Cure of apparent end-stage renal disease in a patient with dissecting aneurysm of the aorta using a percutaneous interventional approach

Martin C. Kammerl1, Christoph Manke2, Stefan Feuerbach2, Delawer Reber3, Hermann Aebert3, Dietrich Birnbaum2, Frank Schweda1, Günter A. J. Riegger1 and Bernhard K. Kramer1

1Klinik und Poliklinik für Innere Medizin II, 2Institut für Radiologie, 3Klinik und Poliklinik für Herz-, Thorax- und Herznahe Gefäßchirurgie, University of Regensburg, Regensburg, Germany

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Introduction

Reduced perfusion of abdominal organs as well as of the legs may occur in patients with dissection of the thoracic and abdominal aorta [1,2]. Different therapeutic approaches have been reported: surgery, percutaneous intervention and medical treatment [5–12].

We report on a 47-year-old man who suffered from dissection of the descending thoracic aorta with marked compression of the true lumen by the false lumen. The patient presented with severe arterial hypertension, apparent end-stage renal disease, and repeated neurological symptoms of the legs due to spinal ischaemia. By means of percutaneous transluminal intervention normal circulation below the dissection was re-established. Thereafter renal function recovered rapidly and no more neurological deficits were detectable.

Case

Five months before admission the patient complained about sudden epigastric pain spreading to the neck, and vomiting. Acute myocardial infarction could be excluded by coronary angiography (50% stenosis of the right coronary artery). In addition a diagnosis of a nephrotic syndrome with a serum creatinine level of 345 μmol/l and a proteinuria of 6.5 g/day was made. Some degree of proteinuria had already been known for about 25 years, and the patient refused a renal biopsy at this time.

During the following 2 months the patient suffered from repeated episodes of paraesthesia in both legs up to the coccyx, and loss of muscle tone with a duration of up to 10 min. DSA of the legs was performed at another hospital, confirming peripheral arterial vessel obstruction of the true lumen (5 F pigtail catheter within the true lumen) by the blind ending false lumen and with a mean pressure gradient of 43 mmHg.
disease but without finding an explanation for these symptoms.

In the following month the patient suffered from worsening dyspnoea and finally he had to be readmitted to the other hospital with pulmonary oedema, a hypertensive emergency (blood pressure up to 240/100 mmHg) and worsening renal function (serum creatinine 628 μmol/l, serum urea 34.9 mmol/l), necessitating emergency dialysis. Since antihypertensive treatment did not achieve satisfactory blood pressure control, an arteriography of the renal arteries was performed. A 40% stenosis of the left renal artery and dissection of the epiphrenal thoracic aorta were found.

CT of the chest revealed an extension of the aneurysm from the left subclavian artery’s origin to the suprarenal abdominal aorta. Since the dissection was considered to be chronic, no need of surgery or interventional treatment was seen. Because of recurrent episodes of neurological symptoms affecting the legs, a MRT of the spine was carried out. It showed evidence of ischaemia of the cervical and thoracic spinal cord. Also, stenosis of the right internal carotid artery was diagnosed by duplex sonography. This stenosis was treated by surgery. In the further nephrological work-up, sonography and duplex sonography showed normal size of both kidneys, reduced renal perfusion and a stenosis of the left renal artery. The latter was considered to be haemodynamically not relevant. 99Tc-MAG3-scintigraphy of the kidneys revealed reduced perfusion, secretion and excretion of the tracer, the left kidney contributed 60% of total RPF. Biopsy of the right kidney showed benign nephrosclerosis with no evidence of cholesterol embolism or tubular necrosis. Blood pressure was not well controlled despite a combination of five antihypertensive drugs (calcium-channel blocker, beta blocker, clonidine, dihydralazine, and losartan).

Sensory disturbance of the left leg regularly occurred at blood pressure values below 150/80 mmHg. Ischaemia of the spinal cord from obstruction of the true lumen of the thoracic descending aorta was suspected.

Arteriography of the aorta and iliac arteries was performed. The extension of the type-B aneurysm was estimated as 12 cm in length and 3 cm in width. The true lumen compromised less than 25% of the normal value. Furthermore a >50% stenosis of the left renal artery and stenoses of atherosclerotic iliacal arteries were seen. Interventional fenestration of the dissection flap was carried out. A 10 F sheath was inserted into the left femoral artery and a Rösch-Uchida needle in a 10 F Teflon catheter was placed in the true lumen of the aorta. The dissection flap was penetrated via the sheath with a combination of a 5 F Teflon catheter and a 20 G nitinol needle. After removal of the needle an
Amplatz guidewire was placed in the false lumen, and by means of a 16 mm balloon catheter fenestration of the flap was performed, creating an artificial re-entry. The pressure gradient caused by obstruction of the true lumen was reduced from 43 to 14 mmHg, following insertion of a Palmaz stent the gradient could be abolished (<2 mmHg). The stenosis of the renal artery was treated with PTA (5 mm balloon catheter) and implantation of a stent (6 mm Palmaz stent). The left iliac artery was dilated with a 7 mm balloon catheter.

Thereafter dialysis was no longer required (present serum creatinine levels are stable at 141 μmol/l), neurological deficits were gone and blood pressure could be controlled by a combination of two antihypertensive agents (120/75 mmHg), but proteinuria persisted (4.78 g/day 3 weeks after the procedure).

Discussion

Renal ischaemia is a well known reason for renal failure and may be caused by atherosclerotic and fibromuscular renal artery stenoses, by emboli, by trauma, and by aneurysms of the aorta [1,2]. In the above patient a dissecting aneurysm of the descending thoracic aorta caused renal ischaemia and dialysis dependency for 2.5 months. Repeated prior application of contrast media and a pre-existing damage of the kidneys, most probably due to glomerulonephritis or hypertension or a combination of both, may have further contributed to progressive renal failure. Signs of cholesterol embolism were not found in the biopsy. In addition to renal failure, reduced perfusion in the spinal arteries led to repeated neurological deficits of the lower extremities. The pulmonary oedema probably was flash pulmonary oedema caused by reduced renal perfusion due to dissecting aneurysm as it is well known in renal artery stenosis [3]. Renal function could be improved and neurological deficits reversed when normal arterial perfusion distal to the dissection could be re-established by percutaneous fenestration of the dissection flap. Nephrotic proteinuria could be improved presumably by interfering with stimulation of the renin–angiotensin system [4,5].

To our knowledge no patient with apparent end-stage renal disease has been reported so far who had been successfully treated using the fenestration technique.

Aortic stent placement instead of surgery, with its known high morbidity and mortality, has been used for obliteration of the false lumen for similar lesions both in experimental [6,7] and in clinical studies [8–10]. This technique was considered unsuitable for the present case because of the danger of thrombosis in the false lumen with consecutive thrombosis of the intercostal arteries. However, when using this method a covered stent is usually preferred because when a bare stent is used the risk of rupture of the aneurysm still exists. The technique used in the present case was percutaneous fenestration with stent implantation for creating a re-entry of the false lumen. In contrast to aortic stent implantation, the sheath diameter was only 10 F and the intervention was performed under local anaesthesia. This interventional method had recently been introduced as a relatively safe and effective treatment in patients experiencing ischaemic complications of dissecting aortic aneurysm [11–13]. Another advantage of this method is that PTA of the renal artery and iliac artery can be performed during the same treatment session. Placement of a stent in the dissection flap was chosen since balloon fenestration of the fibrotic membrane alone was not effective. In patients with high cardiovascular and perioperative risks this non-surgical procedure may be useful.

References


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