



ST PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

**OUTCOME OF CASES OF UROLITHIASIS MANAGED BY
URETEROSCOPY IN SPHMMC IN THE PAST ONE YEAR (2017GC)**

**BY
DAWIT GAREDEW (INTERN)**

August, 2018

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HEALTH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DOCTOR OF MEDICINE**

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Abstract

Background: Urolithiasis is one of the commonest urologic problems. There are different methods of managing urolithiasis. Of these Ureteroscopy is one of the surgical methods. .Ureteroscopy is one of the earliest endourologic techniques developed. Many studies worldwide and in Ethiopia have evaluated the safety and efficacy of urethroscopy. SPHMMC is one of the few centers in Ethiopia that ureteroscopy is being practiced. There is no study assessing the effectiveness and the complication rate of the procedure in this hospital.

Objective: To describe the presentation, the outcomes and complications of patients with urolithiasis managed by ureteroscopy.

Method: A hospital based cross-sectional retrospective descriptive study was done. The chart of all patients who underwent URS procedure from January 2017- December 2017 was reviewed. Descriptive statistical tools were used to analyze the findings. The results were compared with similar studies worldwide and in Ethiopia.

Results: A total of 117 patients were studied. Of these 96.6% presented with flank pain. Previous treatment history for stone disease was 25.6%. Ultrasound investigation was the commonest and accounted for 94.9%. Hydronephrosis was present in 91.5%. Intraoperatively stone was present in 72.6% of cases. The failure rate for uretroscopy was 3.4%. Intraop complication rate was 9.6%. Postop complication rate was 14.5%. Post op pain compliant was present in 53.0%. Mean hospital stay was 7.18

Conclusion: The outcome of cases of urolithiasis managed by uretroscopy is comparable to other setups. The overall discharge rate after successful treatment is low and postoperative pain control is very poor.

Acronyms

DM	Diabetes Mellitus
FMOH	Federal Ministry of Health
HTN	Hypertension
PNL	Percutaneous Nephrolithotomy
SPHMMC	St. Pauls Hospital Millennium Medical College
SPSS	Statistical Package for Social Sciences
ECSWL	Extracorporeal Shock Wave Lithotripsy
RVI	Retroviral infection(HIV)
TASH	Tikur Anbessa Specialised Hospital
URS	Ureteroscopy/ Ureterorenoscopy
USA	United States of America

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1. Introduction

1.1. Background

Urolithiasis a common medical problem recognized since the ancient Greeks. It is said to affect up 12% of males and 6% of females. Renal and ureteral stones are more common in economically developed nations. They usually consist of calcium oxalate and phosphate stones. The prevalence rate is between 4-20% while annual hospitalization rate is between 0.03 -0.1%. On the other hand bladder stones usually occur in developing nations especially Asian countries and usually consist of urate and calcium oxalate stones.¹

Urinary calculi may occur anywhere in the urinary tract. They usually are asymptomatic in the renal pelvis or bladder, but they are a very common cause of symptomatic ureteral obstruction. The obstruction may be partial or complete. Smaller stones (up to 6 mm) may cause severe symptoms, such as flank pain and nausea, but typically pass without intervention beyond supportive care. α -Blockers, which relax the distal ureter, may be given to reduce renal colic. Calculi ≥ 7 mm are more likely to become impacted or to have a prolonged passage through the ureter. For this reason, intervention at the time of presentation is preferred for larger stones (except in cases where the calculus is in the very distal ureter) due to the likelihood of repeat emergency room visits for severe symptoms.²

Considerable progress has been made in the medical and surgical management of nephrolithiasis over the past 20 years. Approximately 10 to 20 percent of all kidney stones require surgical removal, which is determined based upon the presence of symptoms and the size and location of the stones. Larger stones and proximal ureteral stones are less likely to pass spontaneously. Stone removal is also indicated for pain or obstruction or for an infected struvite stone. On the other hand, no specific surgical therapy is required for asymptomatic stones, particularly those that are less than 5 mm in diameter.

Three minimally invasive surgical techniques that significantly reduce the morbidity of stone removal are currently available. These are

- Percutaneous nephrolithotomy (PNL)
- Rigid and flexible ureteroscopy (URS)
- Shock wave lithotripsy (SWL)

These techniques appear to offer comparable success when compared with open renal and ureteral surgery, and provide significant advantages in terms of patient morbidity. Interventional radiologic techniques provide many additional treatment options.

There continues to be a limited role for open stone surgery. Less than one percent of patients are candidates for such surgery. Open stone surgery is primarily reserved for the management of complex renal and ureteral calculi that cannot be removed with a reasonable number of minimally invasive procedures. Current indications include patients who have failed endoscopic stone removal, patients with complex (staghorn) renal calculi, and patients with complex renal/ureteral anatomy or morbidly obesity.³

1.2. Statement of the problem

As stated above urolithiasis is present in 4-20% of the population and of these 0.1% are hospitalized.¹ Ureteroscopy is one of the surgical options to manage urolithiasis. Ureteroscopy (URS) is defined as retrograde instrumentation performed with an endoscope passed through the lower urinary tract directly into the ureter and calyceal system.

There has been a shift toward minimally invasive surgery in all surgical subspecialties in recent decades. Ureterorenoscopy represents an area in which there have been numerous advances that have resulted in excellent patient outcomes with low morbidity. Technologic advances such as miniaturization of ureteroscopes and improved video imaging have expanded the indications for ureteroscopy. The entire upper urinary tract can now be accessed for diagnosis and treatment of many common urologic conditions. Technologic research and development will continue to drive future improvements in the technique and applications for ureteroscopy.⁴

URS is currently being practiced at SPHMMC. Hundreds of patients have been managed using the technique. But there is no study describing the effectiveness and complication rate of the procedure.

1.3. Significance of the study

The information that is obtained from this study will be primarily important to the department of Urology in SPHMMC. It can be utilized to assess the quality of care and point out challenges and problems that need improvement. It can also be a starting point for further studies to address unanswered questions worldwide like the issue of routine stenting following uncomplicated URS. The FMOH can also use the data to evaluate the effectiveness of such procedures and to expand such practices to other setups in the country.

2. Literature Review

2.1. History of URS

The progression from cystoscopy to upper urinary tract endoscopy was natural, with pediatric cystoscopes being used as the first rigid rod-lens ureteroscopes. Relatively large rod-lens endoscopes, averaging 12F (3F = 1 mm) in diameter, combined with ultrasonic and electrohydraulic lithotripsy probes became the first commonly accepted ureteroscopic equipment combination used to treat distal ureteral calculi.⁵

Ureteroscopic treatment of calculi and, in particular, distal ureteral stones was the first common application of upper urinary tract endoscopy. Early in this evolution, smaller and more precise instrumentation was obviously found to cause less trauma to normal tissues. Rigid ureteroscopes progressed from rod-lens imaging to fiberoptic imaging with outer-diameter miniaturization. The narrow and delicate distal ureter once required vigorous balloon dilation for ureteroscopic access; however, by 1989, the fiberoptic-based rigid endoscopes were small enough (averaging 7F in diameter) for frequent placement in the distal ureter under direct vision. The small rigid ureteroscopes combined with both laser and pneumatic lithotriptors are currently used to treat distal ureteral calculi in both university and community settings.⁵

Flexible ureteroscopy was an attractive alternative to rigid ureteroscopy in that the more proximal ureter and intrarenal collecting system were theoretically more easily accessible with this type of instrument. The application of flexible ureteroscopy was first reported by Marshall in 1964. He described the passage of a 9F endoscope manufactured by American Cystoscope Makers into the ureter to visualize an impacted ureteral calculus. These first flexible ureteroscopes were not capable of being directed and did not have a working channel, thus permitting only the most primitive diagnostic maneuvers. The subsequent addition of a cystoscopically placed “guide tube” facilitated placement of the first flexible ureteroscopes. In addition, irrigant then could be passed through the guide tube to displace the ureteral mucosa and debris from the distal endoscopic lens.⁵

2.2. Worldwide Studies

One study from USA studied 317 patients who underwent 346 transurethral ureteroscopic procedures. For most patients the intramural ureter was dilated with balloon dilators and all procedures were performed under fluoroscopic control. The over-all success rate for lower ureteral stone removal was 95 percent, which increased to 97 per cent for stones treated in 1984 and 1985. The study concluded Ureteroscopy is useful for the evaluation of idiopathic gross hematuria, and for the diagnosis and treatment of ureteral and renal pelvic tumors.⁶

Another study reviewed chart of 194 patients who underwent 209 ureteroscopic procedures during 1992. The indications for ureteroscopy were calculus extraction (67% of the cases), diagnosis (28%) and stent manipulation (5%). Overall ureteroscopic success rate was 96%. Success of stone extraction improved from 89 to 95% distal success rate 95 to 97% and proximal success rate 72 to 77%. Success of diagnostic inspection was 98%. Failure is due almost exclusively to impassable ureteral strictures (63%). The overall complication rate was 12%. The study concluded improvements in ureteroscope design, accessories and technique have led to a significant increase in the success of diagnostic and therapeutic ureteroscopy while decreasing morbidity. Outpatient ureteroscopic stone extraction, particularly for distal ureteral calculi, is almost uniformly successful with low morbidity.⁷

The issue of stenting following uncomplicated URS has been the interest of many studies worldwide. Between August 2004 and April 2005 eighty-five patients were studied in Althawara Hospital in Yemen. The study concluded when treating ureteric stones by URS stenting should not be used as routine. The use should be limited to those with ureteric injury, bigger stone and prolonged operative time. The non-stenting method decreases the need for postoperative analgesia, time of color clearance and hospital stay⁸.

Another recurring issue with regard to URS is the rate of complications. One study done in Department of Urology, "Saint John" Emergency Clinical Hospital, Bucharest,

Romania evaluated 2436 patients aged 5 to 87 years underwent retrograde ureteroscopy under video and fluoroscopic assistance from June 1994 to February 2005. The rate of intraoperative incidents was 5.9% (162 cases). Intraoperative incidents consisted of the impossibility of accessing calculi (3.7%), trapped stone extractors (0.7%), equipment damage (0.7%), and double- J stent malpositioning (0.76%). In addition, migration of calculi or stone fragments during lithotripsy was apparent in 116 cases (4.24%). The general rate of intraoperative complications was 3.6% (98 cases). It also saw mucosal injury (abrasion [1.5%] or false passage [1%]), ureteral perforation (0.65%), extraureteral stone migration (0.18%), bleeding (0.1%), and ureteral avulsions (0.11%). Early complications were described in 10.64%: fever or sepsis (1.13%), persistent hematuria (2.04%), renal colic (2.23%), migrated double-J stent (0.66%), and transitory vesicoureteral reflux (4.58%, especially in cases with indwelling double-J stents). It also found late complications such as ureteral stenosis (3 cases) and persistent vesicoureteral reflux (2 cases). Most (87%) of the complications followed ureteroscopic therapy for stones. Three fourths (76%) of the complications occurred in the first 5 years of the series⁹.

2.3.In Ethiopia

There are two studies of interest in Ethiopia. Both are done in Tikur Anbessa Specialised Hospital.

The first study is a one-year cross-sectional study of urolithiasis patients admitted in TAGSH from January 1st to December 31st 2013. Data was collected using a preset questionnaire from medical records, laboratory and imaging investigations. The number of patients with urolithiasis admitted to the urology ward in the study period was 84, which is 22.3% of the 376 urology patients admitted. Of these, 58(69%) were males and 26(31%) females. The age range was 16-74 years. The age groups commonly affected were 25-34 years and 35-44 years with 31% (26) and 22. Nearly 79% (76) of the patients are under the age of 45 years. Forty-one (48.8%) patients were admitted with diagnosis of renal stones followed by 33(39.3%) ureteric stones, 5(6.0%) bladder stones, 4(4.8%) renal and bladder stones. The most common complication of stone diseases at presentation was hydronephrosis seen in 53(63%) of patients followed by renal failure

13(15%) and only 8(10%) of patients came with stone disease without complication. During the study period 46 (55%) patients were treated with open surgical procedure, 35 (42%) were treated endoscopically and 3 (3%) both open and endoscopy. Of the open treated patients twenty-one (43%) of patients were treated by pyelolithotomy and 13 (25.5%) of patients were treated by nephrolithotomy whereas 4(8%) ended up in nephrectomy. Of those treated endoscopically 30 (76%) underwent semi-rigid ureterorenoscopy and 7 percutaneous nephrolithotomy. Complete stone clearance was achieved in 65 (77.4%) patients while 14 (16.7%) patients had partial stone clearance and 5 (6%) had no stone clearance. After surgery 59(70%) had smooth post-operative course free of complications. The most common post-operative complication was infection in 8 (9.5%) patients followed by 6(7.1%) stone migration, 5(6%) renal failure, 4(4.8%) prolonged urine leak and 2 (2.4) major bleeding respectively. The study concluded that Urolithiasis is a major cause of urologic admissions making one-fifth (20.1%) of all urologic admissions to the hospital and the treatment modalities offered are not up to the standard.¹⁰

The second study is also from the same hospital. It was a cross sectional study of patients who underwent URS at TAGSH from September 11, 2010 to September 10, 2011. Medical records of patients was reviewed and retrieved by a preset questionnaire. The clinical notes and imaging studies were examined. A total of 84 patients who underwent ureteroscopy were included in the study. Among these patients 47 (56%) were males while 37 (44%) were females. There were two peak age incidences in the 21 to 30 and the 41 to 50 age groups. Loin pain was the most common presenting symptom in 83 (98.8%) of the patients, 21 (25%) presented with haematuria 21(25%) and 7 (8.3%) complained of fever. The most common clinical diagnosis was stone disease 54 (64.3%). Most 38 (45.3%) patients had stone disease during ureteroscopy while 20 (23.9%) were diagnosed normal and 16 (19.1%) ureteric stricture. Most patients 56 (66.7%) had no post-operative complications. Fourteen (16.7%) patients had abdominal colic while 7 (8.3%) patients reported haematuria. Only a single patient had ureteric perforation. Out of the 38 patients with ureteric stones, complete stone extraction was done for 19 (50%) of patients. Nine (23.7%) patients had only double J stenting while no other therapeutic ureteroscopy procedure was done for 6 (15.8%) patients. For 2 (5.3%) patients the stone

was crushed and in 2 (5.3%) others stone was dislodged. Of the 38 patients 24 (63.2%) were discharged after the ureteroscopy while 12 (31.5%) patients had to undergo other procedures and 2 (5.3%) patients for a repeat ureteroscopy. The study concluded Ureteroscopy is an indispensable diagnostic and interventional procedure. The study also showed there is a long way to go to improve the therapeutic ureteroscopic ureteric stone lithotripsy.¹¹

3. Objectives

3.1.General Objectives

- To describe the clinical features, outcomes and complications of patients with urolithiasis managed by ureteroscopy.

3.2.Specific Objectives

- To describe the clinical presentation of patients with urolithiasis managed by URS
- To assess the outcome of the cases
- To describe the intra-operative and post-operative complication rate of the cases managed by URS

4. Methods and materials

4.1. Study setting

St. Paul's Hospital was built in 1969 (was named St Paul General Specialized Hospital until 2008) by Emperor Haile Selassie in collaboration with the German Evangelical Church, as a source of medical care for underserved populations. It currently has 392 beds, with an annual average of 200,000 patients and a catchment population of more than 5 million. Approximately 75% of the patients receive medical care free of charge. There are over 1300 clinical and non-clinical staffs in over 13 departments.

The Medical School opened in 2007, the new Millennium era of the Ethiopian calendar. It is intended to alleviate the severe shortage of medical doctors in the country²². In line with various encouraging efforts performed by the Ministry of Health in this regard. It has a unique integrated and modular educational model. The college has its own senate and governed by a board under FMOH.

4.2. Study design

A hospital based cross-sectional retrospective descriptive study was conducted from January 2018-July 2018

4.3. Source population

All patients with urolithiasis managed with ureteroscopy in SPHMMC from January 2017-December 2017.

4.4. Study population

All patients who had undergone ureteroscopic lithotripsy admitted to the department of surgery urology ward from January 2017-December 2017 that meet the inclusion criteria for this study.

4.5. Inclusion criteria

- patients who have undergone ureteroscopic lithotripsy in SPHMMC from January 2017-December 2017

4.6.Exclusion criteria

- Patients with deficient medical record i.e. Missing admission note, OR note and discharge summary
- Patients who have undergone surgical interventions at another hospital and then referred to SPHMMC
- Patients who underwent ureteroscopy for other indications other than preoperative diagnosis of urolithiasis

4.7.Variables

- **Sociodemographic variables**
 - age
 - sex
 - region
- **Clinical variables**
 - Comorbidities
 - previous treatment history
 - lab values: urea and creatinine
 - side of stone visualized
 - location of stone visualized
 - preoperative complication

4.8.Sample size determination

All medical records of patients that fulfill the inclusion criteria were included in the study

4.9. Ethical considerations

This study was commenced after approval by the Ethical and Research committee of SPHMMC. Confidentiality was observed and no names were quoted. All patients' files were considered to be private and confidential as per hospital ethical and research committee regulations.

4.10. Data collection

The data was collected on data collection form. The form contained all the demographic and clinical information as well as intraoperative finding and complications. The tool was used as questionnaire designed to extract relevant information from the medical records. It was filled by the data collector. The medical records in the study period were obtained from the medical record office.

4.11. Data analysis and management

The data was entered and analyzed using IBM SPSS 21. Descriptive statistical tools like percentages, frequency and chi-square tests were utilized and tables, graphs and charts were used to visualize the findings.

4.12. Dissemination of results

The result of this study has been submitted to the public health department of SPHMMC as a partial fulfillment of Degree of Medical Doctor (MD). Hard copy and soft copy of this study will be available in SPHMMC library for all undergraduate medical students and other concerned bodies. Publication of the result of this study may be considered according its acceptance and the importance of the findings.

5. Results

5.1.Socio-demographic characteristics

A total of 140 patients underwent URS in the year 2017; of these chart of 117 (83%)patients were retrieved.

Of the patients included in the study 81(69.2%) were males and 36(30.8%) were females. Patients' age ranged from 13 to 72 with the mean age of 36.73. The commonest age group is from 21to 30 with 42(35.9%) patients being from that age category followed by the age 31 to 40, the extremes of age accounted for 6% of the population each. Most patients were from Addis Ababa 59(50.4%) followed by Oromia 29 (24.8%).Table1

Table 1: Sociodemographic characteristics of patients who underwent URS in SPHMMC in 2017					
Sex			Region		
	Frequency	Percent		Frequency	Percent
Male	81	69.2	Addis Ababa	59	50.4
Female	36	30.8	Oromia	29	24.8
			Amhara	12	10.3
			SNNPR	11	9.4
Age			Gambella	3	2.6
	Frequency	Percent	Tigrai	1	0.9
<= 20	7	6	Somali	1	0.9
21 - 30	42	35.9	Harari	1	0.9
31 - 40	32	27.4			
41 - 50	17	14.5			
51 - 60	12	10.3			
61+	7	6			

5.2 Clinical presentation and imaging studies

Flank pain was overwhelmingly common presenting complaint accounting for 113(96.6%) patients. Most patients present within one month of the onset of the illness. Duration ranged from one week to five years. Pain complaint was present in 100% of the cases. Hematuria was the commonest associated complaint 29(24.8%).

Hypertension was the commonest comorbidity 19(16.2%) followed by diabetes 8(6.8%) and HIV 5(4.3%).Of the patients included in the study 30(25.6%) underwent treatment for urolithiasis before the session of URS that was included in the study. Open surgery is the most common procedure patients underwent accounting for 14 (12%) followed by ECSWL 11(9.4%) and URS 6(5.1%).

Five imaging modalities were utilized in diagnosing cases included in this study. Ultrasound was used in 111(94.9%) of the cases followed by IVP 70(59.8%) and KUB 60(51.3%). Abdominal CT scanning was utilized in 23(19.7%) and abdominal MRI in one (0.9%) case.

Table2: Clinical features of patients who underwent URS in SPHMMC in 2017

Presenting Compliant		
	Frequency	Percent
Flank Pain	113	96.6
Decreased Urine Output	2	1.7
Non Specific Urinary compliant	2	1.7
Associated complaints		
	Frequency	Percent
Flank Pain	3	2.6
Hematuria	29	24.8
Fever	19	16.2
Nonspecific urinary symptoms	24	20.5
vomiting	20	17.1
loss of appetite	4	3.4
failure to pass urine	3	2.6

Fig1: Duration of Presenting compliant

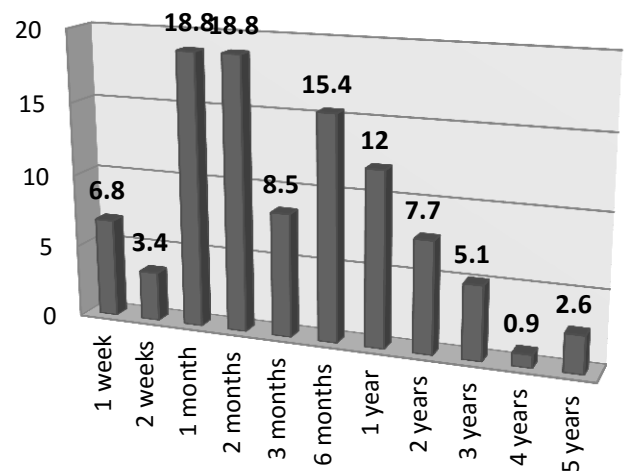


Table3: Comorbidity and Previous Treatment history

Comorbidity			Previous procedure type		
	Frequency	Percent		Frequency	Percent
Hypertension	14	12	URS	6	5.1
Diabetes	3	2.6	ECSWL	10	8.5
HTN and DM	5	4.3	Open surgery	13	11.1
RVI	5	4.3	open surgery plus ECSWL	1	0.9

In 98.3% (115) of cases stone was visualized. Of these 42 (35.9%) were on left side while 37(31.6%) were on the right and in 36(30.8%) of the cases bilateral stones were identified. Of the unilateral stones identified 36(30.8%) were distal ureteric stones while 28(23.9%) were proximal ureteric stones. Middle ureteric stones account for 13(11.1%)and in two cases(1.7%) the stone were renal.

Serum creatinine was determined in 112 patients on admission and ranged from 0.37 to 15.4 with the mean of 1.64 and standard deviation of 2.5. Of these 34(29.1%) had serum creatinine level

greater than 1.20. Urea was determined in 108 patients and it ranged from 10.5 to 422.0 with a mean of 37.6. Seventeen patients (14.5%) had serum urea level above 45.

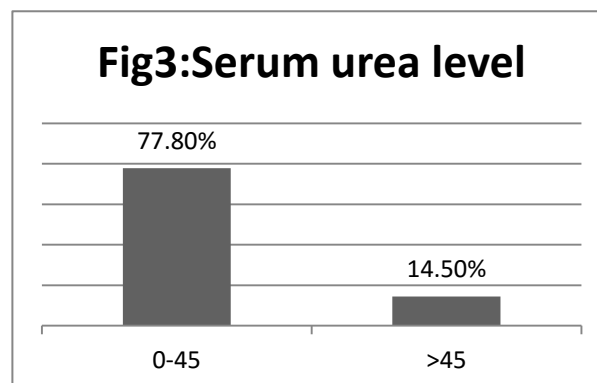
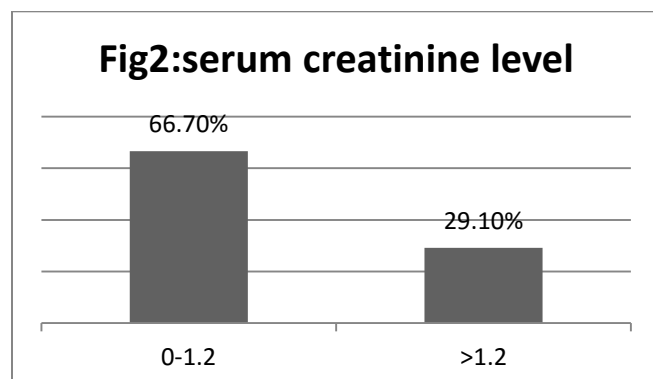
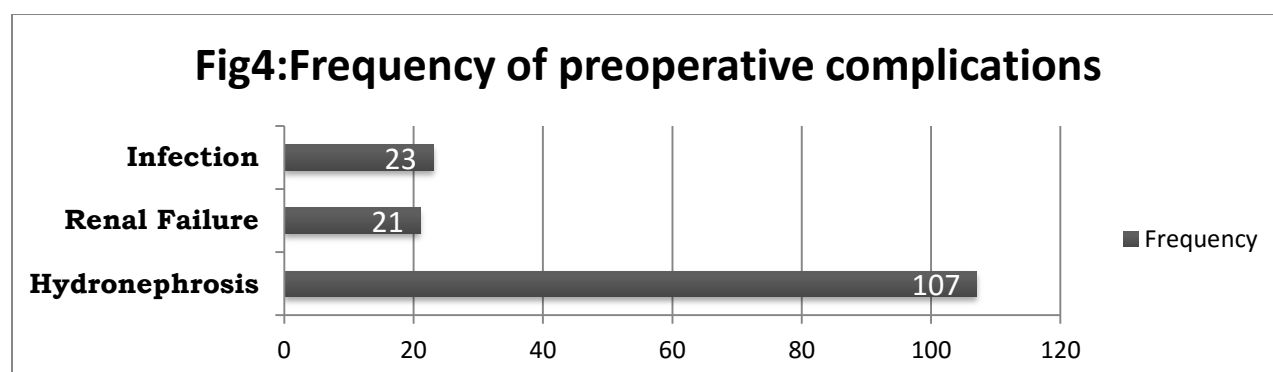


Table4: Imaging studies utilized in investigating patients and their results

Side of the visualized stone					
	Frequency	Percent		Frequency	Percent
Ultrasound	111	94.9	Right	37	31.6
IVP	70	59.8	Left	42	35.9
KUB	60	51.3	bilateral	36	30.8
CT	23	19.7			
MRI	1	0.9			
				Frequency	Percent
			proximal	28	23.9
			Middle	13	11.1
			Distal	36	30.8
			Renal	2	1.7

Of the preoperative complications included in the study hydronephrosis was present in 107(91.5%) of the cases and in 21 cases(17.9%) renal failure was reported. Infectious complication was present in 23(19.7%) cases.



5.3 URS procedures done in 2017

Most procedures were done under general anesthesia accounting for 69(59.0%) followed by spinal anesthesia. One procedure was done under sedation.

Monthly rate of procedures ranges from two in January to sixteen procedures in the month of November. Mean procedure rate for a month is between nine and ten.

Intraoperatively stone was present in 85(72.6%) of the cases. Ureteral stricture was present in 6(5.1%) of the cases and in one instance there was a report of fragment of stent missed from previous procedure.

In 92(78.6%) cases the operating surgeon reported no difficulty in inserting the uretroscope. In 21 cases (17.9%) there some difficulty while advancing the uretroscope. In four cases(3.4%) uretroscope couldn't be inserted at all and the procedure was abandoned.

Stenting was done in 89(76.1%) of the cases successfully. In four cases(3.4%) stenting was attempted but it failed. In 24 cases(20.5%) stenting was not done.

Lithotripsy was done in 64(54.7%) cases. Of these laser lithotripsy was done for 31(26.5%) cases and pneumatic lithotripsy was done for 2 cases(1.7%). Both laser and pneumatic lithotripsy was utilized in 3(2.6%)cases. In 27 remaining cases lithotripsy was reported to be done but it was not specified.

'Stone extraction was successfully done in 26 (22.2%) cases. Proximal dislodging was done in 2 cases (1.7%).

Open surgery was done for the contralateral in two cases of URS sessions included in the study. Other procedures include cystoplexy, stricture dilatation and ureteric reimplantation.

Overall intraop complication rate is 9.6%. The commonest intraop complication reported is extraureteral stone migration which was reported in 6 cases(5.1%). Bleeding was reported in 2 cases(1.7%). Other complications reported include ureteral perforation, ureteral avulsion, mucosal injury. About 106 cases (90.6%) of uretroscopy included in the study were done without any intraoperative incident.

Overall post-op complication rate is 14.5. Infectious complication was reported in 11 cases(9.4%). Persistent hematuria was reported in 4 cases(3.4%). And stent migration was reported in 2 cases.

Table5: Summary of URS Procedures in SPHMMC in 2017

Intraop findings			Anesthesia		
	Frequency	Percentage		Frequency	Percentage
Stone	85	72.6	GA	69	59
ureteral stricture	6	5.1	SA	47	40.2
missed stent from prev stenting	1	0.9	Sedation	1	0.9
false tract	1	0.9			
Procedure					
Insertion of uretroscope			Lithotripsy		
	Frequency	Percentage		Frequency	Percentage
Easy	92	78.6	done	64	54.7
Difficult	21	17.9	not done	53	45.3
Failed	4	3.4			
Stenting			Type of lithotripsy		
	Frequency	Percentage		Frequency	Percentage
Done	89	76.1	Laser	31	26.5
not done	24	20.5	Pneumatic	2	1.7
attempted but failed	4	3.4	Laser and pneumatic	3	2.6
Stone Extraction			not specified	27	23.1
	Frequency	Percentage	Other procedures done		
done	26	22.2		Frequency	Percentage
Not done	91	77.8			
Proximal dislodging			open surgery for contralateral cystoplexy	2	1.7
	Frequency	Percentage		1	0.9
done	2	1.7	stricture dilitation	1	0.9
not done	115	98.3	ureteric reimplantation	1	0.9

Of the patients included in the study 62 (53.0%) had a complaint of flank pain on their follow up visits.

The total number of days between first day of evaluation to hospital admission ranges from zero to three hundred forty two days. Mean preadmission stay is about 59.8 days with standard deviation of 64.02.

Mean hospital stay for patients included in the study is 7.18 days. Total hospital stay ranges from one day to forty one days.

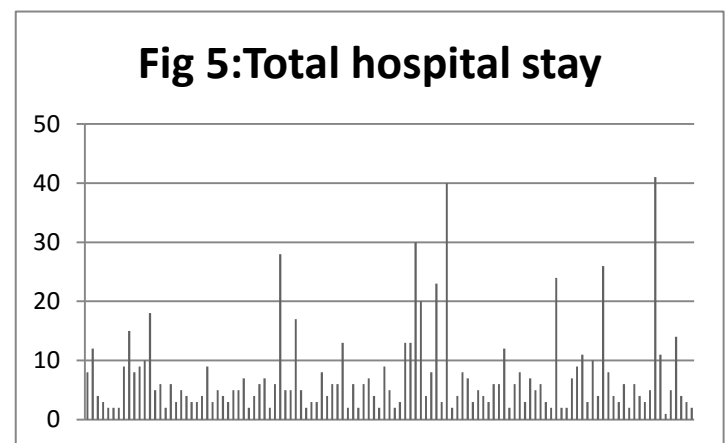
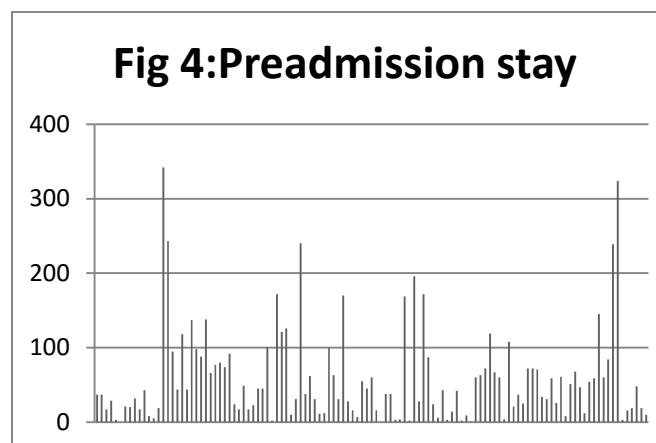
Postop stay ranged from discharge on immediate post op to 39 days. Mean post op stay was 3.2 days with standard deviation of 5.2

Stent removal ranged four days after insertion to 351 days. Mean duration before stent removal was about 53 days.

After the procedure 34 patients(29.1) underwent repeat URS. ESWL was recommended for 21 patients (17.9%). And seven patients (6.0%) underwent open surgery for treatment of urolithiasis following URS session included in the study. In 55 cases(47.0%) no further treatment was required and patients were discharged from the care.

Table6: Complications of URS procedures done in SPHMMC in 2017

Intraop Complications				Post-OP complications		
		Frequency	Percent		Frequency	Percent
Extraureteral stone migration	6	5.1		Infection	11	9.4
bleeding	2	1.7		Persistent Hematuria	4	3.4
Ureteral perforation	1	0.9		Stent Migration	2	1.7
Ureteral Avulsion	1	0.9				
mucosal injury	1	0.9				



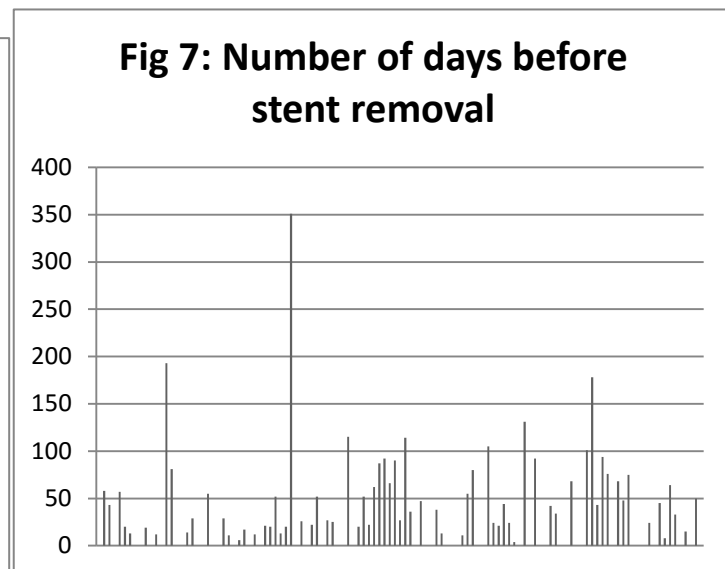
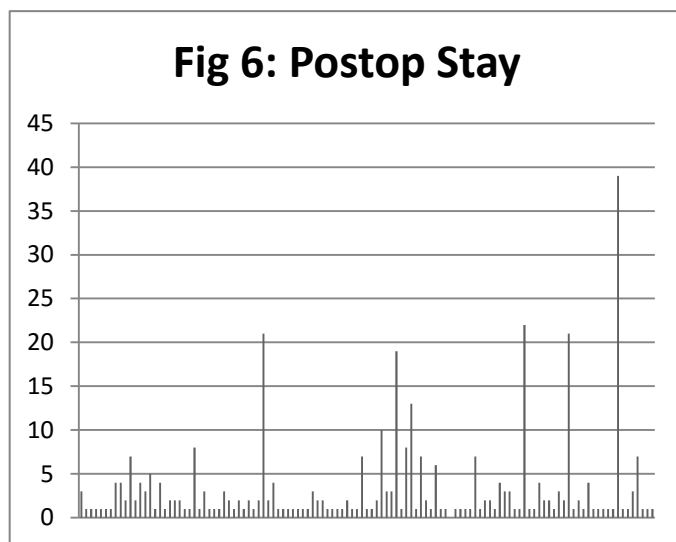


Table 7: Post op recommendation

	Frequency	Percent
Discharge	55	47
Repeat URS	34	29.1
ECSWL	21	17.9
Open Surgery	7	6

Logistic regression model was applied to check for the strength of association. The first test showed factors associated with the probability of undergoing or being discharged after the session of URS included in the study. Patients with bilateral urolithiasis were less likely to be discharged OR 0.23 with 95% CI (0.09, 0.601) and P value of 0.003.

Another test for association checked the probability of reporting flank pain during follow up visits. Patients in which additional urologic treatment was recommended were 6.67 times more likely to complain of flank pain during follow up visit with 95% CI (2.728, 16.431) and p value of <0.001.

6. Discussion

The presenting complaint in this study is overwhelmingly flank pain. This is in accordance of the pathology under study which is colicky pain due to obstruction of ureters by stones. Similar studies done in other setups also report similar figure. A study in TASH in 2011 reported 98.8% of patients who underwent URS had flank pain, which is almost similar to our setup which is 96.6%.¹¹

Urolithiasis cases managed by URS appear to be more common in younger patients. The age group between 21-30 was the commonest age group in the study done in TASH mentioned above. It represented 29.8% of the cases to undergo URS. In our setup this age group was also the commonest and accounted for 35.9% of the cases. This higher incidence can be explained by the higher number of population group they represent. It also has important implication as the morbidity incurred in this population group as well as the loss of productivity and the economic cost of diagnosing and treating these patients will have significant impact in the economy of the nation.¹¹

About quarter of patients whose session of URS was included in the study had previous treatment history for urolithiasis. This can be either due to recurrence of a successfully treated stone disease or inadequate treatment. As mentioned the most common treatment history the patients reported is open surgery. The shift to URS in these patients reflects the surgeons and patients choice to minimally invasive procedures.

More than 90% of patients included in the study were investigated by ultrasound. This figure is expected as ultrasound examination is quite accessible, doesn't need much preparation, has acceptable level of accuracy and is relatively cheap.

With regard to accuracy in diagnosis, the patients included in this study were all diagnosed preoperatively with urolithiasis, but intraoperative finding was only 72.6%. There are two ways to look at this. One is URS is an important diagnostic tool that excluded the presence of stone diseases in 27.4% of the cases. The use of URS in diagnosis of stone diseases is not unheard of. The way to look at it is 32 patients underwent unnecessary invasive surgical procedure. This number is comparable to that of TASH study mentioned. In that study 23.9% of URS had normal findings. This similarity can be explained by similar diagnostic limitations in both hospitals.¹¹

Regarding the preoperative complications, hydronephrosis as expected is the commonest. A study in Saudi Arabia reported 93% of the cases who underwent URS had some degree of hydronephrosis. This is slightly higher than our setup which is 91.5%.⁸

The other preoperative complication is renal failure. Renal failure secondary to obstructive uropathy is more likely to occur in cases of bilateral urolithiasis. This study also demonstrated this fact ($p < 0.001$). Another study from TASH on urolithiasis reported renal failure rate to be around 15%. In our setup it is slightly higher with a rate of 17.9%.¹⁰

When we come the main objective of this study, outcome of uretroscopic procedure can be viewed in different levels.

The first way of assessing outcomes is on purely on the success of inserting the uretroscope. This success rate has been the issue of many earlier studies. Improving this success rate has been central to development of the modern uretroscopes. One study in USA in the 1990s reported jump in success rate from 86% to 96% which they owed to an improved uretroscope design. Other studies also report success rate between 95 and 98%. When look at our setup the success of advancing a uretroscope in this study is 96.6%, which is quite impressive.⁶

The other way to look at outcomes is in terms of complications. One study in Romania in 2005 reported overall intraoperative complication rate of about 9.5%. The intraoperative complication rate in this study is about 9.6%. This is an encouraging result considering the experience in our setup is at an earlier stage and there is much room for improvement.⁹

When we look at the post op complication rate the contrast between our setup and a better setup becomes clearly visible. In the study in Romania mentioned above the post op complication rate is about 10.64% while in our setup it is 14.5%. The number is inflated by the rate of infectious complication rate in our setup which is 9.4% while it is 1.13% in their setup. Other post op complication rate was not that much different. For example persistent hematuria was reported in 2.04 % of procedure in Romania while it was 3.4% in this study. This finding confirms yet again that we as a developing nation can't get away from higher rate of infectious complications even in minimally invasive procedures with low risk of infection like URS. And this calls for a better infection prevention protocol in operating theaters and hospital wards during care for patients undergoing uretroscopy.⁹

The other way to look at outcomes of patients who underwent a URS procedure is by looking at their post-operative course. This is by looking at whether the patient was declared stone free and discharged or underwent another procedure. As mentioned above 25.6% of patients come with a previous unsuccessful treatment for a stone disease before the session of URS included in the study. And after the session of URS only 47% of the patients required no further treatment and discharged. In 53% of the cases the session of uretroscopy was not enough and further management was required. The study in TASH mentioned above had a discharge rate of 63.2%. Further studies are required as to why the discharge rate is poor in our hospital. One of the major findings of this study is showing the association between bilateral stones and the poor outcome of patients. Due to this fact surgeons and patients should know that one session of URS for bilateral stones won't be enough and careful management plan should be placed accordingly.¹¹

Another major finding of this study and probably the most important one is the rate of postoperative pain in patients who underwent URS in our hospital. As mentioned above almost all patients present with a complaint of pain. After undergoing several diagnostic tests, after being admitted to a hospital, after going under anesthesia and after undergoing an invasive

surgical procedure if a patient still complains of pain , it would be foolish to expect satisfaction. Post-operative pain has also been shown to be an indicator of poor treatment outcome and the need for further treatment. Whatever the case is postoperative analgesia following URS is clearly inadequate.

7. Strength and Limitations

- Strength
 - All effort was done to reduce the level of bias in this study by collecting objective data which can be checked for validity and accuracy if a need arises.
- Limitations
 - One year is very narrow to generalize the findings of this research and the get the accurate picture
 - The retrospective method utilized in this study is subject to many limitations.
 - The accuracy of the information recorded in the medical charts is questionable.
 - Due to time and budget constraints much couldn't be done to circumnavigate these limitations.

8. . Conclusion

This study assessed the outcome of cases of urolithiasis managed by ureteroscopy in SPHMMC. Clinical presentation of patients with urolithiasis was similar to other studies. The study showed once again that urolithiasis is more common in younger patients. Pain compliant was almost always present. Intraoperative success rate is almost similar to other setup. Post op complication rate is higher in patients included in the study when compared with other setups. More than half of patients included in the study underwent additional operative treatment for urolithiasis. Patients with bilateral urolithiasis are especially more likely to undergo additional treatment. The rate of pain compliant post op in this study is unacceptably high and is associated with unsuccessful URS session.

9. Recommendations

- To FMOH
 - As shown in this study huge burden of urolithiasis lies within the younger population group. The government should put effort in widening modern and effective treatment options like URS and ECSWL in other hospitals. The outcomes should also be assessed in a multicenter prospective controlled trials to improve the quality of care nationwide.
- To SPHMMC, department of Urology
 - It should take the encouraging results from this study and achieve a better quality of care provided to the patients with urolithiasis
 - Treatment options should be clearly outlined for patients with potential outcomes. Especially for patients with bilateral urolithiasis the higher probability of undergoing another procedure should be stated and management plan should be put accordingly.
 - Every effort should be put to decrease infectious complications following ureteroscopic procedures. This include strict infection prevention protocols in the operating theater and the urology ward.
 - A protocol for post-operative analgesia should be prepared . Potent analgesics should be provided to the patients following URS.
- To Other researchers
 - Further prospective controlled studies are required assessing surgical options in managing cases of urolithiasis.
 - The issues of stenting patients following uncomplicated URS is still unsettled and researchers from our hospital can contribute evidences in advancing the art of optimal URS procedure.

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Annex 1: Data collection questioner

1. Age _____
2. Sex _____
3. Address _____
4. First Date of evaluation _____
5. Date of admission _____
6. Presenting complaint
 - ☐ Flank Pain
 - ☐ Hematuria
 - ☐ Fever
 - ☐ Other _____
7. Associated complaint
 - ☐ Flank Pain
 - ☐ Hematuria
 - ☐ Fever
 - ☐ Other
8. Lab
 - ☐ BUN____ CR____
 - ☐ U/A _____
9. Imaging
 - ☐ Investigated with
 - ☐ US
 - ☐ KUB
 - ☐ IVP
 - ☐ CT
 - ☐ Other _____
 - ☐ Stone visualized
 - ☐ Yes no
 - ☐ If yes
 - ☐ Side
 - ☐ Right
 - ☐ Left
 - ☐ Bilateral
 - ☐ Location
 - ☐ Proximal
 - ☐ Middle
 - ☐ Distal
 - ☐ Other _____
10. Preoperative complication
 - ☐ Hydronephrosis
 - ☐ Renal Failure
 - ☐ infection
 - ☐ Other

Code_____

11. Date of operation_____

12. Intraop finding

- Stone present
 - Yes
 - No
- Size if mentioned_____
- Other_____

13. Procedure done

- stenting
- lithotripsy _____
- stone extraction
- proximal dislodging
- Other_____

14. Post-op recommendation

- Discharge
- Repeat URS
- ESWL
- Open surgery
- Other_____

15. Complication

- Intraop
 - Mucosal Injury
 - Ureteral perforation
 - Extraureteral stone migration
 - Ureteral avulsion
 - Bleeding
 - Other_____
- Post Op
 - Fever
 - persistent Hematuria
 - stent migration
 - other

16. Date of discharge_____

17. Date of stent removal_____