Leiomyosarcoma of the inferior vena cava involving the renal veins: A simple method of right renal vein reimplantation

Hadrien Tranchart, MD,a Alessio Carloni, MD,a Ruben Balzarotti, MD,a Jocelyne de Laveaucoupet, MD,b Alain Chapelier, MD,c and Claude Smadja, MD, PhD,a Clamart, Suresnes, and Paris, France

In this report we describe a case of leiomyosarcoma of the inferior vena cava involving the renal veins. The abdominal computed tomography scan showed a tumor in the infrahepatic portion of the inferior vena cava and the confluence of the renal veins. After resection of the tumor, venous reconstruction involved the replacement of the inferior vena cava with a prosthetic graft and the implantation of the right renal vein into the portal vein. The left renal vein was ligated distally, with preservation of collateral pathways. To our knowledge, no other reports of such venous reconstruction have been published. After a follow-up of 30 months, the patient has shown no further symptoms, and the abdominal computed tomography scan demonstrates patency of the renal portal anastomosis. Tests indicated normal renal and hepatic function, suggesting good tolerance of the renal portal anastomosis. We believe that the technique described in this report should be adopted routinely for tumors located in the renal veins, provided complete resection of the tumor with a comfortable resection margin is possible. (J Vasc Surg 2008;47:209-12.)

Malignant tumors of blood vessels are extremely rare.1 Leiomyosarcoma is the most common such type of tumor occurring in the inferior vena cava (IVC). The only known treatment that can be applied is radical surgery. After resection, several possibilities of reconstruction have been reported, especially when the tumor involves the renal veins. Although it is well established that ligation of the left renal vein is well tolerated because of the presence of collateral pathways, ligation of the right renal vein leads to renal dysfunction.2 This case describes leiomyosarcoma of the IVC involving the renal veins. After tumor resection, we achieved venous reconstruction by replacing the IVC with a prosthetic graft and implanting the right renal vein into the portal vein. To our knowledge, no reports of this particular reconstruction have been published.

CASE REPORT

A 55-year-old-man with gastritis was treated with omeprazole as a result of increasing pain for a period of several months. The pain continued, and abdominal ultrasound scan revealed a large retroperitoneal mass. An abdominal computed tomography (CT) scan showed a tumor in the infrahepatic portion of the IVC and the confluence of the left and right renal veins. The tumor protruded slightly into the ends of both renal veins (Fig 1). Four years before this discovery, the patient had undergone an abdominal CT scan for abdominal pain that showed no apparent anomalies. Retrospec-

From the Departments of Visceral Surgerya and Radiology,b Hôpital Antoine Béclère, Assistance Publique–Hôpitaux de Paris and University Paris XI, and the Department of Thoracic Surgery, Hôpital Foch.c Competition of interest: none.

Correspondence: Claude Smadja, MD, PhD, Professor of Surgery, Hôpital Antoine Béclère, 157 rue de la Porte de Trivaux, 92141 Clamart CEDEX, France (e-mail: claude.smadja@abc.aphp.fr). 0741-5214/$34.00
Copyright © 2008 by The Society for Vascular Surgery. doi:10.1016/j.jvs.2007.06.051

tive analysis showed the presence of a small tumor on the left aspect of the IVC, close to the end of the left renal vein (Fig 2). No other biologic anomalies were detected, and there was no evidence of metastatic disease. The patient had a body mass index of 25 and was at American Society of Anesthesiologists class II.

The patient underwent surgery in May 2004. After a bilateral subcostal incision, the right colon and duodenum were fully mobilized right up to the aorta. Ligaments of the right liver were divided to display the retrohepatic portion of the IVC. The tumor was resected, and the upper and lower portions of IVC were taped as well as the right and left renal veins. The IVC was clamped above and below the tumor and vascular clamps were placed across both renal veins. Resection of the IVC was subsequently performed from its infrarenal portion to its retrohepatic segment.

The IVC tumor was removed with a comfortable resection margin for the right renal vein. The right renal vein was implanted distally into the portal vein in an end-to-side fashion with a running suture of 5-0 Prolene (Ethicon, Somerville, NJ). The left renal vein was ligated distally, with preservation of both the gonadal and adrenal veins. The IVC was replaced using a ringed No. 16 polytetrafluoroethylene graft (Fig 3).

The IVC was clamped for 35 minutes, and the total estimated blood loss was 600 mL. No caval shunt was used during the venous reconstruction. The right renal vein was clamped for 41 minutes. Histopathologic examination revealed a poorly differentiated leiomyosarcoma. The resection was radical, with a resection margin of 11 mm for the right renal vein.

After surgery the patient was found to have severe anaemia (hemoglobin, 3.9 g/dL) requiring transfusion of 3 U of packed red blood cells. The anaemia appeared to be caused by cefotetan hemolysis, because the abdominal CT scan showed no hemoperitoneum and the Coombs erythrocytes test result was positive.3,4 Alternatively, the anaemia could have been caused by paraneoplastic hemolysis; however, we discounted this possibility as being
unlikely. Moreover the patient had no hematemesis, melena, or hematuria.

Postoperative anticoagulation therapy consisted of a dose of unfractionated heparin (10,000 IU/d) until the patient was discharged. Oral anticoagulation therapy was continued for the next 6 months. No adjuvant therapy was administered. After a follow-up of 30 months, the patient has shown no further symptoms, and the abdominal CT scan taken 30 months after surgery (120 mL of contrast at 4 mL/s over 70 seconds) showed no anomalies and demonstrated patent vascular anastomoses (Fig 4). Results of renal and hepatic function tests were normal.

DISCUSSION

Leiomyosarcoma is a rare tumor that occurs in blood vessels. To date, only about 300 cases have been reported,5,6 and >50% of these involve the IVC. The tumor produces symptoms such as abdominal pain, abdominal mass, weight loss, or leg edema. IVC tumors may also be asymptomatic, as in the present case, growing slowly for a period of several years.6 Surgical resection is the only definitive treatment possible for such tumors: neither chemotherapy nor radiotherapy have proven effective.5,7,8

After IVC resection, the vessel can be replaced by a prosthetic graft,9,10 which can be wrapped in omentum, or occluded.11 The IVC is usually split into three parts: segment I, from the iliac veins to the renal veins; segment II, from the renal veins to the retrohepatic segment, and segment III, from the hepatic veins to the right atrium. For tumors affecting segment II, the primary difficulty encountered is the reconstruction of renal veins. The left renal vein ligation is usually well tolerated by patients owing to the presence of collateral channels.2 In contrast, occlusion of the right renal vein cannot be performed because of the lack of collateral pathways that are necessary to restore blood flow to the right renal vein. Several solutions have been proposed to tackle this problem, including autotransplantation of the kidney,12 direct reimplantation of the renal vein into a prosthetic graft,13 or graft replacement with bovine pericardium and reimplantation of renal veins.14

In the present case, the right renal vein was simply implanted into the portal vein in an end-to-side fashion. The venous reconstruction was accomplished with a subcostal bilateral incision that provided excellent exposure of the portal vein and facilitated dissection. This incision did not cause any major bleeding from the collateral circulation, which can result from obstruction of the IVC by a tumor. The technique used for the reconstruction of the right renal vein allowed complete resection of the tumor. The resection margin for the right renal vein was approximately 1 cm. However, this method may not be suited to cases with major involvement of the right renal vein. It is important to note that complete mobilization of the portal vein reduces the length of the right renal vein required for renal portal anastomosis. The feasibility of this method can only be confirmed intraoperatively.
The technique we have presented has the added advantage of not exposing the patient to thrombosis of the right renal vein after occlusion of the prosthetic graft, which can sometimes occur when the right renal vein is implanted directly into a prosthetic graft. To avoid graft occlusion, several authors recommend the use of an arteriovenous fistula to increase prosthetic blood flow.

Our patient has currently been free of recurrence for more than 2 years, and his renal function is normal. Furthermore, tests have also shown normal liver function, suggesting good hepatic and renal tolerance of the renal portal anastomosis. We conclude that the simple and effective technique of venous reconstruction described in this report should be adopted routinely whenever the length of the right renal vein is sufficient after resection.

REFERENCES

Submitted Apr 6, 2007; accepted Jun 22, 2007.