

# Ureteroscopy under General Anesthesia Versus Spinal Anesthesia: Stone Clearance and Morbidity

AFTAB AHMED CHANNA<sup>1</sup>, SHUMAILA ASHFAQ<sup>2</sup>, MUHAMMAD ZAHID AHMAD<sup>3</sup>, MUHAMMAD ASIF<sup>4</sup>, MUHAMMAD WAQAR SHAHID<sup>5</sup>, NAUMAN AHMED<sup>6</sup>

<sup>1</sup>Assistant Professor Urology, Islam Medical College Sialkot

<sup>2</sup>Assistant Professor Anaesthesia, Islam Medical College Sialkot

<sup>3</sup>Assistant Professor Urology Department Unit 2, King Edward Medical College /Mayo Hospital Lahore

<sup>4</sup>Assistant Professor Urology Department Unit 2, King Edward Medical University /Mayo Hospital Lahore

<sup>5</sup>Consultant Urologist, Hassan Gazavi Hospital Jeddah Kingdom of Saudi Arabia

<sup>6</sup>Consultant Urologist, Govt Kot Khawaja Saeed Teaching Hospital Lahore

Corresponding author: Aftab Ahmed Channa, Email: [draftab.channa@gmail.com](mailto:draftab.channa@gmail.com), Cell: 0331 8111797

## ABSTRACT

**Objectives:** To compare stone clearance by ureteroscopy carried out under General anesthesia versus Spinal anesthesia for the treatment of ureteric Stone.

**Place and duration:** For two years from Feb 2019 to Feb 2022, in the Urology department of Islam Medical College Sialkot.

**Methods:** Total 42 patients were selected for study. Males were 26, and Females were 16. Age ranges from 20 years to 56 years. All subjects endured ureteroscopic method for ureteric Stone with semi rigid ureteroscope 8/8.4 fr. The two groups of 21 patients equally were formed. Group A were given General Anesthesia and Group B receiving Spinal Anesthesia. The hospital stays, operative Time, clearance of stones, post-operative and intra operative complications were noted.

**Results:** There were 21 patients in both groups, 16 (76.2%) men in group A (general anesthesia), and 18 (85.7%) men in group B (spinal anesthesia). There were 5 (23.8%) women in A group and 3 (14.3%) women in B group. The patients mean age was 34.1 and 37.2 years in groups A and B, correspondingly. The mean size of stone was 0.80 cm in A group and in group B, it was 1.21 cm ( $p = 0.001$ ). The surgery duration in group A was  $40.9 \pm 1.30$  mints and for group B;  $31.4 \pm 2.09$  minutes ( $p = 0.031$ ). The mean stay in hospital was 20.8 and 17.4 hours in groups A (range 8 to 48 hours) and B group (range 6 to 24 hours,  $p = 0.074$ ), correspondingly ( $p = 0.073$ ). The mean visual-analog pain score was 3.2 in group A and for group B, VAS was 1.7.

**Conclusion:** In this series, ureteroscopy under spinal anesthesia shortened the duration of surgery and hospital stay and did not carry the risk of additional serious complications.

**Keywords:** Ureteroscopy (URS), Ureteric stone, General anesthesia and spinal anesthesia.

## INTRODUCTION

Ureteroscopy has been a routine urological procedure since its introduction in 1980<sup>1-2</sup>. The practice of modern equipment and innovative technology has not solitary augmented the effectiveness of the treatment, but correspondingly expanded its indications<sup>3</sup>. Endoscopic lithotripsy for management of epithelial neoplasms of the urinary tract, resection of strictures and repair of ureteropelvic junction obstruction are modern treatment methods eased by modern techniques of ureteroscopy<sup>4-5</sup>. It has been recognized as a 1<sup>st</sup> line option of treatment with 80-100% success rate in lower ureteral stones<sup>6</sup>. It is rarely cast-off for utmost upper and middle ureteral stones and extracorporeal shock wave lithotripsy is the technique of choice when available<sup>7-8</sup>. With the development of advanced surgical techniques and instruments, the complication rate of ureteropyeloscopy has decreased significantly. Current complication rates are low, 0-6% and stone removal success rate is high<sup>9-10</sup>. The practice was initially accomplished under GA, but patients also tolerate the intravenous anesthesia and spinal anesthesia as well. Possible complications of the procedure include perforation of the ureters, urinomas, stone fragments, strictures or avulsions, bleeding, septic attacks, urinary retention, pain<sup>11-12</sup>. Not treated urinary tract infection, uncorrected bleeding diathesis and endoscopy without adequate antibiotic therapy are comparative contraindications for therapeutic and diagnostic ureteroscopy. This study aims to compare stone clearance by ureteroscopy carried out under General anesthesia versus Spinal anesthesia for the treatment of ureteric Stone.

## MATERIAL AND METHODS

This was a quasi-experimental study on 42 ureteroscopic patients at the Urology department of Islam Medical College Sialkot for two years from Feb 2019 to Feb 2022. Patient data were recorded using convenience technique of sampling. Each patient was informed about the study and was able to choose the anesthesia type to be given. Every patient left the best decision to the anesthesiologist and surgeon. All patients (20-56 years) with lower ureteral stones, stones under the sacroiliac joint on radiography,

were involved in the analysis. The people with upper ureter lithiasis, bleeding, urinary tract infection, ASA categories III and IV, open surgery, and any comorbidities in which general or spinal anesthesia could not be given were omitted from the study. Each removed stone was sent for chemical examination to determine its category. 21 patients received spinal anesthesia and the residual 21 patients were operated under general anesthesia. The anesthesia type was chosen conferring to the choice of patient and the anesthetist's preferences. Maximum of the patients were hospitalized the morning of operation and stayed overnight after surgery. The complete hospital stay was recorded in all cases. The antibiotics were routinely administered prophylactically to every subject. Rigid cystoscopy was performed in all patients by inserting the guide wire into the renal system under fluoroscopy. The 8/8.4 Fr semi-rigid ureteroscope was used in all cases. The opening of the ureter dilated with balloon when the ureteroscope cannot easily pass through the ureter. The stones were fragmented with a pneumatic lithoclast. After the operation, a stent was positioned according to the surgeon's decision. In all cases, surgical time, definite as the time from insertion of the cystoscope to definitive retraction of the ureteroscope, was documented. For intraoperative complications; patients were kept under observation. Fragmentation and clearance of stone in all cases was evaluated by KUB radiography and/or excretory urography (in the case of radio-translucent stones). All subjects were assessed for postoperative complications such as fever, pain, hematoma formation, infection and residual stones causing obstruction. Visual analog pain scores were documented in all patients after surgery. Blood culture and sensitivity were sent when infection was supposed. Abdominal U/S is planned for symptomatic patients due to abdominal swelling or hematoma formation. In all cases, total hospital stay was considered in hours. It was definite as the time from admission to the patient discharge. Morbidity was definite as the patient's overall health, length of hospital stays, postoperative complications (fever and pain), and anesthesia-associated complications (headache and vomiting). The clearance of stone was definite as the absenteeism of stone residue at initial follow-up at postoperative day 7, as confirmed by postoperative

kidney/bladder radiography (KUB) or intravenous urography (IVU). All data were recorded and statistically analyzed in SPSS 23.0 for comparison of the results for stone clearance and morbidity. Continuous response variables such as stone size, operation time and length of hospital stay are presented as mean ± SD. Student's t-test was used for the means comparison among the two groups.

**RESULTS**

42 patients were randomly designated for spinal or general anesthesia with informed consent. In every case, the indication for the procedure was urolithiasis. Both groups consisted of 21 patients and these were then compared for operative time, operative success, complications and hospital stay. There were 16 (76.2%) men in group A (general anesthesia), and 18 (85.7%) men in group B (spinal anesthesia). There were 5 (23.8%) women in A group and 3 (14.3%) women in B group (Table 1).

Table 1: Clinical features of the patients

	Males	Females
General Anesthesia group	16 (76.2%)	5 (23.8%)
Spinal Anesthesia group	18 (85.7%)	3 (14.3%)
Mean age		
General Anesthesia group	34.1 years	
Spinal Anesthesia group	37.2 years	
Surgery Duration		
General Anesthesia group	40.9 ± 1.30 mints	
Spinal Anesthesia group	31.4 ± 2.09 minutes	
visual analog score		
General Anesthesia group	3.2 ± 0.92	
Spinal Anesthesia group	1.7 ± 0.78	

The patients mean age was 34.1 and 37.2 years in groups A and B, correspondingly. The mean size of stone was 0.80 cm in A group and in group B, it was 1.21 cm (p = 0.001). The surgery duration in group A was 40.9 ± 1.30 mints and for group B; 31.4 ± 2.09 minutes (p = 0.031). The mean stay in hospital was 20.8 and 17.4 hours in groups A (range 8 to 48 hours) and B group (range 6 to 24 hours, p = 0.074), correspondingly (p = 0.073). Stone removal was efficacious in all patients. In Group A, all 21 post-operative patients have pain with a mean visual analog score of 3.2 ± 0.920 (range 2 to 5), with "0" not at all pain and "10" maximum pain (Figure 1).

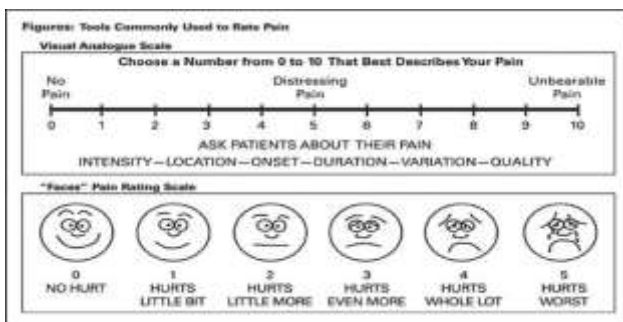


Table 2: Post-operative complications

Fever		
General Anesthesia group	4	19.1%
Spinal Anesthesia group	2	9.5%
Urinary tract infection		
General Anesthesia group	2	9.5%
Spinal Anesthesia group	0	0

All subjects were given intravenous or oral analgesia. 4 (19.1%) subjects established fever with a mean temperature of 38.6 °C (range 38 to 40 °C) in GA group. Urinary tract infection developed in 2 patients (9.5%), and antibiotic therapy was given conferring to culture/sensitivity. No obstruction or hematoma was observed in any patient after the procedure. All patients in group B have pain post-operatively with a mean VAS of 1.8 ± 0.73 (range

1-3). No other complication was observed in any of the cases except 2 (9.5%) patients who developed fever.

**DISCUSSION**

Ureteroscopy is a simple and safe practice accomplished by urologists. The communal sign is the treatment of unsuitable or resistant urinary tract stones, especially in extracorporeal shock wave lithotripsy<sup>13</sup>. Other common indications include evaluation of abnormal change in the results of less invasive imaging tools such as UTI source location, MRI, CT scan, or positive urine cytology or culture. The method can be cast-off for a number of minimally invasive procedures, including lower and upper urinary tract stones, urethral stricture, numerous local malignancies and pelvi-uretric junction obstruction<sup>14</sup>. Main intraoperative problems comprise extensive tissue trauma resulting in extensive wall perforation, separation, or migration of foreign bodies (eg, stones) into the wall of ureter. These complications incidence has declined significantly and now happens in about 1% of all procedures of ureteroscopy. With advances in inpatient infrastructure and techniques, the procedure can be accomplished as an outpatient surgical practice, with 80-94% of patients being directed home the similar day<sup>15-16</sup>. Conventionally, the method is accomplished under GA with paralysis of the muscles to evade possible damage to the ureter due to sudden and unexpected movements of the patient. However, many independent studies have proven that spinal and epidural anesthesia are equally safe<sup>17-18</sup>. Although some investigators have efficaciously used local or epidural anesthesia in combination with IV sedation, the usage of intravenous sedation solitary has also revealed better outcomes in some described studies using the flexible ureteroscope<sup>19</sup>. The ureteroscopic procedure outcome depends on the primary disease and whether therapeutic or diagnostic endoscopy is accomplished<sup>20</sup>. Postoperatively, the mean visual-analog pain score was 3.2 in group A and for group B, VAS was 1.7.

Pain is the most common problem after surgery. All patients received oral analgesia (50 mg diclofenac sodium twice daily for three days) in addition to a single intravenous injection of pethidine instantly afterwards the surgical procedure. 4 (19.1%) patients from A Group and 2 (9.5%) patients from Group B established postoperative fever and were managed with oral antipyretics. UTI developed in one patient who was operated under GA and was treated appropriately. Serious complications such as urinary retention, hematoma, ureteral perforation or displacement were not observed in either group<sup>21-22</sup>. All patients who underwent spinal anesthesia were satisfied with the procedure and the result. When the stone fragments were displayed on the endoscope camera monitor, his confidence in handling the stone increased<sup>23-24</sup>.

**CONCLUSION**

Spinal anesthesia is a safe technique of ureteroscopy for stones in the lower ureter. As practical in this study, the hospital stay and operation time are shorter than general anesthesia and there is no risk of serious complications. Patient satisfaction is significant and postoperative pain is minimal in this analysis.

**REFERENCES**

1. Shaikh AH, Khalid SE, Zaidi SZ. Ureteroscopy under spinal versus general anaesthesia: morbidity and stone clearance. J Coll Physicians Surg Pak. 2008 Mar 1;18(3):168-71.
2. Singh I, Kumar A, Kumar P. "Ambulatory PCNL"(tubeless PCNL under regional anesthesia)—A preliminary report of 10 cases. International urology and nephrology. 2005 Mar;37(1):35-7.
3. Zeng G, Zhao Z, Yang F, Zhong W, Wu W, Chen W. Retrograde intrarenal surgery with combined spinal-epidural vs general anesthesia: a prospective randomized controlled trial. Journal of Endourology. 2015 Apr 1;29(4):401-5.
4. Darisetty S, Tandan M, Reddy DN, Kotla R, Gupta R, Ramchandani M, Lakhtakia S, Rao GV, Banerjee R. Epidural anesthesia is effective for extracorporeal shock wave lithotripsy of pancreatic and biliary calculi. World journal of gastrointestinal surgery. 2010 May 27;2(5):165.

5. Symons S, Biyani CS, Bhargava S, Irvine HC, Ellingham J, Cartledge J, Lloyd SN, Joyce AD, Browning AJ. Challenge of percutaneous nephrolithotomy in patients with spinal neuropathy. *International journal of urology*. 2006 Jul;13(7):874-9.
6. Tandan M, Reddy DN, Santosh D, Reddy V, Koppuju V, Lakhtakia S, Gupta R, Ramchandani M, Rao GV. Extracorporeal shock wave lithotripsy of large difficult common bile duct stones: efficacy and analysis of factors that favor stone fragmentation. *Journal of gastroenterology and hepatology*. 2009 Aug;24(8):1370-4.
7. Bosio A, Alessandria E, Vitiello F, Vercelli E, Agosti S, Gontero P. Flexible Ureterorenoscopy under Spinal Anesthesia: Focus on Technique, Results, Complications, and Patients' Satisfaction from a Large Series. *Urologia Internationalis*. 2022;106(5):455-60.
8. Parikh DA, Patkar GA, Ganvir MS, Sawant A, Tendolkar BA. Is segmental epidural anaesthesia an optimal technique for patients undergoing percutaneous nephrolithotomy?. *Indian Journal of Anaesthesia*. 2017 Apr;61(4):308.
9. Dar MA, Malik SA, Dar YA, Wani PM, Wani MS, Hamid A, Khawaja AR, Sofi KP. Comparison of percutaneous nephrolithotomy under epidural anesthesia versus general anesthesia: A randomized prospective study. *Urology Annals*. 2021 Jul;13(3):210.
10. Nouralizadeh A, Ziaee SA, Hosseini Sharifi SH, Basiri A, Tabibi A, Sharifiaghdas F, Kilani H, Gharaei B, Roodneshin F, Soltani MH. Comparison of percutaneous nephrolithotomy under spinal versus general anesthesia: a randomized clinical trial. *Journal of Endourology*. 2013 Aug 1;27(8):974-8.
11. Gupta R, Mahajan A. Outcomes of percutaneous nephrolithotomy in elderly versus young patients under regional anesthesia: A comparative study. *Urology Annals*. 2020 Jul;12(3):254.
12. Kamal M, Sharma P, Singariya G, Jain R. Feasibility and complications of spinal anaesthesia in percutaneous nephrolithotomy: our experience. *Journal of clinical and diagnostic research: JCDR*. 2017 Jun;11(6):UC08.
13. Moslemi MK, Mousavi-Bahar SH, Abedinzadeh M. The feasibility of regional anesthesia in the percutaneous nephrolithotomy with supracostal approach and its comparison with general anesthesia. *Urolithiasis*. 2013 Feb;41(1):53-7.
14. Chen Y, Zhou Z, Sun W, Zhao T, Wang H. Minimally invasive percutaneous nephrolithotomy under peritubal local infiltration anesthesia. *World journal of urology*. 2011 Dec;29(6):773-7.
15. Tandan M, Reddy DN. Extracorporeal shock wave lithotripsy for pancreatic and large common bile duct stones. *World journal of gastroenterology: WJG*. 2011 Oct 21;17(39):4365.
16. Goel MC, Ahlawat R, Bhandari M. Management of staghorn calculus: analysis of combination therapy and open surgery. *Urologia internationalis*. 1999;63(4):228-33.
17. Izol V, Aridogan IA, Borekoglu A, Gokalp F, Hatipoglu Z, Bayazit Y, Zeren S. Percutaneous nephrolithotomy in prone position in patients with spinal deformities. *International journal of clinical and experimental medicine*. 2015;8(11):21053.
18. Prabhakar M. Retrograde ureteroscopic intrarenal surgery for large (1.6-3.5 cm) upper ureteric/renal calculus. *Indian Journal of Urology: IJU: Journal of the Urological Society of India*. 2010 Jan;26(1):46.
19. Pu C, Wang J, Tang Y, Yuan H, Li J, Bai Y, Wang X, Wei Q, Han P. The efficacy and safety of percutaneous nephrolithotomy under general versus regional anesthesia: a systematic review and meta-analysis. *Urolithiasis*. 2015 Oct;43(5):455-66.
20. Mehrabi S, Zadeh AM, Toori MA, Mehrabi F. General versus spinal anesthesia in percutaneous nephrolithotomy. *Urology journal*. 2013 Jan 1;10(1):756-61.
21. Lingeman JE, Newman D, Mertz JH, Mosbaugh PG, Steele RE, Kahnoski RJ, Coury TA, Woods JR. Extracorporeal shock wave lithotripsy: the Methodist Hospital of Indiana experience. *The Journal of urology*. 1986 Jun 1;135(6):1134-7.
22. Laing KA, Lam TB, McClinton S, Cohen NP, Traxer O, Somani BK. Outcomes of ureteroscopy for stone disease in pregnancy: results from a systematic review of the literature. *Urologia Internationalis*. 2012;89(4):380-6.
23. Kumawat T, Kothari V, Priyadarshi S, Mistry T, Morwal S. A randomized study comparing the efficacy and safety of epidural anesthesia versus general anesthesia in patients undergoing percutaneous nephrolithotomy. *Ain-Shams Journal of Anaesthesiology*. 2016 Jul 1;9(3):353.
24. Shoma AM, Eraky I, El-Kenawy MR, El-Kappany HA. Percutaneous nephrolithotomy in the supine position: technical aspects and functional outcome compared with the prone technique. *Urology*. 2002 Sep 1;60(3):388-92.