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Simultaneous endovascular treatment of abdominal aortic aneurysm and renal artery stenosis

Jednoczasowa wewnątrznaczyniowa operacja naprawcza tętniaka aorty brzusznej i zwężenia tętnicy nerkowej

Streszczenie

Tętniak aorty brzusznej (AAA) często współwystępuje ze zwężeniem tętnicy nerkowej (RAS). Wybór optymalnego postępowania terapeutycznego powinien być w takich okolicznościach zindywidualizowany. Leczenie wewnątrznaczyniowe AAA stało się akceptowalną alternatywą dla operacji otwartych, a angioplastyka RAS prawie całkowicie wyparła rewaskularyzację chirurgiczną. W artykule przedstawiono przypadek pacjenta z wysokim ryzykiem powikłań okołooperacyjnych oraz opornym nadciśnieniem tętniczym, u którego wykonano skuteczną wewnątrznaczyniową operację naprawczą AAA nieobejmującą tętnic nerkowych z jednoczasową angioplastyką RAS z wszczepieniem stentu.

słowa kluczowe: zwężenie tętnicy nerkowej, nadciśnienie, tętniak aorty brzusznej, stentgraft
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Abdominal aortic aneurysm is the most feared, often fatal complication. Renovascular hypertension remains the most common form of correctable hypertension and atherosclerotic renal artery stenosis (RAS) is its most prevalent cause. Coexisting of RAS and AAA has been identified in 33,1% [1]. The treatment of infrarenal AAA associated with atheromateous renal disease is challenging. Both vascular pathologies may be managed by either surgical or endovascular treatment. Endovascular repair of infrarenal AAA (EVAR) has become in recent years a generally accepted alternative to open surgery [2, 3]. In treatment of RAS, percutaneous techniques have largely replaced surgical revascularization [4, 5].

We report a case when simultaneous endovascular treatment of RAS and infrarenal AAA was chosen in management of patient with resistant hypertension, renal dysfunction and cardiopulmonary disease.

Introduction

Abdominal aortic aneurysms (AAA) are being diagnosed with increasing frequency. A rupture of AAA

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Case raport

A 69-year old male with a history of arterial hypertension, diabetes type 2, myocardial infarction, COPD and atherosclerosis of lower extremities arteries, was referred with asymptomatic AAA with diameter of 57 mm in ultrasound and stenosis of the proximal segment on left renal artery. Laboratory studies showed slightly elevated creatinine — 144 μmol/l (normal 53–115 μmol/l), and glomerular filtration rate (GFR) estimated by MDRD formula was

44,5 ml/min. His mean blood pressure on admission and in consecutive measurements was 150/ /80 mmHg on triple therapy (ACE inhibitor — perindopril 10 mg, thiazide-like diuretic — indapamide 1,5 mg, calcium antagonist — amlodipine 5 mg). CT scan confirmed aortic aneurysm and 80% stenosis of the left renal artery (fig. 1). Maximal diameters of aortic aneurysm was 5.8 × 5.4 cm, the neck of the aneurysm measured 3 cm and did not include the renal artery.

Because of a high level of perioperative risk (renal insufficiency, prior myocardial infarction and COPD), favorable anatomy and coexisting significant RAS, simultaneous EVAR with PTRA was chosen in the management of the patient. To decrease the risk of a contrast-induced nephropathy, patient was vigorously intravenously hydrated with 0,9% saline before and after the procedure and a low-osmolar nonionic contrast was used during the procedure. The procedure was done under spinal anaesthesia. Both common femoral arteries were exposed by surgical dissection. The calibrated 5F type pigtail catheter was introduced into the aorta above the renal artery through the left common femoral artery over a hydrophilic guidewire 0.035 (Roadrunner: Cook Ireland Ltd., Europe Shared Service Center, O'Halloran Rd., National Technology Park, Limerick, Ireland) (fig. 2). At first stenosis of left renal artery was treated. After performing the angioplasty, stent was assembled on balloon, 6 mm in diameter and 12 mm in length (Smart, Cordis Corp, NJ, USA), and implanted. After stent implantation digital subtraction angiography (DSA) was performed to examine the location. Subsequently the body of stent-graft (Cook company Inc. USA Terumo Corp., Tokyo, Japan) was introduced over a stiff Lunderquist 0.35 guide through the right femoral artery, into the abdominal aorta, and the covered part of stentgraft was positioned below the renal arteries. Afterwards a guide was introduced into the stent-graft by the left femoral artery. Iliac part of prosthesis was introduced into aorta through the Amplatz 0.35 guide. The right arm of stent-graft was prolonged up to iliac artery. Then, the arms of prosthesis were positioned in the iliac common artery. Directly after stentgrafting digital subtraction angiography (DSA) was performed to examine the location and tightness of the prosthesis (fig. 3).

Follow-up after combined aortic and renal endovascular treatment consisted of a physical examination, laboratory studies including creatinine, estimated GFR,

Figure 1. Angio CT before renal stent and stentgraft implantation

Figure 2. DSA image before renal stent and stentgraft implantation

Figure 3. DSA image after renal stent and stentgraft implantation

Figure 4. Angio CT 36 month after renal stent and stentgraft implantation

and urea, and ultrasound duplex at 6, 12, 24 and 36 months. Due to renal dysfunction the use contrast-enhanced CT was limited and performed at 12 and 36 months after endovascular treatment. At 12 months of follow-up the patients laboratory studies showed creatinine 112,9 μmol/l, eGFR — 59 ml/min while at 36 months: creatinine 99,1 μmol/l and eGFR — 68,7 ml/min. Twelve months after endovascular repair the blood pressure was 130/80 mmHg and a reduction of antihypertensive drugs (perindopril 5 mg, indapamide 1,5 mg) was possible. At 12 and 36 months after endovascular reconstruction angioCT revealed patent renal artery stent without evidence of in-stent restenosis and proper placement aortic endograft without complications (fig. 4).

Discussion

When choosing between EVAR and open surgical repair patient's age, risk factors for perioperative morbidity and mortality, anatomic factors and experience of the surgeon is usually taken into account [6, 7]. The classic indication for EVAR is elderly patient with favourable anatomy who is at high level of perioperative risk. In recent years the numbers of abdominal stent-graft placement have significantly increased [8, 9] and EVAR is offered also in low- or average-risk patients who have no particular contraindications to conventional surgical treatment. EVAR shows an early benefit in patients with preexisting severe neurological, cardiovascular, pulmonary or renal dysfunction [10]. For that reason it offers shorter hospitalization and faster convalescence. The short-term observation of plain EVAR shows favourably renal outcome compared to surgical treatment [11]. This advantage is not seen in longer than one-year observation, when the outcomes are comparable [12].

The diagnosis of coexisting RAS causes the choice of management even more difficult. Expert panel position statement on indication for revascularization of renal artery stenosis in hypertensive patients published after the results of the ASTRAL trial in 2009, recommends an individualiazed approach to patients with significant atherosclerotic RAS based on natural history of disease and other clinical data. The angioplasty with stent is justified in patients with significant RAS and severe, malignant and resistant hypertension. The document only briefly mentions that atherosclerotic RAS should be simultaneuosly treated in case surgical repair of abdominal aorta in vicinity of origins of renal arteries is performed. There are no recommendation on how to manage a patient in case of endovascularar treatment of infrarenal AAA and coexisting significant RAS [13].

When treatment of both AAA and RAS is needed, an important clinical question would be about timing of both procedures — if they can be done simultaneously or should be separated in time. An individualized approach to such patient seems to be reasonable. One of the major advantages of simultaneous treatment is no need of another invasive procedure and avoidance of risk of local complication connected with gaining vascular access. Small series presented in the literature have shown promising early results of simultaneous EVAR and renal stenting without increasing the risk of type I endoleaks and of restenosis in the renal stent in short-term follow up [11, 14]. Suprarenal fixation aortic endograft is safe procedure without blood flow disorder on the renal artery stent and impair kidney function [15]. In case the RAS was not treated during EVAR with suprarenal fixation aortic endograft, there are no contraindications to perform angioplasty of RAS in the future [16]. The necessity of angioplasty may be needed not only in patients with already significant RAS, but also in case of natural progression of previously insignificant RAS or not very common, but possible situation when endograft migrates and impairs blood flow in renal artery.

All patients after EVAR, with or without RAS, requires regular follow-up [17]. Protocols vary, but a typical schedule after uncomplicated EVAR consists of follow up one, six, and 12 months, and then annually. Combined duplex ultrasound and CT scan are generally accepted methods to check the position of the graft, leak to the aneurysms sac and restenosis in renal stent. CT scans often can be performed without the necessity of intravenous contrast load.

Conclusions

Patients with coexisting RAS and AAA need an individualized approach and often may be treated simultaneously by EVAR and renal stenting. Presented strategy show promise to be a safe method without adverse effect on renal artery stent patency or renal function [18].

Summary

Abdominal aortic aneurysm (AAA) often coexists with renal artery stenosis (RAS). Such patients need an individualized approach in choice of treatment. Endovascular repair of infrarenal AAA has become in recent years a generally accepted alternative to open surgery. In treatment of RAS, percutaneous techniques have largely replaced surgical revascularization. In the article a case of patient witha high level of perioperative risk and refractory hypertension is presented, who was successfully treated with simultaneous endovascular repair of AAA and RAS.

key words: stenosis of renal artery, hypertension, abdominal aortic aneurysm, stentgraft

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