

# Role of Percutaneous Nephrostomy in Bladder Carcinoma with Obstructive Uropathy: A Story Revisited

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## Abstract

**Objective:** To evaluate the role of percutaneous nephrostomy (PCN) in patients of carcinoma bladder presenting with obstructive uropathy. **Material and Methods:** We evaluated medical records of 33 patients of bladder cancer with obstructive uropathy that presented to a tertiary care hospital in north India from January 2015 to December 2016. Outcome measures included technical success rates, change in blood urea and serum creatinine (measured on Day 1, 7, and 14); and complications of PCN according to Society of Interventional Radiology Guidelines for Percutaneous Nephrostomy. **Results:** PCN was done in 30 patients. The mean age of patients was 51 years (range 42-67). 24 patients were male and 6 patients were female. The technical success rates for PCN placement were 93.33%. In 12 patients there was no improvement after PCN insertion. Improvement in clinical condition/kidney function occurred in 18 patients. Out of these 6 patients underwent radical cystectomy with ileal conduit formation and palliative radiotherapy/chemotherapy was given to 5 cases. In the remaining 7 patients, after an initial improvement that lasted for 2 weeks after PCN progressive renal dysfunction developed due to malignancy. Minor complications of PCN were seen in 16.6% of patients and major complications were seen in 10% of cases. **Conclusion:** In selected patients with bladder carcinoma with obstructive uropathy, PCN insertion may improve kidney function tests to normal levels and enable them to receive tumor-specific curative/palliative treatment.

**Keywords:** Bladder, carcinoma, obstructive uropathy, percutaneous nephrostomy

## INTRODUCTION

Bladder cancer is fourth-most common malignancy in men and eighth-most common malignancy in women globally.<sup>[1]</sup> Traditional treatment of operable muscle-invasive bladder carcinoma patients includes radical cystectomy (RC) and pelvic lymphadenectomy with incontinent/continent urinary diversion.<sup>[2]</sup> In developing nations like India, this is not straightaway forward as the disease dynamics are complicated (lack of awareness, poor socioeconomic condition, and nonavailability of facilities for diagnosis and treatment of disease) hence a sizeable proportion (26%) of patients present with advanced stage disease.<sup>[3]</sup> In advanced pelvic malignancies such as bladder carcinoma, obstructive uropathy may occur secondary to either malignant involvement of lower ureters or external compression by large primary advanced disease and/or enlarged lymph nodes.<sup>[4]</sup> Untreated obstructive uropathy may lead to electrolyte imbalance, renal failure, upper tract infections, and decreases the quality of life of these patients.<sup>[4,5]</sup> The use of either percutaneous nephrostomy (PCN) or double J (DJ) stent are the traditionally

offered methods to improve renal function in obstructive uropathy.<sup>[6]</sup> These treatments are expected to enable patients to receive either palliative or curative treatment for the tumor. Retrograde DJ stenting is usually difficult in the presence of bladder mass.<sup>[6]</sup> Hence, the majority of such cases are managed by PCN insertion. Data regarding optimal management and outcome of this subset of patients of advanced bladder carcinoma who present with features of uremia secondary to obstructive uropathy is relatively scant. The management of this group of patients is a matter of debate as the results of interventions (PCN/DJ stent) are often unpredictable in terms of renal function recovery and benefit achieved by the patient for subsequent surgery, radiotherapy, or chemotherapy. Therefore, in the present study, we evaluated our experience

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with urinary diversion with PCN in the management of bladder cancer patients presenting with obstructive uropathy and deranged renal function.

## PATIENTS AND METHODS

We retrospectively evaluated prospectively maintained medical records of 33 patients with bladder cancer with obstructive uropathy and deranged renal function that presented to a tertiary care hospital in north India from January 2015 to December 2016. Inclusion criteria for this study were the patient should have features of bladder malignancy (positive urinary cytology, previous history of bladder cancer or bladder mass on imaging/cystoscopy) and obstructive uropathy (high blood urea and serum creatinine levels with ultrasonographic findings suggestive of hydronephrosis). The medical records of all the patients were evaluated noting relevant clinical history, physical examination, and previous treatment(s). In all the patients' necessary workup including complete blood counts, renal function tests, random blood sugar, urine for culture/sensitivity, coagulation profile, X-ray kidney ureter, and bladder (KUB), and ultrasound KUB were carried out. PCN insertion was performed by urologists experienced in percutaneous endourologic procedures using ultrasonic/fluoroscopic guidance and local anesthesia. Patient/relatives were fully explained about procedural prognosis, subsequent treatment possibilities, and expected results. Until, the improvement of the renal functions, the total fluid intake was restricted to 500 ml over output. Urine analysis and cultures from both PCN sites were performed at regular intervals. In case of nonfunctioning PCN, a nephrostogram was done to confirm the position of the catheter in the renal pelvis. Outcome measures included technical success rates, change in blood urea and serum creatinine measured on day 1, 7, and 14; and complications of PCN according to the Society of Interventional Radiology Guidelines for PCN.<sup>[7]</sup>

### Statistical analysis

All data were prospectively entered into Excel sheets. Discrete categorical data were expressed as number and percentage. Continuous data were expressed as a mean  $\pm$  standard deviation. Categorical variables were analyzed using Pearson Chi-square test or Fisher's exact test. Continuous variables were compared between the two groups using independent samples Student's *t*-test.  $P < 0.05$  was considered statistically significant.

## RESULTS

Of 33 patients, PCN was done in 30 patients as three patients refused for any treatment. Adequate passage of urine through PCN was defined as technically successful.<sup>[8]</sup> The technical success rates for PCN placement were 93.33%. Majority of patients (60%) presented with uremic features or oliguria/anuria while 4 (12%) patients presented with hematuria, 6 (18%) patients with irritative lower urinary tract symptoms, and 3 patients (9%) presented with

abdominal pain [Table 1]. Twenty patients underwent hemodialysis before PCN insertion due to various reasons such as refractory hyperkalemia/metabolic acidosis and/or acute pulmonary edema. The mean age of patients was 51 years (range 42–67). Twenty-four patients were male, and 6 patients were female. Mean follow-up was 8 months (range 3–12). In 12 patients, there was no improvement in clinical condition, and progressive rise in blood urea and creatinine levels was seen within 2 weeks of PCN insertion [Table 2a]. These patients subsequently received multiple sessions of hemodialysis along with other palliative/supportive treatments. However, despite all treatments, these patients succumbed due to progressive malignancy and progressive renal dysfunction. Symptomatic improvement and significant fall of blood urea/serum creatinine values occurred in 18 patients [Table 2b]. Of these 18 patients, 11 (36.6%) patients had normalization of their kidney function tests after 2 weeks of PCN. Among these, 6/11 patients who were having localized disease and good performance status underwent curative treatment (RC with ileal conduit); while palliative radiotherapy/chemotherapy was administered to 5/11 cases with poor performance status. In the remaining 7/18 patients, there was an initial decrease in both blood urea and serum creatinine for the first 3 weeks after doing PCN, but ultimately, these patients developed progressive renal dysfunction secondary to malignancy. Subsequently, they underwent frequent sessions of hemodialysis and died within 3 months of PCN placement. Minor complications related to PCN insertion were seen in 16.6% patients while major complications including urosepsis and recurrent placement of PCN tube due to displacement/malposition of the nephrostomy tube were seen in around 10% cases [Table 3]. Most patients required regular flushing of PCN tubes for adequate patency and urine flow through them. Aseptic antiseptic dressings were done regularly to prevent local wound infection.

**Table 1: Presenting complaints of patients with uremia and bladder malignancy**

Complaints	Number of patients (%)
Uremia features	20 (60.61)
Hematuria	4 (12.12)
Irritative LUTS	6 (18.18)
Abdominal pain	3 (9.09)

LUTS: Lower urinary tract symptoms

**Table 2a: Description of renal function tests at various time periods who did not improve after percutaneous nephrostomy placement (n=12)**

Renal function test	Day 0 (mg/dl)	Day 1 (mg/dl)	Day 7 (mg/dl)	Day 14 (mg/dl)
Blood urea	192.58 (120-280)	174.33 (150-200)	160.08 (140-180)	117 (100-150)
Serum creatinine	6.58 (5-10)	6.25 (5-8)	5.91 (4-8)	5.5 (3.5-7)

**Table 2b: Description of renal function tests at various time periods who improved after percutaneous nephrostomy placement (n=18)**

Renal function test	Day 0 (mg/100 ml)	Day 1 (mg/100 ml)	Day 7 (mg/100 ml)	Day 14 (mg/100 ml)
Blood urea	175.22 (150-200)	126 (105-150)	75.66 (60-100)	42.16 (35-58)
Serum creatinine	7.27 (6-9.8)	3.94 (2.2-4.5)	2.05 (1.8-3)	1.88 (0.9-1.7)

**Table 3: Complications related to percutaneous nephrostomy**

	n (%)
Minor complications	
Temporary hemorrhage (<72 h) not requiring blood transfusions	3 (10)
Fever	0
Flank pain	1 (3.3)
Percutaneous leak or perinephric leak	2 (3.3)
Major complications	
Recurrent placement of PCN	2 (6.6)
Urosepsis	1 (3.3)

PCN: Percutaneous nephrostomy

## DISCUSSION

The treating clinician faces a dilemma in managing patients with bladder carcinoma with obstructive uropathy. There are no clear-cut protocols available as to which patients will clearly benefit from any intervention (PCN/DJ stenting) as most of these patients present in poor clinical condition, advanced disease, and usually have a poor performance status.<sup>[4,5]</sup> Timely intervention in these cases can improve the general condition of the patient and can prevent the development of long-term renal dysfunction.<sup>[6]</sup> On the other hand, PCN insertion may prolong the suffering and agony of the patient and decrease the quality of life.<sup>[6]</sup> In patients with carcinoma bladder with obstructive uropathy, retrograde DJ stenting is often difficult due to the involvement of ureteric orifice by tumor or hematuria that decreases visualization of ureteric orifices.<sup>[6]</sup> PCN is especially useful in these scenarios, where retrograde ureteric stenting is often not possible.<sup>[6]</sup> Goodwin *et al.* first described the use of PCN in 1955.<sup>[9]</sup> The factor leading to good recovery of renal function after relief of obstruction is a short duration of obstruction (<25 days).<sup>[10]</sup> Haleblan *et al.* reported bilateral hydronephrosis (HDN) to be an independent prognostic factor in carcinoma bladder patients.<sup>[11]</sup> The authors found that more than 90% of patients of carcinoma bladder with bilateral ureteral obstruction had a disease with extravesical extension compared to around 66% of patients with unilateral ureteral obstruction.<sup>[11]</sup> Although PCN insertion is an invasive procedure, the present study results show that it is very simple and was technically successful in 28 patients (93.33%) who opted for it. Similar studies were done in cervical carcinoma have also shown that it has very low failure rates of 0%–3% during insertion.<sup>[12,13]</sup> The only contraindication of PCN insertion is bleeding diathesis. We opted for bilateral PCN insertion

over unilateral PCN/DJ stenting as an emergency temporary method for renal function correction. In a study done by Lienert *et al.*<sup>[14]</sup> the authors proposed that factors such as the presence of low serum albumin (<30 g/L), grade of HDN, and presence of multiple (3 or more) events related to disseminated malignancy may be used as poor prognostic indicators in patients with palliative urinary diversion.<sup>[14]</sup> Minor complications related to PCN insertion were noted in around 16.6% of cases in the present study. These were manageable with simple measures. Studies done previously in cervical carcinoma patients report the complication rates to vary between 62%–83%.<sup>[12,15]</sup> One of the most significant advantages of PCN insertion noted in the present analysis were that we could administer tumor-specific treatment in 11/30 (36%), i.e., curative surgery in 6 and radiotherapy/chemotherapy in 5 patients. Sharma *et al.* proposed that factors such as cortical thickness (CT) of the kidneys, parenchymal echogenicity, corticomedullary differentiation, pre-PCN creatinine values can predict the recovery of renal function in patients with obstructive uropathy.<sup>[16]</sup> In the present study, the renal CT in patients who had improvement after placing PCN was significantly higher (104.68 vs. 60.58 mm;  $P < 0.05$ ) [Table 4]. However, there were 7 patients who had initial improvement but later on developed progressive renal dysfunction and died within the next 3 months. Hence, the exact factors determining improvement/deterioration of patients with obstructive uropathy in bladder carcinoma is still unknown and warrants further study. Despite placing PCN other supportive measures, such as hemodialysis, play a key role in the management of these patients. There should be shared decision making to do invasive PCN in bladder cancer cases presenting with deranged renal functions due to obstructive uropathy after proper explanation of prognosis, subsequent treatment possibilities, and expected results. Proper counseling of the patient and his/her family members is necessary, and their wishes must be considered.

## CONCLUSION

In selected patients with bladder carcinoma with obstructive uropathy, PCN insertion may improve kidney function tests to normal levels and enable them to receive tumor-specific curative/palliative treatment. The factors that should be taken into account before considering the patient for PCN insertion must be individualized including the extent of disease, availability of treatment options, patients' performance status, associated comorbid conditions, and patients socioeconomic status.

**Table 4: Comparison of parameters between patients showing improvement after percutaneous nephrostomy placement with patients not showing improvement**

Parameter (mean)	Patients showing improvement (n=18)	Patients not showing improvement (n=12)	P
Age (years)	45.05	48.83	0.11
Duration of obstruction (months)	7.72	6.42	0.15
Renal cortical thickness (mm)	104.61	60.58	<0.05
Pre-PCN creatinine (mg/dl)	6.58	7.27	0.13

PCN: Percutaneous nephrostomy

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### Conflicts of interest

There are no conflicts of interest.

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