

Iliac Arteriovenous Fistula Secondary To Iliac Aneurysm Rupture: Multidetector Computed Tomographic Angiography Findings

İliyak Anevrizma Rüptürüne Sekonder Gelişen İliyak Arteriyovenöz Fistül: Multidedektör Bilgisayarlı Tomografi Anjiyografi Bulguları

Aysel Türkvatan, Tülay Ölçer, Turhan Cumhur

Türkiye Yüksek İhtisas Hastanesi, Radyodiagnostik Anabilim Dalı

Iliac arteriovenous fistula occurring as a complication of spontaneous rupture of an atherosclerotic iliac aneurysm is extremely rare. Early diagnosis is important as it allows immediate intervention. Herein, we present the imaging findings of iliac arteriovenous fistula complicating iliac artery aneurysm which was diagnosed immediately using multidetector row CT angiography.

Key Words: *iliac artery, arteriovenous fistula, multidetector computed tomography*

Aterosklerotik iliyak arter anevrizmasının spontan rüptürüne sekonder olarak gelişen iliyak arteriyovenöz fistül oldukça nadir görülen erken tanı ve tedavi gerektiren bir durumdur. Biz burada multidedektör bilgisayarlı tomografi anjiyografi ile kısa zamanda tanı alan iliyak arteriyovenöz fistül olgusunun görüntüleme bulgularını sunduk.

Anahtar Kelimeler: *iliyak arter, arteriyovenöz fistül, multidedektör bilgisayarlı tomografi.*

Iliac artery aneurysms mostly occur in association with abdominal aortic aneurysms, either as an extension of the aortic aneurysm to the common iliac artery or as a separate aneurysm of the iliac artery (1). In addition, one third of the patients have contralateral iliac aneurysms (2). Spontaneous rupture of iliac arterial aneurysm into the iliac venous system is less common (3). Iliac arteriovenous fistula is a life-threatening condition that requires immediate diagnosis and treatment.

We report a case of iliac arteriovenous fistula complicating iliac artery aneurysm which was diagnosed preoperatively using multidetector row computed tomographic (MDCT) angiography. This report underlines the significant role of MDCT angiography as the first imaging method in thoracoabdominal vascular emergencies.

Case Report

A 70-year-old man presented to the emergency room complaining of acute onset of lower abdominal pain and shortness of breath. Physical examination revealed a pulsatile mass in the abdomen accompanied by a thrill and bruit, suggestive of an aneurysm and right lower extremity edema. Electrocardiography showed sinus tachycardia at 103 beats/min, and normal P-waves. His blood pressure was 90/35 mmHg. Thoracoabdominal MDCT was immediately performed with suspicion of aortic aneurysm rupture.

A thoracoabdominal MDCT angiography was performed using a 16-row multislice CT (Light-speed Ultra, GE medical System, WI, USA). Patient was examined while supine and all images were acquired during a single breathhold of 12 sec

Received: 28.09.2007 • Accepted: 01.03.2007

Corresponding author

Aysel Türkvatan

Türkiye Yüksek İhtisas Hastanesi Radyodiagnostik Anabilim Dalı

Sıhhiye, Ankara

Phone : +90 (312) 306 16 71

E-mail address : aturkvatan@yahoo.com

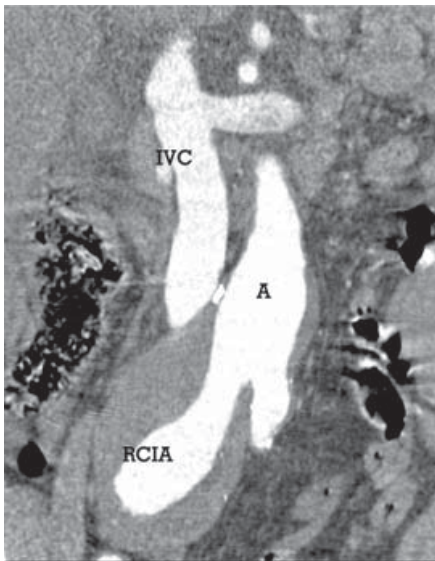


Figure 1: Coronal MPR image shows a 5 cm diameter aortic aneurysm immediately followed by 6.6 cm diameter right common iliac artery aneurysm. The slightly enlarged inferior vena cava appears simultaneously isodense with the aorta and both common iliac arteries due to left-to-right shunt. (IVC: inferior vena cava, A: aorta, RCIA: right common iliac artery)

duration, extending from base of the neck to the groin. Imaging parameters were as follows: 120 kV,

400 mA, 16x1.25 mm collimation, speed 27.5 mm/rot, rotation time 0.5 sec, pitch value of 1.375:1. After determining the contrast agent transit time using the smart prep bolus technique, we acquired image data during an intravenous injection of 120 ml of iodinated contrast agent iopromid (Ultravist 370, Schering, Berlin, Germany) at a rate of 4 ml/sec. For 3-dimensional image reconstruction, the raw CT data were processed on a separate workstation (Advanced Workstation 4.2, GE Medical System, WI) with multiplanar reformatting (MPR), maximum intensity projection (MIP) and volume rendering (VR).

MDCT angiography demonstrated a 5 cm diameter infrarenal aortic aneurysm immediately followed by right common iliac artery aneurysm in 6.6 cm diameter and left common iliac artery aneurysm in 3 cm diameter (Figure 1). The right common iliac artery aneurysm had directly fistulized into right common iliac vein th-

rough a well identifiable fistulous communication at the length of 3 cm and diameter of 2.2 cm from the posterolateral aspect of the aneurysm wall (Figure 2). Early enhancement of the enlarged inferior vena cava and both common iliac veins and retrograde flow to the renal and iliac veins were detected on CT. Additionally, right pleural effusion, right atrial and ventricular enlargement associated with cardiac failure and delayed opacification of the renal cortex probably associated with renal failure were detected (Figure 3).

The patient underwent emergency operation. Aortailiac aneurysm was repaired with an aortailiac bifurcation prosthesis and iliac arteriovenous fistula was closed with a patch. His postoperative course was uncomplicated.

Discussion

Trauma seems to be the main cau-

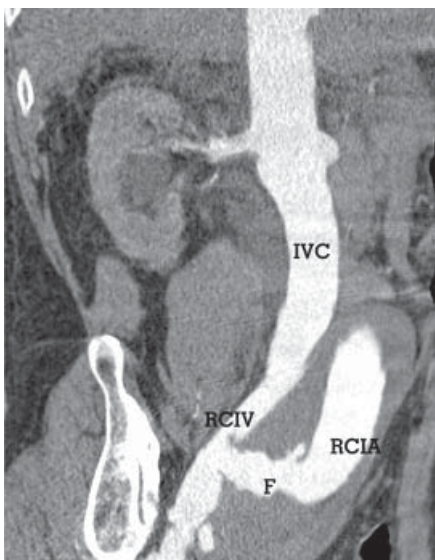


Figure 2A: Coronal oblique MIP image shows the right common iliac artery aneurysm directly fistulizes into the right common iliac vein through a well-identifiable 2.2 cm diameter fistulous communication.

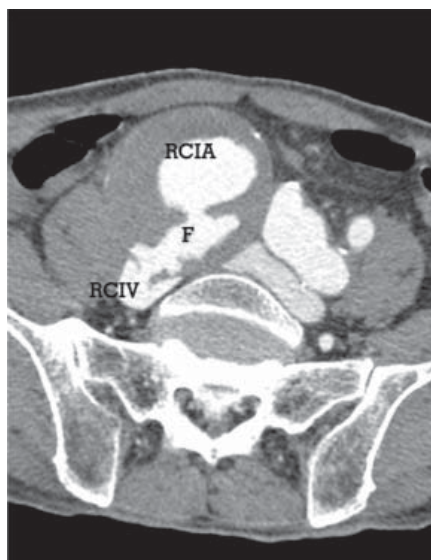


Figure 2B: Axial image shows the fistulous communication between right common iliac artery and vein. In addition, the left common iliac artery aneurysm is also seen.

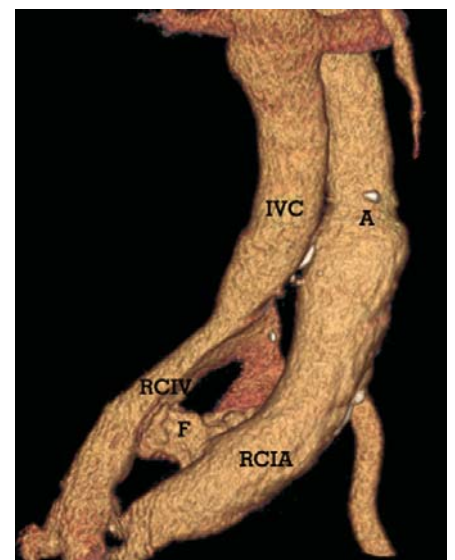


Figure 2C: Volume rendering image shows iliac arteriovenous fistula. IVC: inferior vena cava, A: aorta, RCIA: right common iliac artery, RCIV: right common iliac vein, F: fistula)

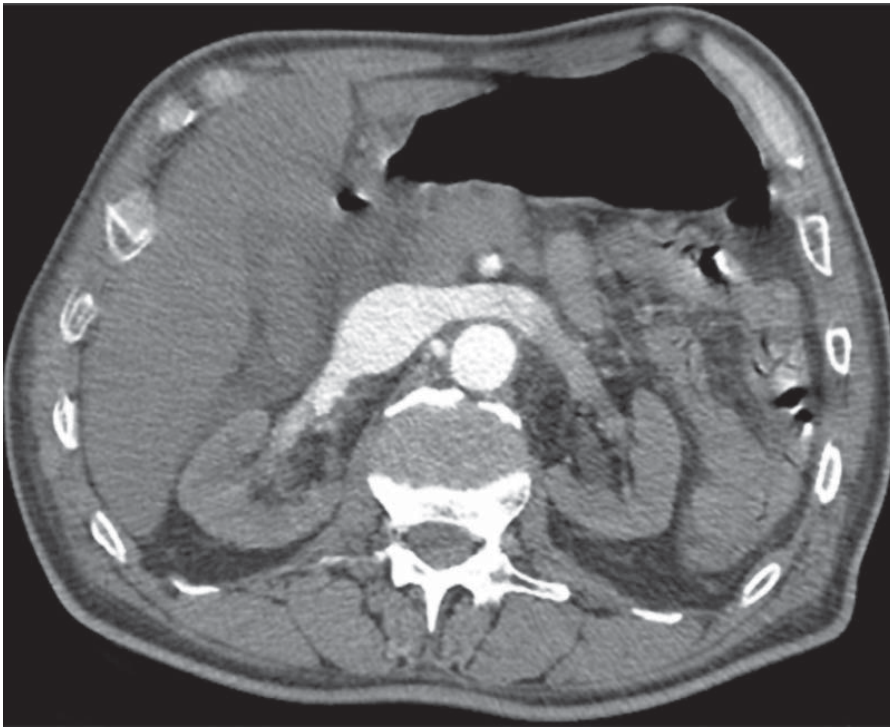


Figure 3: Axial view at the level of the renal veins during the arterial phase showing delayed opacification of the renal cortex and retrograde flow to the renal veins.

se of arteriovenous fistula between iliac artery and vein (1). It results from gun shot wounds, stab wounds, seat belt trauma and iatrogenic injuries in 84% of patients (4). Iatrogenic injury to major retroperitoneal vessels producing an arteriovenous fistula is also a well-described complication of lumbar disc surgery (5). Only in remaining 16% of patients is it secondary to spontaneous rupture of an iliac aneurysm (6). In contrast, 80% of all aortacaval fistulas result from aneurysmal rupture (7). Spontaneous perforation has been described secondary to atherosclerotic or infective (tuberculosis, syphilis, mycotic) aneurysm formation (8). Rare causes include Marfan's syndrome, Takayasu's arteritis, Ehlers-Danlos disease. Rarely, neoplasms may also cause a fistula by erosion of adjacent arterial and venous structure (3).

The classical clinical triad for aorta-iliac aneurysm with fistula consists

of severe low back or abdominal pain, pulsatile abdominal mass, and machinery-like bruit. This triad is complete in only 50-80% of patients (7). Other clinical signs are various and represent consequences of the physiologic derangements of the fistula and the left-to-right shunt (9). Fulminant onset high-output cardiac failure that doesn't respond to medical treatment may result from decreased peripheral resistance that induces a sharp secondary increased cardiac output (10). A large volume left-to-right shunt causes increased venous return leading to venous hypertension and then to passive venous congestion, hepatomegaly, ascites, or severe induced portal hypertension resulting in upper gastrointestinal bleeding. Lower extremity edema, pulsatile venous dilatation and scrotal edema, priapism, rectal bleeding and vesical bleeding may be seen (9). Renal failure is not uncommon and is most likely caused by the

decreased mean arterial pressure and increased venous pressure in the renal vessels which reduces the glomerular filtration (3). Pulmonary embolization is rare and is thought to be due to the embolic material or atheroma from within the aneurysm (paradoxical embolism) or thrombus and clot from the major veins compressed by the aneurysm (1).

Preoperative diagnosis of spontaneous iliac arteriovenous fistula is difficult because the classical triad of abdominal pain, pulsatile lower abdominal mass and abdominal bruit may be absent in up to 50% of patients and may be masked by less specific additional symptoms such as dyspnea, cardiac failure, pain and edema of the legs, or various hemorrhagic complications (7,9). In our patient there were mixed symptoms and signs of high output cardiac failure, renal failure and peripheral venous hypertension.

The diagnosis of iliac arteriovenous fistula often made on the basis of imaging, such as Doppler ultrasound, helical CT, MDCT, MR angiography and conventional angiography.

Ultrasonography has also been used the diagnose of aorta-iliac arteriovenous fistula. It readily depicts aneurysms and sometimes detects dilatation of the inferior vena cava. Doppler interrogation can show arterialized wave forms in iliac vein and inferior vena cava. Color imaging can demonstrate turbulent, mixed arterial and venous flow at the fistula (11). Unfortunately, the acoustic window of ultrasonography is frequently limited by superimposed bowel gas.

Traditionally, the aneurysm is diagnosed by angiographic demon-

tration. This technique provides anatomical details of the aneurysm and clearly outlines the aortic branches and their relationship to the aneurysm. But the early changes in the arterial wall and the periaortic soft tissue are not detected on angiography (8).

MDCT angiography has become an important technique in the evaluation of the vascular system and has already been proven to yield high accuracy in the assessment of the abdominal aorta and its major branches. In combination with 3D image reconstruction techniques, it may be used to clarify complex vascular anatomies. MDCT angiography is the modality of choice for assessment of emergent abdominal vascular conditions because it enables the acquisition of high spatial resolution volumetric image data during a single breathhold. Unlike catheter angiography, MDCT angiography not only

depicts the vessels but also allows direct visualization of associated perivascular abnormalities and assessment of perfusion in adjacent organs (12,13).

While MDCT angiography is an excellent modality for identifying aortailiac arteriovenous fistulas, MR angiography offers an important alternative, particularly in patients with contraindications to iodinated contrast material (14,15). However, diagnosis of fistula might be impossible due to flow artifacts (15).

CT findings of iliac arteriovenous fistula include early enhancement of the venous system, equivalent and simultaneous to that of the aorta and iliac artery, due to rapid contrast flow from the arterial to venous system, loss of the normal anatomic space between the iliac artery and vein and rarely direct visualization of the abnormal com-

munication between the artery and vein. Other possible related findings include distention of the inferior vena cava, iliac veins and renal veins, and retrograde flow to the renal and iliac veins (8,11,13). Delayed opacification of the renal cortex, probably due to the association of reduced renal perfusion owing to decreased diastolic arterial pressure associated with increased venous pressure in the renal veins may be seen (13).

In conclusion, MDCT angiography, a fast, safe and noninvasive imaging technique, should be preferred as the first imaging modality for diagnosis of acute thoracoabdominal vascular conditions, since it enables the acquisition of high spatial resolution volumetric image data during a single breathhold and not only depicts the vessels but also allows direct visualization of associated perivascular abnormalities.

REFERENCES

1. Vallina EA, Perez MA, Pascual MF, et al. Iliac arteriovenous fistula secondary to iliac aneurysm rupture associated with pulmonary embolism and anuria. *Ann Vasc Surg* 2000;14:170-3
2. Morrow C, Lewinstein C, Ben-Menachem Y. Spontaneous iliac arteriovenous fistula. *J Vasc Surg* 1987;6:524-7
3. Gregoric ID, Jacobs MJ, Reul GJ, et al. Spontaneous common iliac arteriovenous fistula manifested by acute renal failure: a case report. *J Vasc Surg* 1991;14:92-7
4. Zajtchuk R, Yacoub M, Kittle CF. Spontaneous arteriovenous fistula between the right common iliac vessels. *Surgery* 1971;69:194-200
5. Franzini M, Altana P, Annessi V, et al. Iatrogenic vascular injuries following lumbar disc surgery: case report and review of the literature. *J Cardiovasc Surg* 1987;28:727-30
6. Weimann S, Flora G. Primary arteriovenous fistula between the common iliac vessels secondary to aneurysmal disease. *Surgery* 1987;102: 91-5
7. Fenster MS, Dent JM, Tribble C et al. Aortacaval fistula complicating abdominal aortic aneurysm: case report and literature review. *Cathet Cardiovasc Diag* 1996; 38: 75-9
8. Alarcon M, Quiroga S, Sebastia MC, et al. Arteriovenous fistula secondary to iliac mycotic aneurysm: helical CT findings. *Abdom Imaging* 2000;25:55-8
9. McAuley CE, Peitzman AB, de Vries EJ, et al. The syndrome of spontaneous iliac arteriovenous fistula: a distinct clinical and pathophysiologic entity. *Surgery* 1986; 99:373-7
10. Turse JC, Dunlap DB. Spontaneous arteriovenous fistula between the left common iliac artery and iliac vein. *Am J Med Sci* 1989;297:190-2
11. Subber SW, Russ PD, Whitehill TA, et al. Diagnosis and localization of spontaneous aortacaval fistula by computed tomography with angiographic confirmation: case report. *Can Assoc Radiol J* 1998;49:35-8
12. Frauenfelder T, Wildermuth S, Marincek B, et al. Nontraumatic emergent abdominal vascular conditions: advantages of multi-detector row CT and three-dimensional imaging. *Radiographics* 2004; 24:481-96
13. Coulier B, Tilquin O, Etienne PY. Multidetector row CT diagnosis of aortacaval fistula complicating aortic aneurysm: a case report. *Emerg Radiol* 2004;11:100-3
14. Wang EA, Lee MH, Wang MC, et al. Iatrogenic left iliac-caval fistula: imaging and endovascular treatment. *AJR* 2004; 183:1032-4
15. Schott EE, Fitzgerald SW, McCarthy WJ, et al. Aortacaval fistula: diagnosis with MR angiography. *AJR* 1997;169:59-61