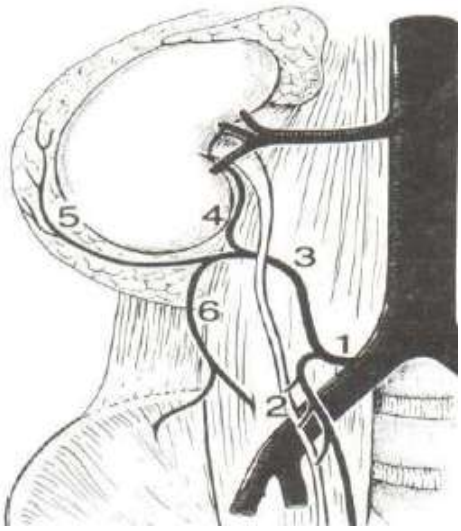

Fig-2: To illustrate a variant lateral branch of the right common iliac artery in an 80-year-old woman. The lateral branch arises dorsolaterally from the proximal third (I). it bifurcates: one branch descends parallel to the ureter. Supplies it and ends there (2): the other branch ascends for a short distance (3). crosses behind the ureter and gives off a branch (4) which reaches the renal hilum and anastomoses with the right renal artery (see Hyrtl 1878), the branch then divides into 2 end-arteries: one to the adipose capsule of the right kidney (5) and the other to the iliopsoas muscle (6).

As to the structures these lateral branches supply, in 43 cases the branch supplied the iliopsoas muscle, in 10 cases the ureter and in one case neighbouring lymph-nodes. In 8 cases the branch supplied more than one structure: once the kidney and ureter, in 5 cases iliopsoas muscle and ureter, in one case iliopsoas muscle and lymph-nodes and in one case the iliopsoas muscle, ureter and kidney. In the 4 cases with double branches: Both branches supplied the iliopsoas muscle in one case, one branch supplied the iliopsoas muscle and the other the neighbouring lymph- nodes in two cases. In the last case one branch supplied the iliopsoas muscle and the other the ureter (see Table 2). In all these cases the lumen of the lateral branch showed an average diameter of 3 mm. All these branches emerged from the dorsolateral aspect of the common iliac artery.

Many authors assume that a lateral branch is, in fact, an anomaly in which the iliolumbar artery arises from the common iliac artery. However, in all the cases we studied there was a normally located iliolumbar artery springing from the internal iliac artery. When one of the above-mentioned lateral branches of the common iliac artery supplied the iliopsoas muscle, it was always in addition to the usual supply from the iliolumbar artery.

To quote Hyrtl [30] again: "I have seen a large anastomosing branch between the renal artery and the right common iliac artery in a newborn". We found a similar ease involving a lateral branch of the right common iliac artery in an 80-year-old woman (Fig. 2).

In conclusion, I would like to point out that a lateral branch of the common iliac artery is not rare: it occurred in our study in 35% of cases. In surgical procedures involving the common iliac artery, it is wise to have a precise knowledge of the variations of this vessel.

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