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Case Report

Infrarenal Aortic Occlusion (Leriche Syndrome) Depicted on Multidetector-row CT Angiography

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Abstract

Digital subtraction angiography is regarded as the gold standard for the evaluation of aortoiliac and peripheral arteriosclerotic disease. However, it is invasive, and difficulties may be encountered during the evaluation of total occlusion of the infrarenal aorta. The rapid development of multidetector-row computed tomography scanners has promoted the use of this modality for assessing the vascular system in a minimally invasive manner. We report a case of Leriche syndrome assessed using multidetector-row computed tomography angiography as the diagnostic tool. The technique allows high-quality angiography-like images and provides adequate information necessary for surgical treatment. (*Tzu Chi Med J* 2009;21(3):251–254)

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1. Introduction

Leriche originally described complete obliteration of the aortic bifurcation, also known as Leriche syndrome, in 1940 (1). This term commonly refers to patients with complete occlusion of the infrarenal aorta presenting with various clinical symptoms including decreased femoral pulses, intermittent claudication, gluteal pain, and erectile impotence. Clinical symptoms may vary according to the level of occlusion and the degree of development of the collateral vessels.

Digital subtraction angiography (DSA) has been considered the reference standard technique in the assessment of aortoiliac occlusive disease. However, diagnostic DSA is an invasive procedure associated with an elevated risk of patient morbidity and mortality (2). Although contrast-enhanced magnetic resonance angiography (CE-MRA) is an acceptable noninvasive tool for evaluation of abdominal and peripheral vasculature, it is more expensive and less readily available. Recently, multidetector-row computed tomography (MDCT) angiography has been proven to be a powerful tool in visualizing abdominal, pelvic, and lower extremity arterial systems (3–6). Here, we report a case of aortic occlusion (Leriche syndrome) that was excellently depicted using MDCT angiography.

2. Case report

A 55-year-old man was admitted to the emergency department because of chronic cough, night sweating, anorexia, and malaise for 1 week. He had lost about 10 kg of body weight during the 1 month prior

to admission. He had weakness and numbness of both legs, and a recent history of falling. He had a history of hypertension for many years that was controlled using regular medication, and he had smoked for about 20 years. On physical examination, decreased breathing sounds in the right lower lung field were noted, along with mildly decreased pulses over bilateral common femoral arteries, although the upper legs were still warm and red-colored. Routine blood and urine test results were normal.

Chest radiography revealed a fibrotic lesion in the right upper lung and mass-like consolidation in the right lower lung field. Because a tumor in the right lower lobe of the lung was suspected, enhanced chest CT was conducted—it showed organized pneumonia in the right lower lobe and a fibrotic lesion in the right upper lobe due to previous tuberculosis infection. A complete thrombotic occlusion of the infrarenal abdominal aorta was found incidentally. For further evaluation, MDCT angiography was selected as the diagnostic tool because it was faster, more convenient, and more comfortable than other diagnostic tests. MDCT angiography from the lower chest to the toes was performed using a 64-slice multidetector-row CT scanner (Light Speed VCT; GE Medical Systems, Milwaukee, WI, USA), using the following parameters: 64×0.625 mm collimation, 5 mm slice thickness, gantry speed of 0.35 seconds, 120 kV, and 250–500 mAs. MDCT angiography was performed after intravenous injection via an antecubital vein with automatic power injector of 120 mL of contrast medium, at a flow rate of 4 mL/sec. The contrast medium bolus was followed by 40 mL of saline administered at the same flow rate. The scanning delay was set using an automatic triggering system. When the preset contrast enhancement level of 100 HU in the upper abdominal aorta was reached, the CT scan was initiated automatically at 3 seconds. Images were reconstructed with a 1.25 mm slice thickness at 1 mm intervals. The total examination time, including the time spent in patient preparation, was less than 15 minutes. The raw data images were transferred to a workstation (Advantage Windows 4.2; GE Medical Systems) with commercially available software that enabled different reconstructions of images, including maximum-intensity projections (MIPs) and volume-rendered images. Volume-rendered images and MIPs showed an occlusion of the infrarenal aorta, and formation of the collateral vessels to the bilateral common femoral arteries (Figs. 1A and 1B). Vascular wall calcifications and mural thrombosis of the abdominal aorta were depicted on axial sources and sagittal reformatted images (Fig. 1C). MDCT angiography of the lower extremities depicted during the same examination showed adequate blood flow in both extremities (Fig. 2). Doppler flowmetry showed moderate atherosclerotic changes of both lower limbs, severely decreased arterial blood flow from the bilateral common femoral arteries, and loss of the arterial blood index.

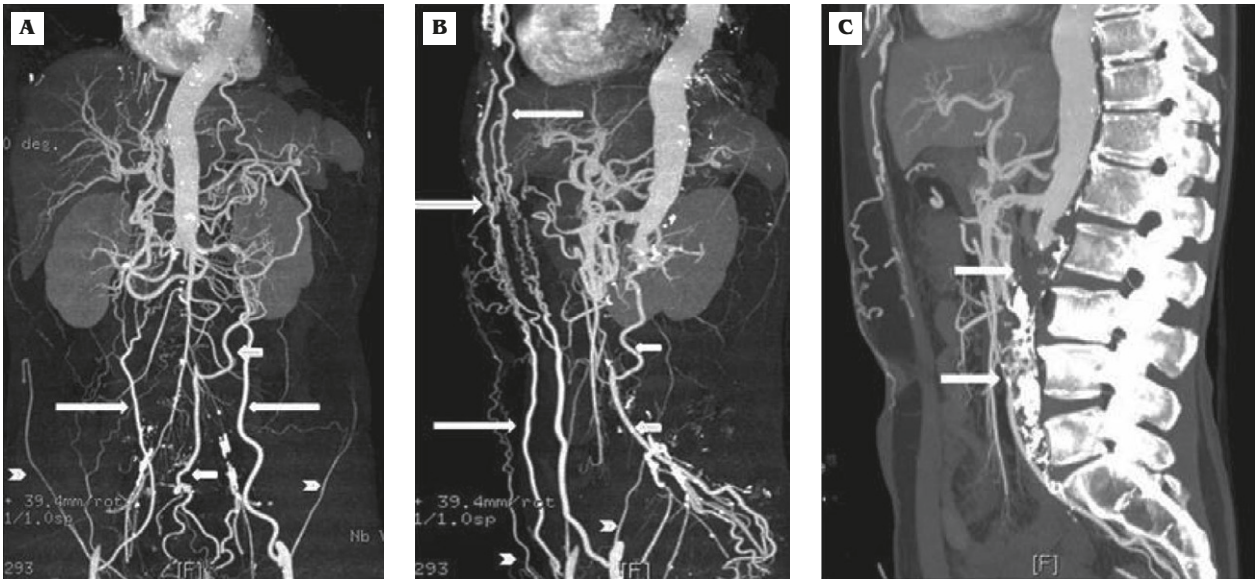

Fig. 1 — (A, B) Total occlusion of the infrarenal abdominal aorta. Coronal and sagittal maximum-intensity projection images of multidetector-row computed tomography angiography show an infrarenal occlusion of the aorta. There is reconstitution of common femoral arteries bilaterally via abundant collateral vessels, including epigastric arteries (long arrows), the circumflex iliac arteries (arrowheads), and mesenteric arteries (short arrows). (C) Sagittal reformatted image of the abdominal aorta shows calcification and mural thrombosis (arrows).

Fig. 2 — Coronal maximum-intensity projection image of multidetector-row computed tomography angiography with bone segmentation bilaterally depicts patency of run-off vessels.

Fig. 3 — Postoperative multidetector-row computed tomography angiography imaging reveals regular perfusion of the graft and the run-off vessels, with much decreased collateral vessels.

The patient underwent surgical treatment with an aortobifemoral bypass graft (16×8×8mm Hemaschield Y-graft) and limited thrombectomy through infrarenal aortotomy. Operative findings showed an infrarenal aortic occlusion with retained organized thrombus. Three days after surgery, follow-up MDCT angiography showed a patent aortobifemoral graft and markedly decreased collateral vessels to the bilateral common femoral arteries (Fig. 3). The patient's postoperative course was uneventful, and he was discharged from hospital 7 days after the operation.

3. Discussion

Currently, DSA is still the gold standard for evaluating arterial occlusive disease. However, it is invasive and time-consuming because it requires post procedural monitoring. The operator is also exposed to a dose of radiation. Furthermore, this technique requires highly trained personnel, it is more expensive, and it has low, but not negligible, procedure-related morbidity, such as atheroembolism, pseudoaneurysm formation, and puncture site hematoma (2). In addition, it has a limited field of view, a limited view angle, and a single-lumen opacification. Thus, it can be quite difficult to interpret when evaluating on infrarenal aortic occlusion with complex collateral vessels. In cases of distal aortic occlusion, transfemoral catheterization is contraindicated, and the transbronchial approach is then the most commonly used technique. However, the risk associated with this technique increases substantially compared with the femoral route. Therefore, DSA was not performed in this case, and the availability of MDCT angiography was then the alternative method. In the evaluation of aortoiliac occlusive disease, DSA was found to be superior to MDCT angiography only when depicting the collateral circulation.

Using the state-of-the-art MRA technique, CE-MRA has recently become a popular method for investigation of aortic and peripheral vascular disease. It is noninvasive, free of ionizing radiation, and provides high-quality angiography-like images (7–9). MRA is relatively pain-free, safe for patients with severe reactions to iodinated contrast or poor renal function, and does not require post procedural monitoring as in DSA. Ruehm et al studied 24 patients with Leriche syndrome using CE-MRA and found the technique was well suited for the assessment of this condition (10). However, CE-MRA has some drawbacks: the acquisition protocol in MRA involves some intricate and time-consuming processes, such as careful setting of the scanning position, and multi-station acquisition; further, CE-MRA cannot be used to evaluate the vascular wall for mural thickness or calcification. The presence of any metallic device such as a stent may cause artifacts that interfere with the evaluation of arteries (7–9). Furthermore, this modality is more expensive, requires longer examination time, and is limited with regard to determination of the small arterial course, compared with MDCT angiography. Therefore,

the CE-MRA imaging technique is used for vascular imaging, like the evaluation of aortic occlusion, only when the patient has contraindication to CT or DSA—such as those with impaired renal function or severe allergic reactions to iodinated contrast agents.

The widespread use of MDCT has changed many aspects of CT. The rapid speed of data acquisition and use of thinner collimation generated isotropic voxel data sets allow excellent-quality three-dimensional reconstruction methods. This makes it possible to image the arterial system noninvasively. This technique allows three-dimensional visualization from any angle and in any direction, which cannot be achieved using projection techniques such as DSA [4–6,11]. The reconstructed images of MDCT angiography can create angiography-like images and can show segments immediately distal to the point of occlusion, which are not shown in DSA. In this study, MDCT angiography showed the location of aortic occlusion, the visceral branches, the type and extent of collateral vessels, and the arterial system of the lower limbs. In addition, MDCT angiography can be used in other important ways, such as to determine intramural thrombus, the thickness of the vascular wall, the diameter and lumen of vessels, and vascular wall calcification. All the aforementioned data are crucial in planning radiological and surgical interventions. One limitation of MDCT angiography is the evaluation of heavily calcified arteries, especially in patients with long-term diabetes (due to partial volume "blooming" artifacts). These may cause overestimation of stenoses.

Although both CE-MRA and MDCT angiography provide acceptable image quality when compared with catheter angiography, MDCT angiography is selected as the preferred imaging tool for vascular study as it requires a shorter acquisition time, is easier to handle, more convenient, is widely available, and less expensive. In our case, the entire examination was completed within 15 minutes, including the time spent in patient preparation. Thus, it can be conducted as an emergent or outpatient procedure. However, there are drawbacks to MDCT angiography compared with CE-MRA. MDCT angiography exposes the patient to ionizing radiation and uses a nephrotoxic iodinated contrast agent.

In summary, we demonstrated a case of Leriche syndrome using MDCT angiography. As MDCT angiography is a fast, accurate, and noninvasive technique that can depict aortic occlusion, collateral vessels, and the lower extremity arterial system in one examination, we advocate that MDCT angiography be used as a first-line tool for investigation of adult patients suspected to have aortic occlusive disease.

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