



Case Report:

Duplication of Inferior Gluteal Artery and Course of Superior Gluteal Artery Through the Lumbosacral Trunk

Authors

Satheesha B Nayak, Prakashchandra Shetty, Sudarshan Surendran, Surekha D Shetty,
Melaka Manipal Medical College (Manipal Campus), Manipal University, Manipal - 576104, Karnataka, India.

Corresponding Address

Dr. Satheesha Nayak B,

Professor of Anatomy,
Melaka Manipal Medical College (Manipal campus),
Manipal University, Madhav Nagar,
Manipal, Karnataka State, INDIA.

E-mail: nayaksathish@gmail.com

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Abstract: Internal iliac artery (IIA) shows great deal of variations in its branching pattern. The knowledge of its variant branches is required for successful surgical, orthopedic, plastic surgery and radiological procedures. We observed variations of some of the branches of right IIA in an adult male cadaver. The iliolumbar artery originated from the main trunk of the IIA. After this, IIA divided into anterior and posterior divisions. The posterior division gave lateral sacral and superior gluteal arteries. Superior gluteal artery pierced the lumbosacral trunk before leaving the pelvis. The anterior division further divided into anterior and posterior trunks. Anterior trunk gave rise to superior vesical, inferior vesical, middle rectal and obturator arteries. The posterior trunk gave two inferior gluteal arteries and an internal pudendal artery.

Key Words: Internal iliac artery; Iliolumbar artery; Superior gluteal artery; Inferior gluteal artery; Lumbosacral trunk; Variation

Introduction:

Internal iliac artery [IIA] is the smaller terminal branch of the common iliac artery. It supplies the pelvic organs, pelvic walls and proximal part of the lower limb through its branches. As described in the textbooks, it usually divides into anterior and posterior divisions. The anterior division gives superior vesical, inferior vesical, middle rectal, obturator, internal pudendal and inferior gluteal arteries. In females, the anterior division also gives uterine and vaginal arteries. The posterior division gives iliolumbar, lateral sacral and superior gluteal arteries.[1] However, IIA fails to divide into anterior and posterior divisions in a few cases; where all its branches directly come from its trunk. The branches that are normally given by anterior division might come from posterior division and vice versa. Some of its branches like obturator artery might come from other arteries like inferior epigastric artery also. A thorough knowledge of these variations is useful to various medical disciplines for a proper diagnosis and treatment and to avoid iatrogenic injuries during various procedures. We report some rare variations in the branches of the internal iliac artery and discuss their clinical implications in this report.

Case Report

During our dissection classes for first year medical students, we noted the following variation in the branches of right internal iliac artery in an adult male cadaver aged approximately 65 years. The internal iliac artery first gave rise to iliolumbar artery and then divided into anterior and posterior divisions. The anterior division further divided into anterior and posterior trunks. The anterior trunk gave origin to superior vesical, inferior vesical, middle rectal and obturator arteries. The posterior trunk gave rise to two inferior gluteal arteries and an internal pudendal artery. One among the two inferior gluteal arteries ended by supplying muscles of gluteal region, whereas the other one had a normal course and distribution of the inferior gluteal artery as described in the textbooks. The posterior division gave rise to lateral sacral and superior gluteal arteries. The superior gluteal artery pierced the lumbosacral trunk before leaving the pelvis. After piercing the lumbosacral trunk, it entered the gluteal region through greater sciatic foramen, above the piriformis muscle. Its course and distribution in gluteal region was normal. The variations are shown in Figures 1-3.

Discussion

Internal iliac artery is known to show variations in its branching pattern. One of the rare variations of IIA is its total absence.[2] When it is absent, its territory is taken care by nearby vessels such as lumbar arteries. First classification of variations of branches of IIA was done by Jastshinski on Polish population.[3] He classified the vessels into four types. Adachi et al., further classified the branches into five types in Japanese people.[4] Later this classification was modified by Yamaki.[4] Adachi's classification is the most popular among all classifications. In the current case, the anterior division of the IIA divided into anterior and posterior trunks. None of the above classifications describe this type of subdivision of anterior trunk of IIA. There are reports on total absence of inferior gluteal artery and its replacement by other arteries.[5] However, its duplication as reported in the current case is extremely rare. It is a boon for plastic surgeons to have two inferior gluteal arteries.[6] An inferior gluteal artery flap can

be raised without compromising blood supply to the gluteal region in such cases.

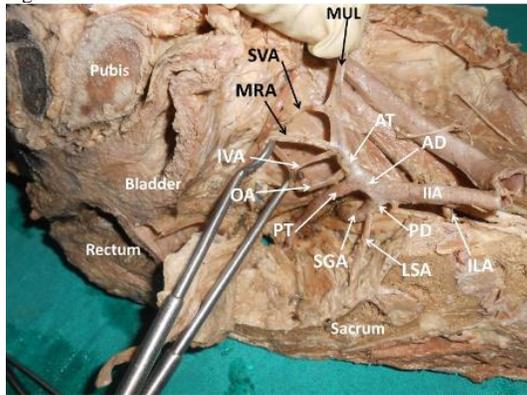


Figure 1. Photograph of dissected right hemipelvis showing the branches of internal iliac artery. (IIA – internal iliac artery; ILA – iliolumbar artery; AD – anterior division; PD – posterior division; AT – anterior trunk of anterior division; PT – posterior trunk of anterior division; SVA – superior vesical artery; IVA – inferior vesical artery; MRA – middle rectal artery; OA – obturator artery; MUL – medial umbilical ligament; LSA – lateral sacral artery; SGA – superior gluteal artery)

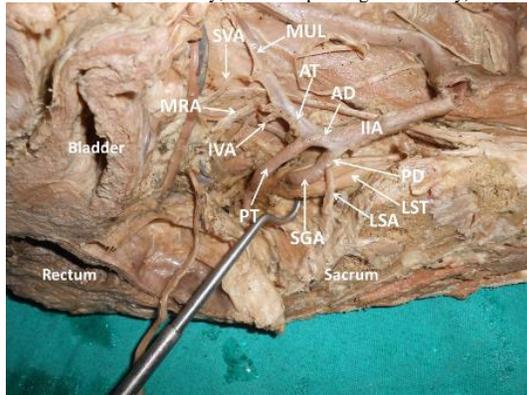


Figure 2. Photograph of dissected right hemipelvis showing the piercing of lumbosacral trunk by the superior gluteal artery. (IIA – internal iliac artery; AD – anterior division; PD – posterior division; AT – anterior trunk of anterior division; PT – posterior trunk of anterior division; SVA – superior vesical artery; IVA – inferior vesical artery; MRA – middle rectal artery; MUL – medial umbilical ligament; LSA – lateral sacral artery; SGA – superior gluteal artery; LST – lumbosacral trunk)

Iliolumbar artery usually arises from the posterior division of IIA as its first branch. However, it may arise directly from the common iliac or IIA. In the current case, it arose directly from the main trunk of the IIA. This type of direct origin can be found in 14-71% of cases as reported in the literature.[7-9] Iliolumbar artery is an important landmark in orthopedic surgery. Knowledge of its variations comes handy in orthopedic procedures.[7,8]

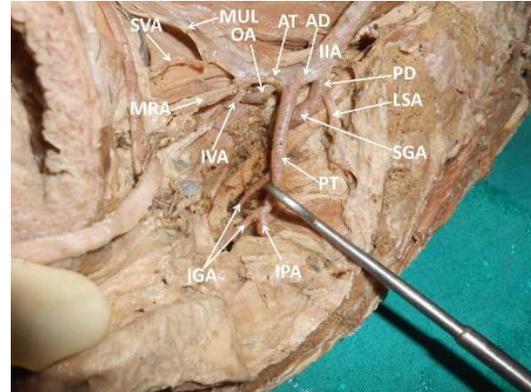


Figure 3. Photograph of dissected right hemipelvis showing the piercing of lumbosacral trunk by the superior gluteal artery.

(IIA – internal iliac artery; AD – anterior division; PD – posterior division; AT – anterior trunk of anterior division; PT – posterior trunk of anterior division; SVA – superior vesical artery; IVA – inferior vesical artery; MRA – middle rectal artery; OA – obturator artery; MUL – medial umbilical ligament; IGA – inferior gluteal artery; IPA – internal pudendal artery; LSA – lateral sacral artery; SGA – superior gluteal artery)

Superior gluteal artery is a constant branch from the posterior division of IIA. It does not show many variations. After giving iliolumbar and lateral sacral artery, posterior division of IIA continues as superior gluteal artery. It leaves the pelvis through greater sciatic foramen above the piriformis muscle, along with superior gluteal nerve. Just before leaving the pelvis, it passes through the gap between the lumbosacral trunk and ventral ramus of first sacral nerve. In the current case, this artery pierced the lumbosacral trunk before leaving the pelvis. This is an extremely rare variation and to the best of our knowledge, has not been reported yet. Knowledge of variation of superior gluteal artery is very useful in radiological, orthopedic and plastic surgery procedures. Transcatheter embolisation for pseudo aneurysms[10,11], and iliosacral screw placement [12] are the techniques that require a sound knowledge of variations of this artery. Deep inferior epigastric perforator is of first preference for breast reconstruction surgery. Superior gluteal artery flap is the second option for this surgery.[13] However, superior gluteal artery flap is used in some other procedures such as sacral sore coverage[14], and meningocele defect cover.[15] Angioplasty of superior gluteal artery is done in patients with buttock claudication. [16] However, the possibility of lumbosacral trunk being pierced by it has to be kept in mind during this procedure. Gluteal compartment syndrome [17,18] is noted in some cases of hip dislocation. In the current case, entrapment of the superior gluteal artery in the lumbosacral trunk might also lead to symptoms similar to that of gluteal compartment syndrome.

Conclusion

Though it is not uncommon for iliolumbar artery to arise directly from main trunk of IIA, it is very rare to see anterior division of IIA to divide into two trunks, duplication of inferior gluteal artery and piercing of lumbosacral trunk by superior gluteal artery. Thus the case we are presenting here is unique. It has many clinical implications too. Duplication of inferior gluteal artery can be a boon to plastic surgeons raising inferior gluteal artery flaps. Piercing of lumbosacral trunk by superior gluteal artery might make radiological procedures and surgical procedures difficult. Compression of the superior gluteal artery within the lumbosacral trunk might lead to vascular symptoms in the gluteal region and thigh. The artery might

also compress the lumbosacral trunk and the symptoms may mimic that of sciatica.

injury as a result of simple hip dislocation: a case report. *Iowa Orthop J.* 2011;31:181-6.

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