COMPARATIVE STUDY BETWEEN STANDARD AND TUBELESS PERCUTANEOUS NEPHROLITHOTOMY PROCEDURES FOR SURGICAL MANAGEMENT OF KIDNEY STONES.

General Surgery

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ABSTRACT

Introduction: Percutaneous Nephrolithotomy (PCNL) is an effective treatment for renal stone. Due to significant pain and morbidity after standard PCNL because of nephrostomy tubes, various modifications of PCNL are being performed. We report a randomised trial comparing these modalities.

Material and method: 50 patients were randomised in two groups of 25 each: standard PCNL with nephrostomy tubes (Group 1) and tubeless PCNL with ureteric stent and no nephrostomy (Group 2). At the end of procedure randomisation was done for those patients satisfying the inclusion criteria based on duration of surgery, single puncture tract, intraoperative bleeding, stone burden, intact pelvicalyceal system and no residual stone at end of procedure. Hb drop, haemorrhage, need for blood transfusion, pyrexia, urine leak, pain score, analgesic requirement and duration of hospital stay were measured.

Results: No significant difference in haemorrhage was observed. Urinary leak was only seen in one patient of standard group. Duration of hospital stay and analgesic requirement attained statistical significance in favour of tubeless group compared to standard.

Conclusion: Tubeless is effective and safe method for management of renal stones. It reduces postoperative pain and morbidity compared to standard group.

KEYWORDS

INTRODUCTION

Percutaneous nephrolithotomy (PCNL) is a minimally invasive treatment modality for management of renal calculi. It was introduced in 1976[1]. Morbidities such as bleeding, pyrexia, pleural injury and adjacent organ injury are associated with PCNL[2]. Refinements in technique and better technologies of lithotripsy led to less morbidities. Nephrostomy tube is placed after stone removal in standard PCNL procedure. Studies showed that smaller nephrostomy tubes were effective as larger ones [3],[4],[5]. Morbidities such as infection, pain, urine leak, bleeding and prolonged hospitalization is associated with presence and removal of Nephrostomy[6]. Tubeless PCNL was then introduced with the insertion of double J ureteric stent following PCNL. However, the presence of DJ stent in tubeless PCNL is often associated with stent related problems such as frequency, urgency, nocturia, pain, stent induced haematuria [7]. The aim of this study is to determine whether tubeless PCNL is safe and less morbid management technique for renal stones compared to standard PCNL with nephrostomy tube.

MATERIAL AND METHOD

In this Study patients were included who gave consent for randomization and underwent PCNL at our hospital

INCLUSION CRITERIA

<3 stones in number
Size <3cm
Single puncture tract
PCNL lasting <90 minutes
Complete Clearance of stones as ensured by fluoroscopy and visual nephroscopy
No Significant bleeding
Intact pelvicalyceal system at end of procedure

EXCLUSION CRITERIA

Renal anatomical abnormalities (Ectopic kidney, Horse shoe kidney, Malrotated kidney)
Staghorn Calculus
Active Urinary Tract Infections
Coagulopathy

routine examination, renal function studies, urine culture, coagulation profile and computed Tomography (CT) Scan. Under aseptic precaution, a urethral catheter 6F was introduced in to the renal pelvis, the patient was then turned prone and percutaneous access in to corresponding pelvicalyceal system was achieved under image intensifications using an 18G needle. The tract was then dilated using a serial step metallic dilator upto 26F. Renal stones were fragmented using pneumatic lithotripsy. All the surgeries were done by single surgeon.

Those patients satisfying inclusion criteria based on duration of surgery were randomized. The patients were divided in two groups:-

Groups 1- After procedure, a 20F nephrostomy tube was inserted in the pelvicalyceal system (standard)

Groups 2- With ureteral DJ stent 6F and without nephrostomy (tubeless).

25 Patients were include in each group. The randomization allocation was done by using random number generator, and allocation concealment was done by sequentially numbered opaque sealed envelope which was opened at end of stone removal.

In the tubeless group patients were monitored in postoperative period for (a) gross hematuria in catheterized urine or visible voided hematoma after Catheter removal whereas in Standard group patients were monitored for bleeding which is defined as gross hematuria from the Nephrostomy[9] (b)postoperative Hb drop (c) Blood transfusion requirement (d)Pyrexia by maintaining temperature chart (e) Urine leak (f)postoperative pain assessed 24 hr postoperatively by visual analog scale (g) Anesthesia required by WHO guidelines[10] (h) Hospital stay duration. In both groups patients were discharged with stable vital signs and no complications. Readmission details of hospital were recorded Data were entered in to Microsoft Excel and analyzed using SPSS software version 16 SPSS inc. Chicago, USA. Chi-Square test and t-test were used for finding association between qualitative and quantitative data. Post hoc test was done to compare differences between two groups.

RESULTS

The clinicodemographic characteristics of study were comparable

Preoperatively all the patients were evaluated with Blood and Urine

between groups and are listed in [Table 1]. Operative Complications and main outcomes of study are listed in [Table 2]

Table 1: Clinic demographic characteristics

Patient Characteristic	Standard group (n=25)	Tubeless Groups (n=25)	Total
Sex, n%			
Male	22 (88)	20(80%)	42(84%)
Female	3 (12)	5(20%)	8 (16%)
Age groups, n (%)			
20-40yrs	13(52)	11(44)	24(48%)
41-60yrs	12(48)	14(56)	26 (52%)
Side ,n(%)			
Right	12(48)	15(60)	27(54%)
Left	13(52)	10(40)	23(46%)

Table 2: Main Outcomes and Complications

Variables	Standard (n=25)	Tubeless (n=25)	Total	P
Mean(SD)				
Hemoglobin drop(g%)	1.01 (0.53)	1.55(1.64)		0.051
Pain score	6.64(1.4)	4.76(1.2)		0.001
Opioïd analgesic requirement	396(16 7.3)	156(126.09)		0.001
Duration of hospital stay(h)	99.84(11.34)	76.8 (33.9)		0.001
Complications, n (%)				
Hemorrhage	2(8)	2 (8)	4(8)	
Blood	1(4)	3(12)	4(8)	
Transfusions	2(8)	2 (8)	4(8)	
Pyrexia	24(96)	-	24(48)	
Urine Leak				

The mean Hb drop in the two groups [Table2] was not found to be statistically significant with $F=2.75$ and $P=0.051$. Out of 50 patients, two patients in each group had bleeding postoperatively. Among these, 3 patients required blood transfusion and one patient in standard group was managed without blood transfusion. Only 4 patients developed pyrexia in postoperative period. The differences in the need for blood transfusion and postoperative pyrexia were not found to be statistically significant with $X^2=0.429$ and 3.0 and $P=0.807$ and 0.22 [Table 2]

24 Patients in standard group developed urine leak through the wound postoperatively, but none in tubeless group developed urine leak. Urine leak lasted for 2-6 days and resolved spontaneously.

There was a statistically significant difference in pain score between different groups ($P=0.001$). The duration of hospital stay between the group was found to be statically significant with $F=13.102$ and $P=0.00$.

DISCUSSION

The standard method for removal of large renal stones is PCNL. Traditionally after completion of stone removal a nephrostomy tube is placed. It help in tamponade of bleeding, urine drainage, recovery of tract and guide for second look nephroscopy [11,12] if required, though in our study, the clearance of stones was confirmed by rigid and flexible nephroscopy.

Hemorrhage is most significant complication, Mean Hb drop (g%) in Standard and Tubeless PCNL was 13 and 17. 4 patients in total had postoperative bleeding.

Fever following PCNL is also a significant complication. A study Found the incidence of postoperative fever to be more in patients Nephrostomy[13]

Common problem following PCNL is urinary leak. It is due to mucosal edema, infundibular narrowing, blood clots, retained fragments. It is difficult to quantify, but urine leakage persisting 48h following nephrostomy removal is considered as prolonged Urine leakage. Important risk factor for urine leak persisting for 48h or more depend stone complexity severity of hydronephrosis, thickness of renal parenchyma and residual stones[14]. Analgesics were given.

CONCLUSION

Tubeless PCNL is safest and affective method of renal stone

management. It help in reducing pain, analgesic requirement, urinary leak and postoperative fever. Early discharge also helps in reducing financial burden to patients.

REFERENCES

- Fernstrom I, Johansson B. Percutaneous pyelolithotomy. A new extraction technique. Scand J Urol Nephrol 1976;10: 257-9.
- de la Rosette J, Assimos D, Desai M, Gutierrez J, Lingeman J, Scarpa R, et al. The Clinical Research Office of the Endourological Society Percutaneous Nephrolithotomy Global Study: Indications, complications and outcomes in 5803 patients. J Endourol 2011;25:11-7.
- Maheshwari PN, Andankar MG, Bansal M. Nephrostomy tube after percutaneous nephrolithotomy: Large bore or pigtail catheter? J Endourol 2000;14:735-7
- Pietrow PK, Ague BK, Lallas CD, Santa - Cruz RW, Newman GE, Albala DM, et al. Pain after percutaneous nephrolithotomy: Impact of nephrostomy tube size. J Endourol 2003 ;17: 411-4.
- Desai MR, Kukreja RA, Desai MM, Mhaskar SS, Wani KA, Patel SH, et al. A prospective randomized comparison of type of nephrostomy drainage following percutaneous nephrostolithotomy: Large bore versus small bore versus tubeless. J Urol 2004;172: 565-7.
- Borges CF, Fregonesi A, Silva DC, Sasse AD. Systematic review and meta-analysis of nephrostomy placement versus tubeless percutaneous nephrolithotomy. J Endourol 2010;24: 1739-46.
- Saltzman B. Ureteral stents. Indications, variations and complications. Urol Clin North Am 1988; 15:481-91.
- Tefekli A, Altunrende F, Tepeler K, Tas A, Aydin S, Muslumanoglu AY. Tubeless Percutaneous nephrolithotomy in selected patients: A prospective randomized comparison. Int Urol Nephrol 2007; 39:57-63.
- Crook TJ, Lockyer CR, Keoghane SR, Walmsley BH. A randomized controlled trial of nephrostomy placement versus tubeless percutaneous nephrolithotomy. J urol 2008;180: 612-4.
- WHO guidelines: World Health Organization. Cancer pain relief: With a guide to opioid availability. 2nd ed. Geneva: WHO;1996.
- Paul EM, Marcovich R, Lee BR, Smith AD. Choosing the ideal nephrostomy tube. BJU Int 2003; 92: 672-7
- Srinivasan AK, Herati A, Okeke Z, Smith AD. Renal drainage after percutaneous nephrolithotomy. J Endourol 2009; 23: 1743-9
- Sharifi Aghdas F, Akhavanizadeh H, Aryanpoor A, Inanloo H, Karbakhsh M. Fever after Percutaneous nephrolithotomy: Contributing factors. Surg infect (Larchmt) 2006; 7:367-71.
- Ansari H, Tomar V, Yadav SS, Agarwal N. Study of predictive factors affecting the prolonged urinary leakage after percutaneous nephrolithotomy. Urol Ann 2016; 8:60-5.