



Variant Branching Pattern of the Right Internal Iliac Vessels in A Male: A Case Report

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Abstract

Internal iliac vessels show frequent variations in their branching pattern. We saw variations in the branching pattern of right internal iliac vessels in a male cadaver. The internal iliac artery did not divide into anterior and posterior divisions. There were three common trunks: one for iliolumbar and lateral sacral arteries, another for inferior gluteal and internal pudendal arteries, and the third one for superior vesical and obturator arteries. The superior gluteal and middle rectal arteries arose directly from the main trunk of the internal iliac artery. The internal iliac vein did not have a main trunk. Its anterior and posterior divisions joined with the external iliac vein to form the common iliac vein. Knowledge of these variations might be useful for the urologists and surgeons.

Key words: Internal iliac artery, internal iliac vein, pelvic vessels, variation

Introduction

The internal iliac artery (IIA) is among the terminal branches of the common iliac artery. It supplies the pelvic viscera, perineum and the gluteal region. It begins in front of the sacroiliac joint at the level of the intervertebral joint between the fifth lumbar vertebra and the sacrum. It descends down to the upper margin of the greater sciatic notch and terminates by dividing into anterior and posterior divisions [1,2]. In males the anterior division gives superior vesical,

inferior vesical, obturator, middle rectal, inferior gluteal, and internal pudendal arteries. The posterior division gives iliolumbar, lateral sacral, and superior gluteal arteries. The variations in the origin and branching pattern of IIA are said to be due to the developmental reasons. Developmentally, the IIA is derived from the umbilical artery [3]. Various authors have attempted to classify the anatomic variants of the branching pattern of IIA, based on the cadaveric studies [4-5].

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The internal iliac vein (IIV) collects the venous blood from the pelvic organs, perineum and the gluteal region. Its tributaries correspond to the branches of the IIA, except for the iliolumbar vein. The iliolumbar vein drains into the external iliac vein. The variations in the pattern of formation of the IIV are relatively rare. The IIV may form an annulus around the IIA or it may receive an unusual vessel representing a confluence of the internal pudendal, obturator, gluteal, and sciatic veins [6]. Here we present the variation in the formation and termination of the IIV.

Case Report

During the dissection classes for medical undergraduates, we observed concurrent variations of the internal iliac vessels. The variations were found on the right side of the pelvis of a male cadaver aged approximately 65 years. The IIA had a normal origin and course but it did not divide into anterior and posterior divisions. There were three common trunks: one for iliolumbar and lateral sacral arteries, another for inferior gluteal and internal pudendal arteries, and the third one for superior vesical and obturator arteries (Figure 1). The superior gluteal and middle rectal arteries arose directly from the main trunk of IIA. The superior gluteal artery entered the gluteal region through the greater

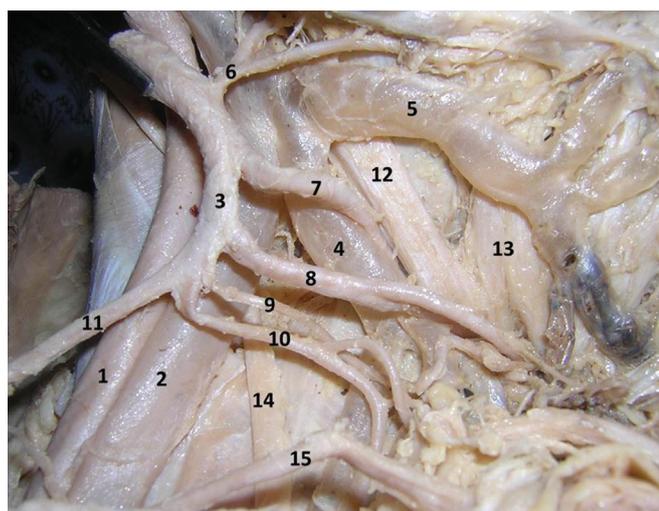


Figure 1. Dissection of the right side of the pelvis showing the unusual internal iliac vessels. (1 – external iliac artery; 2 – external iliac vein; 3 – internal iliac artery; 4 – anterior division of internal iliac vein; 5 – posterior division of internal iliac vein; 6 – common trunk for iliolumbar and lateral sacral arteries; 7 – superior gluteal artery; 8 – common trunk for inferior gluteal and internal pudendal arteries; 9 – middle rectal artery; 10 – common trunk for superior vesical and obturator arteries; 11 – medial umbilical ligament; 12 – lumbosacral trunk; 13 – ventral ramus of first sacral nerve; 14 – obturator nerve; 15 – vas deferens).

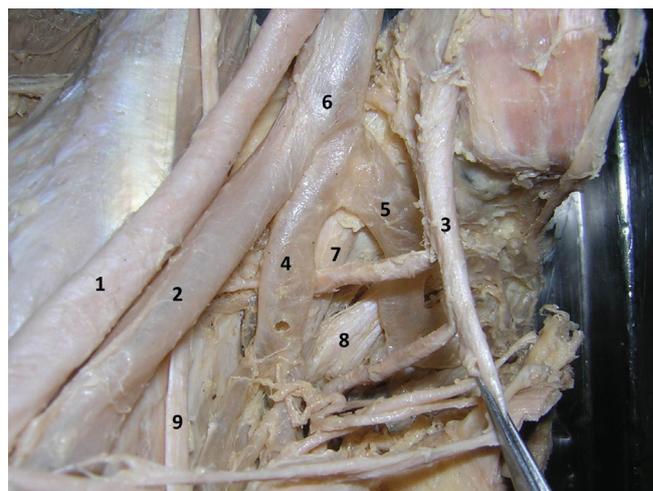


Figure 2. Dissection of the right side of the pelvis showing the unusual formation of the right common iliac vein. (1 – external iliac artery; 2 – external iliac vein; 3 – internal iliac artery; 4 – anterior division of internal iliac vein; 5 – posterior division of internal iliac vein; 6 – common iliac vein; 7 – lumbosacral trunk; 8 – ventral ramus of first sacral nerve; 9 – obturator nerve).

sciatic foramen by passing above the lumbosacral trunk instead of passing between the lumbosacral trunk and ventral ramus of the first sacral nerve. The superior vesical artery supplied the territory of the inferior vesical artery, since the inferior vesical artery was absent. The IIV did not have a main trunk. Its anterior and posterior divisions joined with the external iliac vein to form the common iliac vein [Figs. 1 and 2]. Its posterior division ascended in front of the ventral rami of sacral spinal nerves, and the anterior division ascended parallel to the lumbosacral trunk (Figure 2).

Discussion

The IIA is known to show some variations in its branching pattern and the knowledge of these variations is of utmost importance for the surgeons performing obstetric and gynecological surgeries. Knowledge of the branching pattern of this artery is pivotal in pelvic surgeries because erroneous interpretation and ligation of its branches are the sources of unexpected bleeding during the surgery. The percentage of successful ligation of its branches varies from 42–75% [7,8].

Jastschinski [4] was the first person that grouped the variations of parietal branches of the IIA in the Polish population. He classified the vessels into four definite types. After this, Adachi et al. [4] classified the branching pattern of IIA into five types with 8 groups in a study on Japanese subjects. In both the above studies, the classification was based on the variations

in the origin of the branches of IIA, namely umbilical, superior gluteal, inferior gluteal, and internal pudendal arteries. Yamaki conducted a study on 645 pelvic halves of Japanese cadavers, and proposed a modified Adachi classification. He divided the branching pattern of IIA divided into 5 types and 19 groups [5]. In this modified classification, type 1 is the predominant type. Earlier in the literature, type 1 was observed in 50.9% [9], 54.2% [10], and 58.2% [5] of cases. In the type 1 pattern, the superior gluteal artery is the first to arise independently from the main stem, and inferior gluteal and internal pudendal arise from a common trunk as a second branch. It is further divided into four groups. When the common trunk of the inferior gluteal and internal pudendal arteries divides within the pelvis, it is considered to be group 1. If the division occurs outside the pelvis, it is group 2. When the superior gluteal artery and the common trunk of the inferior gluteal and internal pudendal arteries simultaneously originate from the main stem, they are classified as group 3 and group 4. In the present case, we observed the group 2 branching pattern of IIA. Yamaki, in his study, found that group 2 was observed in 2.8% of cases among type 1. During embryonic life the most appropriate channels of developing IIA enlarge, whereas the others get retracted or disappear to give a final arterial pattern. In this process, sometimes there is a chance of disappearance of one of the major appropriate channels, which will result in a variant arterial pattern. Variation of the superior gluteal artery has to be kept in mind while planning iliosacral screw placement because the aberrant course or branching might result in the involvement of the artery or its branches [11]. In the current case, the superior gluteal artery did not have its normal course between the lumbosacral trunk and the first sacral nerve. This abnormal course might make it liable to injuries. Knowledge of abnormal origin, course or branching of the obturator artery is important for the surgeons dealing with a femoral and obturator hernia. Since the superior vesical and obturator arteries originated from a common trunk, the surgeons performing the bladder surgery or femoral hernia reduction must be aware of this possibility in order to avoid the ligation of the common trunk.

Variations of the IIV are relatively rare compared to

the variations of the IIA. The IIV may cross the midline and terminate in the common iliac vein of the opposite side, or it may join the IIV of the opposite side to form a common trunk and then drain into one of the common iliac veins [12]. The aberrant venous patterns of formation and drainage can be detected using multidetector computerized tomography [13]. In the current case, the common iliac vein was formed by the union of the external iliac vein and two divisions of IIV, instead of IIV itself. The knowledge of this variation may be useful for the surgeons while performing the aggressive pelvic dissection.

Conclusions

Though the variations of the branching pattern of IIA and IIV are common, a sound knowledge of the possible variations is needed for the surgeons dealing with a femoral hernia, repair of pelvic floor, surgery of genital organs, rectum and anal canal, and also for the orthopaedic surgeons doing surgeries of hip or sacroiliac joints. The current report may be very useful because of its rarity.

Conflict of interest statement

We, the authors, wish to declare that there are no conflicts of interest.

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