Prosthetic Left Renocaval Bypass for Posterior Nutcracker Syndrome

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Abstract A 58-year-old man presented with severe hematuria of unknown origin and intermittent left flank pain for 8 months, and he was diagnosed with posterior nutcracker syndrome. He underwent prosthetic left renocaval bypass with complete resolution of symptoms. Computed tomography showed a functional graft between the left renal vein and caval vein. This technique is a feasible choice for surgical treatment of posterior nutcracker syndrome with satisfactory results.

Keywords Posterior nutcracker syndrome · Venous bypass · Left renal vein · Hematuria

Introduction

Posterior nutcracker syndrome is a rare entity when the left renal vein (LRV) has a retro-aortic course between the abdominal aorta and vertebral body. The resultant increase in pressure within the LRV can cause hematuria, flank pain, hypertension, pelvic congestion in female patients, and varicocele in male patients. Treatment for posterior nutcracker syndrome depends on symptom severity, and numerous of treatment modalities have been described, including LRV transposition, venolysis, abdominal aortic transposition, and LRV bypass [1–4]. This article reported one case of prosthetic left renocaval bypass for symptomatic posterior nutcracker syndrome.

Case Report

A 58-year-old man presented with severe hematuria and intermittent left flank pain for 8 months. The pain occurred about three times every week, and every attack lasted for 40 min. His medical history and findings on physical examination were unremarkable with a body mass index of 19.4 kg/m². The urinalysis was positive for hematuria, and the hemoglobin level was 10.5 g/L (105 g/L). Computed tomography angiography (CTA) showed the presence of a retro-aortic LRV, and CTA also confirmed compression of the LRV by the abdominal aorta and the vertebral body (Fig. 1). Cystoscopy revealed bleeding from the left ureteral orifice. He received conservative treatment for 7 months, and the condition did not improve.

Open surgical treatment was performed with a mid-line incision under general anesthesia. A transmesenteric approach was adopted. The inferior vena cava (IVC) and the LRV were mobilized. Under systemic heparin (4000 UI), a Satinsky clamp was placed on the IVC, which allowed the IVC to be opened longitudinally for the anastomosis. The proximal end of the 10-mm vascular graft (REF F4008, Bard Peripheral Vascular, Inc.) was subsequently anastomosed to the lateral wall of the IVC in a tension-free, end-to-side manner with continuous 6-0 polypropylene suture. Another Satinsky clamp was placed on the lateral wall of LRV until the distal end of vascular prosthesis was anastomosed to the LRV (Fig. 2a).

The entire procedure lasted 105 min, with an estimated blood loss of 100 ml. The postoperative course was uneventful, and postoperative anticoagulation treatment with low-molecular-weight heparin was given for 1 week. He was discharged on day 7, with oral anticoagulants for 6 months. Urinalysis revealed that the macroscopic hematuria

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Fig. 1 CTA revealed an enlarged retro-aortic renal vein between the aorta and the vertebra

disappeared on 1 month. He reported complete resolution of hematuria and flank pain, and the hemoglobin reached 13.6 g/L with a follow-up of 2 years. The CTA confirmed patency of the vascular graft (Fig. 2b).

Fig. 2 **a** The inferior vena cava-left renal vein bypass completed anastomosis. **b** At 1-year follow-up, the graft is patent. Note the reduced caliber of the left renal vein

Discussion

Management of posterior nutcracker syndrome is controversial. Conservative treatment has been proposed for cases with mild hematuria and in particular for young patients. Open surgery may be indicated, after 2 years of follow-up in cases of persistent hematuria or severe flank pain. The aim of various surgical approaches is to facilitate renal venous outflow and relieve LRV hypertension. Up to now, there are six posterior nutcracker syndrome patients who received open surgeries, including LRV transposition, left ovarian vein transposition, radical nephrectomy, venolysis, and abdominal aortic transposition [1–5]. Transposition of the LRV has been recommended for the treatment of nutcracker syndrome in order to resolve compression [1, 2]. However, the left renal artery was clamped and the renal ischemia time depended on the process of reanastomosis during the transposition of the LRV. The abdominal aortic transposition was more difficult compared with the LRV transposition [2, 3]. The difficulties of these rare techniques presented an alternative choice for the posterior nutcracker syndrome in a specific circumstance.

Our choice of prosthetic left renocaval bypass was extrapolated from spleno-caval shunt for portal hypertension, and a new venous bypass was constructed in this procedure, which increased renal venous blood outflow and relieved LRV hypertension effectively. In addition, the left renal artery was not clamped, and the LRV was just partially clamped. Renal blood circulation was minimally affected during the overall anastomosis, and the renal ischemia time was negligible. Finally, our technique required only limited exposure of the regional lateral wall of the LRV and IVC for left renocaval bypass, and this markedly decreased the surgical technical difficulty and bleeding risks. As expected, prosthetic left renocaval bypass in this case proved to be successful. Further experience and longer follow-up are needed to evaluate the efficacy of this novel procedure.

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Conflicts of Interest The authors declare that they have no relevant financial interests.

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