

A Three Year Review of Ultrasound-Guided Percutaneous Nephrostomy in a Single Center in Port Harcourt

Omodu OJ*, C Okengwu and Agana G

*Division of Urology, Colworths Medical Centre, Port Harcourt, Rivers State, Pin code: 500001, Nigeria

ABSTRACT

Background: Percutaneous nephrostomy (PCN) is a technique of establishing a drainage tract into the urinary system by puncturing the kidney directly through the skin. The indications are urinary tract obstruction, urinary diversion during ureteric injury or urine leak, access for percutaneous procedures as in stone treatment or ureteric stenting, diagnostic testing such as antegrade pyelography. **Aim:** To present our experience on the ease of access to the kidney percutaneously using ultrasound scan as a guide. **Patients and Methods:** A prospective study of all percutaneous nephrostomies performed between 2016-2019. Information obtained includes age, gender, diagnosis, procedure, duration of surgery, complications and successes were analysed. The procedure was done by the same urologist using the Seldinger's technique, to achieve good puncture. **Results:** During the period of study, 18 patients with age range of 35-89 years and mean age of 66.9 years underwent percutaneous nephrostomies. There were 12 males and 6 females. Three patients had bilateral percutaneous nephrostomies. Initial cystoscopies were performed for all the 18 patients. All the patients had urethral obstruction. Ten men had advanced carcinoma of the prostate while 2 men had ureteral stone. Three females had ureteral obstruction as a result of bladder carcinoma, 2 females had ureteral stones and 1 female had unilateral stenosis. All the patients had deranged electrolyte urea and creatine. **Conclusion:** With the advent of high-resolution ultrasound scan machines, percutaneous nephrostomy can be done easily.

Keywords: Percutaneous nephrostomy, Pyelography, Ultrasound, Ureteral stone

INTRODUCTION

Percutaneous nephrostomy (PCN) is a technique of establishing a drainage tract into the urinary system by puncturing the kidney directly through the skin. The indications include but not limited to urinary tract obstruction, urinary diversion during ureteric injury and urine leak.

Obstructive uropathy refers to the structural and functional changes presenting as a reduction of normal urine flow. This leads to progressive renal damage if left untreated and depending on the severity, duration and presence of concomitant infection. Renal functions are affected at various degrees [1]. Obstruction of the urinary tract is a common occurrence in urological practice. Although commoner in the lower urinary tract, it can occur at any level. Quite often, upper tract obstruction is a consequence of lower urinary tract pathology [2]. Retrograde placement of nephrostomy tubes is sometimes very difficult due to non-visualization of the ureteric orifices during cystoscopy thereby necessitating the antegrade placement of a nephrostomy tube.

*Corresponding Author:
gidaug[at]yahoodotcom

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In certain situations where placement of ureteral catheter proximal to the obstruction is not technically feasible or not appropriate even if feasible, placement of a percutaneous nephrostomy tube is an ideal urinary diversion method [3]. PCN is an established method

of upper tract drainage. Assisted image guidance for PCN includes image intensifier, ultrasound scan, computerized tomography and magnetic resonance imaging. The advantage of ultrasound scan is availability, affordability and absence of radiation [2,4].

PATIENTS AND METHODS

We carried out a study of 18 patients who had percutaneous nephrostomies between 2016 and 2019. The nephroscope used, was mainly size 26 Fr nephroscope in 12 patients while a size 16 Fr nephroscope was used in 6 patients. Information obtained included age, gender, diagnosis, procedure, duration of surgery, complications and successes were analysed. Written and verbal consents were obtained from patients and procedure explained to them. Patients were carefully selected following clinical, radiological and laboratory medical evaluations to make diagnosis and exclude unfit patients. Patients with grade IV hydronephrosis were particularly selected. Patients were assessed by consultant anaesthetist. Coagulation parameters of all cases were evaluated before percutaneous nephrostomy tube placement and prophylactic antibiotic (1g of ceftriaxone) was administered. Intraoperatively, the patient was placed in prone position or lateral decubitus position depending on the site of pathology. Ultrasound scan used was 4D machine with a convex 3.5MHz probe which visualized grade IV hydronephrosis as in (Figure 1). The procedure was done by the same urologist using the Seldinger's technique to achieve good puncture as shown in (Figure 2).

RESULTS

Among the 18 patients who had percutaneous nephrostomy, 12(66.6%) were males and 6(33.3%) were females with age range of 35-89 years and mean age of 66.99 years. Check cystoscopies were conducted for all the patients. Three patients (16.6%) had bilateral percutaneous nephrostomies. All the patients had ureteral obstruction. Ten men (55.5%) had advanced carcinoma of the prostate while 2 men (11.1%) had ureteral stone. Three females (16.6%) had ureteral obstruction secondary to bladder carcinoma, 2 females (11.1%) had ureteral stones while and 1 female (5.5%) had unilateral stenosis.

All the patients had deranged electrolyte urea and creatine. Following the Seldinger's technique and achieving a good puncture, the nephrostomy tube placement was achieved for all the patients with good flow of urine egressing from the nephrostomy tube and connected to the urinary bag (Figure 3 and Figure 4). Placement was confirmed intraoperatively with ultrasound scan and postoperatively with intravenous urography after return of urea and creatinine to normal values.

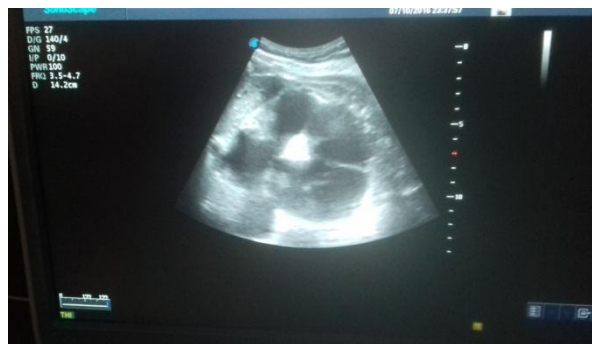


Figure 1: Grade IV hydronephrosis



Figure 2: Puncture successful after Seldinger's technique



Figure 3: Anchoring the nephrostomy tube with sutures



Figure 4: Nephrostomy tube in proper placement

DISCUSSION

Obstructive uropathy can affect all age groups and any part of the urinary tract. Although obstruction can occur anywhere along the urinary tract, lower urinary tract obstruction is

particularly common in men due to pathologies of the prostate and urethra. Most upper urinary tract obstruction with very severe renal impairment requiring temporary urinary diversion is secondary to lower urinary tract pathologies [5]. In our study, the commonest indication for percutaneous nephrostomy was ureteral occlusion due to advanced carcinoma of the prostate in men while ureteric occlusion secondary to advanced bladder cancer was commonest in our female patients. Performing the renal access during PCN is the most crucial step of the procedure with the steepest learning curve and can either be performed by the interventional radiologist or by the endourologist [6]. The position of the patient is equally important which varies from supine, prone and lateral positions. In all our patients, we utilized the prone position with abdominal bolsters. Various methods of access included fluoroscopy guided, endoscopic guided, ipad guided, combined computerized tomography guided, electromagnetic tracking guided and the ultrasound guided which we use quite often. The ultrasound guided technique is safe and effective as well as versatile enabling real-time image acquisition. It is also cost-effective and can be used in both supine and prone positions.

CONCLUSION

Ultrasound guidance, particularly the 4D machine, has made puncture easier. The advantage of the affordability and availability of the ultrasound combined with its safety has popularized its use in developing nations.

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