DOI: https://doi.org/10.53350/pjmhs22165479

ORIGINAL ARTICLE

Analysis of use of Percutaneous Nephrostomy and Ureteral Stenting in Management of Ureteral Obstruction

YASRAB[1], MUHAMMAD NAUMAN IQBAL[2], QURAT-UL-AIN KHAN[3], HAFIZ MUHAMMAD ASIM MUSHTAQ[4], SYEDA SAMINA ASAD[5], AFTAB AHMED[6]

[1]*Consultant Radiologist, Ziauddin Hospital Clifton Campus Karachi*
[2]*Medical Officer Urology , Kidney Center Bahawal Victoria Hospital Bahawalpur*
[3]*Lecturer Department of Anatomy, Sir Syed College of Medical Sciences for Girls*
[4]*University Hunan Normal University College of Medicine*
[5]*Civil Medical Officer, District Headquarter Hospital Bagh Azad*
[6]*Senior Registrar Urology Ajk Medical College, Urologist Shaikh Khaleefa Bin Zaid Hospital/CMH Muzaffarabad Ajk*
Corresponding author: Yasrab, Email: yasrab.rad@gmail.com

ABSTRACT

Introduction: Urinary diversion is one of the ways to manage ureteral obstructions and is commonly performed in our daily practice when the underlying condition of ureteral obstruction cannot be eliminated in a short period. Ureteral obstructions can be a consequence of malignancies or benign diseases.

Aims and objectives: The basic aim of the study is to analyze the use of percutaneous nephrostomy and ureteral stenting in management of ureteral obstruction.

Methodology of the study: This cross sectional study was conducted at Department of Urology, Shaikh Zayid Hospital Lahore during October 2020 to Dec 2021. This study was done with the permission of ethical committee of hospital. There were 110 patients who selected for this study analysis. Enrollment criteria consisted of the need for unilateral or bilateral upper urinary tract diversion for at least 6 months. Either a PCN tube or an internal ureteral stent (e.g., double-J stent) was used for ureteral obstructions of various etiologies.

Results: There were 110 patients with mean age 60 years in this study. There were 66 patients with ureteral stents and 44 (40%) with PCN tubes. A smaller elevation in serum creatinine was noted in the PCN group (0.21 vs. 0.78 mg/dL, p = 0.03). Nine of 86 (10.4%) double-J stents were converted to PCN tubes during the study period. Residual hydronephrosis after decompression was more common in the stent group than in the PCN group (65.2% vs. 27.2%, p = 0.01).

Conclusion: It is concluded that Urinary diversion or decompression using PCN produced better preservation of renal function and lower incidences of complications in our study.

Keywords: PCN, Hydronephrosis, Urinary, Renal, Function

INTRODUCTION

Urinary diversion is one of the ways to manage ureteral obstructions and is commonly performed in our daily practice when the underlying condition of ureteral obstruction cannot be eliminated in a short period. Once a metastatic lesion affects a ureter, the resultant obstruction is very difficult to cure and should therefore be drained[1]. The approach of draining urine, the so-called urinary diversion, can be either the use of an internal ureteral stent (e.g., a double-J stent) or a percutaneous nephrostomy (PCN). Although both the approaches preserve renal function, they differ in many aspects[2].

Ureteral obstruction is a heterogeneous clinical entity, and it is often challenging for the clinician to determine the optimal method of decompression. Malignant ureteral obstruction can arise from intrinsic urologic malignancy such as prostate or bladder cancer, or extrinsic involvement from another primary malignancy, most commonly of gynecologic or colorectal origin[3]. The therapeutic goal of urinary drainage in malignant disease is to adequately drain the upper urinary tracts for symptomatic relief with maintenance of renal function, allowing the initiation of systemic therapy while minimizing further urologic intervention[4], hospitalization and negative impact on the quality of life. On the other hand, the etiology of benign ureteral obstruction is generally a consequence of intraluminal pathology, such as ureteropelvic junction obstruction, ureteral stones or ureteral stenosis[5]. Extraluminal benign obstruction can arise from localized mass effect of benign tumors such as uterine leiomyomas or retroperitoneal fibrosis. Benign ureteral obstruction caused by ureteropelvic junction obstruction is primarily managed with definitive treatment of the underlying condition[6].

Background of the Study: Emergent collecting system decompression with retrograde placement of an in-dwelling JJ ureteric stent or a percutaneous nephrostomy (PCN) tube is considered the standard of care in patients with obstructive urolithiasis and sepsis[7]. A previous small randomized trial showed equivalent short-term outcomes for each treatment method in patients with obstructive urolithiasis and signs of infection; however, the patterns of use and comparative outcomes for JJ stent placement and PCN have not been characterized in a contemporary series[8].

Aims and Objectives: The basic aim of the study is to analyze the use of percutaneous nephrostomy and ureteral stenting in management of ureteral obstruction.

METHODOLOGY OF THE STUDY

This cross sectional study was conducted at Department of Urology, Shaikh Zayid Hospital Lahore during October 2020 to Dec 2021. This study was done with the permission of ethical committee of hospital. There were 110 patients who selected for this study analysis.

Data collection: There were 110 patients were included in this study. Enrollment criteria consisted of the need for unilateral or bilateral upper urinary tract diversion for at least 6 months. Either a PCN tube or an internal ureteral stent (e.g., double-J stent) was used for ureteral obstructions of various etiologies.

Study Design: In the stent group, the obstructed ureters were stented with 6-Fr catheters under cystoscopy. In the PCN group, radiologists performed the procedures under ultrasonographic guidance. In all cases, 6-Fr nephrostomy catheters were put in place. In our practice, either PCN tubes or double-J stents were kept for a maximal period of 3 months, and then replacement was required. The tubes were also replaced when obstructions or infections were observed clinically. The criteria for acute pyelonephritis were met when fever, backache, and a positive urine culture presented together.

Exclusion criteria

1. Cases of stone-related hydronephrosis were excluded from this study.
2. Patients with coagulopathy
3. CRF patients

Statistical analysis: Statistical analysis was performed with commercial computer software (SPSS version 15; SPSS Inc., Chicago, IL, USA). Statistical significance was set at $p < 0.05$.

RESULTS

There were 110 patients with mean age 60 years in this study. There were 66 patients with ureteral stents and 44 (40%) with PCN tubes. The mean duration of diversion was 16.8 ± 8.6 months in the stent group versus 14.1 ± 6.7 months in the PCN group (p = 0.067). Demographic data shows that overall age of the two groups differed significantly (60.8 vs. 67.8 years, p = 0.004); younger patients tended to receive ureteral stenting as the treatment (table 01).

Table 01: Demographic characteristics of selected patients

Variable	Ureteral stent	Percutaneous nephrostomy	p
Total (n)	66	44	
Mean age (y)	60.8	67.8	0.043
Age ≥65 y (n, %)	24 (36.4)	26 (59.1)	
Age <65 y (n, %)	42 (63.6)	18 (40.9)	
Gender (n, %)			
Male	25 (37.9)	22 (50)	
Female	41 (62.1)	22 (50)	
Laterality (n, %)			0.22
Left	23 (34.8)	14 (31.8)	
Right	23 (34.8)	14 (31.8)	
Both	20 (30.4)	16 (36.4)	
Duration of diversion (mean ± SD mo)	16.8 ± 8.6	14.1 ± 6.7	0.067
Stricture level (n)			
Upper	17	13	
Middle	5	13	
Lower	44	18	

The most common cause of obstructive uropathy was stone disease i.e. renal, ureteric or both and 75.0% patients in group A and 65.0% in group B, presented with it followed by other causes i.e. carcinomas, pyonephrosis and PUJ obstruction as shown in table 02.

Table 02: Causes of Obstructive Uropathy

Causes	No. of patients	%age
Stone disease • Renal • Ureteric • Renal + Ureteric	75 40 25 10	75.0 40.0 25.0 10.0
Carcinomas • Urinary Bladder • Prostate • Cervix • Others	20 03 02 05 10	20.0 3.0 2.0 5.010.0
Pyonephrosis	03	3.0
PUJ Obstruction	02	2.0

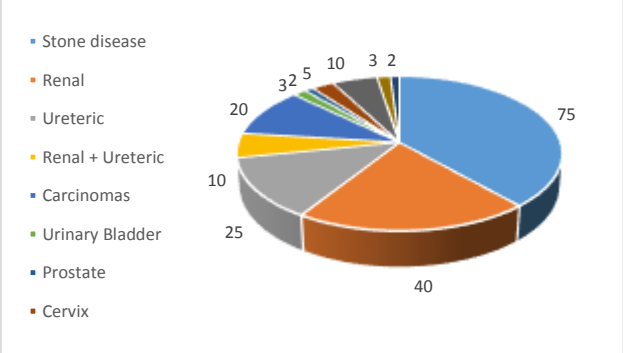

Figure 01: Graphical presentation of causes of Obstructive Uropathy

Regarding the etiology, 56 cases were of benign causes and 54 were due to a malignancy. Extensive ureteral injury was the most common cause requiring urinary diversion among the benign etiologies; cervical cancer was the most common malignancy associated with ureteral obstructions.

Table 03: Primary cause of ureteral obstruction.

	Ureteral stent	Percutaneous nephrostomy
Benign causes	40	16
Malignancy	26	28
Cervical cancer	19	9
Prostate cancer	4	5
Colon cancer	1	7
Bladder cancer	2	1
Stomach cancer	0	1
Ovarian cancer	0	1
Lung cancer	0	1
Endometrial cancer	0	1
Lymphoma	0	1
Breast cancer	0	1

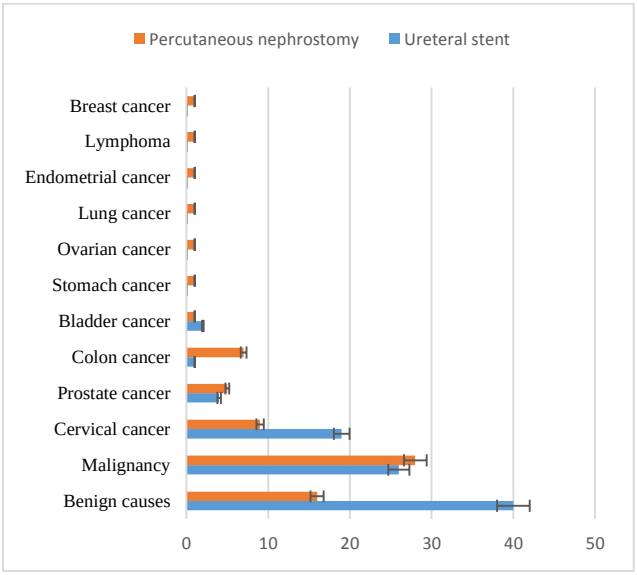

Figure 2:

DISCUSSION

Three terms are used to describe a disease as a consequence of urinary tract obstruction: obstructive uropathy, obstructive nephropathy and hydronephrosis, but each in different connotation. If ureteral dilatation due to impaired flow of urine is associated with renal parenchymal damage, it is described as obstructive uropathy[9]. It is a potentially life threatening condition and sometimes it is desirable to provide immediate temporary relief of the obstruction, until definitive treatment can be undertaken[10]. Cystoscopy with retrograde catheterization and percutaneous nephrostomy (PCN), are two main options for temporary urinary diversion with their own merits and demerits[11].

Ureteral obstruction was highly amenable to endoscopic ureteral stents in cases of benign intrinsic obstruction, but the incidence of stent failure was significantly higher in cases of extrinsic compression, as was seen with most malignant diseases[12]. Retrograde insertion of ureteral stents ultimately failed in 16–58% of patients whose ureteral obstructions were due to a malignancy[13]. Despite previous enthusiasm, metallic stents were also reported to have considerable failure rates of 38–48%. These patients then required a PCN or ureterostomy to achieve adequate diversion[14].

Although the severity of hydronephrosis itself is not directly related to residual renal function, more severe hydronephrosis still implies higher intrarenal pressure that can hamper renal function[15]. In our series, percentage of residual hydronephrosis after ureteral decompression was higher in patients who had undergone ureteral

stenting (65.2% vs. 27.2%)[16]. A small percentage of patients in the PCN group had undergone ureteral stenting initially, but eventually switched to PCN after learning that their renal function had deteriorated[17].

CONCLUSION

It is concluded that Urinary diversion or decompression using PCN produced better preservation of renal function and lower incidences of complications in our study. Moreover, PCN is also proved to be a suitable modality for drainage of pyonephrosis and ureteric obstruction especially due to malignant disease of pelvic origin which can otherwise be highly fatal.

REFERENCES

1. Ku JH, Lee SW, Jeon HG, Kim HH, Oh SJ. Percutaneous nephrostomy versus indwelling ureteral stents in the management of extrinsic ureteral obstruction in advanced malignancies: are there differences.Urology. 2004;64:895–9.
2. Richter S, Ringel A, Shalev , Nissenkorm I. The Indwelling Ureteric Stent: a 'friendly' procedure with unfriendly high morbidity. BJU Intl. 2009;85(4):408–11.
3. Ivica S, Dragan S. Long-term indwelling double-J stents: bulky kidney and urinary bladder calculosis, spontaneous intraperitoneal perforation of the kidney and peritonitis as a result of "forgotten" double-J stent. Vojnosanit Pregl. 2009;66(3):242–4
4. Baishya RK, Dhawan DR, Jagtap J, Sabnis R, Desai MR. Percutaneous nephrostomy under ultrasound guidance. Indian J Nephrol. 2011;21(1)
5. Karim R, Sengupta S, Samanta S, Aich RK, Das U, Deb P. Percutaneous nephrostomy by direct puncture technique: An observational study. Indian J Nephrol. 2010;20(2):84–8.
6. Memon NA, Talpur AA, Memon JM. Indications and Complications of Indwelling Ureteral Stenting at NMCH, Nawabshah. Pak J of Surg. 2007;23(3):187–91.
7. Chang HC, Tang SH, Chuang FP, Wu ST, Sun GH, Yu DS, et al. Comparison between the use of percutaneous nephrostomy and internal ureteral stenting in the management of long-term ureteral obstructions. Urol Sci. 2012;23(3):82–4.
8. Nariculam J, Murphy DG, Jenner C, Sellars N, Gwyther S, Gordon SG, et al. Nephrostomy insertion for patients with bilateral ureteric obstruction caused by prostate cancer. The British J of Radiol. 2009;82:571–6.
9. Wah TM, Weston MJ, Irving HC. Percutaneous nephrostomy insertion: outcome data from a prospective multi-operator study at a UK training centre. Clin Radiol. 2004;59:255–61.
10. Shao Y, Zhuo J, Sun XW, Wen W, Liu HT, Xia SJ. Nonstented versus routine stented ureteroscopic holmium laser lithotripsy: a prospective randomized trial. Urol Res. 2008;36:259–63.
11. Arshad M, Shah SS, Abbasi MH. Applications and complications of polyurethane stenting in urology. J Ayub Med Coll Abbott. 2006;18(2):69–72.
12. Jalbani MH, Deenari RA, Dholia KR, Oad AK, Arbani IA. Role of Percutaneous Nephrostomy (PCN) in Malignant Ureteral Obstruction. J Pak Med Assoc. 2010;60(4):280–3.
13. Romero FR, Broglio M, Pires SR, Roca RF, Guibu IA, Perez MD. Indications for percutaneous nephrostomy in patients with obstructive uropathy due to malignant urogenital neoplasia. International Braz J Urol. 2005;31(2):117–24.
14. Chung SY, Stein RJ, Landsittel D, Davies BJ, Cuellar DC, Hrebinko RL, Tarin T, Averch TD. 15-year experience with the management of extrinsic ureteral obstruction with indwelling ureteral stents. J Urol. 2004;172:592–595
15. Yossepowitch O, Lifshitz DA, Dekel Y, Gross M, Keidar DM, Neuman M, Livne PM, Baniel J. Predicting the success of retrograde stenting for managing ureteral obstruction. J Urol. 2001;166:1746–1749.
16. Sammon JD, Ghani KR, Karakiewicz PI, Bhojani N, Ravi P, Sun M, Sukumar S, Trinh VQ, Kowalczyk KJ, Kim SP, et al. Temporal trends, practice patterns, and treatment outcomes for infected upper urinary tract stones in the United States. Eur Urol. 2013;64:85–92.
17. Mokhmalji H, Braun PM, Martinez Portillo FJ, Siegsmund M, Alken P, Köhrmann KU. Percutaneous nephrostomy versus ureteral stents for diversion of hydronephrosis caused by stones: a prospective, randomized clinical trial. J Urol. 2001;165:1088–1092.