CASE REPORT

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BILATERAL COMMON ILIAC ARTERY COILING: RADIOLOGICAL CASE REPORT WITH EMPHASIS ON POSSIBLE CLINICAL SIGNIFICANCE FOR PELVIC SURGERY AND ENDOVASCULAR PROCEDURES

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Abstract. *The common iliac arteries (CIAs) are typically straight conduits that bifurcate from the abdominal aorta at L4–L5 to supply the pelvis and lower limbs. Although degrees of arterial tortuosity are not uncommon, true 360° coiling is exceedingly rare and may have important clinical implications during endovascular or surgical procedures. Herein, we report an incidental finding of bilateral 360° coiling of the CIAs identified during computed tomography angiography on an asymptomatic 81-year-old woman. Three-dimensional reconstructions demonstrated a pronounced coil of the right CIA at L5 and of the left CIA at S2, with elongation of the left external iliac artery. No additional vascular variants or associated pathological findings were identified. Although frequently asymptomatic, pronounced iliac tortuosity has the potential to increase procedural complexity, prolong fluoroscopy and contrast use, and may theoretically predispose to hemodynamic disturbances or compression of adjacent neurovascular structures. Recognition of such variation is critical for preprocedural planning, particularly for endovascular aortic repair and pelvic surgery, where tortuosity can challenge access and device delivery. Bilateral 360° coiling of the CIAs is an exceptionally uncommon anatomic variation. Even in asymptomatic individuals, comprehensive radiologic documentation and communication with treating teams are essential to support safe procedural planning.*

Key words: *common iliac arteries, coiling, computed tomography, angiography, surgery*

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INTRODUCTION

The common iliac arteries (CIAs) are the terminal bifurcations of the abdominal aorta which provide the principal arterial supply to the pelvis and lower extremities. Typically, the CIAs originate at the level of the L4 vertebra and descend obliquely toward the pelvis, where – around the L5–S1 level – they bifurcate into the external and internal iliac arteries. In approximately 1% of individuals, the CIAs are absent and the external and internal iliac arteries arise directly from the abdominal aorta [1, 2].

Although arteries are often conceptualized as relatively straight conduits for distal perfusion [3], various degrees of arterial tortuosity are commonly encountered on anatomic dissection, imaging, and during surgical or endovascular procedures [3, 4]. Tortuosity has been associated with aging, atherosclerosis, hypertension, diabetes mellitus, and certain genetic conditions, and ranges from mild, clinically silent curvature to severe deformities that may impair organ perfusion [3, 5]. Descriptive forms of vascular tortuosity include curving/curling, angulation, twisting, looping, and kinking [3, 6, 7]. True coiling (often used interchangeably with looping) is an uncommon variant most frequently reported in the internal carotid artery and is only rarely described in other arterial beds; although usually asymptomatic, coiling may complicate diagnostic or therapeutic interventions and, in exceptional cases, give rise to ischemic events or iatrogenic injury [8, 9].

In this report, we describe a rare instance of bilateral 360° coiling of the common iliac arteries identified incidentally during computed tomography angiography (CTA) on an 81-year-old woman. We accompany the case with a concise review of selected literature and discuss the potential clinical and procedural implications of such anatomic variation.

CASE REPORT

An incidental vascular anomaly was identified during retrospective review of CTA data from an 81-year-old female who reported no clinical complaints. No further medical history or clinical records were available for review. Because bilateral coiling of the CIAs is extremely uncommon, we present the imaging findings despite the limited clinical information.

Three-dimensional volume-rendered CTA images (Figure 1) demonstrate marked coiling of both CIAs. The right common iliac artery is dilated and shows a pronounced coil at the level of L5, while the left common iliac artery is dilated with a coil at the level of S2 and is accompanied by an elongated left external iliac artery. No additional anatomical variants of the pelvic or abdominal vasculature were identified on the available study. There were no acute or chronic findings to explain symptoms, which is consistent with the patient being asymptomatic.

Although clinical correlation is not possible in this retrospective case, recognition and documentation of such rare iliac artery tortuosity is relevant for radiologic reporting and may be important to consider during preprocedural planning for endovascular or surgical interventions.

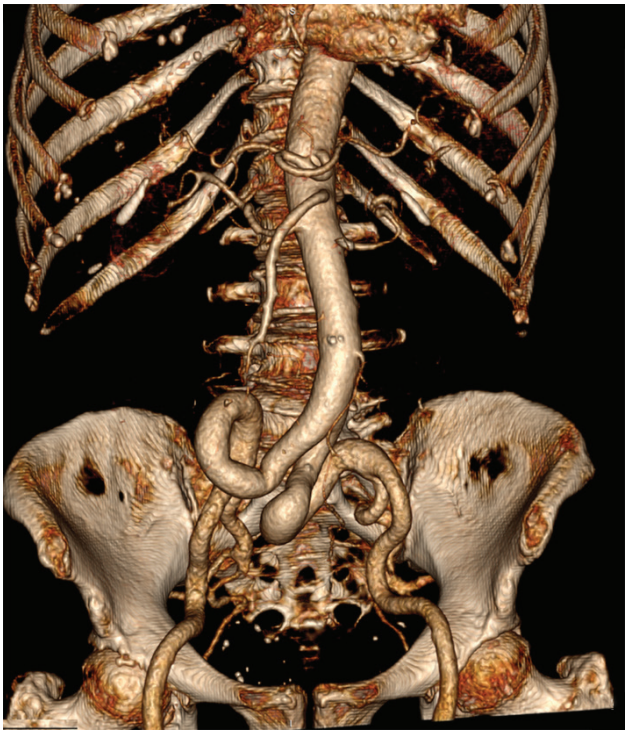

Fig. 1. CTA presenting coiling of dilated right CIA and coiling of dilated left CIA, together with elongated left EIA

DISCUSSION

The present findings demonstrate that pelvic vascular anatomy – and, in particular, the course of the common and external iliac arteries – shows clinically important variability, a fact well established in the literature [10, 11]. Precise knowledge of these variants is essential for surgeons and interventionalists because unexpected arterial loops, tortuosity or abnormal branch origins can change operative risk and technical strategy during surgical, gynecological, orthopedic, vascular and urological procedures [12]. When these vessels are injured, they can produce severe, potentially life-threatening hemorrhage and anatomic surprises in the pelvis, and therefore carry direct implications for perioperative planning and intraoperative management [13-15].

Anatomic loops of the external iliac artery deserve particular attention. Loops (or marked tortuosities) can physically compress adjacent neurovascular structures – most notably the obturator nerve and its accompanying vessels – producing local neurovascular symptoms and creating an added hazard in operations that expose the lesser pelvis or inner acetabular region [12, 13]. Nayak et al. described a unilateral, prominent loop of the left external iliac artery that descended into the lesser pelvis and lay in close relation to the obturator nerve; in that specimen, the deep circumflex iliac and the inferior epigastric arteries arose just above the inguinal ligament. The authors emphasized that such a configuration may compress the obturator nerve and vessels and may place the artery at risk during procedures involving the hip, ovaries or prostate [16].

Tortuosity and looping of the iliac arteries are also highly relevant to endovascular practice. Any curving, angulation, twisting or kinking of the iliac arteries can complicate access for aortic and endovascular repairs and lengthen procedural fluoroscopy and contrast use [14]. Wolf et al. reported that increased tortuosity prolongs fluoroscopic time and increases contrast requirement during endovascular interventions, although it does not necessarily correlate with a higher complication rate [15]. Case reports illustrate the spectrum of clinical consequences: Johare and Rajagopal documented an incidentally discovered complete arterial loop of the external iliac artery in a 58-year-old woman with abdominal pain [13], while Milic et al. reported a 360° coiling of the right external iliac artery associated with an ischemic toe ulcer – resection of the affected 7-cm segment and end-to-end reconstruction resulted in healing of the ulcer [17].

Apart from being an immediate surgical risk, the presence of a marked loop may also alter local hemodynamics. Nayak et al. suggested that a long, tortuous external iliac artery can change vascular dynamics in the limb and that external compression of a looped artery by pelvic viscera could theoretically impair distal blood flow, with potential consequences for limb perfusion. Such hemodynamic effects – together with the mechanical risk of nerve or organ compression – explain why recognition of these variants is important across multiple specialties [16].

The CT-derived centerline measurements in Lee et al. provide a quantifiable link between these morphological features and potential functional effects [14]. Importantly, objective series show that tortuosity per se is not always predictive of adverse device outcomes. In the 144-patient Endovascular Aneurysm Repair (EVAR) cohort cited above, although 48.6% of patients experienced one or more complications (and 39.6% had endoleaks of any type), graft-related complications specifically attributable to iliac anatomy occurred in 11% of patients and tortuosity index was not significantly associated with graft-related complication rates. Indeed, mean tortuosity index was slightly lower (not higher) in the small subgroup with graft-related complications, and tortuosity grade and iliac angle grade did not predict higher complication or secondary intervention rates [14]. Thus, while tortuosity increased procedural complexity (longer procedures, more fluoroscopy/contrast), it did not translate into a clear increase in graft-related complications in that series – a finding that likely reflects both device evolution and the multifactorial nature of endovascular outcomes [14].

From a practical standpoint these data lead to three actionable points for clinicians confronted with pelvic arterial variants or planning pelvic procedures:

Preoperative imaging matters: objective 3-D centreline measurements (tortuosity index, iliac angle, lumen diameter and length) provide reproducible descriptions of anatomy and should be used to anticipate technical difficulty and to plan access strategy [14].

Anticipate both mechanical and functional effects: looped/tortuous arteries may compress nerves or adjacent organs and can alter distal hemodynamics; this is relevant not only to vascular procedures, but also to pelvic, orthopedic and urological operations that mobilise viscera or work close to the pelvic brim [12, 13, 16].

Do not assume tortuosity equals failure: although tortuosity predicts greater procedural complexity (and may lengthen fluoroscopy and contrast use), it is not an absolute contraindication to endovascular or other pelvic surgery and, in modern practice, does not necessarily predict graft-related complications – still, it should prompt careful intra-operative vigilance and a low threshold for adjunctive maneuvers (such as iliac conduits, controlled dilation, or arterial reconstruction) when required [14].

Finally, the literature shows that the precise morphology of these loops and their branch patterns is variable: reported anomalies include atypical origins of the obturator, inferior epigastric or profunda femoris arteries from the external iliac, and uncommon configurations in which the femoral artery receives flow from alternate sources [13-16]. These patterns are directly relevant when planning pelvic dissections, hip arthroplasty, radical prostatectomy, ovarian surgery or any procedure that mobilises pelvic viscera, since an unrecognised arterial loop or aberrant branch can both complicate exposure and be a source of unexpected bleeding.

CONCLUSION

Arterial variations of the pelvic region are of interest not only to anatomists, but also to clinicians due to possible significant bleeding after injury during surgical, orthopedic, gynecological and urological treatment. Bilateral 360° coiling of the common iliac arteries is an exceptionally rare vascular variant that, although asymptomatic in this case, may complicate surgical or endovascular access, increase fluoroscopy and contrast requirements, and theoretically contribute to neurovascular compression or altered distal hemodynamics. As such, clear radiologic documentation and communication with the treating teams is essential. Pre-procedural planning, including 3-D reconstructions and objective tortuosity measurements, can help anticipate technical challenges, while conservative management is appropriate when patients remain asymptomatic. However, vascular-surgical evaluation may be required should ischemic or neurovascular symptoms arise.

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