



PERCUTANEOUS NEPHROSTOMY USING ULTRASOUND GUIDED SELDINGER TECHNIQUE IN PATIENTS WITH OBSTRUCTIVE UROPATHY – ITS OUTCOME AND COMPLICATIONS

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*Corresponding Author**ABSTRACT**

Background: Obstructive uropathy is a urinary tract disorder caused by obstruction of urine flow that can be structural or functional. PCN is now a well-established technique for providing temporary or permanent drainage of an obstructed urinary system. Although percutaneous nephrostomy was developed using fluoroscopic guidance, now ultrasound guided procedures have become routine practice and are safe, easy and effective. **Primary Objective:** To estimate the proportion of success of ultrasound guided percutaneous nephrostomy insertion in patients with obstructive uropathy using seldinger technique. **Secondary Objective:** To compare the improvement in renal function post nephrostomy insertion in benign and malignant cases. **Materials and Methods:** It is a hospital based cross sectional study of 185 patients with obstructive uropathy requiring USG guided percutaneous nephrostomy as urinary diversion in Department of Urology, Government Medical College Thiruvananthapuram. **Results:** A total of 185 cases of obstructive uropathy underwent USG guided percutaneous nephrostomy and were analyzed. In our study, in 156(84.32%) cases PCN was successfully placed and failed cases were 29(15.68%). Significant decrease was seen in serum urea and creatinine(mg/dL) post procedure as compared to pre procedure in both benign and malignant cases of obstructive uropathy (p value<.0001). Complication rate in our study was 38% which includes minor complications like transient hematuria, tube displacement, tube blockage and major complications 4.32 % due to urosepsis. **Conclusion:** Thus, ultrasound guided percutaneous nephrostomy insertion by seldinger technique is a safe, procedure without major complications and is an effective means of salvaging kidneys in obstructive uropathy.

KEYWORDS : Obstructive uropathy, percutaneous nephrostomy, seldinger technique**INTRODUCTION**

Obstructive uropathy is a urinary tract disorder caused by obstruction of urine flow that can be structural or functional. The illness might be acute or chronic. In the case of bilateral obstruction, urosepsis, uremia and hyperkalemia, persistent renal colic, worsening hydronephrosis, and renal impairment (creatinine increased, or GFR decreased, which is more precise), emergency treatment of obstructive uropathy is required [1]. Two valid treatment options are available, first retrograde placement of ureteral catheter/DJ stents or nephrostomy tube is indicated temporarily till definitive treatment of potentially life-threatening obstruction is achieved. Regarding the decision between inserting a ureteral stent (JJ stent) or a percutaneous nephrostomy, literature indicates that there is no statistically significant difference in efficacy between the two operations [2]. In patients that receive anti-coagulation medication, the preferred therapy is JJ stent placement whereas in the case of urosepsis, percutaneous nephrostomy placement is the gold standard therapy. In obstructive uropathy due to cancer, there may be difficulties during the insertion of a JJ stent so percutaneous nephrostomy is preferred [2]. The aim of our study is to evaluate technical success, complications and improvement in renal function in patients who underwent ultrasound-guided percutaneous placement of nephrostomy tube with the indication of obstructive uropathy.

Aims and Objectives**Primary Objectives**

1. To estimate the proportion of success of ultrasound guided percutaneous nephrostomy insertion in patients with obstructive uropathy using seldinger technique
2. To study the complications of ultrasound guided percutaneous nephrostomy using seldinger technique

Secondary Objective

To compare the improvement in renal function post nephrostomy insertion in benign and malignant cases.

METHODOLOGY

It is a hospital based prospective observational study. A sample size of 185 patients who have undergone percutaneous nephrostomy in the department of Urology, Government Medical College, Thiruvananthapuram between January 2022 to April 2023 were included in the study.

Study Variables

1. Age
2. Gender
3. Renal function test (pre and post procedure after 2 weeks)
4. Etiology of obstruction (benign or malignant cause)
5. Successful or failed insertion of nephrostomy

Inclusion Criteria

1. All patients of obstructive uropathy both benign and malignant causes who need percutaneous nephrostomy for urinary drainage.
2. Age > 18 years
3. Willing to provide consent to be included in the study

Exclusion Criteria

Patients with INR > 2

Data Collection And Study Procedure In Detail

After obtaining hospital ethics committee clearance, a proforma would be filled after taking informed consent from the patients with the following details:

1. Patient details – age, gender
2. Detailed USG KUB and NCCT/CECT KUB
3. Routine blood investigations (renal function test, complete blood count, PT/INR and APTT).
4. Post nephrostomy renal function test after 2 weeks follow up
5. Details of complications (if any) post procedure.

Patients underwent ultrasound guided percutaneous nephrostomy in the Department of Urology at Govt. Medical College, Thiruvananthapuram. Coagulation parameters of all cases was evaluated before percutaneous nephrostomy tube placement, and one hour before the procedure a single dose of prophylactic antibiotic (ceftriaxone 1 g IV) was administered. The patients were placed in prone position using a lumbar cushion with the diseased part facing upwards. For intrarenal access into collecting system, lower pole posterior calyceal access through a puncture was made nearly 2 cm below the 12th rib on the posterior axillary line was selected. After preparing a sterile surgical site, local anesthesia given on the puncture line, and using an 11 G scalpel the anatomical layers from the skin down to fascia was punctured. Collecting system entered using a sheathed 18 G needle, and urine flow checked for the confirmation of correct access. The needle removed, and 0.035" J-type guidewire is advanced through the sheath. Nephrostomy tract dilated with Amplatz type dilators up to a diameter which exceeds the calibre of the nephrostomy tube (10-14 F) which is chosen based on patient's

anatomical characteristics. Afterwards, nephrostomy tube was advanced over guidewire, and guidewire is withdrawn, and nephrostomy tube fixed to the skin with 2/0 silk sutures. A nephrostogram was done to confirm placement of PCN in pelvicalyceal system.

Statistical Analysis

Data was entered into Microsoft excel and analyzed using SPSS ver. 27.0. Quantitative variables are expressed as mean and standard deviation. Qualitative variables are expressed as proportion and 95% confidence intervals calculated. Paired 't' test was used to compare RFT after the percutaneous nephrostomy. Independent sample unpaired 't' test was used to compare the improvement in renal function test between benign and malignant cases. p value less than 0.05 was considered significant.

RESULTS

The study was conducted in Department of Urology, Government Medical College, Thiruvananthapuram. 185 patients of age >18 years with obstructive uropathy both benign and malignant causes who needed percutaneous nephrostomy were included and results are as follows.

Out of 185 patients, 98(52.97%) patients were females and 87(47.03%) patients were males. Etiology of obstruction; out of 185 patients of obstructive uropathy 88 were of benign etiology and 97 were malignant cases.

In 88 benign cases, 34 (37.50%) cases had ureteric calculi, 16 (18.18%) cases had PUJ obstruction,

Table 1 – Benign Causes Of Obstructive Uropathy

Benign	Frequency	Percentage
Obstructive Renal calculi	21	23.8 %
EPN	5	5.68 %
Pelvic mass	1	1.14 %
PUJ obstruction	16	18.18 %
Pyonephrosis	5	5.68 %
Retroperitoneal fibrosis	2	2.27 %
Ureteric calculi	34	38.63 %
Ureteric stricture	3	3.41 %
Total	88	100.00 %

In 97 malignant cases, 33(34.02 %) cases had Ca cervix, 24(24.74%) cases had Ca bladder

Table 2: - Malignant Causes Of Obstructive Uropathy

Malignant	Frequency	Percentage
Ca bladder	24	24.74%
Ca cervix	33	34.02%
Ca endometrium	6	6.19%
Ca ovary	15	15.46%
Ca prostate	3	3.09%
Ca rectum	7	7.22%
Lymphoma	3	3.09%
Non-Hodgkin's lymphoma	1	1.03%
Retroperitoneal sarcoma	1	1.03%
Urothelial ca	2	2.06%
Uterine sarcoma	2	2.06%
Total	97	100.00%

Side of insertion of 82(44.32%) cases were left, 75(40.54%) cases were right and 28(15.14%) cases were bilateral.

Table 3 - Side Of Insertion Distribution.

Side of insertion	Frequency	Percentage
Bilateral	28	15.14%
Left	82	44.32%
Right	75	40.54%
Total	185	100.00%

Outcome of procedure i.e., out of 185 cases PCN was successfully placed in 156(84.32%) cases, 29(15.68%) cases PCN insertion was not achieved.

Table 4 - Outcome Of Procedure Distribution.

Outcome of procedure	Frequency	Percentage
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Failed	29	15.68%
Successful	156	84.32%
Total	185	100.00%

Comparison of serum urea(mg/dL) pre and post nephrostomy insertion in benign and malignant cases.

Benign: - Significant decrease was seen in serum urea(mg/dL) post procedure as compared to pre procedure. (p value<.0001)

Malignant: - Significant decrease was seen in serum urea(mg/dL) post procedure as compared to pre procedure. (p value<.0001).

Table 5: - Comparison Of Serum Urea(mg/dl) Pre And Post Nephrostomy Insertion In Benign And Malignant Cases.

Serum urea(mg/dL)	Benign	Malignant
Pre procedure		
Mean ± SD	88.52 ± 18.35	109.95 ± 21.25
Post procedure		
Mean ± SD	35.95 ± 12.58	58.08 ± 20.15
Intra group p value	<0.0001*	<0.0001*

Comparison of serum creatinine(mg/dL) pre and post nephrostomy insertion in benign and malignant cases.

Benign: - Significant decrease was seen in serum creatinine(mg/dL) post procedure as compared to pre procedure. (p value<.0001)

Malignant: - Significant decrease was seen in serum creatinine(mg/dL) post procedure as compared to pre procedure. (p value<.0001). (see table 6)

Table 6: -comparison Of Serum Creatinine(mg/dl) In Benign And Malignant Cases Pre And Post Nephrostomy Insertion.

Serum creatinine (mg/dL)	Benign	Malignant	Total
Pre procedure			
Mean ± SD	4.64 ± 1.15	5.99 ± 1.24	5.35 ± 1.37
Post procedure			
Mean ± SD	1.68 ± 0.69	3.1 ± 1.27	2.41 ± 1.25
Intra group p value	<0.0001*	<0.0001*	-

Inter group comparison

Mean ± SD of decrease in serum urea(mg/dL) in benign was 53.05 ± 15.31 and in malignant was 53.09 ± 15.84 with no significant difference between them. (p value=0.987).

Mean ± SD of decrease in serum creatinine(mg/dL) in benign was 3 ± 0.9 and in malignant was 2.98 ± 0.98 with no significant difference between them. (p value=0.86)

Out of 185 cases, 114(61.62%) cases did not have any complications. 35(18.92%) cases had hematuria, 21(11.35%) cases had dislodgement and 8(4.32%) cases had blockage and septicemia each.

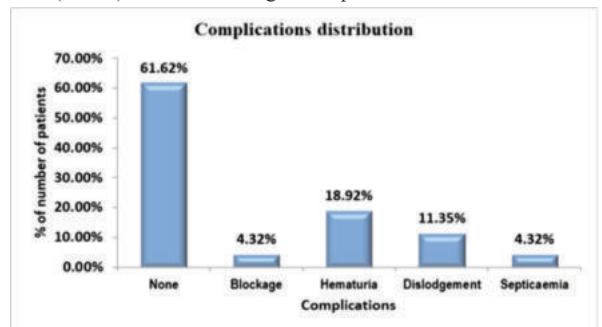


Figure 1 - Complications Distribution

DISCUSSION

A total of 185 eligible patients were enrolled into the study

Outcome of Procedure

Percutaneous nephrostomy can be performed under ultrasound guidance with a success rate ranging from 83.1% to 92% according to literature [3, 4]. In our study PCN insertion was successful in 156 cases (84.32%) which is consistent with other studies. Placement failure occurred in 29 cases which were due to either poor dilatation of pelvicalyceal system, bleeding during puncture or loss of PCS dilatation during dilatation of puncture tract.

Renal Function

Our study showed definite improvement in 81 out of 97 patients with terminal malignancy, 16 patients did not show much improvement and there were 7 deaths due to an underlying disease. Markovich et al. concluded that PCN was beneficial for malignant obstructive uropathy associated with fewer complications [5]. Hoe & Tung observed an overall survival median of 5 months after PCN and 68% of people achieving a useful life. [6]

Complications

We observed a complication rate of 38%. (minor complications). There were few major complications throughout the study and in most of the cases haematuria settled by itself, only 4 out of 35 patients required blood transfusion post PCN insertion. Tube displacement 21 cases was other minor complication (11.35%) for which reinsertion was done successfully. Post procedure tube blockage was seen in 8 (4.32%) patient which resolved after removing of clots and debris by flushing. Sepsis was seen in 8 cases (4.32%) managed by intravenous antibiotics.

Procedure-related complications continue to be widely reported. Rates vary from 25 - 60% though this includes late (more than 24 hours after insertion) minor complications such as those related to tube malfunction, leakage, dislodgment and encrustations. Picus et al. summarized early complications inherent with fluoroscopy-guided PCN, being the most common acute bleeding requiring transfusion (< 5%), failed access (< 5%), adjacent organ injury: bowel, spleen, lung (< 1%), and septicemia (< 1) [7]. Adjacent organ injury is another complication, the colon and pleura may be inadvertently injured; the former had the need of a colostomy, the latter, a tube thoracostomy. [7]

CONCLUSION

PCN is effective as an initial palliative or temporary means of saving renal function in patients with both benign and malignant pelvic/ureteric obstructions, thus improving the patients' outcome, and possible better quality of life. Hence ultrasound guided percutaneous nephrostomy insertion by seldinger technique is a safe procedure without major complications and is an effective means of salvaging kidneys in obstructive uropathy.

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