

A Case of Renal Pelvi-venous Fistula Diagnosed by Nephrostogram: A Rare Complication of Percutaneous Nephrostomy

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ABSTRACT

Percutaneous Nephrostomy (PCN) is a minimally invasive procedure used in patients with hydronephrosis. Major haemorrhagic complications requiring transfusions occur in 1-4% of PCNs, while major vascular injuries (requiring embolisation or nephrectomy) occur in 0.1-1% of cases. The sources of bleeding are usually from pseudoaneurysms or Arteriovenous (AV) fistulas when the nephrostomy tract passes near the renal hilum. A calyceal-venous or renal pelvi-venous fistula is a rare but significant complication that can arise following PCN, ureteric obstruction, and renal transplantation. Invasive treatment options for managing these fistulae include transvenous embolisation, external drainage to relieve outflow obstruction, and open surgical management, which may involve closure of the fistula, partial nephrectomy, or complete nephrectomy. Hereby, the authors present a case of 74-year-old male patient with carcinoma of the urinary bladder, who had a history of bilateral PCN due to vesico-ureteric junction involvement. He presented post-procedure with continuous haematuria from the left PCN catheter. There was a significant drop in haemoglobin; however, the patient remained vitally stable. A nephrostogram performed by injecting contrast via the PCN catheter revealed a renal pelvis-renal vein (pelvi-venous) fistula. He was managed by placing a pigtail catheter with its tip in the mid-ureter to provide external drainage and a tamponade effect at the fistula site. The haematuria gradually resolved within two days, with clear urine output. Therefore, the authors aimed to draw attention to the rare finding of a renal pelvi-venous fistula on nephrostogram following PCN and its management through the repositioning of the nephrostomy tube.

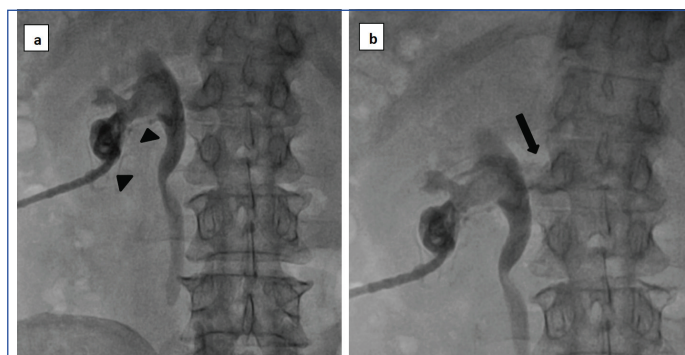
Keywords: Carcinoma, Embolisation, Haematuria, Nephrectomy, Pigtail catheter, Postoperative complication

CASE REPORT

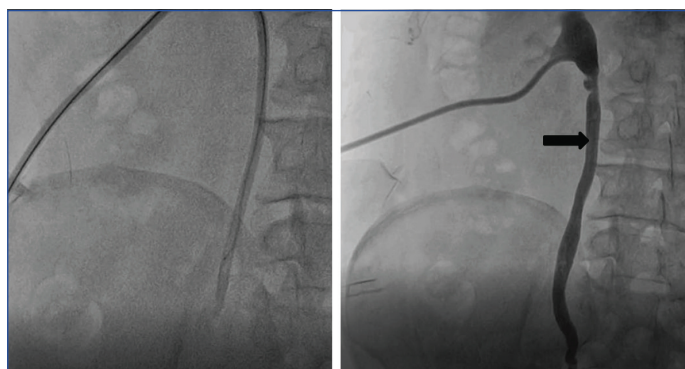
A 74-year-old male patient presented to the Outpatient Department (OPD) with a known case of carcinoma of the urinary bladder, diagnosed 15 days prior. He had a history of bilateral PCN performed one day earlier for vesico-ureteric junction involvement, which caused bilateral hydronephrosis. Post-procedure, he developed continuous haematuria from the left PCN catheter and was referred to present Institute for further management after two hours of unsuccessful conservative treatment. Initial evaluation revealed hypotension and tachycardia [Blood Pressure (BP): 90/60 mmHg and heart rate of 110 beats per minute (bpm)]. Investigations indicated a significant drop in Haemoglobin level (Hb: 6.5 gm/dL), and he was subsequently treated with blood transfusions.

Transarterial renal angiography did not reveal any pseudoaneurysms or AV fistulas. Subsequently, a nephrostogram was performed by injecting contrast via the PCN catheter into the renal pelvi-calyceal system [Table/Fig-1a,b]. A loop of the pigtail catheter was noted in the inferior calyx. Contrast opacification of the renal pelvis was followed by the opacification of small draining veins at the level of the lower pole calyx, which was likely the site of a fistulous communication. The main left Renal Vein (RV) and Inferior Vena Cava (IVC) were also sequentially opacified. This finding suggested a fistulous communication between the renal pelvi-calyceal system and the draining veins.

Over the metallic guide wire access, the pigtail drainage catheter was placed with its hole-bearing part and tip in the mid ureter to achieve a tamponade effect of the catheter at the fistulous site in the inferior calyx [Table/Fig-2]. In the postoperative period, the patient was closely monitored for vital signs, haemoglobin levels, and the presence of haematuria. He remained vitally stable with no further drop in haemoglobin levels. The haematuria gradually resolved within two days, resulting in clear urine output. A urine routine and



[Table/Fig-1]: Nephrostogram via left PCN catheter showing: a) opacification of small draining veins (arrowheads) at the level of lower pole calyx; followed by; b) opacification of left renal vein (arrow) and IVC.



[Table/Fig-2]: Post-procedure nephrostogram showing pigtail drainage catheter with its tip in the mid ureter (arrow).

microscopy were performed on postoperative day 7, which did not reveal the presence of Red Blood Cells (RBCs) in the urine. There were no adverse events or further complications during the follow-up period.

DISCUSSION

The placement of a PCN is a minimally invasive procedure that can be temporary or permanent in patients with hydronephrosis. Indications for the procedure include urinary drainage in cases of failed transurethral access, pyonephrosis, access for percutaneous nephrolithotomy, and urinary diversion in the setting of a urinary leak or fistula [1].

Despite being a minimally invasive technique, it may involve minor complications such as Urinary Tract Infections (UTI), catheter dislodgement, catheter obstruction due to debris, urine leak, and skin inflammation at the site of the PCN catheter. Major complications are uncommon and include cardiac arrest, bleeding requiring transfusion or embolisation, sepsis, hydrothorax, or pneumothorax [2]. Major haemorrhagic complications requiring transfusions occur in 1-4% of PCN cases, and major vascular injuries (requiring embolisation or nephrectomy) occur in 0.1-1% of cases [3].

Sources of bleeding following PCN may include parenchymal injury from the nephrostomy tract itself, lacerations during tract dilation, and vascular injuries. Vascular injuries are rare but may lead to late bleeding complications up to three weeks after the procedure. They generally originate from pseudoaneurysms or AV fistulas and require therapeutic interventions [4]. These vascular injuries usually occur when the nephrostomy tract passes near the renal hilum, causing laceration of the interlobar and lower pole arteries [5].

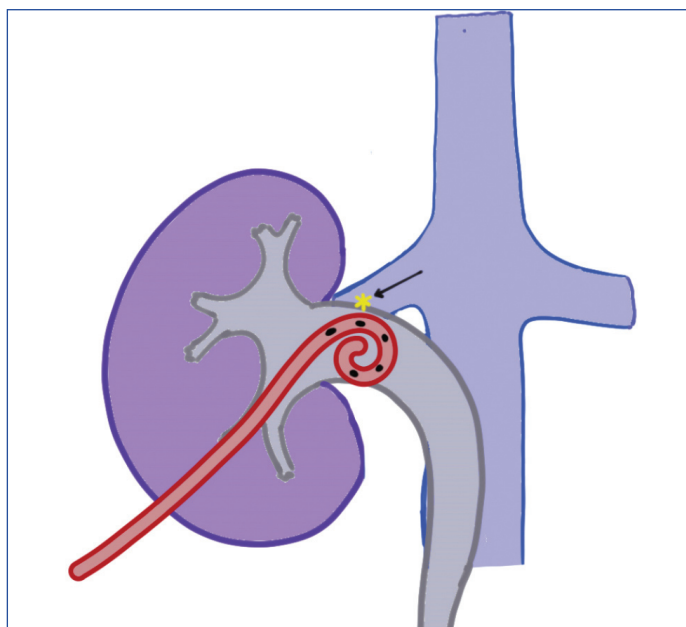
Renal pelvi-venous fistulae have been reported in the literature as rare complications following percutaneous nephrolithotomy, ureteric obstruction, renal transplantation, or as a non-traumatic occurrence due to chronic outflow obstruction [6-9]. Treatment options include transvenous embolisation [7], external drainage to relieve outflow obstruction [9], and open surgical management [10,11], which may involve closure of the fistula, partial nephrectomy, or complete nephrectomy. Rastogi N et al., reported a case of coexisting intrarenal AV and calyceo-venous fistulae after percutaneous nephrolithotomy, successfully managed with embolisation of the intrarenal Arteriovenous Fistula (AVF) and conservative management of the calyceo-venous fistula [12]. Management of present rare condition should be case-based and depends on the discretion of the physician and interventionist, due to limited evidence supporting any particular treatment method.

In present case, the patient presented with delayed haematuria and a drop in haemoglobin as an iatrogenic complication of PCN. The usual suspects of renal artery pseudoaneurysm and renal AVF were first ruled out. A nephrostogram then revealed the presence of a renal pelvi-venous fistula, which was successfully managed conservatively. In this relatively stable patient with a urinary tract malignancy, authors chose conservative management with the intention of minimising invasive procedures and preserving renal function. Open surgical treatment can be considered a second-line option in case of non-resolution, with partial nephrectomy if the site of the fistula can be clearly localised on preoperative imaging, or total nephrectomy in the event of treatment failure or renal venous thrombosis [10].

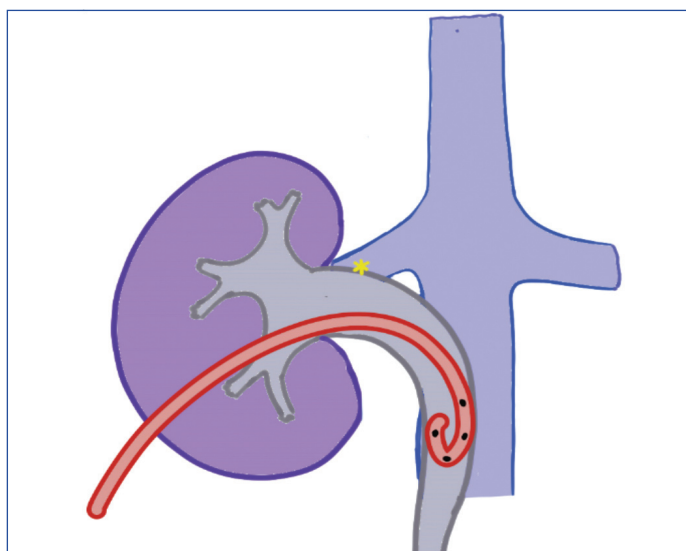
The pigtail catheter was initially positioned with its hole-bearing tip adjacent to the fistulous site, allowing free access for blood extravasation into the drainage catheter. This has been depicted in [Table/Fig-3]. Authors repositioned the catheter so that the hole-bearing tip was deep inside the mid-ureter, with its non-hole-bearing portion providing a tamponade effect at the fistulous site, resulting in the formation of a blood clot at that site and resolution of haematuria [Table/Fig-4].

CONCLUSION(S)

Renal pelvi-venous fistulae are abnormal communications between the pelvi-calyceal system and the venous system. They are very rare complications that can arise following chronic ureteral



[Table/Fig-3]: Schematic diagram showing initial position of PCN catheter with hole bearing tip in the pelvicalyceal system, adjacent to fistulous site (black arrow).



[Table/Fig-4]: Schematic diagram showing corrected position of PCN catheter with hole bearing tip in the mid ureter, with non hole bearing part adjacent to fistulous site, resulting in tamponade effect eventually closing the fistula.

obstruction or may be of iatrogenic origin. Management options include transvenous embolisation or an open surgical approach. Based on present case, an alternative approach of conservative management with continued external drainage and the tamponade effect produced by a repositioned PCN catheter may be feasible in haemodynamically stable patients, allowing for spontaneous healing of the renal pelvi-venous fistula.

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