

KLINIKINIS ATVEJIS

Aorto-caval fistula clinically presenting as left renal colic Findings of multislice computed tomography

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Key words: abdominal aortic aneurysm; dissecting aneurysm; aorto-caval fistula; renal colic; multislice computed tomography.

Summary. Spontaneous aorto-caval fistula is a rare complication of abdominal aortic aneurysm. A definitive diagnosis is sometimes difficult, as the classic diagnostic signs (pulsatile abdominal mass with bruit, high-output heart failure, and acute dyspnea) are present in about half of the patients. Diagnosis may be suspected from clinical symptoms, but sometimes atypical clinical features may obscure the actual situation. Computed tomography findings include early detection of contrast medium in the dilated inferior vena cava, which is isodense with the adjacent aorta, an associated aortic aneurysm, loss of normal anatomic space between aorta and vena cava, and rarely one can even visualize the abnormal communication between aorta and vena cava. Prompt radiological diagnosis is of key importance in the management of these patients. We describe findings of multislice computed tomography of the patient with dissecting aortic aneurysm and aortocaval fistula, clinically presenting as left renal colic. Multislice computed tomography is the imaging modality of choice for diagnosis of abdominal vascular pathology as it is noninvasive, fast and demonstrates a high diagnostic accuracy.

Introduction

Aorto-caval fistula (ACF) is a rare entity, complicating about 0.2–6.04% of all abdominal aortic aneurysms (1, 2).

Classical clinical signs of ACF are pain in the abdomen/flank, palpable aneurysm, and abdominal bruit (2), though the specific “triad” is not always present. Before wide implementation of spiral and multislice computed tomography (CT), some studies reported about 75% of preoperatively undiagnosed cases of ACF (1). Specific signs of ACF on CT enable the prompt and accurate diagnosis (2–5).

We report a unique to our knowledge case of combination of dissecting infrarenal aortic aneurysm with aorto-caval fistula and ischemic injury of the left kidney, clinically presenting as left renal colic, and detected by means of multislice CT.

Case report

A 62-year-old male was admitted to the hospital with acute abdominal and lumbar pain. At the initial examination, left renal colic was suspected, and the

patient was admitted to the emergency department for ultrasound examination and deeper evaluation. Auscultation abnormalities or sensible pulsatile mass were not detected. Neither history of blunt abdominal trauma nor former iatrogenic impact was detected. There was no history of chronic abdominal aortic aneurysm, hypertension, signs of heart failure, as well. Laboratory findings of cholesterolemia and anemia were absent; serum creatinine and urea levels were in normal range. In the emergency department, the syndrome of ischemia of lower extremities developed, while abdominal and lumbar pain increased. Thus, the patient was referred to urgent abdominal CT scanning, without initial ultrasound examination.

Urgent contrast-enhanced single-injection dual-phase (arterial and venous) CT investigation was performed with a 4-row multislice CT unit (Siemens SOMATOM Volume Zoom, Siemens S.A.S., Saint-Denis, France); scan area extended from above the diaphragm to below symphysis pubis. Scan parameters were as follows: 4×2.5 mm collimation, pitch 1.5, rotation time 0.5 s, 120 kV, 180 eff. mAs.

A total of 120 mL of non-ionic contrast medium (300 mg I/mL; injection rate, 3.0 mL/s; scan delay, 18 s) was injected via an 18-G standard intravenous catheter into the antecubital vein of the patient. No oral contrast material was given.

Obtained data were reviewed on a workstation (Leonardo, Siemens AG), applying all available postprocessing techniques: multiplanar reformatting (MPR), maximum intensity projection (MIP), and volume rendering (VR).

CT demonstrated a large infrarenal aortic aneurysm with slightly calcified walls, involving both iliac arteries. Mural thrombus of about 2 cm in thickness was evident. Signs of intra-aneurysmal dissection were apparent in the aneurysmal sack (Figs. 1A, 1B). Fistula to inferior vena cava (IVC) arising from the pseudolumen and situated beneath the left renal vein was possible to identify (Figs. 1A, 1B). Slight infiltration of periaortic fat was observed at the level of fistula.

In the arterial phase of enhancement, vivid retrograde opacification in both renal veins (especially in the left one) was obvious (Figs. 2A–C), also contrast enhancement of dilated IVC (Figs. 1A–2C). Left renal vein was in retroaortic position (Figs. 2B, 2C), enlarged, and homogeneously enhanced with contrast medium. Infiltration of left perirenal space as well as altered contrast enhancement of the enlarged left kidney parenchyma was evident (Figs. 2A–2C, 3), suggesting venous hypertension, decreased arterial perfusion, and left renal ischemia (2). Right kidney looked intact on CT, with now signs of blood flow impairment. The insertion of right renal vein was above the fistula, hence not so heavily influenced by the retrograde blood flow. Thrombosis of IVC above the left renal vein insertion was suspected (Figs. 2C, 3).

On delayed venous phase scanning, the left kidney showed poor enhancement, as well (Fig. 3).

The patient was transferred to the Department of Surgery. During laparotomy, aorto-iliac synthetic graft was tailored into the aorta and iliac arteries, as well as suture of IVC was performed. Suspected thrombosis of IVC was not detected at surgery.

After the operation, the patient was moved to the intensive care unit. Unfortunately, the outcome was unfavorable. The patient developed hypovolemic shock, acute renal insufficiency, and pulmonary infection and died 14 hours after operation.

Discussion

Aorto-caval fistula uncommonly arises from ruptured atherosclerotic aortic aneurysm (6). It can also result from blunt abdominal trauma and iatrogenic injury (7). Rare causes include mycotic aneurysm,



Fig. 1 A. Contrast-enhanced computed tomography through the lower aorta, axial slice. Aneurysm with dissection is apparent, as well as aorto-caval fistula (solid arrow).



Fig. 1 B. Contrast-enhanced computed tomography, multiplanar reformatting, coronary projection. Aorto-caval fistula (solid arrow), providing vivid opacification of dilated inferior vena cava (dashed arrow).

lues, connective tissue disorders, such as Ehlers-Danlos syndrome and Marfan syndrome (6). Clinical symptoms are nonspecific; small aorto-caval fistulas may be with no symptoms present (5). In general, aorto-caval fistulas may manifest with increased pulse pressure, venous congestion, and congestive heart failure (7–9).

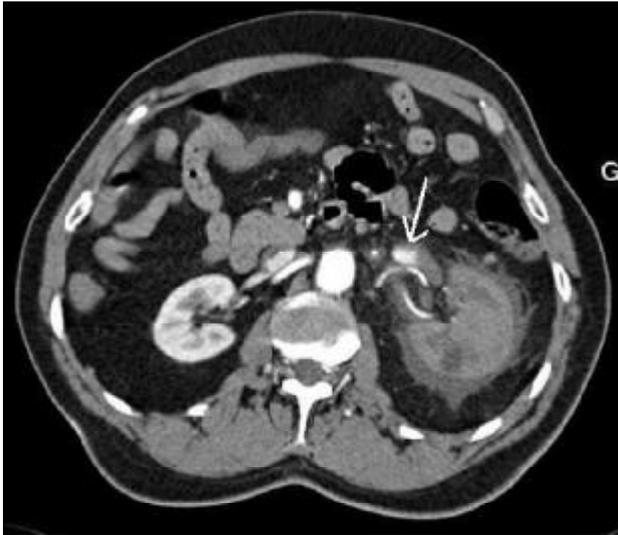


Fig. 2 A. Contrast-enhanced computed tomography at the level of renal veins, axial slice
Intensive retrograde enhancement, especially in the left renal vein (solid arrow), as well as weak enhancement of enlarged left kidney.



Fig. 2 B. Contrast-enhanced computed tomography at the level of renal veins, axial slice
Left renal vein is in retroaortic position (dashed arrow).



Fig. 2 C. Contrast-enhanced computed tomography, multiplanar reformatting, and coronary projection
Intensive retrograde enhancement, especially in the left renal vein and inferior vena cava. Retroaortic position of left renal vein (dashed arrow).



Fig. 3. Contrast-enhanced computed tomography, late phase, axial slice
Delayed and weak enhancement of the parenchyma of the left kidney.

Before wide penetration of helical and multislice CT technologies, the condition remained undetected in 25–75% of cases (1) and thus increased risk and death rate at surgery (6, 7, 10). Computed tomography is well determined as the first-choice imaging modality

in the assessment of patients with abdominal aortic aneurysm (2–4). Spiral and especially multislice CT enables short acquisition time, thin collimation, and sufficient scan volume in addition to multiphase scanning, i.e. all that is of key importance in order to rule out all possible complications of abdominal aortic aneurysm (3, 4).

Typical findings of ACF on CT are as follows: early contrast enhancement of the dilated IVC (earlier than renal and hepatic parenchyma), which is isodense

with the adjacent aorta, retrograde enhancement of dilated renal and/or iliac veins, an associated aortic aneurysm, loss of normal anatomic space between aorta and IVC (4, 5, 8). In some cases, it is possible to visualize the leak itself, though reports on direct fistula visualization are rather rare (2, 3, 9). In addition, sometimes it is possible to track delayed opacification of the renal cortex on CT, probably due to reduced renal perfusion, decreased arterial pressure associated with venous hypertension (2, 4, 9).

We present CT findings of a case that to our knowledge has never been described before – a combination of dissecting infrarenal aortic aneurysm with

aorto-caval fistula arising from false lumen and left renal affection. One similar unilateral kidney affection on CT pattern has been reported by Koslin et al., but with no signs of concomitant aneurysmal dissection (8). Mansour et al. reviewed 16 patients with aorto-left renal vein fistulas, who possessed nonfunctioning left kidney (11). Fifteen of these patients had retro-aortic left renal vein, as well. In this review, CT was performed in three patients only.

Knowing all the possible signs of ACF presentation on CT may help the radiologist to make a definite diagnosis when it is not suspected from clinical examination.

Pilvinės aortos-apatinės tuščiosios venos fistulė, pasireiškusi kaip kairiojo inksto kolika Daugiasluoksnės kompiuterinės tomografijos radiniai

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Raktažodžiai: pilvinės aortos aneurizma, disekuojamoji aneurizma, aortos-tuščiosios venos fistulė, inkstu kolika, daugiasluoksnė kompiuterinė tomografija.

Santrauka. Spontanine aortos-tuščiosios venos fistulė yra reta pilvinės aortos aneurizmos komplikacija. Ši diagnozė nėra lengvai nustatoma, nes įprasti diagnostiniai požymiai (pulsuojantis pilvo skausmas ir ūžesys, širdies nepakankamumas ir ūminis dusulys) pasitaiko maždaug pusei pacientų. Kompiuterinės tomografijos vaizduose nustatoma, kad per anksti pasirodo kontrastinė medžiaga išplėstoje apatinėje tuščiojoje venoje, vizualizuojamas pats aneurizmos maišas, taip pat išnyksta skiriamoji riba tarp pilvinės aortos ir apatinės tuščiosios venos. Retai kompiuterinėse tomogramose galima pamatyti ir pačią patologinę jungtį tarp aortos ir apatinės tuščiosios venos. Šiuo atveju radiologinė diagnostika turi būti skubi. Mes aptariame paciento, kuriam buvo nustatyta disekuojamosios pilvinės aortos aneurizmos ir apatinės tuščiosios venos fistulė, kliniškai pasireiškusi kairiojo inksto kolika, daugiasluoksnės kompiuterinės tomografijos radinius. Daugiasluoksnė kompiuterinė tomografija yra pirmojo pasirinkimo metodas, tiriant pilvo srities kraujotakos sutrikimus, nes jis yra greitas, neinvazinis ir pasižymi aukštu diagnostiniu tikslumu.

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Received 26 November 2007, accepted 9 June 2008
Straipsnis gautas 2007 11 26, priimtas 2008 06 09