



# Anomalous Retro-Psoas Iliac Artery: A Case Report

허리근뒤 이상 온엉덩동맥: 증례 보고

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The anomalous retro-psoas iliac artery is an extremely rare congenital iliolumbar vascular anomaly. A 51-year-old woman presented to our emergency department with worsening right lower extremity pain and weakness for 3 months. CT angiography of the right lower extremity showed no evidence of stenosis in the lower extremity arteries and the incidental finding of an anomalous right retro-psoas iliac artery. Herein, we report a rare case of anomalous retro-psoas iliac artery. Surgeons and clinicians need to be aware of this rare congenital anomaly to avoid severe complications during pelvic or orthopedic surgery.

**Index terms** Iliac Artery; Congenital Abnormalities; Cardiovascular Abnormalities

## INTRODUCTION

The anomalous retro-psoas iliac artery is an extremely rare congenital iliolumbar vascular anomaly (1-5). Our literature review revealed only six reported cases of the anomalous retro-psoas iliac artery. Usually, they are incidentally detected on imaging or at autopsy, as the patients are asymptomatic. We incidentally detected the presence of the retro-psoas iliac artery located between the right psoas muscle and the adjacent vertebral body. If rare congenital anomalies of the iliac arteries are not recognized, they may complicate aortoiliac or vertebral surgery (1-5). Therefore, herein, we report a case of the anomalous right retro-psoas iliac artery incidentally found on CT angiography.

## CASE REPORT

A 51-year-old Asian woman presented to the emergency department with worsening right lower extremity pain and weakness for 3 months. On physical examination, good femoral and peripheral pulses were palpated in both lower extremities. Neurological examination showed normal motor and sensory functions. Routine laboratory tests were within normal limits. The patient had a past medical history of hypertension, back pain, and total abdominal hysterectomy. Brain CT and MRI showed no evidence

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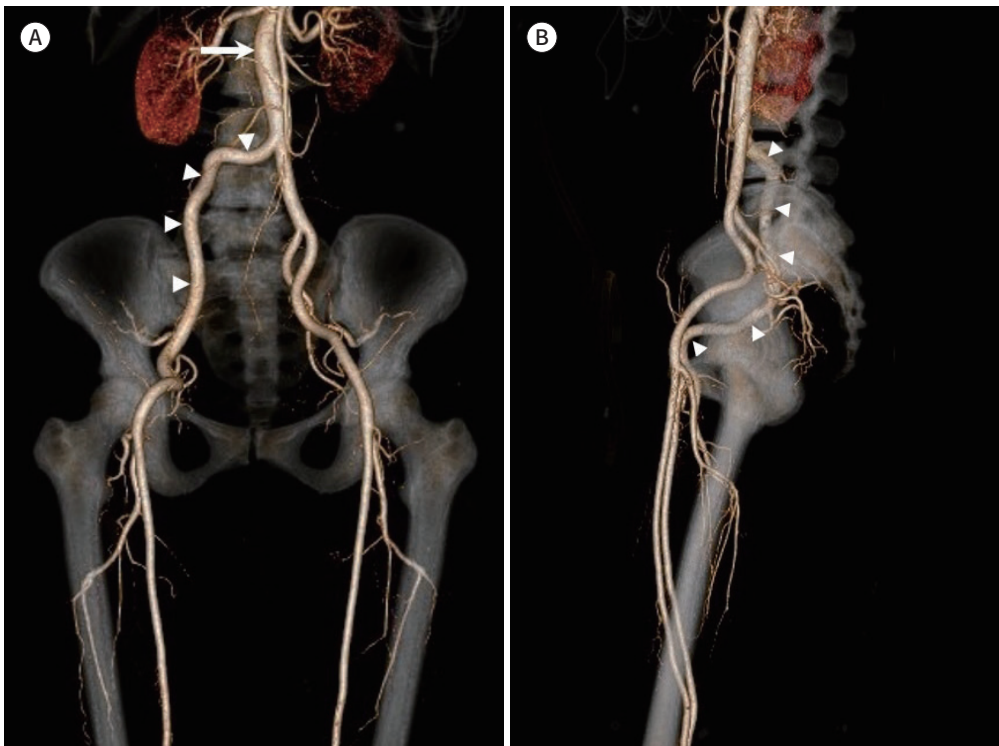
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of acute infarction, hemorrhage, or mass-like lesions that could have caused the patient's symptoms. Lower extremity CT angiography showed no evidence of stenosis in the lower extremity arteries. During this examination, the tortuous right iliac artery was detected incidentally. The abdominal aorta was located more laterally toward the left side rather than at the center before the bifurcation (Fig. 1A). The anomalous right iliac artery originated at the L3-L4 disc level with a more latero-posterior course at an acute angle than that on the contralateral side (Fig. 1A, B; arrow showing the abdominal aorta and anomalous right iliac artery). This anomalous artery was situated between the right psoas muscle and the vertebral bodies behind the inferior vena cava and right iliac vein (Fig. 1C-E). The anomalous right iliac artery did not bifurcate into the internal and external iliac arteries as on the left side and gave off multiple collateral branches serving the role of both the internal and external iliac arteries (Fig. 1F). At the inguinal ligament level, the anomalous right iliac artery was found at its normal position, continuing as the femoral artery. The contralateral left iliac artery showed no unusual anatomical orientation.

**Fig. 1.** A 51-year-old woman with the right anomalous retro-psoas iliac artery.

**A.** The anteroposterior view of the volume-rendered reconstruction image of CT angiography shows the anomalous right retro-psoas iliac artery bifurcating at the L3-L4 disc level with a more latero-posterior course at an acute angle than that on the contralateral side (arrowheads). The abdominal aorta (arrow) is located more laterally toward the left side rather than at the center before the bifurcation. Note the absence of bifurcation into the external and internal iliac arteries distally.

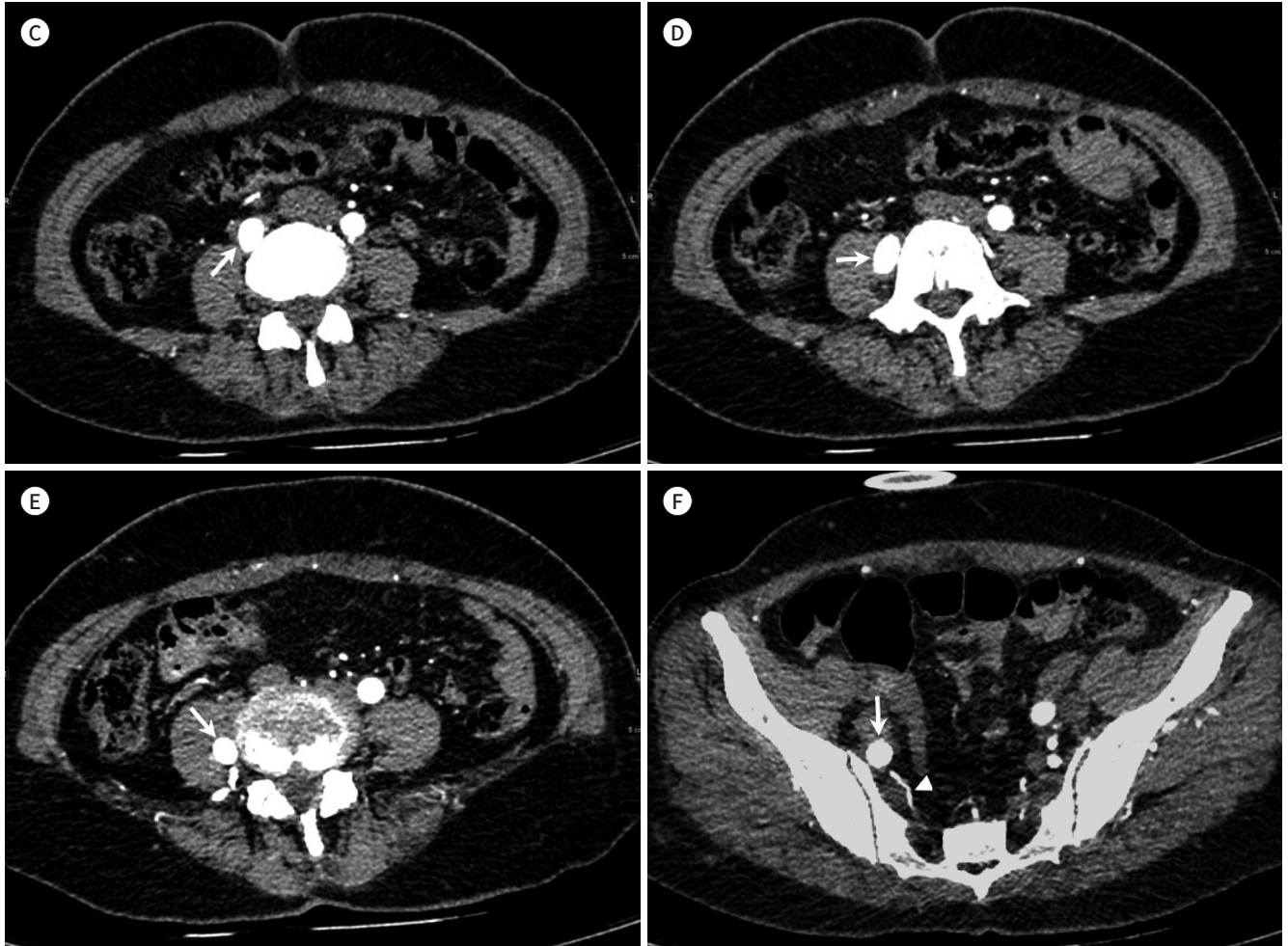
**B.** The lateral view of the volume-rendered reconstruction image of CT angiography shows a more latero-posterior course of the right anomalous retro-psoas iliac artery (arrowheads) than that of the normal left common iliac artery.



**Fig. 1.** A 51-year-old woman with the right anomalous retro-psoas iliac artery.

**C-E.** Axial CT angiography shows the course of the right anomalous retro-psoas iliac artery (arrows) situated between the right psoas muscle and the vertebral bodies behind the inferior vena cava and right iliac vein.

**F.** Axial CT angiography shows the right anomalous retro-psoas iliac artery (arrow) giving off a collateral branch (arrowhead) as the left internal iliac artery.



## DISCUSSION

The anatomy of the common iliac artery is rather fixed. It originates from the aortic bifurcation at the level of the L4 vertebra and runs infero-laterally for approximately 4 cm before running along the medial border of the psoas muscles to its bifurcation at the pelvic brim in front of the sacroiliac joints (3). Each artery bifurcates into the external and internal iliac arteries. The external iliac artery continues as the common femoral artery as it crosses under the inguinal ligament to supply the lower extremities. The internal iliac artery traverses the upper sacral regions and gives off multiple branches supplying the pelvic viscera and musculoskeletal structures (4, 6).

Vascular anomalies of the iliac arteries are rare, and their definite embryological mechanism remains unknown (1-5). In 1977, Greebe (7) reported six cases of iliac artery anomalies in a series of approximately 8000 patients who underwent angiography of the pelvic artery.

The most common iliac artery anomaly is the persistent sciatic artery with iliofemoral aplasia, which classically presents as a pulsatile buttock mass and no femoral pulse. In 1983, Honkasalo et al. (8) reported a case of the retrocausal right iliac artery in a patient with an aortic aneurysm. In that patient, the anomalous iliac artery travelling behind the psoas muscles was confirmed surgically. In 1991, Vohra and Leiberman (1) reported a case of the anomalous right common iliac artery with stenosis running behind the psoas muscle on CT. In 1998, Sonneveld et al. (2) first coined the term “retro-psoas iliac artery” while searching for an abdominal aortic aneurysm to describe the anomalous right common iliac artery running between the vertebral body and the psoas muscle.

All six case reports of the retro-psoas iliac artery published in the literature were found on the right side and none on the left side (1-5). All of them arose from the aortic bifurcation at a 90° angle at the level of the L3 or L4 vertebral body, being positioned between the psoas muscle and the vertebral body. The anomalous retro-psoas iliac artery did not bifurcate into the internal and external iliac arteries in any case except that reported by Honkasalo et al. (8). In the case reported by Vohra and Leiberman (1) the patient complained of right lower extremity pain, and angiogram showed stenosis in the right retro-psoas iliac artery. Pain alleviated with the bypass graft procedure. In the case reported by Delasotta et al. (4), the patient presented with progressively worsening right lower extremity pain, which was managed with anterior lumbar interbody fusion and physical therapy. In all other reported cases, the patients were asymptomatic, and the artery was incidentally found while investigating for aneurysms or other underlying diseases.

Lower extremity pain, as in our case, may have occurred because of the more laterally running course of the anomalous retro-psoas iliac artery, compressing the adjacent lumbar nerve roots or lumbar plexus, causing neuralgia (4). Furthermore, the risk of complications, such as fistula, hematoma, or pseudo-aneurysm, may increase in such vascular anomalies, and therefore, recognizing this vascular anomaly is important (5).

In our case, smaller collateral branches from the anomalous right retro-psoas iliac artery extending to the territory of the internal iliac artery was subtly evident. These small branches may have developed to compensate for the absence of the internal iliac artery. With development of the collateral branches, the anomalous retro-psoas iliac artery seemed to serve the role of both the internal and external iliac arteries without division.

Embryologically, the umbilical arteries arise when the embryo is less than 1.5-mm long, from the most caudally situated branches of the primitive dorsal aorta (6). The axial artery arises from the umbilical artery, with its proximal part becoming the sciatic artery, middle part becoming the deep peroneal artery, and distal part becoming the embryonic interosseous artery. Proximal to the origin of the axial artery, the external iliac artery branches off from the umbilical artery. From the external iliac artery, the inferior epigastric artery and proximal part of the femoral artery arises. At the end of the fourth week of gestation, the initial segment of the umbilical artery, dorsal to the origin of the external iliac artery, becomes the common iliac artery by connecting with the fifth lumbar intersegmental branches of the aorta (6, 9). The distal segment of the umbilical artery, ventral to the origin of the external iliac artery, becomes the internal iliac artery. It can be hypothesized that the anomalous retro-psoas iliac artery resulted from embryological discordances at the level of the umbilical artery and pos-

sibly from an abnormal connection between the umbilical artery and the lumbar intersegmental arteries during the development. Since the anomalous iliac artery reaches the same psoas muscle as the lumbar artery, the retro-psoas iliac artery may be derived from an abnormal connection between the umbilical artery and the fourth, instead of the fifth, lumbar intersegmental artery (1, 2, 5).

Congenital anomalies of the iliac artery were classified into three groups by Tamisier et al. (10). Anomalies in the origin or course of the iliac artery was classified as group 1; iliac artery hypoplasia or atresia compensated by the persistent sciatic artery was classified as group 2; and isolated hypoplasia or atresia of the iliac artery was classified as group 3. The anomalous retro-psoas iliac artery, as in our case, was classified as Tamisier group 1 and unlikely to cause chronic ischemia of the lower extremities since there was no associated obstruction. Thus, incidental finding is the most common detection method, as in our case, and contrast-enhanced CT is considered as the ideal non-invasive method. Volume-rendered reconstruction images also offer different simulating views, allowing a more accurate surgical planning (5).

Although surgical correction may be performed, conservative care is preferred because of the absence of significant complications. For lower extremity neuralgia, physiotherapy and stretching are helpful in relieving symptoms (4). Selective nerve root blocks should be avoided because of the high risk of inadvertent injections to the anomalous artery.

In conclusion, the retro-psoas iliac artery is an extremely rare iliac artery anomaly. Radiography is the best non-invasive modality to detect such vascular anomalies, as patients are usually asymptomatic. If these anomalies are left undetected, serious vascular compromise may occur during vascular, pelvic, or orthopedic procedures. Therefore, clinicians and radiologists should be aware of the anomalous retro-psoas iliac artery and carefully examine pre-operative CT scans.

#### Author Contributions

Conceptualization, K.Y.; data curation, K.B.J.; formal analysis, all authors; funding acquisition, all authors; investigation, K.B.J.; methodology, K.B.J.; project administration, K.Y.; resources, K.Y.; software, K.B.J.; supervision, K.Y.; validation, K.Y.; visualization, all authors; writing—original draft, K.B.J.; and writing—review & editing, all authors.

#### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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## 허리근뒤 이상 온엉덩동맥: 증례 보고

김범진 · 김영준\*

허리근뒤 이상 온엉덩동맥은 엉덩허리 혈관 이상 중에서도 굉장히 희귀한 선천적 이상이다. 51세 여성이 응급실에 점점 심해지는 오른쪽 하지 통증과 쇠약으로 내원하였다. 하지 CT 혈관 조영술에서 하지 동맥들에 협착 소견 없었으며 이 검사 중에 오른쪽 허리근뒤 온엉덩동맥을 우연히 발견하였다. 우리는 희귀한 허리근뒤 이상 온엉덩동맥 증례를 보고하고자 한다. 외과 의사와 임상외과의 이 선천적 이상을 알고 있어야 골반 쪽이나 기타 정형외과적 수술 시 발생할 수 있는 심각한 합병증을 예방할 수 있다.

전주예수병원 영상의학과