



# Persistent urinary leak after partial nephrectomy in a child: Definitive therapy with percutaneous glue

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## ABSTRACT

Urinary fistulas are usually managed with diversion, and persistent fistulas may require nephrectomy. For refractory cases in adults, rare reports have described percutaneous glues as an alternative to nephrectomy. We present the case of a child with persistent urinary leak after partial nephrectomy for recurrent microabscesses. In order to spare the child nephrectomy, the fistula was treated percutaneously with the application of cyanoacrylate glue and a vascular occlusion plug. This is the first report of percutaneous glue treatment with an adjunct vascular occlusion device for a urinary leak, and the first report of percutaneous management of a pediatric urinary fistula.

## 1. Introduction

Urinary leak or fistula can complicate partial nephrectomy (PN). Fistulas are managed with maximal urinary diversion, and, if persistent, nephrectomy may be required. We present the case of a 4 year-old who developed fistula after PN. In order to spare the child nephrectomy, the fistula was successfully treated percutaneously with cyanoacrylate glue and a vascular occlusion plug. This is the first report of percutaneous management of a pediatric urinary fistula.

## 2. Case presentation

A 4 year-old healthy girl presented with four episodes of recurrent left pyelonephritis requiring prolonged admissions over four months. Urine culture grew *Pseudomonas aeruginosa*. The infections would recur within days of completing prolonged IV antibiotics. Ultrasonography (US) during infection consistently demonstrated lobar nephronia within the left interpolar area (Fig. 1). CT scan was consistent with interpolar pyelonephritis, without evidence of abscess. The area appeared as a cortical defect on DMSA renogram. VCUG and urodynamic study were normal. X-ray did not reveal constipation or bony abnormalities. Cystoscopy with positional installation of contrast was normal. Immunology consultation confirmed normal immune function. An initial

magnetic resonance urography (MRU) after antibiotic therapy reported cortical scarring in the anterior interpolar region of the left kidney. Given recurrent pyelonephritis three weeks later, a new MRU showed multiple, small, round and elongated foci of hyperintense signals on T2, which did not show post-contrast enhancement. These punctate intrarenal collections were found to extend on 2.4 cm × 2.8 cm in the anterior, interpolar area of the left kidney. Due to recurrent focal microabscesses, left open PN was performed. The mid-anterior portion was mapped out and confirmed with intra-operative US. Ischemia time was 23 minutes. Resection was performed with electrocautery as well as electrothermal bipolar sealing system (LigaSure, Medtronic, Dublin, Ireland). Entry into the renal collecting system was repaired with 4–0 Vicryl. A three-layer cover of matrix sealant (FloSeal, Baxter BioSurgery, Westlake Village, California) and oxidized regenerated cellulose (Sur-gicel, Johnson & Johnson Medical, New Jersey, USA) was applied for hemostasis. A Penrose drain was placed. Pathology showed multifocal renal scarring and chronic pyelonephritis.

On post-operative day (POD) 6, the patient developed hematuria with haemoglobin drop. Angiography revealed an arteriovenous fistula at the left midpole. Urgent subsegmental embolization of the left renal artery branch creating the pseudoaneurysm was performed and the patient recovered.

On POD 13, a new perinephric collection measuring 6.5 × 7.5 × 6.5

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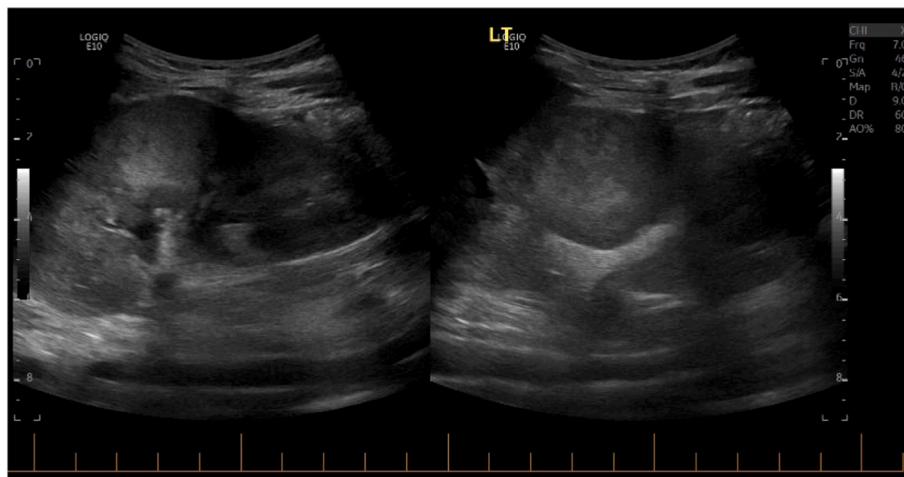


Fig. 1. Ultrasound findings at the first presentation demonstrating left mid-pole phlegmonous changes (3.8 × 2.8 × 2 cm).

cm was found on US done for pain. A left retrograde pyelogram (Fig. 2A) identified contrast leak at the angioembolization site. A double J stent and urethral catheter were inserted. One month post-operatively, imaging showed persistence of the urinoma and a perinephric drain was inserted. This drain had continuous output (100–200 mL/24hrs), which was confirmed to be urine. After three weeks, a 7 Fr nephrostomy tube was inserted in the left lower pole. Simultaneously, the double J stent was removed. High output persisted for more than two months. To preserve renal function, the decision was made to attempt percutaneous treatment of the fistula.

Under general anaesthesia, contrast was injected through the nephrostomy and the perinephric drain, to define the fistula tract. A 1:1 mixture of cyanoacrylate glue (GluStitch, British Columbia, Canada) and oily contrast (Lipiodol, Guerbet, New Jersey, USA) was injected through the fistula tract using an angiographic catheter under fluoroscopy guidance. Post-procedure nephrostogram showed no contrast flow through the fistula. Perinephric and nephrostomy drains were left in site. Two days afterwards, a second procedure was performed due to persistent but reduced drain output (max 50 mL/24hrs). A second generation Amplatzer 3mm duct occlusion device (AGA Medical Corporation, Minnesota, USA) was placed through the fistula tract and the mixture was instilled into the Amplatzer device. Four weeks after the instillation, there was no residual perinephric collection and both drains were removed. Abdominal X-rays at two and 12 months post-glue instillation revealed resolution of radio-opaque material next to the angioembolization coils (Fig. 2 B, C). After five months, the left kidney had a normal aspect (Fig. 3). After seven months, a DMSA scan demonstrated a differential renal function of 39% (44% initially) for the left kidney, with mild upper pole parenchymal loss and minimal contour irregularities.

### 3. Discussion

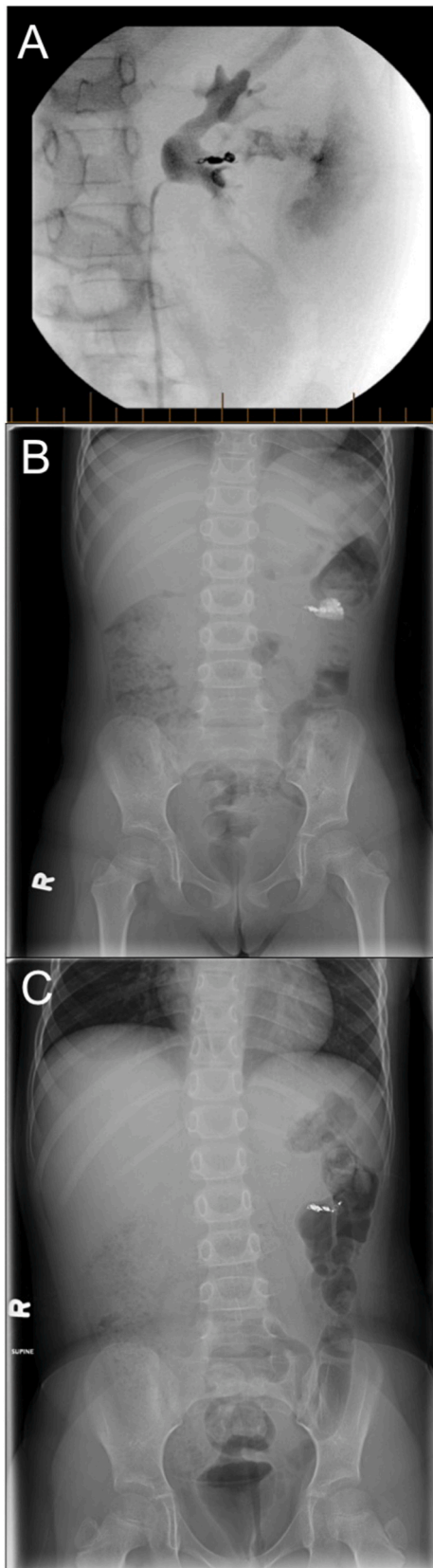
This case represents the first report of the use of cyanoacrylate glue

instillation with an adjunct vascular occlusion device to treat a persistent urinary leak in a child. Historically, persistent urinary fistula would entail total nephrectomy. Various tissue sealants exist such as fibrin, cyanoacrylate glue or collagen and gelatin-derived products. Bradford and Wolf reported in 2005 the use of fibrin glue in an adult chronic nephrocuteaneous fistula that persisted four months after PN for renal mass.<sup>1</sup> The fistula was refractory to conservative treatment and to electrocauterization during ureteroscopy. Fibrin was administered through a perinephric drain with an application catheter, in a similar fashion to ours. Another similar report of percutaneous fibrin use exists for a nephrocuteaneous fistula that developed after PN for renal mass.<sup>2</sup>

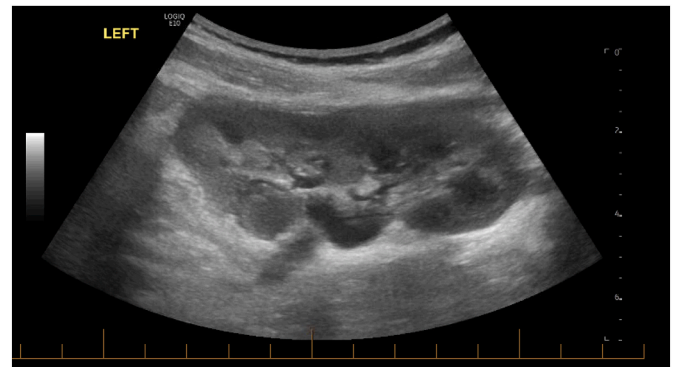
In our case, we used cyanoacrylate glue combined with a vascular occlusion device to achieve cure. Cyanoacrylate glue is a synthetic, biodegradable monomer and polymerizes in contact with tissues.<sup>3,4</sup> Compared to fibrin, cyanoacrylate glue has better tensile and adhesive strength.<sup>3</sup> It is used widely for the treatment of esophageal varices.<sup>3</sup> Combining the cyanoacrylate glue with oily contrast (Lipiodol) allows for fluoroscopic localization of the glue (Fig. 2B and C) and prevents the glue from solidifying in the applicator too rapidly.<sup>3,4</sup> Our first instillation reduced but did not eliminate the leak. In a second setting, we used an occlusion device (AGA Medical Corporation, Minnesota, USA) with cyanoacrylate glue and achieved cure. Nouri et al. described seven adult fistulas after PN embolized with coils and sealed with cyanoacrylate glue.<sup>5</sup> Of note, in their series, four patients required repeated procedures. More than one instillation may be necessary before complete fistula sealing.

### 4. Conclusion

We report for the first time the use of percutaneous cyanoacrylate glue with an adjuvant vascular occlusion device for the management of a pediatric urinary fistula that persisted after PN. Our technique was successful and spared the child a nephrectomy.



**Fig. 2.** A. Retrograde pyelogram demonstrating contrast extravasation at the site of the angioembolization coils. B. Abdominal X-ray 2 months after cyanoacrylate glue and lipiodol instillation in the fistulous tract. C. Abdominal X-ray 12 months after glue instillation.



**Fig. 3.** Ultrasound appearance of the left kidney five months after partial nephrectomy, without any collections identified.

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**Author contributions**

Ioana Fugaru: Data curation, original draft, review & editing.  
 Karl Muchantef: Review & editing.  
 John-Paul Capolicchio: Supervision, review & editing.

**Declaration of competing interest**

None.

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