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Case Report

Multiple variations of internal iliac artery – A case report

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ABSTRACT

Introduction: Internal iliac artery (IIA) is the vessel predominantly supplying the pelvic viscera and the pelvic wall. The main stem of IIA is usually devoid of any branches. Its two divisions give rise to all its branches.
Method: A case of multiple variations of IIA was noted during routine dissection of a male cadaver on the right side.
Results: Inferior gluteal artery and middle rectal artery which are usually branches of the anterior division of IIA arose from the posterior division. Iliolumbar artery, usually a branch of the posterior division arose from the main stem of IIA. Obturator artery arose from external iliac artery instead of IIA.
Discussion: The knowledge of such variations aids in performing various surgical and radiological procedures in this region.

1. Introduction

IIA also known as the hypogastric artery is the prime artery of pelvis. It continues as the umbilical artery in fetus, which persists as the medial umbilical ligament in adult life. It is a terminal branch of common iliac artery. It ends by dividing into anterior and posterior divisions. The anterior division gives rise to the parietal branches namely internal pudendal artery, inferior gluteal artery, obturator artery and the visceral branches namely superior vesical artery, inferior vesical artery (replaced by vaginal artery in females) and middle rectal artery; uterine artery in addition to these in females. The posterior division gives rise to the parietal branches namely iliolumbar artery, lateral sacral artery and superior gluteal artery.[1] IIA is known for its variations.[2] Some of them are of significant clinical importance.

This case is being reported for the presence of multiple such variations in the same pelvis.

2. Materials and methods

During routine dissection of a 70-year-old male cadaver in the department of anatomy, variation was observed in the IIA of

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right pelvis. The pelvis was separated by transection of trunk at the level of L4–L5 articulation and disarticulation of the hip joint. The pelvis was bisected longitudinally in the midline and further dissection was completed. IIA was traced distally and all the branches of both the divisions were identified. The external iliac artery was dissected and traced distally to look for the origin of obturator artery. The findings were photographed.

3. Results

IIA terminated into anterior and posterior divisions at the upper border of greater sciatic notch. Iliolumbar artery which is usually a branch of the posterior division was found to arise from the main stem of IIA even before its bifurcation. The anterior division gave away the branches namely two superior vesical arteries (then tapered as the umbilical artery), inferior vesical artery and internal pudendal artery. The middle rectal artery and the inferior gluteal artery which are usually the branches of the anterior division were found to arise from the posterior division. They were along with the other two usual branches of posterior division namely the superior gluteal artery and the lateral sacral artery (Fig. 1).

The obturator artery instead of arising from the anterior division of IIA arose from the external iliac artery. It coursed lateral to the femoral ring and entered the obturator foramen (Fig. 2).

4. Discussion

Inferior gluteal artery usually a branch of anterior division of IIA arose from the posterior division in this specimen. According to Adachi's classification, the pattern of branching of

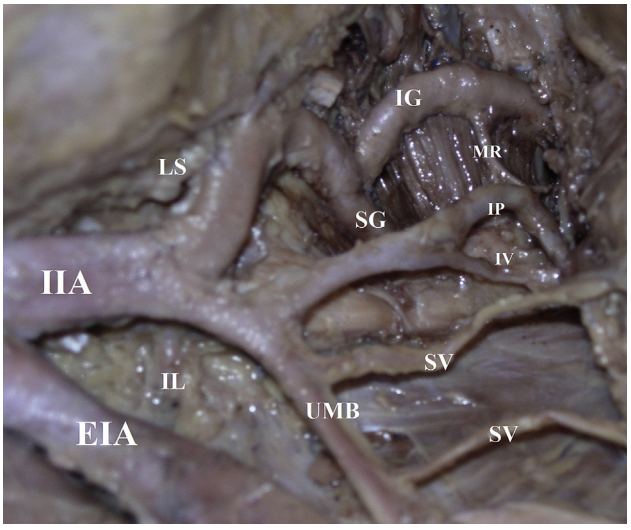

Fig. 1 – Branches of internal iliac artery. IIA – Internal iliac artery; EIA – External iliac artery; IL – Iliolumbar artery; LS – Lateral sacral artery; SG – Superior gluteal artery; IG – Inferior gluteal artery; MR – Middle rectal artery; IP – Internal pudendal artery; IV – Inferior vesical artery; SV – Superior vesical artery; UMB – Umbilical artery.

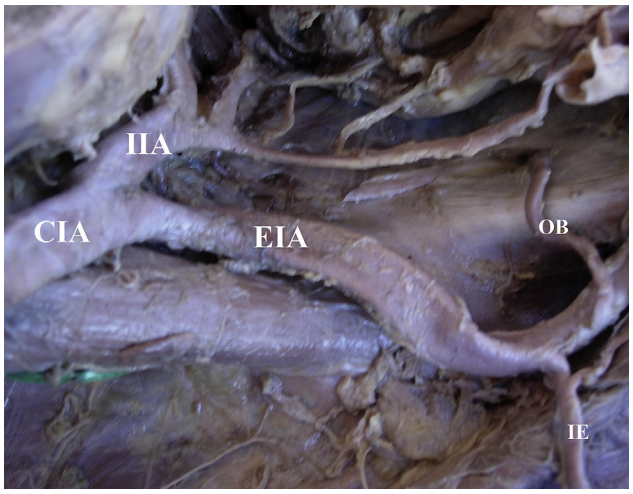

Fig. 2 – Obturator artery. CIA – Common iliac artery; IIA – Internal iliac artery; EIA – External iliac artery; OB – Obturator artery; IE – Inferior epigastric artery.

IIA was not described in terms of its anterior and posterior divisions. They are of five types based on the large parietal branches namely umbilical artery, superior gluteal artery, inferior gluteal artery and internal pudendal artery.[3]

Type I: The superior gluteal artery arises separately from the IIA, and the inferior gluteal and internal pudendal vessels are given off by a common trunk. If the latter divides within the pelvis it is considered to be Type Ia, whereas if the bifurcation occurs below the pelvic floor it is classified as Type Ib (51.2%). Type II: The superior and inferior gluteal arteries arise by a common trunk and the internal pudendal vessel separately. If the trunk common to the two gluteal arteries divides within the pelvis it is Type IIa and if the division occurs outside the pelvis it is classified as Type IIb (23.1%). Type III: The three branches arise separately from IIA (18.2%). Type IV: The three arteries arise by a common trunk gluteal arteries (4.1%). Type V: The internal pudendal and the superior gluteal arteries arise from a common trunk, and the inferior gluteal has a separate origin (0.8%).

This case belongs to Type IIa of Adachi's classification since the superior and inferior gluteal arteries arise from a common stem. Such a variation was observed in a different study to be 11.8%.[4]

The division of IIA into two divisions may not be clear cut, and the branches which arise from anterior and posterior trunks may vary considerably.[5] The so-called anterior division and posterior division may not exist at all.[6] In some cases the branches arise without the artery dividing into an anterior and posterior division.[2]

Iliolumbar artery is usually a branch of posterior division and is found to arise from the main stem in this specimen. Such a finding had been earlier mentioned by Piersol.[7]

Middle rectal artery is somewhat variable both in its origin and in its size.[7] Its origin from the posterior division as in this case is a rare finding. However there are reports which indicate its origin in common with inferior gluteal artery. Origin of middle rectal artery from inferior gluteal artery was noted by DiDio et al in 26.7%.[8]

Obturator artery was found to arise from external iliac artery or inferior epigastric artery in 29%.[9] The origin from external iliac artery as in this specimen is a rare finding and is observed in hardly 1% of specimens.[7]

Embryologically, the IIA is consisted of two main trunks: the medial umbilical ligament (superior vesical artery) and inferior gluteal artery. Most of the branches originate from the two trunks and the junction between them.[10] The alteration in the point of origins during embryonic life had resulted in multiple variations in this case.

The definitive obturator artery forms as a result of uneven growth of the anastomosis between IIA and external iliac artery which is connected with the peculiarities of regional organogenesis. All gradations may be found between normal arrangement and complete replacement of the original intra pelvic portion of the obturator artery by the pubic anastomosis.[7]

The clinical importance underlying the branching pattern of IIA is that any deviation in the normal arterial pattern, if unnoticed during pelvic surgery may lead to undue hemorrhage. In IIA ligation, a thorough understanding of the pelvic vasculature and also of the possible individual variations in the branching pattern of the IIA is necessary for pelvic surgeons.[11] Intra arterial chemotherapy and middle rectal artery embolization in patients presenting with sustained bleeding with carcinoma rectum is being done which requires the knowledge of such variability in the origin of middle rectal artery.[12]

Any number of radiological procedures involving IIA requires a detailed knowledge of these variations, in order to perform either diagnostic or therapeutic procedure. The surgical significance underlying the obturator artery arising from external iliac artery is that, the artery runs a greater risk of being wounded during the operation for strangulated femoral hernia. It may lead to undue hemorrhage if attention is not provided.

Conflicts of interest

All authors have none to declare.

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