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Case Reports

Transplant Renal Vein Thrombosis Rescued in a Pediatric Patient Using Suction Thrombectomy

Anjay Batra, BS[1]; Zachary Pallister, MD[2]; Jayer Chung, MD[2]; Kelby Fuller, PAC[2]; Christine O'Mahony, MD[2]; N. Thao Galván, MD, MPH[2]

[1]School of Medicine, Baylor College of Medicine, Houston, Texas
[2]Department of Surgery, Baylor College of Medicine, Houston, Texas

Abstract

Renal vein thrombosis after kidney transplant is a rare but potentially graft-threatening event. As sequelae of this complication can range from brief acute kidney injury to total graft failure, it is necessary to maintain close clinical observation postoperatively. If posttransplant renal vein thrombosis does occur, recanalization may be attempted with mechanical thrombectomy, suction thrombectomy, or explantation and reimplantation of the allograft. This is a novel report of the successful use of suction thrombectomy to treat renal vein thrombosis in a pediatric kidney transplant.

Keywords: Renal vein thrombosis; suction thrombectomy; kidney; transplant; pediatric

Introduction

Renal vein thrombosis (RVT) after kidney transplant is reported in up to 4.2% of adult kidney transplant patients and can be a graft-threatening event.[1] In the pediatric population, an overall allograft vascular thrombosis rate of 5% to 10% has been reported.[2] Whether in the adult or pediatric population, close clinical observation posttransplant is necessary to enable prompt action if this condition develops. Presentation often includes various signs, including nausea, vomiting, abdominal pain, gross hematuria, or oliguria. Depending on the severity and duration of graft injury because of RVT, the postintervention prognosis can range from brief, self-resolving acute kidney injury to total graft failure.[2,3]

Although early diagnosis and urgent treatment are necessary, they are often unsuccessful.[1] Successful revascularization using thrombolytic therapy with mechanical thrombectomy or suction thrombectomy has been described in adults. In addition, successful open thrombectomy after explantation and reimplantation of the allograft has been reported.[4,5]

This is the first case of successful suction thrombectomy in a pediatric patient described, to the best of the authors' knowledge. Given the potential severity of this complication and the degree to which it threatens graft survival, awareness of the potential success of suction thrombectomy may contribute to graft rescue from RVT in future cases. The patient consented to the use of her case details and vascular images for the purposes of research and publication. Data, including clinical notes, biochemical laboratory findings, and operative notes, were retrospectively collected from the electronic medical record. Ultrasonography and Doppler images were also reviewed and are presented here.

Case Report

The patient is 17 years old and female (height, 157 cm; weight, 81.5 kg), with antineutrophilic cytoplasmic antibody–associated vasculitis complicated by stage 5 chronic kidney disease, diagnosed in 2013. She was admitted to the hospital for a preemptive deceased-donor kidney transplant. On admission, her estimated glomerular filtration rate was 20 mL/min, and daily urine output was 1.5 L per day. She and her family reported no recent changes in health or any new shortness of breath, abdominal pain, change in bowel patterns, or dysuria. Preoperative review of systems was otherwise normal, and the patient did not have any history of abdominal surgery. Preoperative physical

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Corresponding author: N. Thao Galván, MD, MPH, 6620 Main St, Suite 1450, Houston, TX 77030 (thao.galvan@bcm.edu)

examination was significant for stage II hypertension (blood pressure, 142/106 mm Hg) and obesity (body mass index, 32.7 kg/m^2). Medications used before admission included azathioprine, norethindrone, nifedipine, iron supplement, hydrochlorothiazide, clonidine, and cholecalciferol.

The patient underwent a deceased-donor kidney transplant during which the donor left kidney was placed in the right iliac fossa, and a single artery and vein were anastomosed to the recipient right common iliac artery and right external iliac vein, respectively. Reperfusion was uneventful, with excellent resultant color, turgor, and pulse of the allograft and the renal artery. The single ureter was sewn to the recipient bladder per the modified Lich-Gregoir technique, without a stent. The cold ischemia time was 25 hours and 34 minutes, and the warm ischemia time was 41 minutes. Overall, the patient tolerated the procedure well and was extubated and transferred to the recovery room in stable condition.

On postoperative day 4, the patient had an episode of hematuria, and duplex ultrasonography suggested a finding of allograft RVT with intact arterial flow. She was taken emergently to the operating room and was found to have an engorged, violaceous allograft with arterial flow but no venous outflow seen on intraoperative ultrasonography. She was also found to have a capsular tear of her engorged transplanted kidney with a surrounding hematoma, which was evacuated. Thrombosis of the transplanted renal vein with involvement of the right external iliac vein was identified, and multiple attempts at Fogarty thrombectomy were performed with no improvement in flow (Fig. 1A and B). In the attempted Fogarty thrombectomies, a 6F Fogarty balloon catheter was introduced through the gonadal branch of the right renal vein and inflated distally to the obstruction. The balloon catheter was then retracted in unsuccessful attempts to remove the obstruction.

Abbreviations and Acronyms

ANAST	anastomosis
EIV	external iliac vein
RT	right
RVT	renal vein thrombosis

After unsuccessful attempts at balloon thrombectomy, an intraoperative consultation was placed with vascular surgery, who performed a venography via percutaneous access of the ipsilateral common femoral vein. The venogram confirmed an obstructive thrombus in the transplanted renal vein and right external iliac vein. The thrombus was crossed with a wire, and a catheter was placed in the inferior vena cava, where venography demonstrated a widely patent inferior vena cava. (Fig. 2 and Fig. 3). Once the sheath was upsized, an Indigo Cat8 aspiration catheter (Penumbra, Inc) was introduced, and several passes were performed under fluoroscopic guidance through the external iliac vein. Completion venography demonstrated successful recanalization of the allograft vein segment and the patient's native external iliac vein, with improved drainage of the allograft. Selective imaging of the allograft vein segment and the native venous system did not demonstrate a flow-limiting stenosis, so no further treatment was required at this time (Fig. 4). The patient was then treated with intravenous heparin infusion for 2 days, after which she was transitioned to low-dose aspirin.

The patient experienced delayed graft function caused by acute tubular necrosis requiring dialysis for less than 2 weeks postthrombectomy. Serial ultrasonographs of

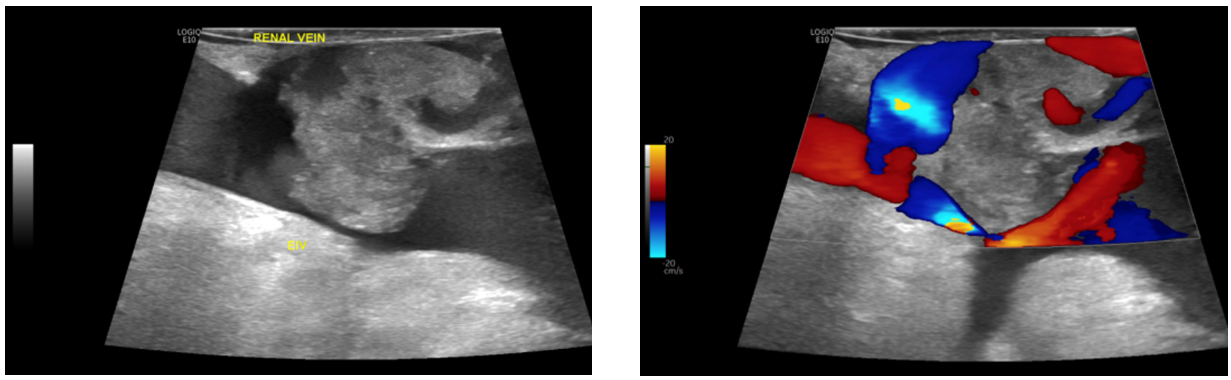

Fig. 1 Image shows **A)** ultrasonograph after Fogarty attempt and **B)** Doppler flow after Fogarty attempt, with the thrombus seen still in place.

EIV, external iliac vein.

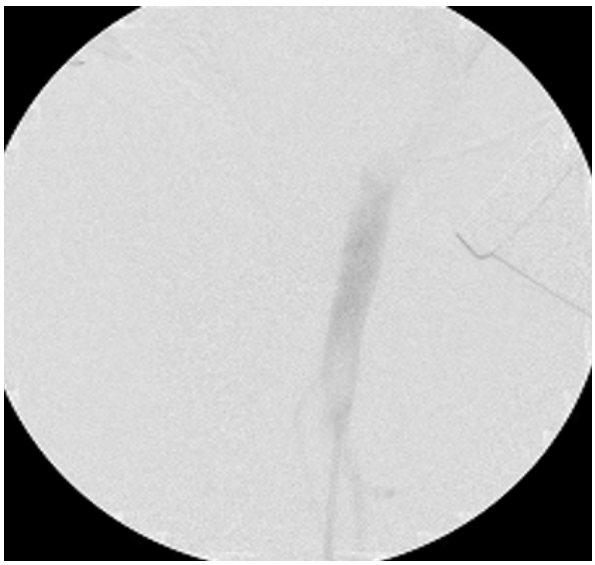

Fig. 2 Fluoroscopic image shows the inferior vena cava before thrombectomy.

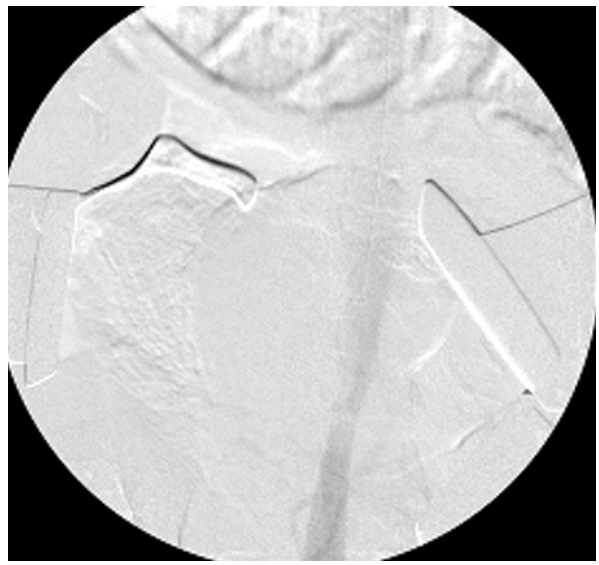

Fig. 3 Fluoroscopic image shows the inferior vena cava after thrombectomy.

the transplanted kidney confirmed patent vasculature. Her postoperative intensive care unit course was complicated by intermittent myoclonus of all extremities with normal electroencephalogram findings, which resolved with adjustment in tacrolimus dosing. The patient was transferred out of the intensive care unit on postoperative day 11 and ultimately discharged home on postoperative day 32 after resolution of a pansusceptible Escherichia coli urinary tract infection treated with cefepime. The patient was discharged with 81 mg aspirin daily for 1 month postoperatively. She continues to do well with a functional transplanted allograft. Follow-up ultrasonographs have also demonstrated patent vasculature. Renal function remains good, with creatinine levels measuring 1.1 mg/dL at a recent follow-up visit.

Discussion

This report highlights the utility of suction thrombectomy in the rescue of a transplant allograft for treatment of RVT. This is a pediatric case in which suction thrombectomy was used to successfully recanalize a transplanted allograft renal vein and salvage the graft. In the future, comparative studies will be necessary to evaluate the most effective methods of thrombectomy and recanalization for RVT posttransplant, though this case does serve as evidence of the utility of suction thrombectomy in the pediatric population. Follow-up ultrasonography both intraoperatively and at several follow-up appointments verified the long-term patency of the vasculature. The patient's stable, long-term recovery and absence of any recurring thrombosis 5 months

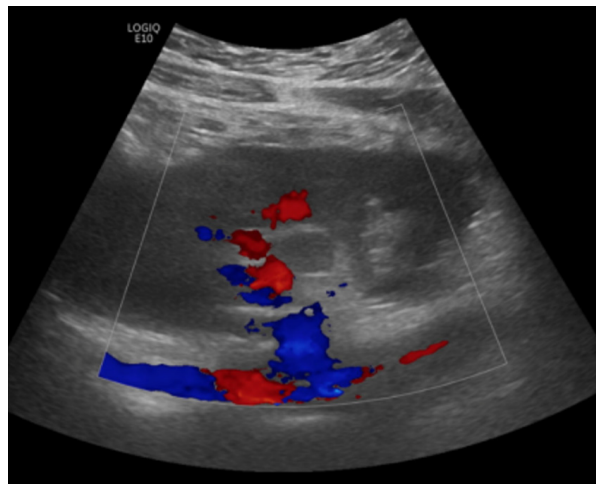

Fig. 4 Image shows ultrasonograph with Doppler flow after successful suction thrombectomy.

postoperatively point to the feasibility of suction thrombectomy as a useful modality for the treatment of posttransplant RVT in the pediatric population.

Conclusion

Given the potentially graft-threatening nature of RVT, it is necessary to have an arsenal of approaches to resolving the complication and rescuing the graft. Endovascular specialists were criticial here in introducing and using these modern thrombectomy techniques. Although previous literature has described mechanical,

suction, and explantation-reimplantation approaches to treating RVT in adults, this report contributes to the body of literature by showing evidence of the efficacy of suction thrombosis in treating RVT in the pediatric population.

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