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A COMPARATIVE STUDY OF PERCUTANEOUS NEPHROLITHOTOMY AND MINIMALLY INVASIVE PERCUTANEOUS NEPHROLITHOTOMY.

Urology

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ABSTRACT

INTRODUCTION : Urolithiasis is a worldwide problem, due to its high prevalence and frequency of recurrence. Day to day advances in technology have made treatment of urolithiaisis less and less invasive with decreasing morbidity.

AIM: To compare Percutaneous Nephrolithotomy and minimally invasive-Percutaneous Nephrolithotomy as treatment modalities of Nephrolithiasis

MATERIAL AND METHODS : This study was done among patients of renal calculi admitted in the Department of Surgery at S.N. Medical College, Agra during the period from January 2017 to December 2017 follow up for 3 months Total of 150 cases were enrolled in the study and divided into 2 groups, Group A having 75 patients who underwent mini PCNL and Group B having 75 patients treated with PCNL.

DISCUSSION-Mean drop in hemoglobin level and bleeding necessitated blood transfusion were significantly lower in the mini PCNL group. Duration of hospital stay were lesser for mini-PCNL .

CONCLUSION- Mini PCNL is effective for managing renal calculi with comparable operative time and stone free rate to standard PCNL with the merit of higher safety due to lower incidence of bleeding and early discharge.

KEYWORDS

Nephrolithiasis, Percutaneous Nephrolithotomy, mini PCNL.

INTRODUCTION

Urolithiasis is a worldwide problem in the general population, due to its high prevalence and frequency of recurrence. It is a common disease affects ,almost 70% of people who suffer kidney stone will have kidney stones recurred [1]. Treatment modalities include conservative Management and Surgical Management Conservative Management is generally done in calculi less than 5 mm which pass spontaneously unless they are impacted. Surgical Management include Percutaneous Nephrolithotomy, mini- percutaneous Nephrolithotomy ,extracorporeal Shock wave lithotripsy and open surgery. Fernstrom and Johansson performed first percutaneous nephrolithotomy (PCNL) in 1976(2) . PCNL is based on the creation of a suitable percutaneous renal access, dilation of this tract (26-30Fr), and fragmentation and elimination of the stone fragments using the nephroscope through an access sheath. In mini-PCNL, the percutaneous tract is serially dilated to 16-20 Fr. Jackman et al first developed Mini-PCNL technique . in the pediatric population with the use of an 11 F access tract.[3] The risk of hemorrhage is increased by more medial punctures, multiple punctures, punctures into kidneys with abnormal anatomy and larger tract size. Delayed bleeding after percutaneous procedures usually indicates the presence of a pseudoaneurysm or an arteriovenous fistula.

MATERIAL AND METHODS This study was done among patients of renal calculi admitted in the Department of Surgery at S.N. Medical College, Agra during the period from January 2017 to December 2017 with a follow up for 3 months

Inclusion criteria were 1.Patients of upper urinary tract calculi ranging 2-3cm (renal pelvicalyceal system) 2. Age 20-60yrs 3. Radio-opaque stone

Exclusion criteria were 1. All known cases of lower urinary tract calculi, 2. Patients with kidney stones who were previously operated. 3. Patients with active urinary tract infection, renal anomalies, uncorrected coagulopathy

A total of 150 cases was taken for study purpose between time duration of January 2017 to December 2017. Group A included 75 patients who were treated by mini PCNL and Group B included 75 patients who were treated by standard PCNL. Cases were randomised into two groups, with the first case selected randomly using sealed envelope method. An informed written consent was provided, and signed by all participants.

All patients who met inclusion criteria and give informed consent was selected for the study. Detailed history, complete examination and following preoperative evaluation was done.

Pre-operative Evaluation: 1. Laboratory investigations- Urinalysis, Random blood sugar, Complete blood count, Coagulation profile, ALT, AST, Renal function Test 2. Imaging techniques (a) Abdominal ultrasonography (b) X-Ray KUB- (c) Intravenous Pyelogram- (d) Non contrast abdomino-pelvic CT scan.

If the urine culture was positive an appropriate antibiotic was prescribed for 1 week and the urine culture repeated to verify urinary sterility before the intervention.

Prophylactic broad-spectrum antibiotics were administered at induction of anaesthesia. Under spinal anesthesia, the patient was placed in lithotomy position, and a 6 Fr open-end ureteral catheter was advanced into the renal pelvis. Retrograde pyelography was done to visualise the collecting system. Patient was turned into the prone position[4]. With the help of C-arm fluoroscopy guidance, the preferred calyx was determined along with the site of incision and angle of puncture. Bull's eye technique was used to gain access in the desired calyx. Skin was punctured at the posterior axillary line using an 18-gauge renal puncture needle through which a 0.038-in. J-tip guidewire was introduced. In the mini PCNL group the tract was dilated up to 16.5 F with metal dilator and a 12-F-sized miniature nephroscope was used. In the standard PCNL group the tract was dilated up to 30 F with telescoping Alken's metal dilators and a 26-F nephroscope was used . The subsequent steps were similar in both groups where, the calculus was identified and fragmented using a lithotripter. The fragments were then retrieved using suction or stone grasper. Stone debris were removed using irrigation with isotonic

solution.Afterwards, visual and fluoroscopic inspection was performed to ensure a stone free status. Under fluoroscopic guidance, an appropriate nephrostomy catheter was inserted at the end of the procedure if required.. The statistical analysis was carried out using SPSS statistic Chi-square and student t-test, using Software STATA version 11. A p-value < 0.05 was considered significant

OBSERVATION -

In current study, a total of 150 patients were taken, 75 in each group of age 20-60 years

TABLE 1-PATIENT'S DISTRIBUTION

Age(yrs)	Group A	Group B
21-30 yrs	20	22
31-40 yrs	15	13
41-50 yrs	25	23
51-60 yrs	15	17

TABLE 2- INTRA-OPERATIVE TIME DISTRIBUTION

Column1	Group A	Group B	p-value
Mean Operative time (min)	76	70	>0.05
Mean Duration of anesthesia (min)	118	112	>0.05

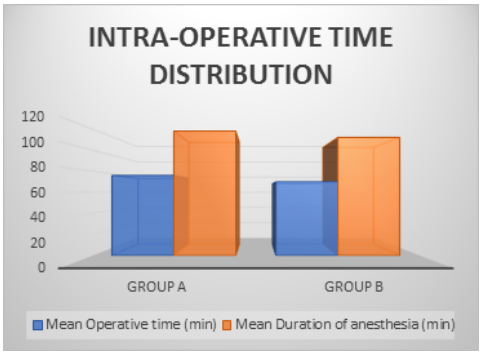


TABLE 3- DISTRIBUTION ACCORDING TO DECREASE IN HB LEVEL AND NEED FOR BLOOD TRANSFUSION

Column1	Group A	Group B	p-value
Mean Decrease in Hb level(g/dl)	0.5	1.9	<0.05
No. of patients requiring Blood transfusion	2	9	0.041

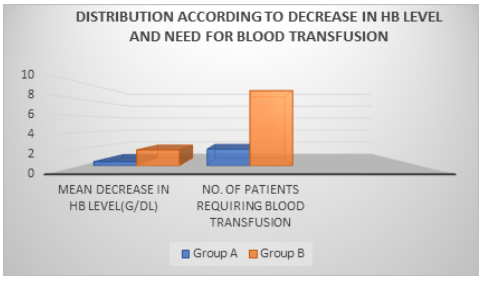


TABLE-4 DISTRIBUTION ACCORDING TO HOSPITAL STAY

Column1	Group A	Group B	p-value
Mean hospital stay (days)	1.9	2.3	0.06

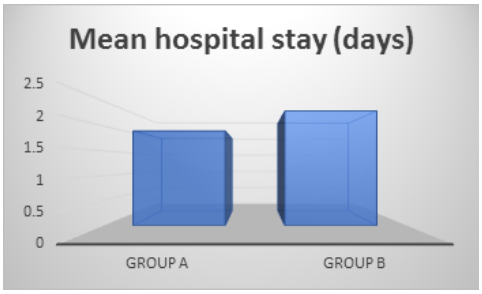
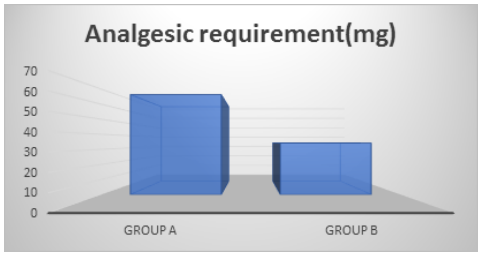
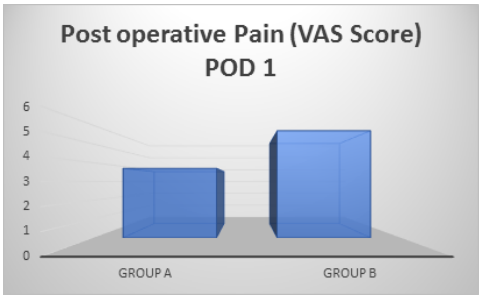


TABLE 5- DISTRIBUTION ACCORDING TO CLINICAL FEATURES

Column1	Group A	Group B	p-value
Analgesic requirement(mg)	66.3	34.2	<0.05
Post operative Pain (VAS Score) POD 1	3.7	5.7	<0.05





DISCUSSION-

In the current study, the mean operative time was longer in the mini PCNL group compared to the standard PCNL, this was statistically insignificant. Similar study results were obtained by Feng et al. and Knoll et al. who reported that although the operative time of mini PCNL is longer than standard PCNL yet it is not statistically significant (5,6). On the contrary, Mishra etal showed significant difference in the mean operative time.(7)

One session stone-free rate (determined on the first post-operative day) was 86% and 89% for Groups A and B, respectively which was statistically insignificant (p >0.05). In their meta-analysis, Zhu and colleagues showed that there was no difference between the mini PCNL and standard PCNL regarding stone free rate(8) .

The mean drop in hemoglobin level and bleeding necessitated blood transfusion were statistically significantly lower in the mini PCNL group. Smaller percutaneous nephrostomy tract causes less damage to the renal parenchyma and subsequently lower procedure-related morbidity without diminishing its therapeutic efficacy (9). The nephrostomy tract size was speculated to be a contributing factor in postoperative discomfort. A smaller nephrostomy tract will be less traumatic and leading to less discomfort and decreased postoperative morbidity; however, this was not proved.

The duration of hospital stay was insignificantly less for mini-PCNL compared to standard PCNL, which is similar to Giusti et al(10) . This was attributed to less post operative discomfort and higher utilisation of tubeless procedure in the mini-PCNL patients.

There was a statistically significant difference regarding analgesic requirement favouring mini PCNL. In the current study, there was statistically significant difference regarding Visual Analogue Score(VAS) score. In the meta-analysis study by Zhu etal, mini PCNL showed advantages in terms of Visual Analogue Score on post operative day 1. This was attributed to smaller tract used for nephrostomy tube. (8)

CONCLUSION-

The mini PCNL can play an important role in the treatment of symptomatic renal and upper ureteric stones with lesser blood loss, lesser duration of hospitalisation, need of transfusion and post-operative pain compared with standard PCNL.

Mini PCNL is effective for managing renal calculi with comparable operative time and stone free rate to standard PCNL with the merit of higher safety due to lower incidence of bleeding.

Mini PCNL is a newer technique that awaits further technical developments so that it can be offered as a standard technique in all patients.

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