Diagn Interv Radiol 2020; 26:58–60

INTERVENTIONAL RADIOLOGY

TECHNICAL NOTE

Percutaneous application of fibrin sealant in surgically recalcitrant urinomas following oncocytoma resection

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ABSTRACT

Surgical application of fibrin sealant is well established as a hemostatic agent. However, reports of its percutaneous application and its uses within the urinary tract are limited. Presented below are two patients with recalcitrant urinomas despite diversion therapy following partial nephrectomy for oncocytomas. Both patients were successfully treated with percutaneous application of fibrin sealant via a sheath at the time of percutaneous perinephric drain removal. Follow-up imaging demonstrated resolution of the urinomas with stabilization of creatinine. Percutaneous application of fibrin sealant may be considered as an alternative treatment for recalcitrant urinomas prior to surgical intervention, though more studies are required to confirm its effectiveness and safety.

Renal oncocytomas are rare, nonaggressive tumors representing approximately 3%–7% of all renal tumors (1). Most oncocytomas are diagnosed following resection due to a significant amount of overlapping features on biopsy samples and imaging between oncocytomas and chromophobe renal cell carcinomas (RCC) (1). Although active surveillance of renal oncocytomas may be safe, the perceived risk of a potential RCC is often not cognitively tolerable to either clinician or patient, and invasive measures are pursued instead. Furthermore, oncocytomas may grow to sizes that disrupt a patient's native anatomy (e.g., impingement on ureter) or affect renal function that indicate surgical resection, usually performed as a partial nephrectomy (PN). Although PNs are typically well tolerated, a common complication is urinary leakage, with an incidence ranging from 0% to 33% (2). Urinary leakage is often treated with conservative management with use of adjunctive measures reserved for failure. First line interventions include perinephric catheter drainage, ureteral stenting, and percutaneous nephrostomy (PCN). In the event of persistent urinary drainage despite diversion, surgical exploration and repair remains the definitive therapy. Presented below are two patients with recalcitrant urinomas following partial nephrectomy for oncocytomas that were successfully treated by the percutaneous application of fibrin sealant following failure of urinary diversion.

Technique

Patient 1

A 40-year-old man with a family history of renal tumors and insulin-dependent diabetes mellitus presented with abdominal and back pain for several months. On physical exam he had palpable abdominal masses. His initial creatinine was 0.95 mg/dL. Follow-up computed tomography (CT) demonstrated bilateral renal masses (Fig. 1).

He underwent staged bilateral open partial nephrectomies without immediate complications. Surgical pathology demonstrated oncocytomas. Four months following surgery he presented with new onset abdominal pain and repeat CT demonstrated large bilateral peri renal fluid collections that were concerning for urinomas (Fig. 2). He underwent bilateral percutaneous image-guided perinephric drain placements followed by bilateral percutaneous nephrostomies and bilateral double-J ureteral stents.

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Received 18 June 2019; revision requested 03 July 2019; last revision received 16 July 2019; accepted 17 July 2019.

Published online 22 November 2019.

DOI 10.5152/dir.2019.19317

You may cite this article as: Liu MY, Duncan DP, Rivera-Sanfeliz G. Percutaneous application of fibrin sealant in surgically recalcitrant urinomas following oncocytoma resection. Diagn Interv Radiol 2020; 26:58–60.

After four months and despite complete urinary diversion, the perinephric tubes continued to drain between 50–100 mL/day with concern for persistent urinomas. Following consultation between the urological and interventional radiology teams, a decision was then made to inject a fibrin sealant (TISSEEL [freeze dried] 10 mL Kit, Baxter) in a staged manner, starting with the right kidney. Under fluoroscopy, the right perinephric drain was removed over a wire and an 8 F sheath (23 cm Prelude Sheath Introducer, Merit Medical) was inserted. Through the sheath, a delivery catheter (5 F, 40 cm Kumpe Beacon Tip Torcon Advantage Catheter, Cook Medical) was positioned in proximity to the lower pole of the remaining right kidney at the presumed area of urine leak. Under fluoroscopic guidance, a total of 40 mL of sealant was delivered using a pull-back technique and the sheath was removed. After two months, the procedure was repeated on the left kidney with injection of 80 mL of sealant into the small cavity following perinephric drain removal. With each application of fibrin sealant, the injection was performed until the sealant came out around the sheath thus proving total cavity seal. A total of up to 12 kits of fibrin sealant, 8 kits for the right kidney and 4 kits for the left kidney, was administered for patient 1. Follow-up CT demonstrated resolution of the urinomas (Fig. 3). The patient's creatinine stabilized at 2.04 mg/dL following all interventions.

Patient 2

A 68-year-old woman with familial oncocytoma syndrome was referred for evaluation. She was asymptomatic with no hematuria or pain. Her abdominal exam was unremarkable. Her initial creatinine was 1.02 mg/dL. The follow-up contrast-enhanced magnetic resonance imaging (MRI) showed bilateral renal masses (Fig. 4).

She underwent a left partial open nephrectomy without immediate complications. Three months following surgery she presented with fever and left flank pain and was found on MRI to have a large left perirenal fluid collection (Fig. 5). A left perinephric drain was then placed followed by a percutaneous nephrostomy, which was subsequently converted into a nephroureteral drain.

After 3 months and despite optimal diversion, the patient's perinephric tube output remained at 100 mL/day. The decision was made to inject a fibrin sealant (TISSEEL [freeze dried] 10 mL Kit, Baxter) to treat the recalcitrant urinoma. Under fluoroscopy, the left perinephric drain was removed over a wire and an 8 F sheath (23 cm Prelude Sheath Introducer, Merit Medical) was inserted in the perinephric space. Through

Main points

- A common complication following partial nephrectomy is urinary leakage, which can persist and form a urinoma.
- Treatment of urine leaks that fail conservative management following partial nephrectomies often include diversion techniques, including perinephric catheter drainage, ureteral stenting, and percutaneous nephrostomy. After failure of these interventions, urine leaks are traditionally treated with surgery.
- Percutaneous fibrin sealant application for a persistent urine leak may be an effective treatment option prior to surgery.

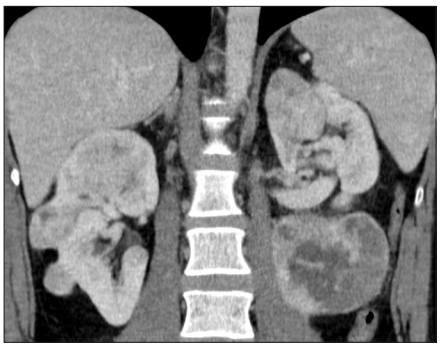

Figure 1. Coronal reformatted CT image shows bilateral oncocytomas, largest on the left measuring 15 cm.

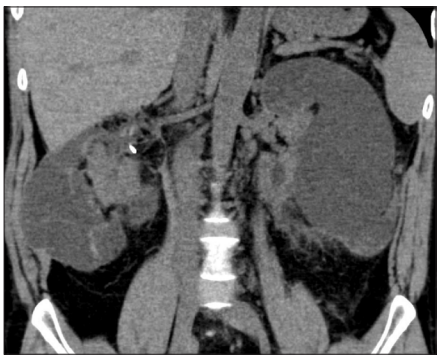

Figure 2. Coronal reformatted CT image shows surgical changes related to bilateral open partial nephrectomies with persistent bilateral perinephric urinomas.

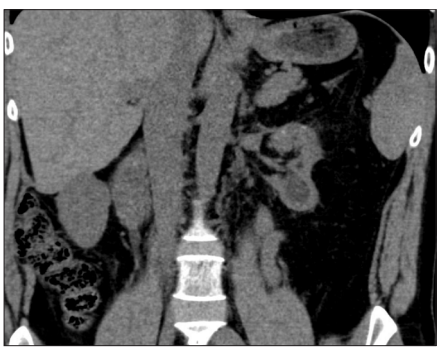

Figure 3. Six months follow-up unenhanced CT demonstrates resolution of previously identified urinomas.

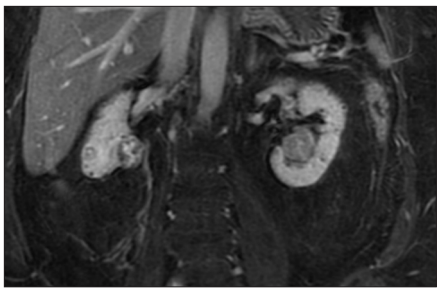

Figure 4. Coronal MRI image demonstrates bilateral oncocytomas, the largest on the left kidney measures 3.5 cm.

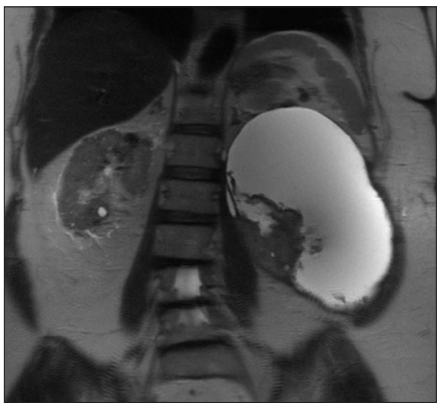

Figure 5. Coronal MRI image demonstrating a large left renal fluid collection in the left partial nephrectomy bed. Follow-up analysis from the drainage catheter placement demonstrated this collection to be a urinoma.

Figure 6. Coronal CT image one month after transcatheter sealant injection shows near resolution of the previously identified large left perinephric fluid collections.

the sheath and using the same technique as previously described, a total of 50 mL of sealant, 5 kits, was delivered until the sealant came out around the sheath, thus proving total cavity seal. The sheath was then removed. A follow-up CT showed resolution of the urinoma (Fig. 6). Her creatinine stabilized at 1.58 mg/dL following all procedures.

Discussion

Urinomas are a common complication after partial nephrectomies, with an incidence of 0%–33% (2). If small enough, the urinomas may resolve spontaneously. However, if the urinoma becomes secondarily infected or is large and symptomatic, then treatment is indicated. The mainstay of treatment for urinary leakage without obstruction includes diversion, typically with perinephric drain placement, percutaneous nephrostomy and/or ureteral stenting. Urine leak resolution rates with percutaneous diversion are variable, ranging from 36% to 100% depending on the pathology and etiology involved (3). If percutaneous interventions fail, the next step in management is traditionally surgery. While there have been case reports describing the use of percutaneous Hystoacryl Glue, thermal ablation, or a combination of both in the management of persistent urinary leakage after PN (4–6), the use of fibrin sealant has yet to be reported as an alternative therapy.

The application of fibrin sealant in urology is diverse, given its propensity to promote hemostasis, tissue adhesion, and wound healing. The major components of fibrin sealant include thrombin and highly concentrated fibrinogen, which when mixed together form a fibrin clot. This clot is eventually resorbed after facilitating wound healing. An advantage of using fibrin sealants versus other synthetic adhesives is its biocompatibility, which prevents the fibrin sealants from inducing inflammatory changes, foreign body response, or tissue fibrosis (7). Compared to ablation, which is expensive and requires general anesthesia, fibrin sealant can be easily applied through a sheath with only local anesthesia and with minimal cost.

In the surgical literature, the use of fibrin sealants as a hemostatic agent is well described (7). However, the few applications within the urinary tract have been for strengthening ureteral anastomoses as suture support or in promoting closure of urinary fistulas (e.g., vesicocutaneous and urethrocutaneous fistulas) (8). Given that fibrin sealant can be easily and safely applied percutaneously, it may be used as an additional tool to treat recalcitrant urinary leakage following percutaneous nephrectomy.

Safety considerations in the use of fibrin sealant include avoiding placement of the sealant into large blood vessels, owing to its thromboembolic properties. Secondarily, the antifibrinolytic agent in TISSEEL, bovine Aprotinin, may lead to hypersensitivity, and therefore judicial use should be taken in patients previously exposed to Aprotonin. Additionally, a concern for viral transmission via the fibrin sealants has been documented although there have been no cases of serious viral transmission reported (7).

This paper presents two patients from a single institution with the same disease process, who had the same procedure, experienced similar complications, failed initial diversion and subsequently underwent successful treatment with fibrin sealant. As such, the study's generalizability is unknown. However, these two cases provide a basis for further studies that may more robustly evaluate the therapeutic potential of fibrin sealant in similar scenarios.

In conclusion, the reported cases show the effectiveness of fibrin sealant injection for recalcitrant urinomas following partial nephrectomies for oncocytomas when performed by a well-trained interventional radiologist. Although urinary diversion followed by surgery remain the preferred therapies based on their proven effectiveness and safety, percutaneous application of fibrin sealant could be considered as an alternative in the correct clinical context.

Conflict of interest disclosure

The authors declared no conflicts of interest.

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