

Aberrant Right Common Iliac Artery Origin: A Novel Aortoiliac Variant

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ABSTRACT

Purpose:

Congenital anomalies of the aortoiliac system are rare and may have significant implications

for surgical and endovascular interventions. We report a rare and, to our knowledge, previously unreported configuration of aortoiliac anatomy and highlight its imaging characteristics and clinical relevance.

Methods:

A single patient was evaluated using contrast-enhanced computed tomography angiography (CTA). Multiplanar and three-dimensional reconstructions were performed to delineate vascular anatomy and characterize the anomalous configuration.

Results:

Imaging demonstrated an aberrant origin of the right common iliac artery arising directly from the abdominal aorta at the level of the L3 vertebra, associated with leftward deviation of the distal aorta and an atypical high bifurcation of the left iliac system. The aberrant vessel followed a tortuous pelvic course, including a focal coiled segment prior to division into internal and external iliac branches. No aneurysmal degeneration or acute vascular pathology was identified. The configuration was clearly demonstrated on three-dimensional reconstructions.

Conclusion:

This case describes a rare aortoiliac variant, termed Aberrant Right Common Iliac Artery Origin (ARCIA). Recognition of this configuration is essential to avoid diagnostic errors and to ensure safe planning of surgical and endovascular procedures.

Keywords:

Anatomical variation; congenital anomaly; aortoiliac anatomy; common iliac artery; aberrant origin; CT angiography

INTRODUCTION

The common iliac arteries normally arise from the bifurcation of the abdominal aorta at approximately the level of the fourth lumbar vertebra and subsequently divide into the external and internal iliac arteries. Anomalies involving the origin, course, or branching pattern of these vessels are rare but clinically relevant. Such variants result from disturbances in embryologic arterial development and are increasingly recognized due to widespread use of cross-sectional imaging [1–3].

Congenital abnormalities of the iliac arterial system include absent common iliac arteries, hypoplastic segments, high or low origins, and unusual branching patterns [1,2]. Aberrant origins of the iliac arteries are particularly uncommon and may significantly impact both diagnostic interpretation and procedural planning.

To the best of our knowledge, this report describes a previously unreported configuration of an aberrant right common iliac artery arising directly from the abdominal aorta, associated with a complex pelvic arterial course.

CASE PRESENTATION

A 22-year-old male was referred to the vascular surgery clinic following detection of a possible pelvic vascular malformation on multiparametric prostate MRI. The patient reported an eight-year history of intermittent pelvic pain, initially associated with symptoms suggestive of prostatitis. Episodes were variably associated with urinary symptoms and occasional positive urine cultures but resolved spontaneously or with antibiotics. No acute symptoms were present at the time of evaluation.

IMAGING FINDINGS

Further evaluation with contrast-enhanced CTA of the abdomen and pelvis was performed.

An aberrant arterial branch was identified arising directly from the anterior aspect of the abdominal aorta at the level of the upper L3 vertebra. This vessel, corresponding to the right common iliac artery, measured approximately 0.9 cm in diameter and followed a caudal course into the pelvis.

Within the pelvis, the vessel demonstrated a focal 360° coiled configuration prior to bifurcation into internal and external iliac branches. The superior and inferior gluteal arteries originated from this coiled segment. The right external iliac artery continued normally to the common femoral artery.

The abdominal aorta demonstrated gradual leftward deviation distally. The left common iliac artery appeared as a direct continuation of the aorta, with a relatively high bifurcation into internal and external iliac arteries at the L5–S1 level.

No significant arterial stenosis, aneurysm, or acute pathology was identified.

An incidental finding of crossed fused renal ectopia with a single ureter and dual arterial supply was also noted.

DISCUSSION

The abdominal aorta and iliac arteries develop from the paired dorsal aortae and associated embryonic vascular networks. Disruptions in normal regression and persistence of these structures can result in a variety of congenital arterial anomalies [1,5].

Previously described iliac arterial variants include absent or hypoplastic vessels, abnormal branching patterns, and atypical origins. However, aberrant origin of a common iliac artery directly from the abdominal aorta, combined with a complex pelvic course as demonstrated in this case, appears to be exceptionally rare.

Although most arterial variants are asymptomatic, their recognition is critical in the context of surgical and endovascular procedures. Misinterpretation of vascular anatomy may lead to complications during catheterization, embolization, or pelvic surgery [1,5].

Advanced imaging modalities, particularly CTA with three-dimensional reconstruction, play a key role in identifying and characterizing such anomalies.

An incidental finding of crossed fused renal ectopia (CFRE) was also present. CFRE is a known congenital anomaly resulting from abnormal renal migration and fusion during embryologic development, with an estimated incidence ranging from 1:1300 to 1:7500 [6]. Although the coexistence of vascular and renal anomalies may reflect shared developmental pathways, a direct causal relationship remains uncertain.

A plausible explanation is a disturbance in caudal embryologic development affecting both vascular remodeling and renal ascent during a critical developmental window. However, this remains speculative and requires further investigation.

CONCLUSION

We report a rare aortoiliac variant characterized by aberrant origin of the right common iliac artery directly from the abdominal aorta, associated with a complex pelvic arterial configuration and concomitant crossed fused renal ectopia. Recognition of such variants is essential for accurate imaging interpretation and safe surgical and endovascular planning.

STATEMENTS AND DECLARATIONS

Funding

This research received no external funding.

Competing Interests

The authors declare that they have no competing interests.

Consent to Publish

Written informed consent for publication was obtained from the patient.

Data Availability Statement

The data supporting the findings of this study are available within the article.

Author Contributions

- 1: Protocol/project development
- 2: Data collection or management
- 3: Data analysis
- 4: Manuscript writing/editing

Gouliauou: 2, 3, 4

Chronis: 2

Koliarakis: 3, 4

Galanakis: 1, 4

Lechareas: 3, 4

Kontopodis: 2, 4

Tsiaousis: 1, 3, 4

Ioannou: 3

Kehagias: 1, 2, 3, 4

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Fig. 1: Contrast-enhanced CT (CECT) transverse section at the L4 vertebral level in the portal venous phase. The fused renal structure is located to the left of the L4 vertebra (star). The inferior vena cava (IVC) lies anterior to the vertebral body (black arrowhead) and is bordered by the right common iliac artery (black arrow) and the aorta/left common iliac artery (white arrow).

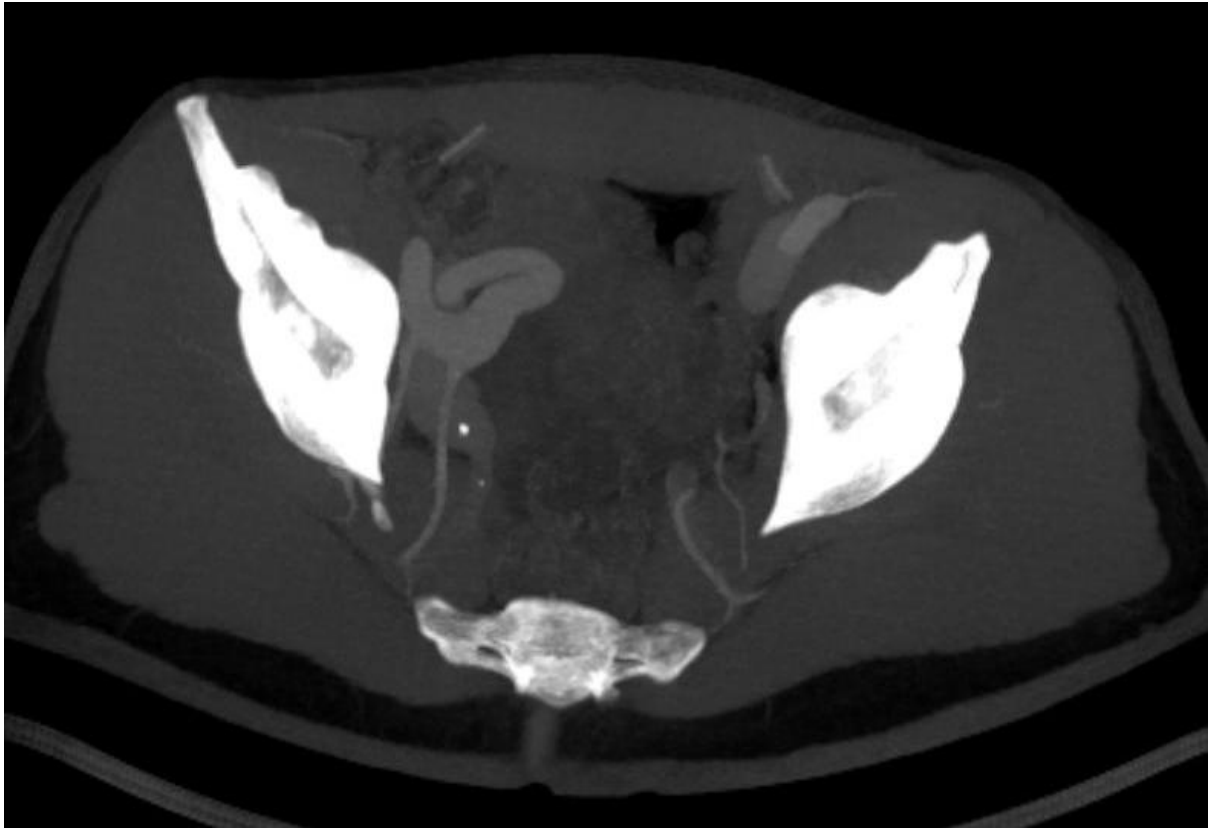


Fig 2 : Maximum intensity projection (MIP) transverse CECT image in the lower pelvis demonstrating the coiling configuration of the aberrant right common iliac artery, giving rise to the superior and inferior gluteal arteries.

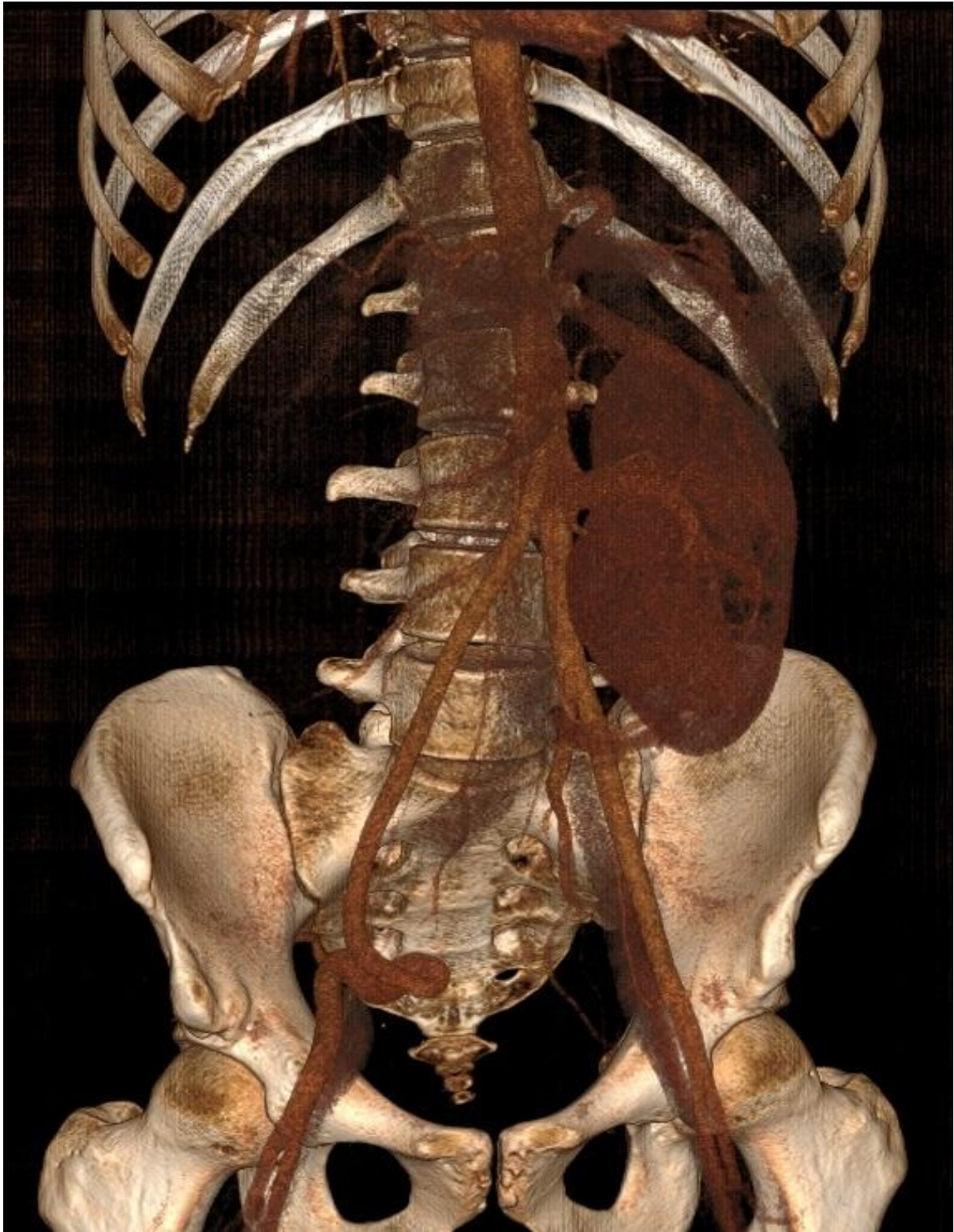


Fig. 3 : Volume-rendered (VR) CT images of the aberrant right common iliac artery originating from the anterior aortic wall, following a caudal course and forming a loop within the pelvis from which the internal iliac branches arise.
(A) Frontal view

(B) Oblique sagittal view

(C) Venous phase demonstrating the relative position of the IVC and iliac veins.