FALSE-POSITIVE IMAGING OF INFERIOR VENA CAVA OCCLUSION

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ABSTRACT

False positive stenosis or occlusion of the inferior vena cava may sometimes occur by medical imaging. A 54-year-old male complained of intermittent ankle swelling with slight abdominal distension for 2 years. Occlusion of the retrohepatic segment of the inferior vena cava and small hepatic veins were visualized by both computed tomography and ultrasonography. A digital subtraction angiography for a definite diagnosis and further interventional treatment revealed no stenosis in either the inferior vena cava or the hepatic veins. The false positive errors of inferior vena cava occlusion by both computed tomography and ultrasound in the present case suggested that the diagnosis of Budd-Chiari syndrome should be based upon the all imaging, laboratory and clinical findings of the patient.

Key words: Budd-Chiari syndrome, diagnostic errors, diagnostic imaging, inferior vena cava.

Introduction

Budd-Chiari syndrome is an uncommon condition of thrombotic or nonthrombotic obstruction to the hepatic venous outflow. The prevalence of Budd-Chiari syndrome is unknown. The underlying etiologies include hematological disorders (such as polycythemia vera), obstetric causes, drugs, infection, malignancy, and trauma, etc. The onset is often slow and obscure, and a misdiagnosis is thus usually the case.

Case report

A 54-year-old male complained of intermittent swelling in the ankles with slight abdominal distension for 2 years. He had a 10-year history of hypertension and a 7-year history of diabetes, and his blood pressure and blood glucose were well-controlled. He had been diagnosed with Budd-Chiari syndrome in another hospital, where digital subtraction angiography revealed stenosis of the hepatic veins and he thus received percutaneous transhepatic balloon dilation. After the interventional treatment, his symptoms did not alleviate in spite of continuous oral diuretic therapy. He came to our hospital for further treatment. On admission, his vital signs were normal with no jaundice. There were no signs of varicose veins, hepatomegaly, splenomegaly or ascites. Blood test showed normal values except for an elevated $\gamma$-glutamyltransferase (106 U/L). Computed tomography (CT) revealed a stenosis of retrohepatic segment of inferior vena cava with a minimal internal diameter of 1 mm and the narrowing section was as long as 2.5 cm (Fig. 1).

Abdominal ultrasonography showed that the internal diameters of the hepatic veins were 6~7
mm, and the length of the narrowing section of the inferior vena cava was 3.6 cm with a minimal diameter of 2 mm. After an institutional case consultation, a decision was made to perform a digital subtraction angiography for a definite diagnosis and further interventional treatment if needed. Surprisingly, digital subtraction angiography revealed that there were no stenoses in the inferior vena cava or the hepatic veins (Fig. 2).

The patient was discharged and prescribed aescuven forte tablet (Cesra Arzneimittel GmbH & Co. KG, Baden-Baden, Germany) 150 mg twice a day. His symptoms were alleviated at a 3-month follow-up.

**Figure 1**: Computed tomography (sagittal view) showing the occlusion of the retrohepatic segment of the inferior vena cava (arrow) was 2.5 cm long with a minimal internal diameter of 1 mm.

**Figure 2**: Digital subtraction angiography showing no stenosis in (A) the inferior vena cava or (B) the hepatic veins.

**Discussion**

The symptoms of Budd-Chiari syndrome vary largely dependent on the extent of the occlusion of the hepatic veins and/or the inferior vena cava. The classical triad of the clinical features includes abdominal pain, ascites and hepatomegaly. This syndrome may have upper abdominal discomfort and progressive ascites caused by portal hypertension. The categorizations of Budd-Chiari syndrome vary considerably. One simple and representative classification includes four types: type I, hepatic vein occlusion/stenosis, accounting for 10-20%; type II, inferior vena cava occlusion/stenosis, accounting for 50-70%; type III, occlusion/stenosis of both the hepatic vein and the inferior vena cava; and type IV, hepatic venular occlusion. The management strategies included anticoagulation, thrombolysis, angioplasty and stenting, portosystemic shunting, and liver transplantation.

Computed tomographic portography is the gold standard of the diagnosis of Budd-Chiari syndrome. Magnetic resonance imaging, magnetic resonance angiography, and ultrasonography are alternative diagnostic methods. However, false-positive and false-negative diagnoses may occur, especially when it is associated with a thrombosis. In a series of 52 patients who had CT portography before surgical exploration of the liver, eight had a total of 10 false-positive findings, yielding a false-positive diagnosis rate of 15%. In eight cases, the false-positive findings from CT portography were correlated with the histologic study on the resected or biopsied materials.

Hepatic and portal veins are not always optimally visualized by CT, CT with portography, magnetic resonance imaging, and ultrasonography. A delayed enhancement of the hepatic veins may be responsible for false positives/negatives of nonopacified hepatic veins and inferior vena cava with hepatic venous occlusion in spiral CT scans.

Soyer et al. reported that in 77 of 146 (52.7%) patients the hepatic or portal veins were not properly visualized. The poor visualization of these vessels may recommend course changes of the vessels, for example compression by the tumors, or by the lack of a panorama view of the lesion without a three-dimensional reconstruction. Contrast-enhanced abdominal CT examinations revealed that the inferior vena cava was not visible at one or more levels in only 132 cases (10.4%). In 57 (43%), non-visualization was due to pathological processes, most frequently metastatic carcinoma, causing compression or thrombosis of the inferior vena cava. In the remainder, technical factors or artefacts could explain the non-visualization.

The laminar flow that results from the congestion caused by the stenosis of the lumina can produce false positive results. The reason for the false-positive diagnostic errors was the inability of the contrast to mix easily with the venous blood. Pressure and flow pattern changes secondary to car-
dianic and respiratory motions might be one of the main reasons of the false positive of inferior vena cava stenosis visualized by ultrasonography(15).

On the contrary, MRA may miss minimal stenosis but never false positive in diagnosing renal artery stenosis or occlusion(16). Three-dimensional contrast-enhanced magnetic resonance angiography may display well the hepatic veins, the inferior vena cava system, and collateral vessels(17).

In the present patient, CT could clearly show neither the blocked or narrowed inferior vena cava or hepatic veins, nor the blockage or narrowing itself. His symptoms of ankle swelling and abdominal distension were considered the result of venous dysfunction, and thus he was given aescuven forte tablet 150 mg twice daily, which led to an alleviation of his symptoms.

Conclusion

False positive inferior vena cava occlusion by medical imaging may sometimes occur. The false positive errors of inferior vena cava occlusion by both CT and ultrasound in the present case suggested that the diagnosis of Budd-Chiari syndrome should be based upon all imaging, laboratory and clinical findings of the patient. A comprehensive evaluation of the patient’s conditions including the symptoms and signs may avoid the bias brought by the medi-cal imaging.

References