

FREQUENCY OF CERTAIN COMPLICATIONS OF PERCUTANEOUS NEPHROLITHOTOMY (PCNL)

Tauheed Fareed, Ahmad Nawaz, Khayyam Farid, Asif Mallik, Safir Ullah Khalil

DR. MUHAMMAD ABUBAKR
MBBS, FCPS
Asst. Prof Department of Orthopaedics
Pak International Medical College, Peshawar

ABSTRACT

Objective: To find out the prevalence of

- Hemorrhage.
- Sepsis.
- Urinary Fistula in PCNL.

Material & Methods: This study was conducted in The Department of Urology, Institute of Kidney Disease, Hayatabad Medical Complex, Peshawar, Pakistan from 1st July 2014 to 30th June 2016. In this descriptive study total of 30 patients were admitted in department of urology on basis of inclusion and exclusion criteria. Objective of this study was to assess the frequency of hemorrhage, sepsis and urinary fistula in PCNL.

Results: Total numbers of patients included in this descriptive study were 30. Gender ratio of the patients (male female) was 2:1 with mean age of 41 ± 16 years. Total complications were recorded per operative and post operative was 26% (n=8). To analyze these complications SPSS version 12 was used. Per operative and post operative hemorrhage that drop blood pressure and needed blood transfusion was noted in 16% (n=5). One of these five patients had massive hemorrhage and procedure was converted to open operation that ended in nephrectomy. Post operative sepsis was recorded 6% (n=2), Post operative urinary fistula was found in 3% (n=1).

Conclusion: Presently PCNL is considered to be a gold standard for the management of renal calculi. But it is still associated with complications. We need more experience and dedicated research to optimize our results and to bring it to the level as seen in international centers of excellence.

Key Words: Percutaneous Nephrolithotomy, Nephroscope, Fluoroscope, Intravenous Urogram, Double J-Stent, Open end Ureteric Catheter, Clinically insignificant residual fragments.

INTRODUCTION

PCNL is the percutaneous removal of stone from renal pelvis, renal calyces and upper ureter through percutaneous nephrostomy tract with the help of a rigid /flexible nephroscope under fluoroscopic/ ultrasound or both control.¹

Urolithiasis is the third common disorder of urinary tract. It was noted prehistorically. Hippocrates is considered to be the 1st surgeon who removed a stone from a blocked pyonephrotic ruptured kidney with perinephric abscess. Management skill of urolithiasis has developed tremendously over the past years. Fernstrom and Johansson were the first to remove a renal calculus through a nephrostomy tract in 1976².

Bio medical technology in the form of Nephroscopic, cystoscope, ureteroscope, ESWL and intracorporeal lithoclast has aided to the great extent in the treatment of Urolithiasis. These endo urological procedures have largely replaced the open surgery for the treatment of upper tract stones³.

Urological researchers have considered PCNL a treatment of choice for the treatment of upper urinary tract stone disease especially for large and complex calculi. The most important indications of PCNL are stones size > 2.5 cm, obstructing renal stones, stones with composition resistance to fragmentations with ESWL and some anatomical malformations like stones in horse shoe kidney, calyceal stones with thin infundibulum or oblique infundibulo-pelvic angle, stone in calyceal diverticula, or renal stones with pelvic ureteric junction (PUJ) narrowing^{4,5}.

Advancement in technology and medical equipment has improved PCNL, resulting in stone removal with less morbidity, mortality, quick recovery, and cost effectiveness⁶. However like other procedure PCNL is not without complications. Complications under discussion in study are:

- Hemorrhage; Perioperative and postoperative bleeding vary from mild to severe. Medial punc-

Department of Urology, Institute of Kidney Disease
Hayatabad, Peshawar

Address for correspondence:

Dr. Tauheed Fareed
Medical Officer, Department of Urology,
Institute of Kidney Disease
Hayatabad, Peshawar
Email: tauheedfareed786@hotmail.com

tures, multiple punctures, and punctures into kidneys with abnormal anatomy are associated with an increased risk of bleeding⁷.

- Sepsis: Urosepsis or wound infection presents with post operative fever.⁸
- Postoperative urinary fistula: This can result from ureteric blockage with residual piece of stone^{9,10}.

MATERIAL AND METHODS

This study was conducted in Urology Department, Institute of kidney Diseases Hayatabad, Peshawar. The study period stretched over 2 years (1st July 2014 to 30th June 2016) and total number of cases were 30.

Inclusion criteria:

- age >12 years and <60 years.
- No history of previous PCNL.

Exclusion criteria:

- Patients below 12 years of age and above 60 years.
- Patients with Bleeding disorders
- Patients with skeletal deformity.
- Patients who refuse to be included in the study.

Patients were admitted in department of urology, Institute of Kidney Disease, Peshawar through out patient department. Complete medical history and thorough physical examination of patient were done to exclude absolute contra indications to PCNL¹¹.

Biochemical examination include complete blood count, serum electrolyte, Renal function test, blood grouping and screening. Retrograde pyelography, IVU or CT urogram (depends on patient socio economic status) were performed to evaluate the patients collecting system and that may aid in selecting the targeted puncture site. Radionuclide scanning were also necessary in selected patients, particularly those having staghorn calculi to evaluate differential renal function. Prophylactic antibiotics is essential in every case¹².

All cases were done under general anesthesia. We performed all procedure under the C-arm/ fluoroscope. After properly positioning of the patient which is prone position with 30 degree elevation of targeted side, An 18 gauge needle was directed in the identified targeted calayx under Fluoroscope guidance.¹³

After the needle was satisfactorily positioned in the collecting system, a hydrophilic guide wire was passed. Once the guide wire was positioned in the ureter, multiple dilators were used to dilate the system¹⁴. After tract dilation, the operating nephroscope is inserted through an open, low-pressure system with an Amplatz working sheath. Stones were then fragmented with the help of pneumatic intra corporeal lithotripter,

Fragments were removed with the

After completion of PCNL, percutaneous drainage through a nephrostomy tube 26 Fr was placed. The tube serves several purposes. The tube is placed to allow access to the collecting system for irrigation and procedure required.

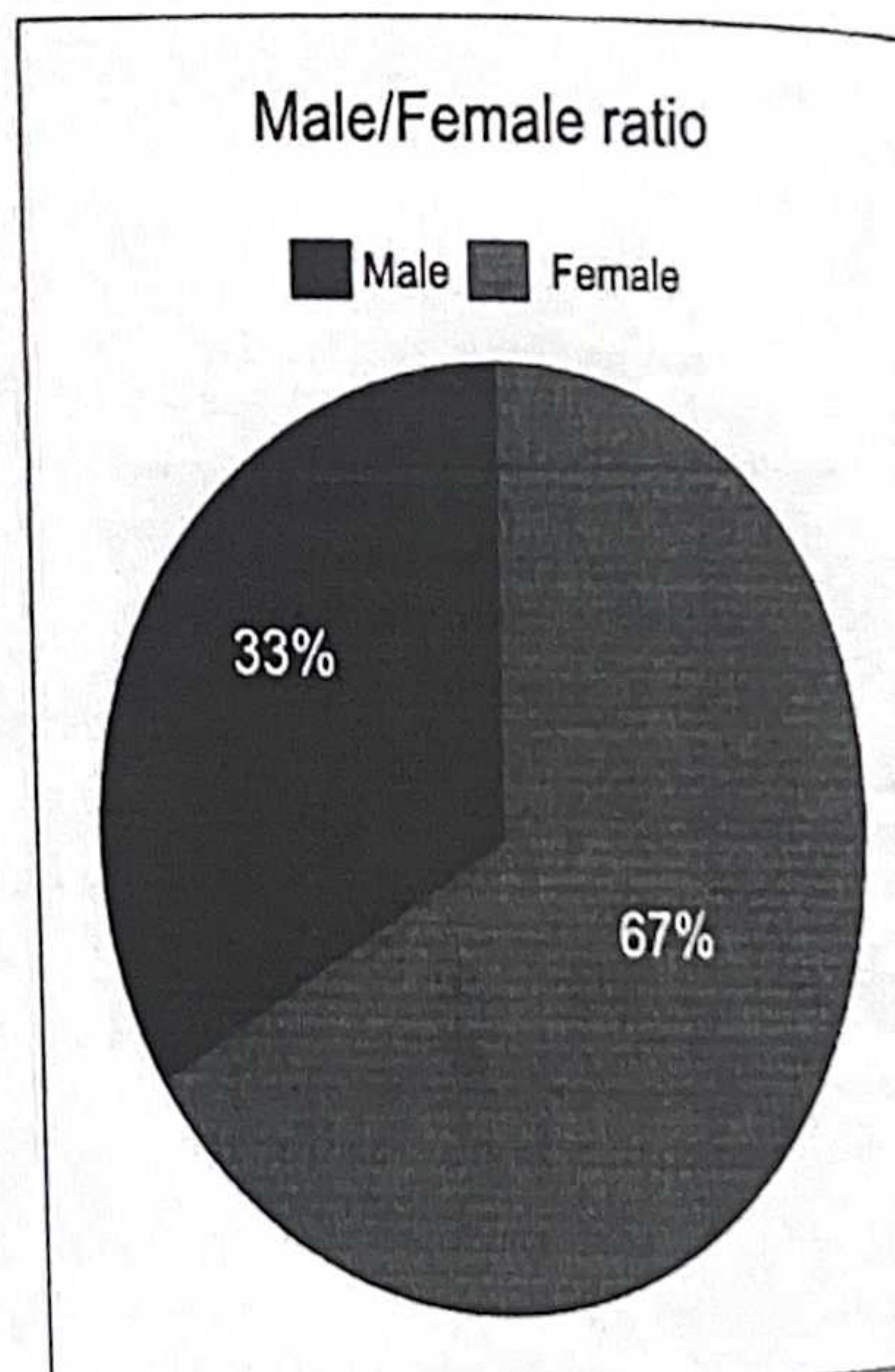
After tube placement, a nephrostogram was obtained 24 to 48 hours after the stone have been removed, in free flow of contrast material down without extravasation, the nephrostomy tube was clamped and removed. All patient had a double-J stent placed during PCNL, and Foley's catheter remained for 24 hours¹⁵.

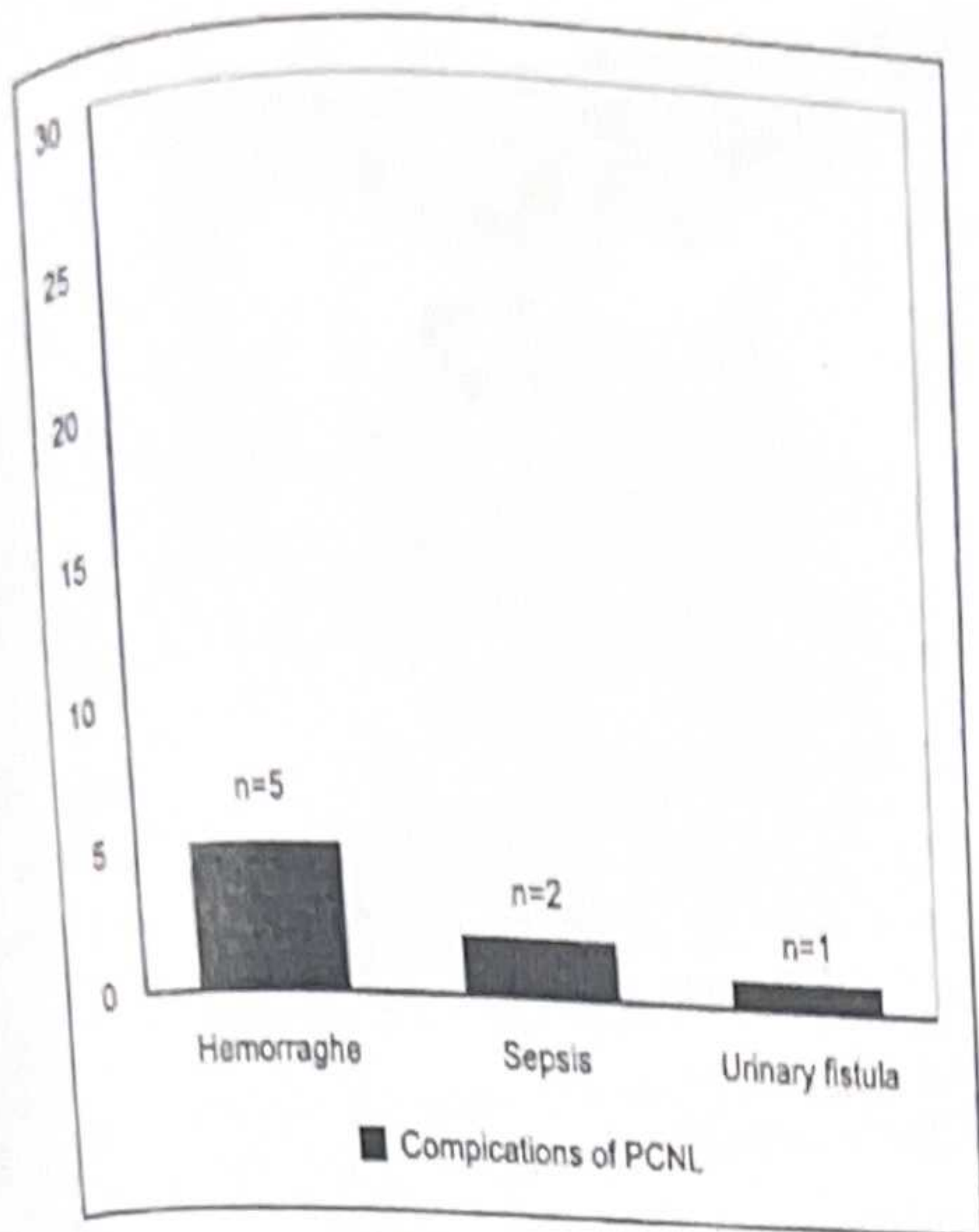
RESULTS

This study included total 30 patients. Male: Female ratio was 2:1. Age distribution of the patients among different age range is shown in Graph-3. The mean age of the patient 41 ± 16 years. Duration of surgery was 120 ± 49 minutes. Amount of irrigation fluid during surgery varied from 5 to 40 litres with the mean of 20 ± 6.5 litres. Mean of postoperative stay of patients in hospital was 3 ± 1 days. Targeted complications noted in this study were: Hemorrhage 16% (n=5), sepsis-6% (n=2) fistula 3-% (n=1).

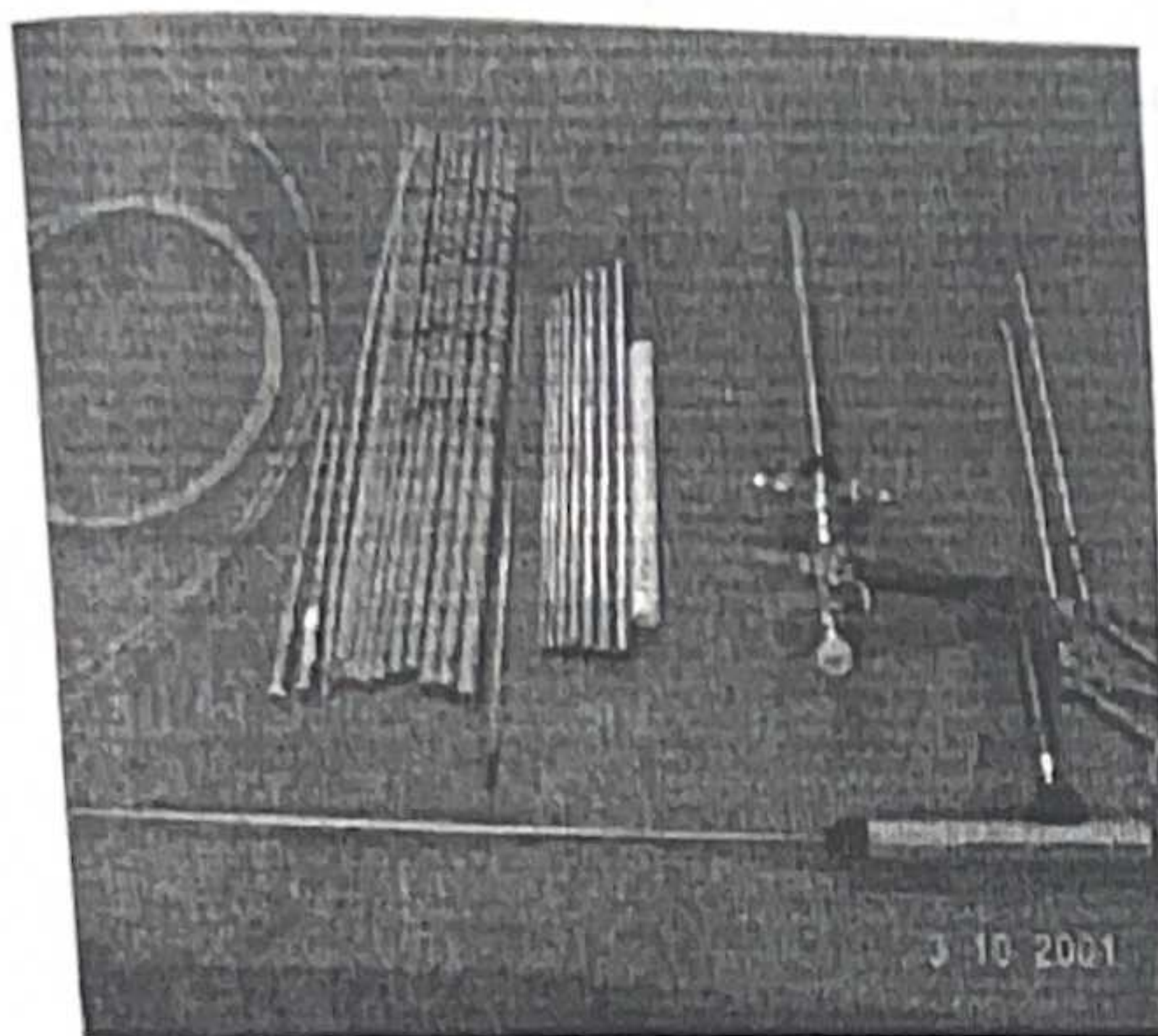
DISCUSSION

Presently PCNL is an established technique used for the treatment of complex and large renal calculi^{16,17}. According to the 2008 European Association of Urology (EAU) and 2005 American Urological Association (AUA) guidelines PCNL is recommended as first line treatment





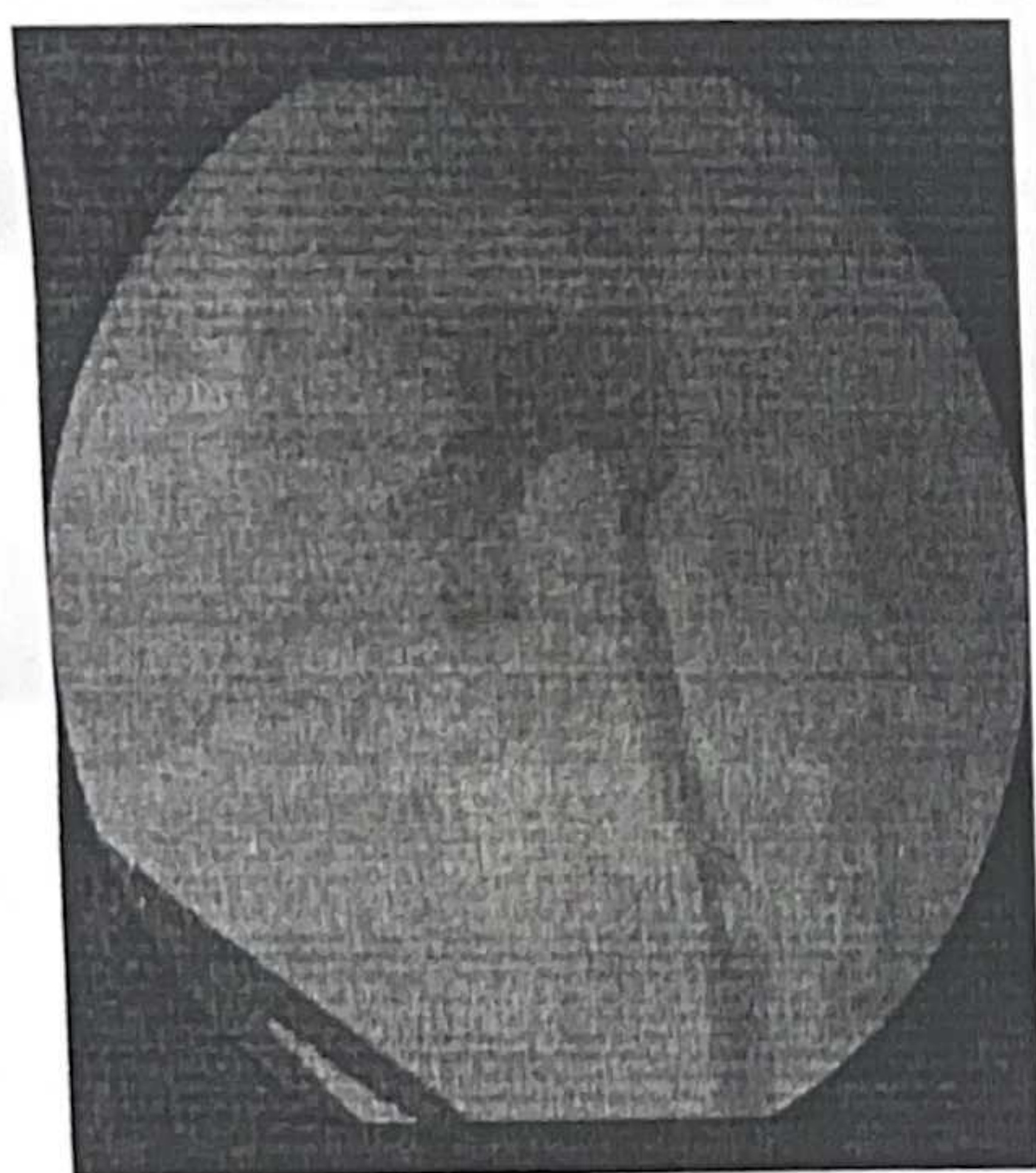
Procedure in progress (picture taken during surgery)



Instruments used in PCNL (picture taken from internet)



Nephroscopic view of a calculus in calyx



Opacification of pelvicalyceal system



Postoperative X-ray showing DJ stent & Nephrostomy tube



Post Operative patient showing Nephrostomy tube for staghorn calculi, Stone size more than 2cm in diameter located in upper, middle and lower calyx^{17,18}.

Success and complication rate measure the result of "Success" defined as the absence of fragments of residual stone under computed tomography or conventional X-ray or when clinically observed insignificant residual fragments (CIRF)^{19,20,21}. Standardized evaluation of complication is still deficient in spite of the availability of result of literature of large series of PCNL.

Recent attempts has been done to report complication rate of PCNL arranging them according to severity by use of Clavien grading system. This was 1st proposed in 1992 later on modified in 2004. This modified system has been validated in a cohort of 6336 patients. This system further modified in 2009 called The Clavien-Dindo classification of surgical complications.

Hemorrhage is common complication which may be minor or severe.²² The causes of a hemorrhage are direct injury to blood vessels, laceration of the kidney during tract dilatation, multiple nephrostomy tracts and size of the tract as reported by Kukreja.²³ The incidence of bleeding noted in our study is 16.66% (n=5) which is comparable to Ugras M et al²⁴ — 14% and Atici S et al — 15% (out of 100 patients). In our study all five patients required blood transfusions and three patient required 2 units of blood, one patient required 4 units of blood and 1 patient had massive hemorrhage and needed 5 units of blood. This patient was ultimately converted to open surgery and nephrectomy done. We haven't seen. perinephic hematoma in our cases but it should be suspected if hematocrit continue to decrease and urine is clear post operatively. Diagnosis is confirmed with a Triphasic abdominal CT scan to distinguish it from urinoma. Percutaneous drain is removed once hematoma resolved²⁴.

Sepsis is one of the serious complications of PCNL and its because of high possibility of bacteremia and endrotoxemia^{19,20}. It presents as post operative fever with rigors.(>98 F)²². The source of infection

always comes from stone itself. Urinary leak, blood transfusion, and use of large amount of irrigating fluid are contributory factor to sepsis. Mostly fever develops within 24 hours following the operation, even though all of the patients had preoperative and postoperative prophlactic antibiotics.¹⁸ We noted sepsis in 6% (n=2) of patients in our study. We treated these patients with i/v antibiotic. They responded well to i/v antibiotic.

Postoperative urinary fistula which is also called access tract leakage was seen in 3% (n=1) patients in our study which stopped with the conservative treatment with in 7 days. These fistulae heal with DJ stenting of the ureter. A Tefekle et al reported in 15% and has mentioned that access tract leakage after removing the nephrostomy tube is usually of short duration (less than 12 hours)²⁷.

Multiple puncture attempt and use of wider bore dilators sheath can contribute hemorrhage, sepsis and fistula formation. These complication should be prevented by avoiding multiple punctures, using small bore dilator with a continuous or open flow system. The procedure should be kept short. Low pressure drainage either with a Nephrostomy ureteral stent or Foley's catheter should be placed²⁵. Septic shock not noted in our study. Prophylaxis is important in those patients with hydronephrosis and large calculi. Major complications rate of experienced center has been analyzed by O Tanrivrd et al and this is 3.7% and this report is much lower than usually reported^{26,28}.

CONCLUSION

Presently PCNL is considered to be a gold standard procedure for the management of renal calculi. But it is still associated with complications. We need more experience and dedicated research to optimize our results and to bring it to the level of the results of international centers of excellence.

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