Acute Renal Failure after Bilateral Retrograde Pyelography — A Case of Early Diversion

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Abstract

Acute renal failure is a rare complication of retrograde pyelography. We demonstrate a patient who experienced acute renal failure induced by bilateral retrograde pyelography. The possible mechanisms, including renal and post-renal causes, are also discussed. Post-obstructive diuretic phase after early urinary diversion is an evidence of obstructive renal failure. Early urinary diversion also shortens the course of acute renal failure and reduces the requirement of hemodialysis which was experienced by cases reported previously.

KEY WORDS: acute renal failure, retrograde pyelography, contrast medium allergy, mitomycin C complication, hydronephrosis

Introduction

Retrograde pyelography (RP) is a very powerful image study for upper urinary tract. It is especially valuable in patients who are contraindicated to intravenous contrast medium. In patients with renal insufficiency, the intravenous contrast medium cannot be excreted into the collecting system appropriately. Furthermore, it might induce acute deterioration of renal function. RP is an admittedly safe alternative for these patients. The serum concentration of contrast medium after RP is much lower than that of intravenous urography and computer tomography. The chance and severity of anaphylactic reactions is thought to be less in patients who are allergic to the intravenous contrast medium. Acute renal failure (ARF) is a rare complication of RP. We present here a patient who experienced ARF after bilateral RP. The possible mechanisms and the value of early diversion with catheterization are discussed.

Case Report

A 69-year-old retired government employee with a history of hypertension, chronic hepatitis B came to the emergency room (ER) of China Medical University Hospital with the chief complaint of painless bloody urine with blood clot for 4 days. Medication was prescribed but he returned hours later to ER because of hematuria, dysuria and low abdominal fullness. Acute urine retention was impressed and Foley catheter was set. He was then admitted for further evaluation.

The urinalysis showed numerous red blood cells and white blood cells per high-power field, and negative cast finding. Serum biochemistry studies found BUN of 17 mg/dL (6.1 mmol/L) and creatinine level of 1.2 mg/dL. The serum potassium concentration was 4.0 mEq/L. The platelet count was 84000. Thrombocytopenia was noted.

In view of repeated painless gross hematuria, cystoscopy and RP was arranged. Active bleeding with blood clot of about 20 grams was noted under cystoscopy. After we evacuated the blood clot, a small papillary tumor, about 0.7 cm in diameter, was found. Bilateral ureteral catheterization for RP was performed smoothly in one attempt without any trauma. No filling defect was found in the bilateral upper urinary tract. Pyelorenal reflux of contrast was noted in the left-side kidney. Then, the patient received transurethral resection of urinary bladder tumor smoothly. A Foley catheter was placed. Intravenous urography was not performed because bilateral RP has been
performed. After the procedure, urine output was recorded as routine. The average urine output was 73 mL/hr in the first 22 hours after the procedure. At 27 hours after bilateral RP, the patient received intravesical instillation of 30 mg mitomycin C (MMC) for superficial urothelial carcinoma of urinary bladder. Anuria was noted immediately after instillation of MMC but the patient complained of first-time bilateral flank pain. Abdominal sonography was performed and revealed no bilateral hydronephrosis or urine in the bladder. Serum biochemistry studies found BUN of 38 mg/dL and creatinine level of 3.9 mg/dL. ARF was impressed. In view of the abdominal sonography findings, prerenal or renal causes were preferred initially. Myoglobin was found to be 117 ng/mL. Rhabdomyolysis was less likely. There was also no sign of dehydration or hypovolemic status. At 48 hours after bilateral RP, renal sonography was performed again, revealing bilateral mild to moderate hydronephrosis and hydroureter. The serum creatinine level elevated to 4.8 mg/dL. According to sonography findings, ARF with post-renal obstruction was recognized.

At about 50 hours after previous bilateral RP, the patient received cystoscopy again. During the procedure, we found bilateral severe edematous ureteral orifice. We also performed ureteroscopy but the ureteroscope could not pass the lower third ureter bilaterally due to severe edematous mucosa. We tried to insert 6 Fr double-J catheter bilaterally, but failed again. Ureter catheters 3 Fr and 4 Fr were set in the R’t and L’t ureter respectively via cystoscopy. After the procedures, urine came out.

At 56 hours after bilateral RP, L’t percutaneous nephrostomy was performed because R’t hydronephrosis improved much while L’t hydronephrosis persisted. The average urine output within 10 hours after bilateral ureter catheterization was 451 mL/hour. The patient was in the post-obstructive diuretic stage. The serum creatinine level returned to 1.8 mg/dL at 90 hours after bilateral RP and to normal limit in 8 days. During this period, no hemodialysis is required. The bladder tumor resected was recognized as low-grade urothelial carcinoma.

**Discussion**

ARF is a rare but severe complication of RP, which was documented in many case reports (1-7). Bilateral edematous ureteral orifice was presented in most cases of post-renal ARF after bilateral RP. There are two major generally accepted mechanisms that induced bilateral edematous ureteral orifice. First, the mechanical trauma of bilateral ureteral orifice happens when urologists attempt to insert ureter catheters. Second, the urothelium is hypersensitive to the contrast medium. Although Allen and Alfrey demonstrated a case with post-RP renal failure without edematous ureter orifice, the mechanism assumed was intrarenal obstructive nephropathy (5). In our case, anuria did not happen till instillation of MMC. Nevertheless, reviewing the literature, we can only find a case report of ARF after repeated instillation of MMC when ultrasonography failed to detect hydronephrosis. It was concluded that the adverse effect in the patient was caused by a hypersensitivity reaction as a result of systemic absorption after the intravesical instillation of MMC (8, 9).

On the other hand, in our case, we found bilateral edematous ureteral orifice without diffuse edematous change of bladder mucosa during cystoscopy after ARF. Instillation of MMC may not be the main cause of ARF but may aggravate it. The mechanism of ARF in this case may involve a series of events, including renal parenchymal injury and intrarenal obstruction by the contrast medium, post-renal obstructive ureteropathy due to ureteral obstruction, and aggravation of renal function due to systemic absorption of MMC.

In previous case reports, the most common clinical presentations of ARF after RP included bilateral flank progressive azotemia, oliguria, and anuria. In our case, the patient complained of bilateral flank pain and anuria (1-7).

The mean number of days of anuria or oliguria was 4.2 days (range, 2 to 7 days). The mean number of days of recovery from ARF was 12.4 days (range, 5 to 30 days) (1-10). In our case, the duration of anuria is less than 24 hours and the duration of recovery from ARF is 10 days. Hence, we demonstrated that an early urinary diversion will shorten the duration of anuria, diminish the requirement of hemodialysis, and possibly shorten the course of ARF, compared with
the cases previously reported (1-10).

**Conclusion**

ARF induced by RP is extremely rare. The possible mechanisms include renal and post-ren al causes. We suggest early urinary diversion as a choice of management when obstructive renal failure after RP is evidenced.

**References**