



Oncology

Successful Endovascular Control of Renal Artery in a Transplant Kidney During Nephron Sparing Surgery (NSS) for Large Centrally Located Tumor

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ABSTRACT

Renal cell carcinoma in a transplant kidney is a rare condition. Nephron Sparing Surgery (NSS) is the treatment of choice. One of the main technical challenges is obtaining adequate vascular control. We present a rare case of large centrally located hilar tumor in a kidney 18 years after transplantation treated with NSS. Vascular control was achieved by using a novel approach. Post-operative course was uneventful with minimal decrease in renal function. We believe that this unique choice of treatment can be used in cases of NSS where the access to the renal pedicle is limited.

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Introduction

Renal cell carcinomas (RCC) comprise 4.6% of malignant neoplasms in patients following kidney transplantation occurs more frequently than in the general population. Native kidneys are affected in 90% of cases compared with 10% of the transplanted kidneys. Thus the incidence of RCC in transplant kidney is extremely low (0.18).^{1–3}

Like in native kidneys these tumors are usually asymptomatic and diagnosed following routine imaging studies. Nephron Sparing Surgery (NSS) is the treatment of choice, although graft nephrectomy is chosen in cases with large lesion (>40 mm), decreased functioning graft, and locally advanced disease.^{1–3} For small and exophytic lesions ablative strategy may be also used.⁴ One of the main technical challenges is obtaining adequate vascular control.

Herein we present a case of large centrally located hilar tumor in a kidney 18 years after transplantation.

Case report

A 38-year-old male patient with history of end stage chronic renal failure caused by membranous nephropathy diagnosed in

childhood. The patient received a living donor kidney transplant from his mother at the age of 20 years. Immunosuppressive treatment consisted of: Prednison, Mycophenolate mofetil, and Cyclosporin A. Recently a routine follow-up sonographic scan revealed a mass in the transplanted kidney. A CT scan demonstrated a large enhancing solid central mass in the hilar region of the kidney



Figure 1. CT scan of the abdomen demonstrating a large solid enhancing central mass in the hilar region of the kidney located in the right iliac fossa measuring, 6.3 × 6.7 × 5.9 cm.

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Figure 2. Arterial catheterization of the transplant renal artery and placement of an occlusion balloon catheter (arrow).

measuring, $6.3 \times 6.7 \times 5.9$ cm (Fig. 1). Metastatic evaluation was normal and baseline serum creatinine was 1.7 mg/dL.

NSS was the chosen procedure due to patient young age and his wish to avoid renal replacement treatment. Tunneled dialysis catheter (HemoFlow[®] HFS28E, Medcomp, Germany) was inserted prior to surgery in case of post-operative need for dialysis. Considering possible difficulties in approaching the renal pedicle due to adhesions and the location of the tumor, arterial catheterization of the Iliac artery was performed in the operating room prior to surgery and an arterial occlusion balloon catheter (LeMaitre[®] 5Fr. Plus, LeMaitre Vascular, USA) was inserted into the renal transplant artery via a contra lateral femoral approach (Fig. 2) in order to ensure adequate hemostatic control without the need to expose and clamp the friable renal artery. Under general anesthesia, through the previous right lower abdominal transplant's incision the kidney was exposed and freed from the surrounding structures, the ureter was identified and then the arterial balloon located in the transplant artery was inflated. Surface cooling was achieved with ice slush and the lesion was

enucleated intact and opening of the collecting system as well as exposed blood vessels were individually sutured. Tumor bed closure was carried out with 15 mL of BioGlue[®] tissue adhesive. Renal artery was occluded for 54 min under *in situ* cooling conditions. After the enucleation the arterial balloon was deflated. No signs of bleeding or urinary extravasations were seen. Post-operative course was uneventful. No hemodialysis was required, patient creatinine level after the surgery was elevated up to 2.9 mg/dL from basal creatinine of 1.7 mg/dL, but gradually decreased to level of 2.1 mg/dL.

Pathology revealed combined papillary type II, grade 3 and clear cell type, grade 3 renal cell carcinoma (Fig. 3).

Discussion

The risk for developing RCC in renal transplant patients is 7–10 times higher than in general population, however only 10% of those tumors are in the transplanted kidney. These tumors are considered *de novo* neoplasm mainly because their average time of diagnosis after transplantation is 5 years. These tumors are usually small, low grade with relatively good prognosis. More than half of them are papillary type and most of the rest are clear Cell. Treatment options include nephrectomy, NSS, ablation and observation. NSS is usually performed when the lesion is small and in peripheral location. The preference in choosing this procedure is usually to keep patient off dialysis. The patient presented is young with a large, centrally located lesion.^{1–3} Despite the complexity of the lesion, we elected to perform NSS in order to avoid hemodialysis and maintain his good quality of life. Technical concerns before surgery included the limited ability to expose properly the kidney hilum and clamp the renal artery, the expected high complication rate due to tumor size and central/hilar location combined with possible adhesions of the kidney and ureter to the surrounding organs made the exposure in doubt. In order to avoid unnecessary manipulation of the renal artery we elected to use a novel approach to achieve temporary arterial occlusion and bloodless field while dissecting the tumor. Through a contra lateral femoral artery catheterization an angiography team selectively catheterized the transplant renal artery and placed an occlusion balloon catheter. Before surface cooling and removal of the mass this balloon was inflated resulting in decreased turgor of the kidney, minimal bleeding, and excellent visibility without vascular damage at the anastomotic area.

Another point for consideration was the preoperative impaired renal function that makes the kidney more vulnerable to the ischemia reperfusion injury associated with vascular clamping. We inserted prior to surgery a hemodialysis access catheter in case

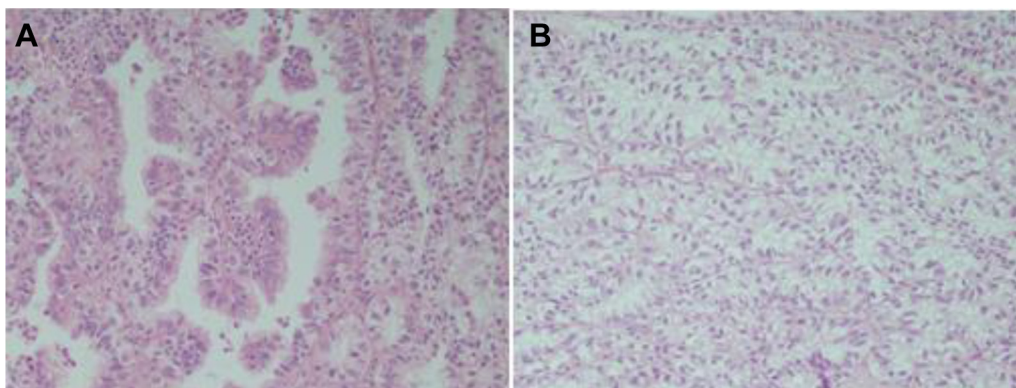


Figure 3. Pathology of the resected specimen demonstrating combined papillary type II, grade 3 (A) and clear cell type, grade 3 (B) renal cell carcinoma.

post-operative hemodialysis is required. Furthermore intravenous Mannitol (0.5 g/kg body weight) was given prior to renal artery occlusion and surface cooling of the kidney was applied in order to reduce the metabolic needs of the kidney during the ischemic period. Except for closing the opened collecting system with monocryl 4/0 continuous suture tumor bed was closed with tissue adhesive only reducing the amount of lost functioning tissue that is associated when tumor bed is closed with sutures. Based on previous reports that have shown decreased kidney injury following clamping of the renal artery alone compared with vascular control of the artery and vein,⁵ we elected to leave the transplant renal vein open.

In summary, we report an unusual case of renal cell carcinoma in transplanted kidney managed by NSS despite the lesion high renal score. A novel approach was used to achieve vascular control by using intra arterial balloon catheterization prior to surgery. We believe that this unique choice of treatment can be used in cases of NSS where the access to the renal pedicle is limited.

Disclosure

The authors of this manuscript have no conflict of interest to disclose.

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