

# Percutaneous Injection Of Fibrin Glue For Persistent Nephrocutaneous Fistula Complicating Colonic Perforation After Percutaneous Nephrolithotripsy

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## Abstract

Colonic perforation (CP) is an extremely rare complication of percutaneous nephrolithotripsy (PCNL). Nephrocutaneous fistulas after PCNL are also unusual and usually resolve with the conservative measures of observation, ureteral stenting, and, occasionally, percutaneous drainage. We present a case of nephrocutaneous fistula as a result of a CP after percutaneous nephrolithotripsy that was treated with percutaneous injection of fibrin glue.

## INTRODUCTION

Percutaneous nephrolithotripsy (PCNL) is an established urologic procedure primarily used to treat patients with complex calculus problems and is currently the procedure of choice for handling such problems. The most common indications for percutaneous management of renal calculi are the presence of either large, hard, or infected stones, obstruction-related stones, extracorporeal shock wave lithotripsy failure, and anatomic variation.<sup>1</sup> Despite PCNL success rates are usually greater than 90%, which has been achieved after technological refinements and increased surgical experience, a significant incidence of complications are still expected.<sup>2</sup> The most common minor complications of PCNL are pain (49%), fever (30%), urinary infection (11%), and renal colic (4%). The most common major complications of PCNL are septicemia (4.1%) and bleeding requiring blood transfusion (2.7%).<sup>3</sup>

## CASE REPORT

A 68-year-old man presented with left staghorn renal stone and was submitted to percutaneous nephrolithotripsy. After completing the procedure successfully, a double J stent was advanced down the ureter and a nephrostomy tube was left in place. On the second postoperative day the patient developed nausea, fever, chills, and left flank pain. On clinical examination, the patient was febrile (38.3°C) with a pulse rate of 112 beats/minute, blood pressure of 130/72 mmHg, and a respiratory rate of 23 breaths/minute. There

was pallor and abdominal palpation revealed tenderness on the left flank side. Complete blood count revealed hemoglobin of 9.5 g/dL, total leukocyte count 18,000/ $\mu$ L with predominant neutrophils, and a platelet count of  $3.9 \times 10^5$ / $\mu$ L. Blood urea nitrogen and creatinine were within limits of normality. Urinalysis showed 20–30 pus cells/field and urine culture revealed growth of *Proteus mirabilis*.

During physical examination, fecal content was observed through the nephrostomy tube. Computed tomography of the upper abdomen revealed the presence of contrast on the peritoneal cavity, suspicious of colonic perforation secondary to PCNL. Patient was started on antibiotics, but symptoms failed to improve. The patient was sent to the operative room and the right parietocolic recess was opened and a tiny perforation was noted and treated with a double suture of the colon and drainage of the area.

On the next day, the patient improved considerably and the nephrostomy tube was withdrawn, as the patient was already using a double J stent. Upon withdrawal of the tube, a high volume drainage of urine was seen, even after 4 days of continuous bladder drainage and double J stenting.

The patient was taken to the operating room and a retrograde ureteropielography was performed revealing a 8 mm diameter pielocutaneous fistula (figure 1). A guidewire was placed through the fistula under fluoroscopic guidance. A 6.5 F catheter was advanced over the wire to the level of the

kidney sheath and a flexible fibrin glue applicator was placed through the catheter (figure 2). Approximately 5 ml of fibrin glue was injected through out the fistula tract as the catheter was slowly withdrawn. A control fluoroscopic image was obtained (figure 3A and 3B) and there was no more communication between the renal sheath and the skin. On the first postoperative day, no urinary leakage was observed and at a four-week follow-up, the patient was asymptomatic with unremarkable findings at clinical examination. At this time the double J catheter was withdrawn, and also no urinary leakage was seen after that.

**Figure 1**

Figure 1 – Fluoroscopic image showing fistula tract.



**Figure 2**

Figure 2 - Fibrin glue applicator being placed through the catheter



**Figure 3**

Figure 3A – Fluoroscopic image 1 minute after fibrin glue application.



**Figure 4**

Figure 3B – Fluoroscopic image 5 minutes after fibrin glue application.



**DISCUSSION**

Colonic perforation (CP) is an extremely rare complication of percutaneous nephrolithotripsy (PCNL). CP complicates around 0,3% of all procedures and is considered a distressful complication. The diagnosis includes multiple symptoms and signs, that occur immediately or several days after the procedure. Unrecognized colonic injury can result in abscess formation, nephrocolic or colocutaneous fistulae, peritonitis and also sepsis.<sup>4</sup>

Some factors may increase colonic injury during PCNL, such as previous intestinal bypass surgery, female sex, elderly, thin patients, horseshoe kidney and previous renal surgery. The incidence is greater on the left side, with lower calicial puncture, and with lateral origin of the puncture. The most important etiology for this complication is a retrorenal or posterolateral position of the colon. Early diagnosis and management is the cornerstone to avoid complications from CP.<sup>5,6</sup>

After PCNL, antegrade nephrostogram can identify colonic perforation, which must be performed in patients with high risk for colonic injury, who develop unexplained fever postoperatively. However, the best diagnostic tool to detect perforation of the colon by the nephrostomy tube is abdominal CT.<sup>6</sup>

The first step after diagnosing CP is separating the nephrocolic communication, including urinary drainage with indwelling double-J stent and removal of the nephrostomy tube outside the pelviccalicial system. Conservative treatment is usually successful in patients with early-diagnosed retroperitoneal colonic injury, however late diagnosis can result on colostomy. This observation highlights the importance of early diagnosis and treatment of colonic injury before establishment of colocutaneous fistula.<sup>6</sup>

Nephrocutaneous fistula after PCNL has a reported incidence in the range of 1.8% to 21%.<sup>7</sup> Urine leaks can spontaneously resolve, but some require intervention as ureteral stenting and/or urethral catheter placement, but can also require percutaneous drainage or surgical correction. The use of fibrin glue for the treatment of nephrocutaneous fistula is quite recent, with only few reports in the literature.

Fibrin glue can be used for several situations, such as providing support to approximating sutures in procedures (pyeloplasty, ureteral anastomosis, vasovasostomy, and vasoepididymostomy), controlling bleeding and preventing urinary leakage in the treatment of renal trauma. Reported uses of fibrin glue to correct fistulas includes vesicovaginal fistula, ureterovaginal fistula, colovesicovaginal fistula, vesicoperineal fistula, colovesical fistula, fistula between an ileal conduit and the skin, and refractory transplant kidney-ureter fistula.<sup>8</sup> Other uses include treatment of bladder injuries sustained during gynecologic procedures, traumatic ureteral injuries, prostate-rectal fistulas, and inflammatory urethrocutaneous fistulas.<sup>9</sup> Fibrin glue can be used either as monotherapy or as a bolster over sutures. The potential

complications are allergic reaction, immunologically induced coagulopathy, thromboembolic complications, and the theoretical risk of viral transmission.<sup>8</sup>

Nephrocutaneous fistula after PCNL is usually managed successfully with observation. As our case consisted of an elderly patient previously complicated with a CP, who needed a recent course of antibiotics, we thought that the administration of fibrin glue would result in prompt closure of the urine leak and provide a faster relief to our patient. We believe that this treatment should be regarded not only as a way of sparing surgical correction of persistent nephrocutaneous fistulas, but also as a good initial choice for selected cases. The optimal results obtained in our experience and the absence of reported complications in urologic procedures lead us to recommend this therapeutic option to be more extensively used.

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