

## Complications of Ultrasound Guided Percutaneous Nephrostomy by Seldinger's Technique in Obstructive Uropathy: An Observational Study

Farhan Q, Safdar Shah\*, Asma N and Sain R

Department of Urology, Sheikh Zayed Hospital, Rahim Yar Khan, Pakistan

\*Corresponding Author: Safdar Shah, Department of Urology, Sheikh Zayed Hospital, Rahim Yar Khan, Pakistan.

Received: February 13, 2015; Published: April 24, 2015

### Abstract

Percutaneous nephrostomy is a procedure of establishing a temporary drainage tract of renal pelvi-calyceal system through skin. This study aims to find out complication rate and ultimately the safety of ultrasound guided percutaneous nephrostomy for obstructive uropathy. About 196 patients were included in this study and PCN was done through Seldinger technique under USG guidance. Sepsis occurred in 0.51%, major hemorrhage in 0.50%, minor hemorrhage in 1.53% and pleural effusion in 0.51% and displacement of catheter in 5.61%. There was no procedure related mortality. USG guided percutaneous nephrostomy through Seldinger technique is a safe procedure and is recommended for obstructive uropathy.

**Keywords:** Percutaneous nephrostomy; Obstructive uropathy; Seldinger technique

### Introduction

Percutaneous nephrostomy is a procedure of establishing a drainage tract into the upper urinary system by puncturing the kidney directly through skin. Percutaneous nephrostomy is done for two purposes, one for decompression of obstructed upper urinary tract for improvement of renal function and secondly for contrast study to establish the level of obstruction in upper urinary tract through antigrade pyelography. The standard Seldinger technique uses needle puncture, guide-wire insertion and serial dilatation of the tract percutaneous nephrostomy by this technique is safe with minimal complication rate.

### Materials and Methods

From Mar - Sep 2012, 196 patients with age more than 12 years, serum creatinine more than 2mg/dl and radiological evidence of obstructive uropathy as hydronephrosis with or without hydroureter were enrolled in this study which was done in the department of Urology, Sheikh Zayed Hospital, Rahim Yar Khan.

We took care of confounding factors like:

- a) Sepsis due to other causes like steroids or diabetes mellitus.
- b) Haematuria due to other causes like Hypertension or coagulopathy.

Patient's biodata, vitals and labs were entered on predesigned Performa attached here with. To control bias created by variety of laboratories all labs were done by pathology laboratory of Sheikh Zayed Hospital. Informed consent was taken. All PCN were done under local anaesthesia and ultrasound guidance, only by our registrar with 7 years experience of PCN to control the bias created by difference of competency among different surgeons. Patients were observed for 15 days after PCN for appearance of any complications like Sepsis, Haematuria, pleural effusion and displacement of PCN catheter and complications were entered on pre designed performa attached herewith.

**Citation:** Safdar Shah., *et al.* "Complications of Ultrasound Guided Percutaneous Nephrostomy by Seldinger's Technique in Obstructive Uropathy: An Observational Study". *EC Gynaecology* 1.2 (2015): 81-84.

**Results**

There were total one hundred and ninety six patients included in this study.

Distribution of patients by age:

The mean age of the patients was 36.40+11.59 years (range 16-63). There were 35 (17.9%) patients of age range of 12-20 years, 44 (22.4%) patients of age range of 21-30 years, 51 (26%) patients of age range of 41-50 years, 23 (11.7%) patients of age range of 51-60 years and 7 (3.6%) patients of age range more than 60 years.

Distribution of patients by sex:

There were 111 (56.6%) male patients and 85 (43.4%) female patients. The female to male ratio was 1:1.30.

Age of patients	No. of patients	Percentage
12-60	35	17.9
21-30	44	
31-40	51	
41-50	36	
51-60	23	
> 60	7	
Mean ± SD	36.40 ± 11.59	
Range	16-63	

**Table 1:** Distribution of patients by complications of PCN:

Among the 196 patients, sepsis occurred in 1 (1.51%) patients, major hemorrhage in 1 (0.51%) patients, minor hemorrhage in 3 (1.53%) patients, pleural effusion in 1 (0.51%) patients, displacement of PCN catheter in 11 (5.61)% patients, and no complications occurred in 179 (91.33%) patients.

Complication of PCN	No. of patients	Percentage
Sepsis	1	0.51
Hemorrhage	Major	1
	Minor	3
Pleural effusion	1	0.51
Displacement of PCN catheter	11	5.61
No Complications	179	91.33

**Table 2:** Mean duration of hospital stay:

The mean duration of hospital stay was 2.16+0.59 days (range 1-4 days).

Distribution of patients by complications of PCN (n = 196)

**Discussion**

Percutaneous nephrostomy (PCN) catheter insertion was first described by Goodwin., *et al.* in 1955 [1] as an emergency procedure to relieve urinary obstruction [2]. Subsequently, the safety and efficacy of this procedure has been established using a variety of different imaging modalities including various combinations of computed tomography (CT), fluoroscopy, and ultrasound. Emergent nephrostomy is most common in the clinical setting of pyonephrosis, which can be defined as the presence of pus in an obstructed renal collecting system [3] pyonephrosis may present with a classic triad of fever, flank pain, and hydronephrosis or simply hydronephrosis and sepsis.

Obstructive uropathy refers to the structural impedance to the flow of urine anywhere along the urinary tract leading to hydronephrosis which is the dilation of the renal pelvis and calyces [4]. Damage to the renal parenchyma caused by these conditions often leads to obstructive nephropathy contributing to a decrease in renal function. [5]. Unlike many other diseases obstructive nephropathy, if treated early, is a potentially curable form of kidney disease [6]. Surgery in patients with renal failure is associated with risk of renal and extra renal morbidity so diversion of urine before surgery is mandatory to optimize the renal function by PCN or DJ Stent [7].

This study was an experience of Seldinger's technique at a tertiary care unit. This study included a large number of patients (n = 196) with obstructive uropathy to determine the complications rate associated with this techniques. The results of this prospective cross sectional survey were in favor of the technique with no complications in 91.33% patients. In literature, there are few other studies which were carried out at different setups utilizing this technique. The results of the studies vary from author to author.

Considering the demographic variables, the mean age of the patients in our study was 36.40-11.59 years included all ranges of age. There was a male predominance (M:F ratio of 1:1.3). There were all range of the ages common in the study, however, majority were young i.e. 22.4% patients were of age range of 20-30 years. In a study by Mahmood T., *et al.* [8] there were 55.7% male patients and 44.3% were female. In our study, sepsis was observed in 0.51% patients, major hemorrhage in 0.51% patients, minor hemorrhage in 1.53% patients, pleural effusion in 0.51% patients, and displacement of PCN catheter in 5.61% patients.

In a study by Nishino A., *et al.* [9] using Seldinger technique among 15 patients with obstructive uropathy observed no case of minor or major complications. They did not documented any case of dislodgment which however, was the most common complication in our study. They used only a limited sample size of only 15 patients which may not be adequate to give a true picture of the outcome.

Radecka E., *et al.* [10] also conducted a study on 558 patients of obstructive uropathy. There were only 4% major complications including cardiac arrest, bleeding requiring transfusion or embolization, septicemia, hydrothorax or pneumothorax. There were 38% minor complications, including urinary tract infection, catheter dislodgement, and catheter obstruction by debris, urinary leakage, and inflammation of the skin at the site of insertion of the percutaneous catheter. There were 14% of the procedures in whom the catheter placement was followed by urinary tract infection, and in 14% catheters slipped out unintentionally. Like our study, the dislodgment was the most frequent complication. They observed only a limited number of patients affected with major complications.

In another study by Karim R., *et al.* [11] conducted in 126 patients with obstructive uropathy while using a Seldinger's technique with a little modification, major complications (including sepsis and hemorrhage) were observed in 1.6% patients, minor complications (like minor hemorrhage and urinary tract infection) in 11% patients and catheter related complications like catheter blockage or dislodgement were 13%. There was no procedure related mortality in our series.

Carrafiello G., *et al.* [12] attempted Seldinger's technique in patients with obstructive uropathy due to malignancy and observed no case of sepsis in any of the case included in their study. Dislodgment of the catheter was observed in 10.70% patients and no minor complications in any of the case. We adopted the Seldinger's technique in our setup because it was safe, having less complication rate & required only local anaesthesia.

The lower rates of the complications like sepsis were probably due to use of the prophylactic antibiotics. The lower rates of the complications like hemorrhage, pneumothorax or pleural effusion was probably due to the help of ultrasound guidance in locating the exact site for the puncture. In a dilated system the posterior lower pole calyx is easily identifiable from a below 12<sup>th</sup> rib by the help of USG. Locating and puncturing a dilated calyx is straightforward but correct placement of catheter could be a bit difficult. We avoided from the dislodgment of the catheter by double anchoring of the catheter with non absorbable suture to the skin.

This technique also helped us in saving the time of the patients in the hospital by decreasing the duration of stay at hospital which was 2.16+0.59 days. The patients were even discharged after the next day of the procedure. This study had some limitations. This was a single center study, which was carried out in a single center.

### **Conclusion**

The complications of the ultrasound guided percutaneous nephrostomy by Seldinger's technique is low among patients with obstructive uropathy. So, the use of this technique is recommended in patient with obstructive uropathy.

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**Volume 1 Issue 2 April 2015**

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