

Impact on Creatinine Clearance in Obstructive Kidney After Percutaneous Nephrostomy

Creatinine
Clearance After
Nephrostomy

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ABSTRACT

Objective: To detect the impact of creatinine clearance after percutaneous nephrostomy done in obstructive kidney at People's Medical College Hospital Nawabshah.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at the Urological Department and Urology OPD of People's Medical College Hospital Nawabshah from January 2017 to August 2018

Materials and Methods: All the patients were admitted through Emergency/urological Outpatient Department of the Hospital. History, examination and required investigations were done. PCN was done in all patients and outcome was assessed according to the follow up visits.

Results: A total of 70 patients were included in this study. There were 40(57.14%) males and 30(42.86%) females. Age ranged from 12 to 70 years. 15 (21.42%) patients aged from 12 to 15 years. 20 (28.57%) patients were of 17 to 30 years and 35(50%) patients age was from 31 to 70 as is shown in table 1 below. The average age was 35 to 40 years. In 71.42% patients, Pre PCN creatinine was 2-3.5mg/dl but post PCN was 0.8-1.2mg/dl. Pre PCN clearance was 30-35ml/m in 77.14%.

Conclusion: The conclusion is that PCN is the best procedure to revive the function of kidney.

Key Words: Creatinine, Percutaneous Nephrostomy, Clearance.

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INTRODUCTION

Percutaneous nephrostomy is the procedure of interventional radiology by which pelvis of kidney is punctured with help of imaging. Images are obtained by ante grade pyelogram. Calcifications are seen through the contrast. This tube is used to allow the drainage.¹ Percutaneous nephrostomy (PCN) was unveiled by urologist Dr. Willard Goodwin in 1955. It was used as a minimally invasive; radio logically guided temporary or permanent procedural. It is alternative to conventional surgery in patients suffering from hydronephrosis. Since then, it has become a gold standard procedure.²

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Anatomically, kidney is at the level of T12 and L3 vertebrae. Its position at this site can cause injuries to surrounding structures while placing PCN. Injuries can be to pleura, diaphragm, colon, spleen and liver. The most common of these is pleura and diaphragm. The pleura are at the level of lower margin at the level of 12th rib therefore injury is minimized while doing the procedure PCN. Its placement above 12th rib can puncture the diaphragm.^{3,4}

PCN is indicated for drainage, stone treatment, urine diversion and diagnosis of obstruction. It is the procedure of choice when transurethral approach is impossible or has failed to relieve obstructing urinary system due to external factors like pregnancy, carcinoma, cysts, abscesses or urinomas. Internal blockage is due to benign or malignant strictures.⁵ The most common indication of PCN is drainage of obstructed kidney for about 85-90% of all cases. The absence if infection is not indication for emergency placement of the Tube but the time matters. If obstruction exceeds one week, there are less chances of good improvement in renal function. Bilateral nephrostomy is rarely indicated particularly in cases like severe hemorrhagic cystitis and bilateral benign or malignant diseases.⁶

The common indication of emergency PCN is to provide drainage in pyonephrotic kidney with

septicemia with risk of permanent renal dysfunction. In these cases, PCN and D-J stenting is recommended. PCN is mostly done in severe state keeping in view the obstructed and infected ureter. In obese patients with minimal hydronephrosis, transurethral D-J stenting is indicated.⁷

PCN is also used as the first step to approach kidney's collecting system in order to provide access to devices for treating renal stones. It creates a tract by which lasers, ultrasonic probes and retractable baskets are used for mechanical crushing, vaporization and stone removal. Now a day, interventional radiology is using commonly PCN before PCNL. PCN is safe method to treat pregnant lady with nephrolithiasis not manageable on conservative therapy.⁸

Direct percutaneous access to the renal collecting system is the least likely invasive method of treating fistulas, strictures and infections. Pyeloplasty/urethroplasty, stent insertion and direct insertion of medication for treatment of highly resistant infection is done by direct access.⁹

There are certain conditions in which PCN cannot be done. Untreated UTI are relative contraindications. Non dilated system, risk factors of hemorrhage and complications from sedation are also contraindications. In patients with obstructed kidney having renal dysfunction can develop hyperkalemia so hemodialysis should be performed before PCN.¹⁰

The rationale of our study is to detect the outcome of PCN in obstructed kidney and post PCN impact on creatinine clearance.

MATERIALS AND METHODS

This study was conducted at urology department of PMC Hospital Nawabshah. All the patients were admitted through Emergency/ urological Outpatient department (UOPD) in Department of Urology Peoples Medical College Hospital Nawabshah This study was conducted from January 2017 to August 2018. This is tertiary care hospital of Sindh dealing patients of not only Sindh but also other provinces of Pakistan.

A detailed history was taken from the patients regarding the pain in lumbar region, nausea/vomiting, discomfort, blood or pus in urine or any symptom or sign of renal failure. Thorough clinical examination is done. Systemic examination included abdominal examination including inguinal and per rectal examination is done. Palpable mass in lumbar regions were found in majority of the patients.

Apart from routine investigations like blood sugar, blood urea, serum creatinine was done to find out any element of uropathology. Serum electrolytes were also done to see hyponatremia and hyperchloremic metabolic acidosis. Urinalysis showed elevated PH.

Ultrasound was also obtained to find out the size of kidney, level of obstruction, number of stones if present or any other pathology.

Patients were prepared for the required procedure and PCN was done in all patients. Most of the patients were discharged after 2 to 5 days and called on for follow up after 3 to 4 weeks and creatinine clearance was done by the following calculation formula

Creatinine Clearance = $\frac{\text{age}(\text{yr}) \times \text{weight}(\text{kg})}{[72 \times \text{serum Cr}(\text{mg/dL})]}$ (multiply by 0.85 for women). All the patients had normal creatinine clearance of 88–128 mL/min for healthy women and 97–137 mL/min for healthy men.

RESULTS

A total of 70 patients were included in this study. There were 40(57.14%) males and 30(42.86%) females. Sex difference was found. Males were victims of this disease more as compared to females..

Table No 1: Age of Patients Percentages

S.No	Age	No of patients	Percentage
1	12 -15	15	21.42%
2	17-30	20	28.58%
3	31-70	35	50%
total		70 n= 70	100%

Age ranged from 12 to 70 years. 15 (21.42%) patients aged from 12 to 15 years. 20 (28.57%) patients were of 17 to 30 years and 35(50%) patients age was from 31 to 70 as is shown in table 1 below. The average age was 35 to 40 years.

This procedure also resulted in some complications that were dealt with accordingly. Major complications occurred 5.69% whereas minor complications ranged up to 67.13%.

Table No. 2: Complications of Patients Percentages

S.No	Complications	No of patients	Percentage
3	Pneumothorax	1	1.42%
4	Hematuria	4	5.71%
5	Infected wound	2	2.85%
Total		7 n=7	9.98%

Table No. 3: Out Come of PCN on Creatinine

S. No.	Pre PCN	Post PCN	No of Patients	Percentage
1	2-3.5 mg/dl	0.8-1.2mg/dl	50	71.42%
2	4.5-5 mg/dl	1.3-1.6mg/dl	15	21.42%
3	5.0-5.5 mg/dl	1.8-2.8mg/dl	5	7.14%

Table No. 4: Out Come of PCN on Clearance/ GFR

S. No.	Pre PCN	Post PCN	No of Patients	Percentage
1	30-35ml/m	60-80ml/m	54	77.14%
2	20-30ml/m	50-60ml/m	13	18.57%
3	10-20ml/m	30-45ml/m	3	4.28%

DISCUSSION

Percutaneous Nephrostomy is the commonly done aimed at diverting the upper urinary system and decompression of the renal collecting system in various clinical scenarios. PCN is the surgical procedure in which renal pelvis is punctured and nephrostomy tube is kept to drain. Though it is the basic urological technique but is challenging technically to place it into appropriate site. It can be done under fluoroscopy, USG or CT guided.¹¹

Surajit Samsol et al conducted study and concluded that by PCN patient is relatively fit for further therapeutic management improving the patients' outcome and quality of life. In a study conducted on outcome of PCN, renal biochemical parameters were assessed on post operative day 1,3 and 7 then 1st and 3rd month. A significant decline was seen in creatinine level with enormous increase in urine output. In our study, 71% patients showed decline in creatinine level and 77% patients showed great improvement in clearance.¹²

There are multiple factors that can influence the function of kidney even after releasing obstruction. These are age, duration of obstruction, function of opposite kidney and compliance of ureter and renal pelvis. Moreover, the factors affecting the kidney function recovery are the presence/absence of infection, use of nephrotoxic agents and contrast materials. But the dysplasia has enormous effect on the recovery of renal function especially in children.¹³

Gillenwater expressed opinion that the best way to detect the level and depth of injury and recoverability is to relieve obstruction with PCN Tube and later on concluding the outcome. In our study, same methodology is applied and renal function recovery was observed in follow up visits. Some investigators are of the opinion that surgical intervention should be done to predict the recovery of the renal function. In one study, the determination of recoverability of the kidney function is done by calculating GFR by MDRD formula due to lack of resources and financial constraints.¹⁴

Recently, new non invasive predictors of recoverability have been suggested like Urinary N acetylglucosaminidase and TGF-beta. Still the studies are required to explore its advantages. In one study, the factors predicting the renal function were CT, RS, Pre Rx GFR, Hb, Pre Rx, urine output, presence of infection and co morbid factors. Other variables such as degree of hydronephrosis, time duration between start of disease and intervention were also observed. Same was also seen in our study.¹⁵

To ascertain the obstruction, ultrasonography, intravenous urogram and computed tomogram are suggested. Diagnostic ureteroscopy is also done in doubtful cases. Insertion of PCN is the measurement of creatinine clearance. In our study, ultrasonography was

done in every case but IVU and CT scans were suggested wherever required.¹⁶

Gillenwater considers PCN as the best way to detect the degree of injury and recovery so that obstruction is to be relieved by this temporary procedure to save the life of kidney. Bassiouny has discouraged the placement of this tube in neonates with poor kidney function owing to risk of infection, retraction of renal pelvis and more kidney injury. Some studies have concluded that the age at the time of obstruction occupies significance to detect the damage. Provost et al concludes that immature kidneys are prone to develop pathology as compared to mature ones. Koff and Campbell studies resulted in good recovery in obstructed kidney. Our study also showed excellent results. Bassiouny also showed good recovery in hydronephrotic kidneys of children.¹⁷

CONCLUSION

Percutaneous nephrostomy is the best procedure in our study with good results in obstructed kidneys. It showed good recovery in serum creatinine and clearance indicating the excellent restoration/revival of renal function.

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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