Short communication

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A Rare Case of Ruptured Abdominal Aortic Aneurysm with the Formation of a Thrombosed Aortocaval Fistula, Thrombosis of the Inferior Vena Cava and Iliac Veins

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ABSTRACT This article considers a rare case of rupture of abdominal aortic aneurysm with thrombosed aorto-caval fistula formation, with thrombosis of the inferior vena cava and iliac veins. During the multiphase computed tomography, early enhancement of inferior vena cava was not obtained, but non-contrasting aorto-caval fistula was revealed in the venous contrast phase, as well as the absence of the contrast in the adjacent parts of the inferior vena cava and iliac veins. The patient was successfully operated and the diagnosis was confirmed intraoperatively.

Keywords: aortic aneurism rupture, aortocaval fistula, computed tomography, inferior vena cava thrombosis

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AAA – abdominal abdominal aortic aneurysm
CT – computed tomography
IVC – inferior vena cava

INTRODUCTION

Aortic aneurysm is a steadily progressive disease of the cardiovascular system with a polymorphic clinical picture, as well as the risk of severe complications. The complicated course of aortic aneurysm can occur suddenly amid complete clinical well-being and is characterized by various pathological changes. The most common manifestation of a complicated course of an abdominal aortic aneurysm (AAA) is its rupture, which occurs more often in the retroperitoneal space and abdominal cavity than in adjacent hollow organs and vascular structures [1, 2].

AAA ruptures with the formation of aortovenous fistulas most often occur at the level of the inferior vena cava (IVC) and less often at the level the renal veins. This manifestation of a complicated course is quite rare and, according to various data, accounts for about 1–7% of the total number of AAA ruptures [3–7].

A functioning aortocaval fistula is accompanied by the development of severe clinical symptoms, including a state of shock due to rupture of an aortic aneurysm plus symptoms of a pronounced right-to-left shunt of blood flow and a sharply rising venous return [8, 9].

The presence of thrombosed aortocaval fistula in a patient with a ruptured abdominal aortic aneurysm is an extremely rare pathology and according to various researchers, only few cases of such a combination have been described [10, 11].

We present the observation of thrombosed aortocaval anastomosis with thrombosis of the IVC due to rupture of an aneurysm of the abdominal aorta.

Clinical observation

A 68-year-old male patient I. was admitted on an emergency basis with complaints of mesogastric pain radiating to the lumbar region, weakness and dizziness.

According to the ultrasound examination, an aneurysm of the infrarenal aorta was detected, of 10-cm transverse size with the presence of thrombotic masses in the aneurysm cavity. The right contour of the aneurysm was not clearly visualized, signs of retroperitoneal hematoma were determined at the level of the aortic bifurcation.

Common, external and internal iliac arteries were not dilated, with calcification of the walls and the presence of the main blood flow. Occlusive thrombosis of the right common femoral vein and the presence of thrombotic masses in the external iliac vein were also identified.

For the purpose of diagnosis, the patient underwent multislice computed tomography (CT) using a *Philips machine iCT,* 256 sections with intravenous bolus injection of a non-ionic iodine-containing contrast agent in a volume of 100 ml. A non-contrast study was performed, followed by arterial and venous phases of contrast enhancement.

In a non-contrast study and in the arterial phase of bolus contrast enhancement, an aneurysm of the infrarenal aorta was determined with a maximum size of up to 89 mm with a rupture and the formation of a retroperitoneal hematoma; an intramural hematoma was visualized along the posterior contour of the aortic aneurysm (Fig. *1A*). The IVC was visualized intimately adjacent to the right wall of the aneurysm (Fig. *1A*, *B*).

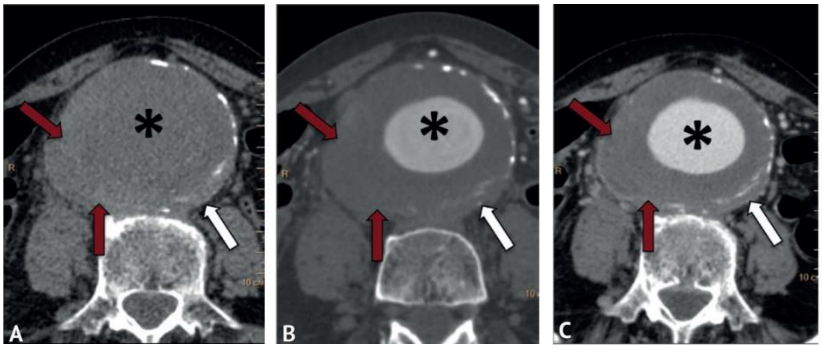

Fig. 1. Abdominal aortic aneurysm (asterisk), images in the axial plane: A - non-contrast study, B - arterial phase of contrast enhancement, C - venous phase of contrast enhancement. The lack of differentiation of the walls of the aneurysm and the inferior vena cava in the venous contrast phase (red arrows). Compaction of the aneurysm tissue along the posterior contour (white arrow)

In the arterial phase, there were no signs of the contrast agent entering the IVC lumen or the contrast agent leaving the aortic aneurysm (Fig. 2).

In the venous phase of contrasting, a defect in the walls of the aortic aneurysm was clearly visualized with the formation of a pathological thrombosed aortocaval anastomosis 53 mm in length.

The IVC was thrombosed 10 mm above the fistula level, and occlusive thrombosis of the common, external, and internal iliac veins was also noted (Fig. *1C*, 3). The top of the thrombus was visualized against the background of thickened walls and was not washed with a contrast agent, so there were no signs of flotation.

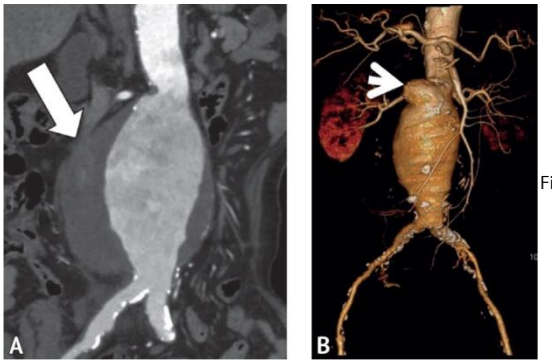

Fig. 2. Abdominal aortic aneurysm, arterial phase of contrast enhancement: A — reconstruction in the frontal plane, B — three-dimensional reconstruction. The lack of early contrast enhancement of the inferior vena cava system in the arterial phase of contrast enhancement, including the level of the wall defect (white arrow), secondary aneurysm

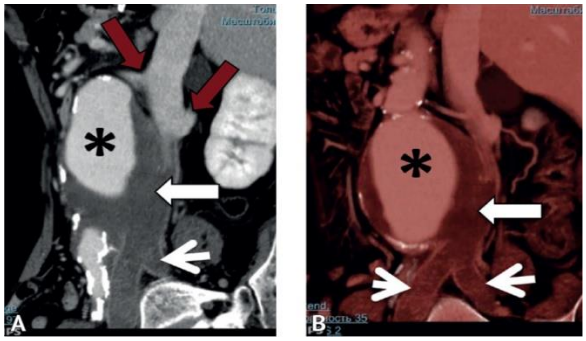

Fig. 3. Abdominal aortic aneurysm (asterisk), venous contrast enhancement phase: A, B — reconstruction in the oblique-sagittal plane. Thrombosed aortocaval fistula (white arrow), thrombosis of the common iliac veins (short white arrows), contrasting of the inferior vena cava from the level of the renal vein mouth (red arrows)

The patient underwent urgent resection of an aneurysm of the abdominal aorta with aortofemoral prosthesis. Two defects of the aortic walls were revealed intraoperatively: a defect in the posterior wall at the level of the lumbar vertebral body and a defect in the right wall with the formation of an aortocaval fistula. Thrombotic masses were removed from the IVC lumen, followed by suturing of the IVC wall defect.

The postoperative period was uneventful, the patient was discharged in a satisfactory condition.

DISCUSSION

The formation of an aortocaval fistula was first described by J. Syme in 1831 [12]. This complication is rare, accounting for no more than 7% of the total number of patients with ruptured abdominal aortic aneurysms. A functioning aortocaval fistula is characterized by a pattern of aortovenous shunting of blood, as well as symptoms of ruptured aortic aneurysm. Thus, the clinical picture in aortic aneurysm rupture with the formation of an aortocaval fistula includes a pulsating abdominal mass, abdominal pain, swelling of the lower extremities, shortness of breath, and the possible development of acute renal failure. In rare cases, thrombotic masses can form in the venous system, which can subsequently cause pulmonary embolism [3, 5, 7].

The first attempt at surgical treatment was carried out in 1938, but the postoperative period was complicated by the development of aortic dissection, which led to the death of the patient. For the first time, successful aortoiliac prosthesis for aortocaval fistula was performed 17 years later by Dr. Cooley, and in 1998 endovascular intervention with aortoiliac stenting and embolization of the right internal iliac artery was performed [7, 13].

When examining patients, aortocaval fistulas may not be diagnosed due to their small size, the formation of a thrombus directly at the level of the fistula, severe IVC compression by an aortic aneurysm, or IVC thrombosis.

In such cases, a detailed preoperative examination helps make a correct diagnosis for the patient. CT angiography is the gold standard in the diagnosis of aortic aneurysms, including ruptured abdominal aortic aneurysms [14]. However, there are data on the limitation of the capabilities of CT angiography in the diagnosis of such lesions [10]. We can relate these results of studies to the limitations of the ability to visualize the state of the walls of the aortic aneurysm and IVC in the arterial phase. The venous phase of contrasting allows the optimal differentiation of the state of the walls of the aorta and adjacent structures and tissues to be got.

CONCLUSION

Conducting a complex computed tomography in a patient with an aneurysm of the abdominal aorta with the implementation of the venous phase of contrasting revealed a rare complication, the formation of a thrombosed aortocaval fistula in combination with thrombosis of the inferior vena cava and iliac veins and ensured the successful treatment of the disease.

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