

# FREQUENCY OF COMMON COMPLICATIONS IN PATIENTS AFTER PERCUTANEOUS NEPHROSTOMY FOR OBSTRUCTIVE UROPATHY

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## ABSTRACT

**Aims and Objectives:** To determine the frequency of common complications in patients after percutaneous nephrostomy for obstructive uropathy.

**Methodology:** This study was undertaken at Department of urology in Institute of Kidney Diseases Hayatabad Medical Complex, Peshawar. This was a descriptive cross-sectional study. One hundred and forty five patients were enrolled during the study period. The non-probability consecutive sampling technique was used. The total duration of this study was one year from July 2011 to May 2012. All adult males and females of age 13 years and above with obstructive uropathy due to ureteric obstruction caused by (impacted ureteric stones, pelviureteric junction obstruction, carcinoma prostate involving ureters, iatrogenic ureteric injury and bladder tumors) were included in the study. Patients of obstructive uropathy with physical deformity and immunocompromised patients were excluded from studies. Percutaneous nephrostomy was done under ultrasound guidance by using local anesthetic agent.

**Results:** During the study period from, July 2011 to June 2012, a total of one hundred and forty five patients in whom nephrostomy was done were studied. Among 145 patients 79 were male and 66 were female. The age ranged between 13-70 years with mean  $\pm$  S.D is  $44 \pm 18.02$ . The indication of nephrostomy included impacted ureteric stone in 79 cases, bladder tumor in 19 cases, carcinoma prostate in 06 cases, pelviureteric junction obstruction in 26 cases, and iatrogenic ureteric injury in 11 cases. Common complications observed in patients were urinary tract infection in 51 cases, macroscopic hematuria in 31 patients; nephrostomy tube dislodgment in 24 cases and Sepsis was the least common of all complications seen in 19 cases.

**Conclusion:** It is concluded from my study that although percutaneous nephrostomy is an important and lifesaving procedure but is not free of complications. Urinary tract infection is the most common complication followed by macroscopic haematuria, catheter dislodgment and sepsis.

**Key Words:** Nephrostomy, Macroscopic haematutia, Sepsis, Obstructive uropathy.

## INTRODUCTION

Obstructive uropathy is one of the most common emergencies faced by urologist and is associated with a significant morbidity and mortality<sup>1,2</sup>. It refers to the obstruction of urinary tract leading to increased pressure within the collecting system of kidney leading to destruction of renal parenchyma<sup>4</sup>. In most cases it presents with classical signs of flank pain, fever and renal dysfunction<sup>2</sup>. Depending on associated sepsis, degree and duration of obstruction, damage to the kidney may vary from mild to severe. Causes of obstructive uropathy could be extramural or intraluminal<sup>4</sup>.

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Obstructive uropathy can be treated by either retrograde insertion of ureteral stent by the help of cystoscopy or it can be done by percutaneous nephrostomy (PCN)<sup>2,3,4</sup>. The first percutaneous nephrostomy was performed by Goodwin in 1955<sup>2</sup>. Later in 1976 percutaneous nephrostomy was used for the specific purpose of stone removal by Fernstorm and Johonnson<sup>10</sup>. In 1981 Alken and colleagues removed stones through mature percutaneous nephrostomy tracts<sup>10</sup>.

Nephrostomy has been indicated in patients with unilateral or bilateral ureteric obstruction in benign as well as malignant diseases where retrograde ureteric stenting is not possible or not a procedure of choice, especially in the presence of infection or sepsis<sup>1,2,4</sup>. Common Indications for PCN are pyonephrosis, urinary tract obstruction related to pregnancy, ureteric obstruction secondary to malignancy of pelvic origin, for ante grade studies, endourological procedures like Percutaneous nephrolithotomy (PCNL), stricture dilatation of ureter and to drain nephric abscesses<sup>3,8</sup>.

PCN is safe, simple and effective procedure which can be performed in emergency operation theatre or radiology department under local anaesthesia<sup>2,4,6</sup>. PCN

is associated with common complications like macroscopic hematuria 9.6%, dislodgement of catheter 19%, sepsis 10.3% and urinary tract infection in 20% of patients<sup>4,9</sup>. Major complications like bleeding requiring blood transfusion ranges from 1.6-2.5%, whereas mortality is reported in 0.3% of cases<sup>2,7</sup>. Renocolic fistula has also been reported in one of the case<sup>5</sup>.

PCN is a relatively common procedure in established urological centers. As there is wide variation in the literature regarding frequency of common complications of PCN e.g. dislodgement of catheter 19%-37.6%<sup>11</sup>. The rationale of this study is to determine the exact frequency of common complications among our patients after percutaneous nephrostomy for obstructive uropathy. Moreover if the common complications rate comes out to be significantly lower or higher than the available data in the literature then it will lead to reconsideration of existing guidelines for the PCN according to our own circumstances, and thus help improve patient care in terms of morbidity/mortality and reducing financial burden on the health care facility.

## PATIENTS AND METHODS

This descriptive cross-sectional study was conducted in the department of urology, Institute of Kidney Diseases Hayatabad Medical Complex Peshawar from 25<sup>th</sup> July 2011 to 4<sup>th</sup> June 2012. A total of 145 patients with obstructive uropathy keeping frequency of macroscopic hematuria after PCN to be 9.6%<sup>9</sup>, 4.8% margin of error and 95% confidence interval under WHO sample size calculations were included in the study. All the patients were selected through non-probability consecutive sampling. Patients of age group 13 years and above either male or female with obstructive uropathy due to ureteric obstruction caused by (impacted ureteric stones, PUJ obstruction, carcinoma prostate involving ureters, iatrogenic ureteric injury and bladder tumors) were included in the study. Patients of obstructive uropathy with physical deformity like lateral scoliosis of lumbar spine on x-ray spine, Patients with uncontrolled bleeding diathesis as detected by history and medical record, obstructive uropathy resulting from bladder outlet obstruction without involving the ureteric orifices on ultrasonography (i.e. enlarged prostate, urethral stricture and meatal stenosis), immunocompromised patients like Diabetes, HIV/AIDS on previous medical records, Patients with history of catheterization in last one week were excluded as they might have acted as confounders and introduce bias to the study results.

After taking ethical committee's approval and informed written consent from patient/next of kin, patients from either gender of age group 13 and above with obstructive uropathy (as per operational definitions) were included whereas patients with physical deformity, bleeding diathesis, bladder outlet obstruction without involving ureters, immunocompromised, and history of catheterization were excluded from the study. All

patients were enrolled through OPD/Emergency for the study. Complete history and physical examination was carried out in all the patients. Necessary investigations like blood complete, renal function tests, Prothrombin time (PT), activated partial thromboplastin time (aPTT) were done preoperatively.

Patient images (e.g. sonograms, CT scans, intravenous urograms IVUs, and radionuclide scintigrams) were reviewed to assess the degree of hydro/pyonephrosis, location of the colon, spleen and liver in determining the approach.

Procedure of PCN: patient was commonly placed in a prone or prone oblique position. Local anesthetic i.e. 1% lidocaine was used to anesthetize the skin. A small skin incision was made to facilitate passage of the needle through the skin into the collecting system. The tract was dilated and drainage catheter (PCN Tube) was placed in the renal pelvis and then attached to an external drainage bag. Postoperatively all patients were closely looked for post-operative complications. Patients were followed up for minimum 14 days for common post-operative complications like hematuria by urine R/E, sepsis by watching clinical signs and bacterial counts, catheter dislodgement by regular ultrasonography and Urinary tract infection by urine microscopy. All PCN were performed by single experienced surgeon/fellow of CPSP having not less than 05 years of experience after fellowship to control surgeon bias. All the preoperative, operative and post-operative data was recorded on structured proforma (attached). Strictly exclusion criteria were followed to control confounders and bias in study results.

Data was analyzed on SPSS version 12. Mean  $\pm$  S.D was calculated for continuous data i.e. Age. Frequencies and Percentages were calculated for categorical data i.e. sex, common Complications (macroscopic hematuria, sepsis, urinary tract infection and catheter dislodgement) and indication for PCN after using multiple response too on indication for PCN. Common complications were stratified among age, sex and indication for PCN to see effect modification. Results were presented in the form of tables and figures.

## RESULTS

During the study period from July 2011 to June 2012 a total of one hundred forty five patients in whom percutaneous nephrostomy was done were studied. All of the patients were followed up and no patient lost to follow-up. In my study 145 patients were enrolled who underwent percutaneous nephrostomy for various indications. Seventy nine (54.5%) patients were male and sixty six (45.5%) were female.

The age ranged between 13-70 years with mean  $\pm$  S.D is  $44 \pm 18.02$ . The indication of nephrostomy included impacted ureteric stone in 79(54%) cases, bladder tumor in 19(13.1%) cases, carcinoma prostate

**Table 1: Frequency of Complications By Indication**

		macroscopic haematuria		UTI		sepsis		catheter dislodgement	
		Yes	No	Yes	No	Yes	No	Yes	No
		Count	Count	Count	Count	Count	Count	Count	Count
Impact ureteric stone	Yes	13	66	29	50	14	65	10	69
	No	18	48	22	44	5	61	14	52
bladder tumor	Yes	9	10	4	15	2	17	6	13
	No	22	104	47	79	17	109	18	108
Ca prostate	Yes	3	3	0	6	0	6	0	6
	No	28	111	51	88	19	120	24	115
pelviureteric-junction obstruction	Yes	5	21	13	13	3	23	4	22
	No	26	93	38	81	16	103	20	99
iatrogenic ureteric injury	Yes	1	10	4	7	1	10	2	9
	No	30	104	47	87	18	116	22	112

in 06(4.1%) cases, pelviureteric junction obstruction in 26(18%) cases, and iatrogenic ureteric injury in 11(7.6%) cases.

In my study frequency of complications were seen as; urinary tract infection (UTI), it was most common complication, present in 51(35%) patients. Second most common complication was macroscopic hematuria seen in 31(21.4%) of patients. On number third was catheter dislodgment. Total 24(17%) of patients presented with this problem. Sepsis was the least common of all complications in this study. This complication was seen in 19(13%) of patients.

When all the complications were stratified according to different age groups, UTI was the most common complication in 11(21.6%) of patients belonging to age group less than 20 to 40 years. In age group of 41 to 60 years contrary to other age groups catheter dislodgment was the most common complication in 12(50.0%) of patients.

**Frequency of complications by indication**

In cases of impacted ureteric stone the most common complication observed was UTI (n=29). On the second number was sepsis (n=14) and the least common complication was catheter dislodgment (n=10) (Table No1).

In all those patients presented with the bladder tumor and carcinoma prostate the most common complication was macroscopic hematuria (n=9) & (n=3) respectively and the least common complication was sepsis (n=2) (Table No1).

**DISCUSSION**

Obstructive uropathy ultimately ends in urosepsis, pain and renal failure. As it is a life threatening condition,

that's why most of the time urgent temporary relief of obstruction is desirable. Cystoscopy with retrograde stent insertion and percutaneous nephrostomy tube placement are the only two options for temporary relief. Over the past 15 years, advancements in urology have increased the indications and usefulness of percutaneous nephrostomy tube placement. It has become a procedure of choice for patients with ureteral stricture and obstruction. It is a first step in obtaining antegrade access to the kidney for a variety of procedures. It is currently the routine emergency procedure performed by Urologists, Nephrologists, general surgeons and interventional radiologists<sup>11</sup>.

The indications for percutaneous nephrostomy tube placement have increased during the last few years and currently nephrostomy tubes are placed as an almost routine procedure. Thus the complications of nephrostomy are more frequently encountered than before.

Certain consequences can be anticipated with placement of a foreign object into the pelvicalyceal system, patients present with macroscopic haematuria, sepsis, UTI, adjacent organ injury and even death. Nowadays there are a wide variety of tubes in commercial use, and more are in stages of development. Although Manufacturers have altered tube designs and materials in an attempt to minimize this morbidity yet nephrostomy tubes are still evolving and their use is not complication free. Furthermore, risk management has become an integral part of every clinician practice.

The department of Urology of institute of kidney diseases is one of the busiest centers of urology in Khyber puktoonkhwa. This is tertiary care hospital; patients are referred here from all over the province and Afghanistan. As nephrostomy tube is placed for a variety of conditions like after stone surgery, any bilateral

or unilateral obstruction causing obstructive uropathy and where retrograde access is not possible so we can say that this procedure is performed in a considerable number of patients.

The strength of my study was that we had larger sample size as compare to most of the studies conducted in the past. No significant work was done on this issue in our set up. So I thought to start my research on this issue.

The weakness of this study was that it was not a randomized control trial and was hospital based study. All the complications of PCN already cited in the literature were not included in this study e.g. injury to the adjacent organ as we rarely come across such complications. The study sample doesn't belong to one group of disease rather we took patients with four different diseases causing obstructive uropathy. Similarly we were not able to see the long term complications of percutaneous nephrostomy like scarring in kidneys and hypertension secondary to nephrostomy tube because the long term follow-up was impossible in our patients.

The age range in my study was 13 to 70 years. In the study conducted by Naeem et al was 12 to 80 years. In the study conducted by R Karim et al, median age was 41 whereas in our study it was 44.<sup>3</sup> Similarly in the study conducted by CH Shen et al the mean patient age was 53.7 years.<sup>7</sup> Our study results are supported by another study conducted in radiology department of Jinnah postgraduate medical institute Karachi by Mahmood T et al the minimum age of the patient was 13 and the maximum age was 68.<sup>12</sup>

The most common indication of nephrostomy in our study was impacted ureteric stone, in seventy nine (54.5%) of cases. In the study of R Karim et al the most common indication was carcinoma cervix.<sup>3</sup> In the study conducted by Naeem M et al from January 2006 to December 2008 it was stone disease in 52% cases which are similar to the current study.<sup>3</sup> In the study conducted by L.zoran et al the obstructive uropathy secondary to malignant ureteric obstruction was in 44 patients and obstructing stone disease was in 21 patients out of total 148 which is in contrast to ours, where the malignant ureteric obstruction was secondary to carcinoma bladder and carcinoma prostate in 19 and 6 patients respectively and 79 patients were having obstructive stone disease.<sup>13</sup>

The outcome data of percutaneous nephrostomy procedures at UK training centre from 1<sup>st</sup> January till December 2002 shows the commonest indication was malignant disease in 53% of cases and the least common cause was stone disease in 4% of cases which is in contrast to our study results.<sup>14</sup> The possible reason for this is that nephrolithiasis, as a cause of renal failure in our patient-population is high compared to other regions in the world. This is partly due to very high prevalence of stone disease in this region and to

the late and incomplete treatment that results in renal damage.<sup>15,16</sup>

Ureteral injury is also common in our province because of the poor obstetric facilities in the periphery. A study conducted in Greece by D. Koukouras et al nephrostomy was done with sample size of 24 patients for ureteric injury which were more than double of ours.<sup>17</sup>

In my study frequency of common complications in cumulative percentages were given as below.

Frequency of UTI was the most common complication, it was present in 35.2% of patients, second most common was macroscopic haematuria, it was in 21.4% of patients, on number third is catheter dislodgement, it was present in 16.6% of patients, sepsis was least commonly seen in our patients(13.1%).

Almost all the authors agree that that although PCN is a safe and effective emergency procedure yet it is not free of complications.

In 2010 study conducted by R. Karim common complications observed after PCN were macroscopic hematuria in 9.6%, dislodgement of catheter in 19% and sepsis in 10.3% of cases.<sup>4</sup>

In another study conducted by Dienstmann R et al in 2008 UTI and catheter dislodgement was reported in 20 and 18% of cases<sup>9</sup>. The results of these studies are almost comparable with my study. In my study the most common complication after PCN insertion was UTI, similarly in one of the local study conducted in Kidney centre Karachi by AM.Rana et al the most common complication was UTI along with other minor complications like catheter dislodgement and sepsis. Which supports our results.<sup>18</sup> In comparison to this the frequency of UTI as a complication of PCN in the international literature is not more than 1.5%.<sup>19</sup> Although we used preoperative antibiotics in our patients but one of the most probable reason for this high frequency of UTI may be the rising resistance to quinolones in our setup.

In the study conducted by T. Mahmood et al in 2007 the most common complication was macroscopic haematuria in 8.5% of cases out of total one hundred and fifty three cases moreover no other complications like UTI, sepsis and catheter dislodgement were encountered in any of the case.<sup>12</sup> whereas in my study macroscopic haematuria was found in 31(21%) of cases. Another different finding in our study was that in cases of obstructive uropathy secondary to carcinoma bladder and carcinoma prostate, the most common complication found was macroscopic haematuria which is not being mentioned in both national or international literature and probably needs further looking into.

In the study conducted by ST. Cochran in 1991 sepsis was the most common complication encountered in 12(21.4%).<sup>20</sup> of cases in contrast to our study

results showing sepsis in 19(13.1%) of cases the cause of which may be the regular use of prophylactic antibiotics in our study.

Nephrostomy catheter dislodgement is one of the less common complications of PCN which was found in 24(16.6%) of cases, while the frequency of nephrostomy tube dislodgement in the international literature is 11%-13%.<sup>14</sup> Difference in dislodgement could be because of different catheters in the studies.

My study is implicated on all the urologists, nephrologists who are working in tertiary care hospitals and general surgeons who are working in rural areas, coming across the common ailment of obstructive uropathy with or without sepsis.

Some unanswered questions which are not answered in this study are that how to minimize the frequency of these complications, secondly why macroscopic hematuria was so common in patients suffering from urinary tract malignancy which needs further research studies.

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