Case Report

Acute renal failure secondary to aortic and renal thrombosis in a patient with abdominal aortic hypoplasia

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Introduction

Acute renal arterial occlusion is a cause of acute renal insufficiency. This occlusion may occur as a result of the renal artery embolization or of the renal thrombosis usually secondary to atherosclerotic complication [1,2]. We report a patient older than 50 years who developed acute aortic and renal arterial thrombosis. The occlusive process was caused by an abdominal aortic hypoplasia. Acute anuric renal failure as first manifestation of this aortic disease is very uncommon [3]. Moreover, the onset of symptoms in this infrequent vascular pathology is usually at an early age [3–7]. On the other hand, the favourable resolution of this case illustrates the renal parenchyma resistance to prolonged ischemia and the effectiveness of the surgical revascularization in this entity.

Case report

A 55-year-old man was referred to our hospital with acute anuria for 24 h. He had history of smoking (10 cigarettes/day) and poorly controlled hypertension during 15 years. He reported also symptoms of intermittent claudication 14 years ago which disappeared spontaneously 2 years later. The initial symptom was an acute lumbar pain after a physical exercise. On admission, the blood pressure was 160/100 mmHg. Lower extremity pulses were absent. The rest of the physical examination was normal. The laboratory data showed serum urea 127 mg/dl, serum creatinine 8.3 mg/dl, cholesterol 229 mg/dl, and LDH 1101 mU/ml. The remaining laboratory tests were within normal limits.

Abdominal Doppler ultrasonography disclosed a hypoplasic right kidney (diameter 3 cm) and a normal left kidney without signs of obstructive uropathy. The Doppler study revealed very reduced arterial flow with normal venous flow in the left kidney, and absent flow in the abdominal aorta. In the scintigraphy with Tc-99m-DPTA the right kidney was not visualized; the left kidney showed decreased perfusion, good tracer’s concentration, and no excretion of isotope after 20 min (Figure 1).

Transbrachial aortic arteriography was performed showing normal thoracic aorta, total occlusion of infradiaphragmatic aorta and extensive collateral circulation from thoracic aortic branches to abdomen and lower limbs. Celiac trunk, mesenteric arteries, renal arteries and nephrograms were not visualized (Figure 2).

We started treatment with haemodialysis. The diagnosis of thrombosis of the infradiaphragmatic aorta and renal artery and subsequent anuric renal failure was established. Two days after admission, the patient was referred to another hospital for the realization of revascularizing surgery.

In this medical centre, abdominal tomography was performed showing diffuse abdominal aortic hypoplasia with thrombosis (Figure 3). Eleven days after the onset of anuria, the patient underwent surgical revascularization. Thrombectomy of celiac aorta, transaortic endarterectomy of left renal artery and celiac-aortobifemoral by-pass (haemashield 16 × 8 mm) were made. Diuresis was recovered and the patient was discharged from hospital 24 days after the surgery with a serum creatinine concentration of 1.7 mg/dl. A postoperative arteriography was obtained showing normal blood flow in suprarenal aorta, left renal artery, and aortobifemoral by-pass, together with a widened Riolan’s arch filling the superior mesenteric artery in retrograde fashion (Figure 4).

After 34 months follow-up, the patient enjoys a normal life with normal renal function (serum creatin-
Fig. 1. Tc-99 m-DPTA Scintigraphy. (a) Absence of perfusion. (b) Good concentration of DPTA without excretory phase.
Fig. 2. Transbrachial arteriography. (a) The study shows total aortic thrombosis below the diaphragm and a very hypertrophic collateral circulation from thoracic aortic branches; nephrograms are not visualized. (b) The arteries of the lower limbs are refilled from these collateral vessels.

Discussion

Hypoplasia of the abdominal aorta is a rare and complex group of vascular abnormalities. Diffuse narrowing or tubular stenosis can affect several parts of the abdominal aorta and its branches.

Aortoiliac hypoplasia is a special syndrome affecting the infrarenal aorta and iliac arteries. This aortoiliac involvement occurs much more frequently in women over 50 years of age, and is usually associated with smoking, hyperlipidaemia, and symptoms indicating ischaemia of the lower extremity [8,9]. Several synonyms have been given to the disease when it affects the midabdominal aorta: middle aortic syndrome, abdominal aortic coarctation, or abdominal aortic hypoplasia. Hypoplasia of the midabdominal aorta can also involve the visceral and renal arteries. The pathogenesis in unknown. Most cases appear related to disorders occurring during foetal develop-
Fig. 3. Computed Tomography showing in sectional images the hypoplastic right kidney (arrow) and the narrowing of the aortic lumen. 
(a) Normal aortic lumen at level of D12-L1 vertebrae (arrow). (b) Diffuse aortic narrowing starting on L1 vertebra level (arrow).
Fig. 4. Postoperative arteriography. (a) Normal flow in suprarenal aortae, complete revascularization of the left kidney and well-functioning aortobifemoral by-pass are observed. (b) The arteriography reveals a Riolan’s Arch of large caliber (arrow).
Acute renal failure secondary to abdominal aortic hypoplasia

Acute renal failure secondary to abdominal aortic hypoplasia may be the result of ‘overfusion’ of the two foetal dorsal aortae or their failure to fuse with obliteration of one of these two primitive vessels [3–5]. The presence of a hypoplastic kidney seems to support the hypothesis of malformation in our patient.

The symptoms resulting from abdominal aortic hypoplasia usually appear at an early age without sex predilection, and in most cases the diagnosis is made during the second decade of life. The first manifestations are usually severe hypertension and intermittent claudication of the lower extremities. Abdominal visceral ischaemia is very uncommon owing to the effectiveness of the intestine’s collateral circulation, as we observed in postoperative arteriography performed on our patient. The outcome without treatment is poor with death or severe sequelae (hypertensive cardiac failure, cerebrovascular accidents) in young adulthood [3–5].

The present case had several interesting features. Although renal arteries can be involved, few patients present with renal insufficiency [3,6,7]. Clinical presentation with acute anuric failure is exceptional and we have found only one case report in the literature [3]. Clinical presentation at an advanced age is also very uncommon [6,7]. Moreover, patients who reach the age of 50, often present infrarenal involvement. Our patient had diffuse narrowing of the abdominal aorta and, in spite of this, he remained asymptomatic over a long period. He had complained of lower limb claudication 14 years ago, but the symptoms disappeared and he continued to be active and entirely asymptomatic. Development of an extensive collateral circulation could explain these exceptional features.

Surgical revascularization can restore the renal function in nonfunctionating kidney with prolonged ischaemia secondary to totally occluded renal artery. This reveals the ability of the kidney to survive in spite of persistent ischaemia. Pre-existing collateral circulation offers protection and maintains the viability of renal parenchyma at subfiltration arterial perfusion pressures. On the other hand, there are no reliable criteria to predict the reversibility of renal ischaemic dysfunction. Reasonable kidney size, presence of nephrogram, presence of rich collateral circulation and patency of the distal renal artery beyond total occlusion, have been considered indications to revascularization [1,2]. In our patient, some of these findings were absent but the hypertrophic collateral circulation preserved the kidney and the visceral organs against hypoxic injury. The result of surgical revascularization, performed by expert surgeons, has been excellent with total recovery of renal function in spite of prolonged ischemia.

In conclusion, abdominal aortic hypoplasia may be asymptomatic for a long time and its first clinical manifestations may appear at advanced age. It should be considered in the differential diagnosis of aortic thrombosis in adult patients. It may be the cause of acute renal failure. Successful revascularization is possible despite a prolonged ischaemic period. Even in cases with extensive thrombosis, surgical treatment, which often requires complex arterial revascularization techniques, may provide excellent results.

References


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