

*Original Article***Indications, Outcome and Complications of Ureteroscopy, at Gezira Hospital for Renal Diseases and Surgery, Sudan: a Seven Years 'Experience**Mustafa O Mansour¹, Sami M Taha^{2*}, AbdElmahmood Abdallah³
Mohammed El Imam¹**ABSTRACT:****Background:** Ureteroscopy (rigid and flexible) with irrigating and working channels have expanded the capability of the urologist to diagnose and treat most abnormalities of the upper tracts.**Objective:** This study was conducted as a part of holistic auditing to the services provided by Gezira Hospital for Renal Disease and Surgery (GHRD&S), and specifically to evaluate ureteroscopy done in GHRD&S with emphasis on the indications, outcome and complications.**Methods:** Across-sectional- hospital-based study was adopted. All patients who underwent ureteroscopy since the inauguration of the hospital from 2005-2011 were included.**Results:** The total number of patients satisfying the inclusion criteria was 472 with a mean age of 40.6 years. Male to female ratio was 1.46:1. The mean hospital stay was 2.74 days. The commonest indication for ureteroscopy was ureteric stone amounting (74%) to a tangible share of ureteric stenting or removal as indication were found in (56.8%) . and therapeutic ureteroscopy for (92.3%). Ureteric stricture was not uncommon (24%). The success rate of therapeutic ureteroscopy was (93.7%) with definite correlation to the site of pathology been (91.75%), (92.3 %) and (87.5%) for the lower, mid and upper ureter respectively.

The complications recorded were bleeding (3.3%), penetration (2.5 %), post-operative colic (13%) and infection (0.4%). Mortality rate was zero

Conclusion: Because the experience of ureteroscopy in GHRD&S was auspiced by regular training from the SIU the outcome is really comparable to the literature.**Keywords:** Ureteroscopy, Gezira Hospital for Renal Disease and Surgery, Wad Medani, Success and safety.

The introduction of fiberoptics ureteroscopy opened the doors to the field of ureteroscopy. Advances in rigid and flexible ureteroscopy with irrigating and working channels have

expanded the capability of the urologist to diagnose and treat most abnormalities of the upper tracts in adult and paediatric population¹.

Diagnostic ureteropyeloscopy includes abnormal imaging findings (filling defects), obstruction-determination of etiology, unilateral essential hematuria, localizing source of positive urinary cytology result, culture results, or other test results and evaluation of ureteral injuries². Therapeutic indications are urolithiasis, endoureterotomy for ureteral

1. Professor of Urology. Faculty of Medicine University of Gezira -Sudan

2. Associate professor of Urology. Faculty of Medicine University of Gezira- Sudan

3. Urologist. Gezira Hospital for Renal Disease and Surgery- Sudan

*Correspondent author: Sami MahjoubTaha .

Tel:+249128151911, E mail:samimahj@gmail.com

stricture, retrograde endopyelotomy for ureteropelvic junction obstruction, biopsy/ablation of upper tract transitional cell carcinoma and retrieval of migrated ureteral stent^{1,2}.

Diagnostic endoscopy is performed with the least possible trauma to the upper urinary tract. In a recent prospective study of 460 consecutive upper-tract endoscopies, no-touch ureteroscopy was successfully performed in most patients without prior stenting (24%) or ureteral dilatation (11%)³.

Excellent results of ureteroscopy for treatment of ureteral stones were achieved in many studies both for distal or proximal ureteral stones². The American urology Association(AUA) panel guidelines recommended ureteroscopy or shock wave lithotripsy as acceptable options for stones in the distal ureter, while recommending Extracorporeal Shock Wave Lithotripsy(ESWL), percutaneous Nephrolithotomy and ureteroscopy equally for proximal ureteral stones larger than 1 cm⁴. Stone free rates in the distal ureter exceed 95% after ureteroscopy⁵⁻⁷.

Complications of ureteroscopy intraoperatively include failure of access to the ureter, kidney or stone migration into the ureteral wall, mucosal trauma, ureteral perforation and ureteral avulsion⁸.

Early post-operative complications should be anticipated, which include: gross hematuria, renal colic, small residual stone fragments, blood clot, or ureteral edema, pyelonephritis, urinoma and ureteral stent symptoms while late complications can be due to ureteral stricture or "Forgotten" encrusted ureteral stent. However, complications during ureteroscopy have decreased over the past 20 years because of improvements in ureteroscopies, ancillary devices, intracorporeal lithotripters and surgical skills⁹.

PATIENTS AND METHODS:

This study was conducted at Gezira Hospital for renal Disease and surgery in the period from 2005 to 2011 as a cross-sectional –hospital based study. Around 513 patients underwent ureteroscopy both for diagnostic and therapeutic purposes and only 472 patients were satisfying the inclusion criteria. All patients presented to the urology department in the casualty or the referred clinic. Clinical assessment and diagnosis were done by history, clinical examination and investigations including basic laboratory investigations and imaging in the form of abdominal ultrasound, intravenous Urography and CT Urography for non-visualized kidneys in IVU.

The patient to be included in this study: Ureteroscopy procedure should be done in the hospital, elective operation, patients were on regular follow-up and the indications of ureteroscopy were include:

- 1) Ureteric stones not responding to drug expulsion therapy.
- 2) Stones which were amenable for drug expulsion therapy (DET), but there is hydronephrosis & hydroureter.
- 3) Ureteric stones more than 1 cm according to the American urological guide lines.
- 4) Lower ureteric Stricture.
- 5) Migrating Dj-catheter.
- 6) Non excreting kidney in IVU with hydronephrosis/hydroureter in abdominal ultra- sound.
- 7) Radiolucent stones.

The exclusion criteria include: tumors, sepsis and emergency ureteroscopy.

A 7.5Fr-semirigid ureteroscopy with a 4-Fr working channel was used. A written consent after describing the procedure its possible outcomes and complications was always attained. Ethical clearance from the ethical committee was granted.

The patients were submitted to spinal anesthesia and rarely general anesthesia

when spinal block fails. They were placed in the lithotomy position.

The procedures started with videocystoscopy and retrograde introduction of a guide wire in the appropriate ureter. Next dilatation of the ureteric orifice and the lower few centimeters of the ureter was performed by the ureteroscopy, which was guided by the wire and flushed with a continuous flow of distilled water using the pressure of the flow of water which is augmented by occluding the side way opening of the working channel. This will dilate the ureter. The ureteroscope was carefully advanced targeting the ureteric lumen all the time ahead. The procedure was stopped whenever there was any difficulty in advancing the ureteroscope. Dilatation for ureteral was done either by balloon or facial dilator. For stones visual estimation of the stone size and its correlation with the lumen of the ureter led us to decide upon direct extraction using Dormia basket or ureteric forceps or intracorporeal lithotripsy and fragment extraction using Lithoclast. The use of ureteral double-stent or sometimes short stenting for 48 hours with long ureteric catheter fixed externally to a Foley's catheter. The ureteroscopy procedure took one to one and half hour. Patients were discharged within 24 to 48 hours and followed up by clinical, laboratory and radiological assessment.

Data of all patients were kept in specialized forms with full detailed information ranging from identification information, case history, images, indications and outcome with brief follow up. All data were retrieved from the previous form and formatted to SPSS version 17 both dependent and independent variables were considered as significant if p value was equal to or less than 0.05. The tests applied to determine the p value were t test for two paired

means (numerical) and chi square for categorical variables. Informed consent was obtained from each subject after ethical approval of the protocol by the hospital and state ministry of health ethical committees.

RESULTS:

For the evaluation of the experience of ureteroscopy in GHRDS, a number of 472 patients were enrolled in this study in the period from 2005 to 2011. Age range between 25 to 55. Mean age is 40.61 +/- 15.1(S.D). Male: Female ratio is 1.46: 1. Mean hospital stay is 2.74 +/- 4.16(SD). Figure (1) shows the number of ureteroscopies per year was increasing.

Indications for ureteroscopy in this study were found to be as follows: Ureteric stones in (74 %), ureteric stricture in (24 %) with only one percent was reflux and migrating DJ stent, Figure (2) shows the high incidence of ureteric stones.

Post- ureteroscopy stent was inserted in 268 patients (56.8%) while 204 patients (43.2%) didn't need any stent.

The outcome of ureteroscopy in this study was found to be successful in (93.7%) and unsuccessful in (6.3%) of the interventions, because of the profound strictures on junk in the procedure, Figure (3) shows the high success rate of ureteroscopy.

The success rate was found to vary according to the site of pathology where the success rate within the lower third was (91.75%), the middle third was (92.3%) while intervention in the upper third had a success rate of (87.5%), and it was statically significant (p value 0.001). Table (1) shows this variation.

The complications of ureteroscopy were low with only (19.2%) having complications in the form of bleeding in (3.3%) of the cases, penetration in (2.5 %) of the cases, post-operative colic in (13%) and only (0.4%) of the cases had infection.

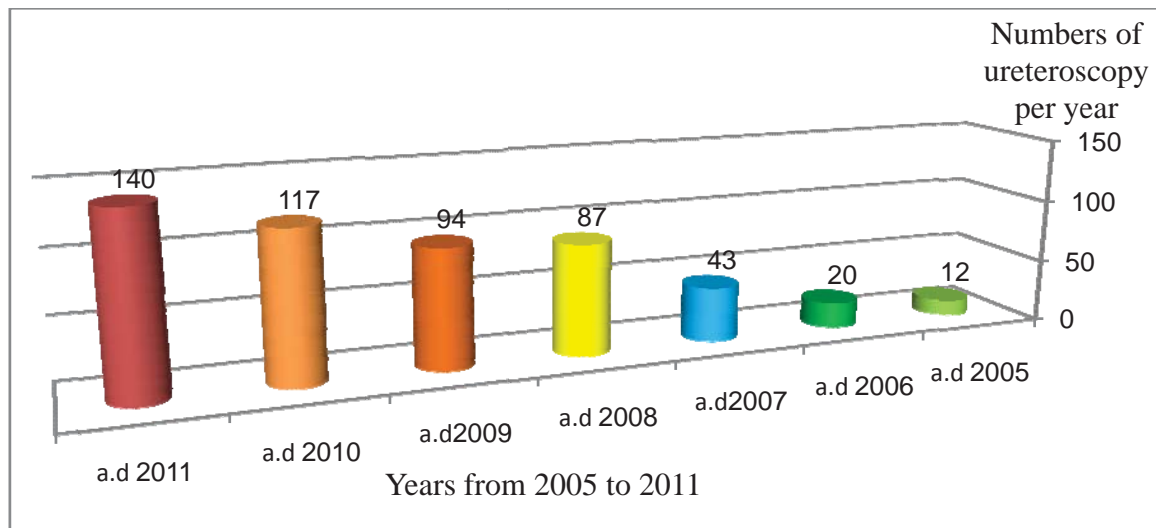


Figure (1): Distribution of ureteroscopies in the study period (2005-2011).

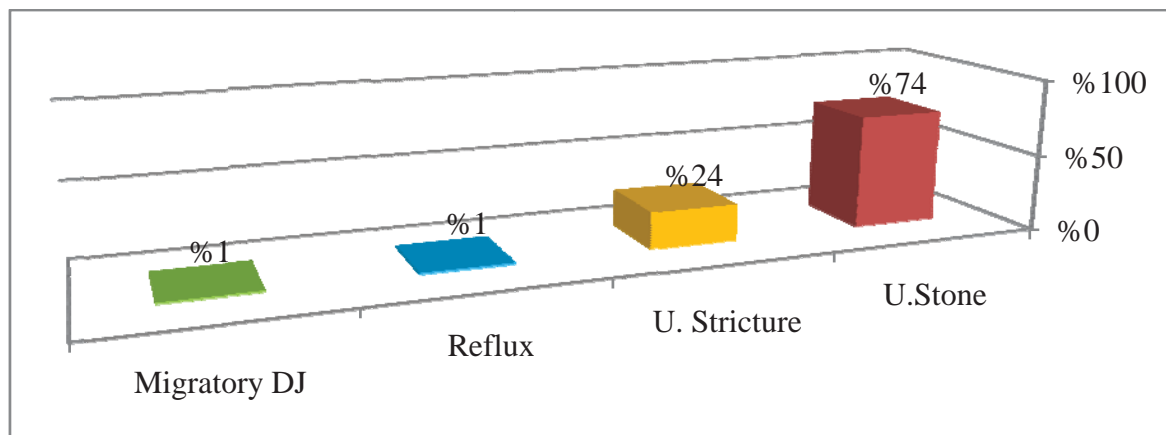


Figure (2): Indications of ureteroscopy among the studied 472 patients (2005-2011).

Figure (4) shows the lowest incidence rates of penetration and infection.

DISCUSSION:

Ureteroscopy has become a standard urological technique and is used in a wide variety of situations for diagnosis and treatment.

In this study it was found to be effective in diagnosing conditions like radiolucent stones, and strictures. More diagnostic indications can be included like evaluation of positive cytology, with normal cystoscopy, monitoring of previous upper tract transitional cell carcinoma, undiagnosed gross hematuria².

In treatment of ureteric stones we noticed

that there were higher success rates in the middle (92.3%) than in the lower (91.5%) or the upper thirds (87.5%), which differs from other studies that showed stone free

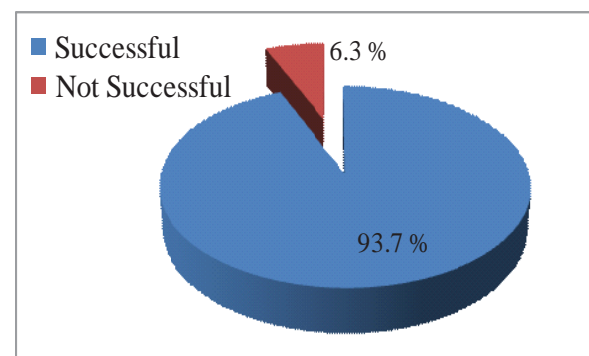


Figure (3): Outcome of ureteroscopy among the studied 472 patients (2005-2011).

rates in the distal ureter exceeding 95% after ureteroscopy⁵⁻⁷. To explain this difference we had noticed difficulties in dilatation and introduction of the ureteroscope when there is impaction of the stone at the ureterovesical junction or near it. The ureter here is very narrow so there is a very narrow space hindering the dilatation and expansion of the ureter.

In determining the factors predicting unfavorable results of semirigid ureteroscopy for ureteral calculi, El-Nahas and others¹³ showed the factors as: proximal ureteral stones, ureteroscopy done by surgeons other than experienced endourologist, stone impaction and stone width.

This matched with our results where we can explain the low rate at lower ureteric impacted stones for the difficulty in their disimpaction, disintegration and removal. The upper third stones are also one of these unfavorable factors and this also

Table (1): Relation between the site and the success rate of ureteroscopy among the studied patients (2005-2011).

Site		Successful	Not Successful	Total
Lower third	Lower third	356(91.75%)	32	388
	Middle third	48(92.3%)	4	52
	Upper third	28(87.5%)	4	32
		432	40	472

P value =0.001 and it was statistically significant

goes with our results. It has been found that stone free rates in Ureteroscopies are higher than after ESWL which has 75-97 % stone free rates¹⁴⁻¹⁷.

According to the European and American Urological Association guide lines for ureteric stone management ureteroscopy and shock wave lithotripsy are acceptable treatment choices for stones 1 cm or less in the ureter if drug expulsive therapy failed or in other certain conditions (failure of progress- persistent obstructing stone-increasing or unremitting abdominal colic). For proximal ureteric stones the European Urological Association guide lines 2010 recommend ESWL as first line therapy with ureteroscopy and antegrade ureteroscopy as acceptable other choices. While for proximal ureteric stones bigger than 1cm, ESWL and ureteroscopy all are equally viable options⁴. In our study big stones more than 2 cm are excluded,

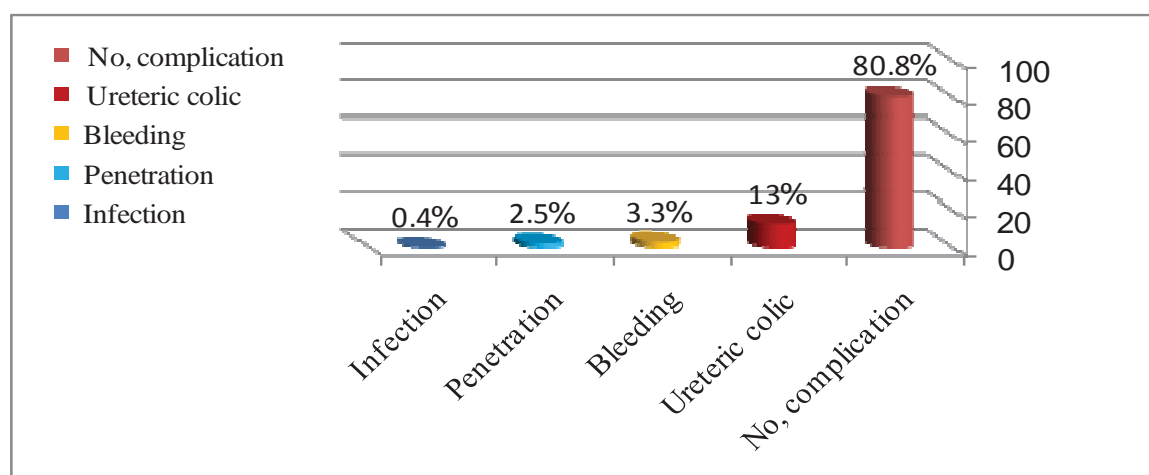


Figure (4): Complications of ureteroscopy among the studied patients (2005-2011).

to be left for ESWL which if failed open surgery would be conducted. Intra corporeal lithotripsy increases the efficacy in dealing with stones bigger than 1cm. In our study we are using pneumatic lithotripter (lithoclast) which is simple and effective especially for stones within the lower third of the ureter. It is less effective than Holmium Yag Laser, which is the current "gold standard method", because of its effectiveness in fragmenting any stone composition and has an excellent safety profile. This explains the lower success rate in our study in comparison to the rates of Holmium YAG Laser which usually exceeds 95 %.

Complications are minimal in our study and this is comparable to international results. Reviewing the literature during the last 20 years there was improvements and less complication due to the improvements in Ureteroscopies, ancillary devices, intracorporeal lithotripters and surgical skills. In 1986, Carter and colleague reported that 8% of patients suffered ureteral perforation or stricture and 3% of patients required a ureteral re-implantation. Recent experience showed that the perforation rate has decreased to between 0- 4.7 percent 10-11-12. Both the use of smaller endoscopes and the use of the Holmium Yag Laser have dramatically contributed to this improvement.

Reduction of hospital stay is a good outcome reducing the expenses. The reduction of the operating time also reduces expenses and complications. Contemporary ureteroscopies now are being carried out as a day case which indicates that now it is getting simpler and less traumatic with excellent post-operative course so the patient can go back to work in shorter time¹⁸.

Finally the overall treatment cost for patients with upper third ureteral stone was significantly higher in the ESWL group than in the URSL group but the success

rate was significantly higher in the URSL group than in the ESWL group¹⁹.

CONCLUSION:

Ureteroscopy in (GHRDS) was indicated for stone disease mostly and minimal complications were reported.

CONFLICT OF INTERESTS AND ETHICAL CONSIDERATION:

The authors declare that they have no competing interests.

FUNDING AND SUPPORT:

No official funding only contributions from the authors.

THE AUTHOR CONTRIBUTIONS:

1. Study concept and design:
 - 1) Prof:MustafaOmran
 - 2) Dr.SamiMahjoubTaha
2. Collection of data:
 - 1) Prof. MustafaOmran
 - 2) Prof.Mohammed El Imam
Mohammed Ahmed
 - 3) Dr.SamiMahjoubTaha
 - 4) Abd El Mahmoud AbdAlla
3. Analysis and interpretation of data:
 - 1) Prof:MustafaOmran
 - 2) Prof.Mohammed El Imam
Mohammed Ahmed
 - 3) Dr.SamiMahjoubTaha
 - 4) Abd El Mahmoud AbdAlla
4. Draft and revision:
 - 1) Prof.Mohammed El Imam
Mohammed Ahmed
 - 2) Dr.SamiMahjoubTaha
 - 3) Abd El Mahmoud AbdAlla

REFERENCES:

1. Johnston WK ,Springhart WP, Ekeruo WO, et al The evolution and progress of ureteroscopy UrolClin North Am. 2004 Feb;31(1):5-13.
2. Ben H,John D, Ramello A, Vitale C, MarangellaM,etal.Ureteroscopy and

- Retrograde Ureteral Access. In Wein.Campbel-Walsh Urology,9th edi.2007.
3. Johnson GB,Parcelo D, GrossoM,Bevan A, et al Advanced Ureteroscopy, wireless and sheathless. J Endourol.Aug 2006;20(8):552-5. I Association. J Urol. 1997;158(5):195-21.
 4. Ch.Turk,T.Knoll,A.Petrik,K.Saica,C.Seitz et al. Guidelines in urolithiasis April 2010.Eur Urol 2001Oct;40(4):362-71. EurUrol 2007Dec;52(6):1610-31. J Urol 2007Dec;178(6):2418-34.
 5. Peschel ,Cohen EP, Sobrero M, RoxeDMetal.Extracorporeal shock wave lithotripsy versus ureteroscopy for distal ureteral calculi. Aprospective randomized study. J Urology 1999;162: 1909-1912.
 6. StrohmaierWI, Schubert G, Rosen Kranz T, Wesgl A; Comparison of Extracorporeal shock wave Lithotripsy and ureteroscopy in the treatment of ureteric calculi. Aprospective study, EurUrol 1999;376-379.
 7. Soefr M, Waterson JD, WollinTA,etal; Holmium YAG Laser Lithotripsy for upper urinary tract calculi in 598 patients; J Urol 2002; 167:31-34.
 8. Ben H. CHEW, John D,DENSTED, Complications of ureteroscopy. In Wien: Campbel- Walsh Urology,9th edi. 2000.
 9. Carter SS, Cox R, Wilkham JE, Complications associated with ureteroscopy; Br J Urol 1986; 58: 625-628.
 10. Harman WJ, SershonPA,Blute ML, etal; Urteroscopy; Current practice and long term Complications; J Urol 1997;157: 28-32.
 11. Daneshmand S, Queck ML, Huffman JL,; Endoscopic management of upper urinary tract transitionaal cell carcinoma; long term experience. Cancer 2003;98: 55-60.
 12. BoorjianS,Ngc, Munver,etal; Abnormal selective cytology results predict recurrence of upper-tract transitional cell carcinoma treated with ureteroscopic laser ablation; J Endo urol 2004;18; 912-916.
 13. El-Nahas AR, El-Tabey NA, Eraky I, Shoma AM, El-Hefnawy AS, El-Assmy AM, Soliman S, Youssef RF, El-Kenawy MR, Shokeir AA, El-Kappany HA. Semirigidureteroscopy for ureteral stones: a multivariate analysis of unfavorable results. J Urol. 2009 Mar;181(3):1158-62. Epub 2009 Jan 18.
 14. Eden et al., 1998. Eden CG, Mark IR, Gupta RR, et al: Intracorporeal or extracorporeal lithotripsy for distal ureteral calculi? Effect of stone size and multiplicity on success rates. J Endourol 1998; 12:307-312.
 15. Park et al., 1998. Park H, Park M, Park T: Two-year experience with ureteral stones: Extracorporeal shockwave lithotripsy v ureteroscopic manipulation. J Endourol 1998; 12:501-504.
 16. NettoJúnior NR, Claro Jde A, Esteves SC, Andrade EF.Ureteroscopic stone removal in the distal ureter. Why change? -J Urol. 1997 Jun;157(6):2081-3
 17. Mohamed El Imam ,MostafaOmran,EzEldeen. B,et al .Audit of Extracorporeal shockwave Lithotripsy in 210 Sudanese Patients at Gezira Hospital for Renal Diseases & Surgery (GHRDS) Sudan. Sudan JMS ol.3,No 1, Mar 2008 pp 11-16.
 18. Bromwich EJ, Lockyer R, Keoghane SR. Day-case rigid and flexible ureteroscopy. Ann R collSurg Engl.2007 Jul;89(5):526-8.
 19. Huang CY, Chen SS, Chen LK.Cost-effectiveness of treating ureteral stones in a Taipei City Hospital: shock wave lithotripsy versus ureteroscopy plus lithoclast. Urol Int. 2009;83(4):410-5. Epub 2009 Dec 8.

