

ENDOSCOPIC MANAGEMENT OF UPPER URETERIC AND RENAL PELVIC STONES WITH SEMIRIGID URETERORENOSCOPE UNDER SPINAL ANAESTHESIA

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ABSTRACT

Background: Ureterorenoscopy is acknowledged as a minimally invasive and easily accessible technique characterized by low morbidity, positive outcomes, and swift postoperative recovery.

Objective: To manage upper ureteric and renal pelvic stone, ESWL and flexible URS is preferred choice.

Aim: To demonstrate that we can treat upper ureteric and renal pelvic stones, smaller than 2cm, by semirigid URS and these patients can be operated under spinal anaesthesia especially in patients where general anaesthesia is high risk.

Method: It was retrospective study to analysed the data of 132 patients admitted between 1st January 2021 to 31st December 2023.

Results: In 79 (59.84%) patients the stone was located in proximal ureter while in 53 (40.15%) patients it was in renal pelvis. The stone free rate was 79.54% (n=105) after first intervention. In remaining 27 patients 7 patients required ESWL, 8 patients required second session of URS and in 13 patients there was spontaneous passage of stone. Post operatively mild haematuria developed in 21 patients, fever in 18 patients and sepsis in 2 patients.

Conclusion: Semirigid URS and Spinal anaesthesia is equally good treatment option for stones present in proximal ureter or renal pelvis, especially in developing countries where financial resources are limited.

KEYWORDS: Spinal Anaesthesia, Proximal Ureteric Stone, Renal Pelvic Stone, Semirigidureterorenoscopy

Article History

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INTRODUCTION

Urolithiasis exhibits diverse prevalence and geographic distribution worldwide. Central Europe, the Mediterranean, Scandinavian nations, the British Isles, Australia, a small portion of China, Malaysia, the West Indies, and Pakistan are regions with a notably elevated prevalence of calculi. Nephrolithiasis, also known as urolithiasis, represents a considerable global health concern owing to its rising incidence and recurrence rates.[1] The prevalence ranges from 1% to 5% in Asia, 7% to 13% in North America, and 5% to 9% in Europe. About 12% of the worldwide population, inclusive of all ages, genders, and ethnicities, is affected by urinary calculi. Although it was previously shown that men were more susceptible to nephrolithiasis than women, this discrepancy is currently decreasing. The incidence of nephrolithiasis has markedly risen in various Asian nations, including Japan (from 4.3% to 9.0%), South Korea (from 3.5% to 11.5%), China (from 4% to 6.4%), and Thailand (from 1.4% to 16.9%).[2]

The Asian continent is considered to have the highest occurrence of calculi in persons. The prevalence of urolithiasis in the worldwide adult population is roughly 10% during a lifetime. Individuals between the ages of 20 and 50 are primarily affected, and the patient demographic has been rising in recent years.[3] The rising incidence of nephrolithiasis places a significant strain on healthcare systems and associated costs in affluent nations, especially when those with obesity and diabetes demonstrate a greater likelihood of getting this condition.[4] Approximately 25% of persons with urolithiasis will necessitate active intervention, but about 50% of those with kidney stones may exhibit symptoms, including renal pain. Individuals with kidney stones may experience serious problems such as intractable pain, infection, hematuria, reduced renal function, and end-stage renal disease. Among patients from whom the initial stone was successfully removed, 50% would thereafter develop another stone within five years.[5]

In certain areas of world, urolithiasis is very common and often it needs surgical intervention. For the management of urolithiasis extracorporeal shockwave lithotripsy (ESWL), retrograde intrarenal surgery (RIRS) and percutaneous nephrolithotomy (PCNL) are recommended for stone of different sizes. To treat the stone present at upper ureter, ESWL and flexible ureterorenoscopy (FURS) are recommended.[6] The selection of treatment option for urolithiasis is based on the size of stone, its location and density, general condition of the patient, the choice of patient, the experience of urologist, and the availability of equipment. There are advantages and disadvantages of each intervention just like other procedures.

The prevalence of urolithiasis is more in fourth and sixth decade of life. This age groups face more comorbidities as compared to others. As a result, the risk of complications related to anaesthesia increases in the presence of these comorbidities. In patients who are at high risk of general anaesthesia, the preferred method is regional anaesthesia such as spinal anaesthesia.[7] However, for surgical management of upper urinary tract stones (such as RIRS and PCNL), general anaesthesia is a more preferred method. The PCNL can be performed comfortably under general anaesthesia or spinal anaesthesia or a combination of spinal and epidural anaesthesia or epidural anaesthesia alone. While performing PCNL, the advantage of general anaesthesia may be a better control on the breathing of patient which improves the comfort of the patient. However, there are certain known complications of general anaesthesia such as drug reaction, atelectasis and postoperative nausea or vomiting.[8],[9] Moreover, in the presence of severe comorbidities the general anaesthesia is not a safe option for the patient. On the bases of available data, it has been established that regional anaesthesia has some advantages on general anaesthesia in RIRS and PCNL.[10],[11]

Our aim of study is to demonstrate that surgical management of stone present at upper ureter and renal pelvis can be done under regional anaesthesia by using semirigid ureterorenoscope and holmium laser.

MATERIAL AND METHOD

Approval from ethical committee was taken by letter number 16/24 dated 01-07-2024.. Total 132 patients were included in this study. These patients have stone in proximal ureter or renal pelvis smaller than 2cm. These patients were operated using semi-rigidureterorenoscope and Holmium Laser under spinal anaesthesia. It is a retrospective study and the patient operated during 1st January 2022 to 31st December 2023 at Social Security Teaching Hospital, Lahore was included in this study. All the patients were operated under Spinal Anaesthesia (Regional Anaesthesia). The inclusion criteria were, age more than 18 years, proximal or pelvic stone size less than 2cm. While the exclusion criteria was set as those patients who did not give consent for spinal anaesthesia , history of bleeding disorders or the patient was on anticoagulants, patients with any spinal deformity, local or systemic infection, pregnancy or breast feeding and where spinal anaesthesia was ineffective and procedure was converted to general anaesthesia.

Spinal anaesthesia was given by injecting 2ml of 0.5% Bupivacaine along with 25mg of Fentanyl between L3 and L4 space. Before giving spinal anaesthesia injection Midazolam, 0.03mg/kg, was given intravenously. The subarachnoid area was reached through interstitial space of L3 and L4 vertebra in midline. When clear fluid came in the spinal needle then anaesthetic drug was injected. To confirm the effect of anaesthesia and analgesia up to 10th thoracic dermatome, a pinprick test was done. After satisfactory sensor and motor block, the procedure was allowed to start. The operation time was set to two hours at maximum. If there were unsolicited complaints just like nausea or vomiting these were managed and for additional analgesia opioids or sedation was given.[12]

Two well experienced urologists performed surgeries by using 8/12 semirigidureterorenoscope and 15W holmium laser. Residual stones, if extracted, were advised for a stone analysis. A 6Fr double J stent was inserted post operatively in all patients and this stent was removed after three weeks. A CT without contrast scan was done at fourth week and if no residual stone was found, the patient was declared as stone free. If there was residual stone then a further plan was given to patient according to size and site of stone. All the demographic data of patient along with stone size, site, operation time, residual stone, operative complications were noted and prepared for analysis.

All the data collected was entered and frequencies of all quantitative variables were calculated by using SPSS version 22.0.

RESULTS

Total 132 patients were included in the study. Among them 96 (72.2%) were male while 36 (27.27 %) were female. Their mean age was 46.6 ± 3.9 years. In 72 (54.54%) patients the renal stone were on left side while in 60 (45.45%) the stones were on right side. Proximal ureteric stones were present 79 (59.83%) patients while renal pelvic stones were present in 53 (40.15%) patients. In 113 (85.6%) patients there was single stone and in 19 (14.39%) patients there were two stones. The mean size of stone was 1.06 ± 0.27 cm (Table 1). In 108 (81.81%) patients the stone was accessed in first attempt while in remaining 24 (18.18%) of patients, a double J stent was placed and second attempt was done after three weeks. The mean operation time was 50.26 ± 12.25 minutes. Among all patients, post operatively, 105 (79.54%) were declared as stone free and in 27 (20.45%) there was residual stone. The mean size of residual stone after first intervention was 4.8 ± 0.27 mm (Table 2). Among these patients with residual stones, 12 patients passed stone spontaneously or with help of expulsive therapy, 7 patients were advised ESWL and 8 patents needed a second session of URS. There was significant no per operative complication. Post operatively 21 (15.9%) patients developed mild haematuria which did not required any blood

transfusion, 18 (13.63%) developed fever and in 4 (1.5%) sepsis developed which was managed by giving good coverage of antibiotics (Table 2). The mean hospital stay of patients was 2.03 ± 1.00 days.

Table 1: Demographic Data

| | | |
|---------------------------------|---------------------------------|---------------------------|
| Total Number of Patients | 132 | |
| Gender | M: 96 (72.72%). | F: 36 (27.27%) |
| Age | 46.6 \pm 3.9 years | |
| Site of Stone | Proximal Ureteric: 79 (59.84%). | Renal Pelvic: 53 (40.15%) |
| Size of Stone | 1.06 \pm 0.27 (0.5-1.7) cm | |

Table 2: Data of Surgical Procedure and Complications

| | | | |
|---|---------------------------|--------------------------|-------------------------|
| First attempt to access stone | 108 (81.81%) | DJ Stunting: 24 (18.18%) | |
| Stone free rate in first attempt | 105 (79.54%) | | |
| Size of residual stone | 4.8 \pm 0.27 mm | | |
| Operation Time | 50.26 \pm 12.25 minutes | | |
| Secondary Treatment | ESWL: 7 | Second URS: 8. | Spontaneous Passage: 13 |
| Final Stone Free Rate | 122 (92.4%) | | |
| Complications: | | | |
| • Haematuria | 21 (15.9%) | | |
| • Fever | 18 (13.63%) | | |
| • Sepsis | 2 (1.5%) | | |

DISCUSSION

In the surgical management of upper ureteric and renal pelvic calculi, Extracorporeal Shock Wave Lithotripsy (ESWL) and Retrograde Intrarenal Surgery (RIRS) with a ureterorenoscope are employed. RIRS is gaining more popularity daily due to technological advancements.[13] RIRS is anticipated to become the preferred treatment option in the future due to its low complication rates and high success rates.[14],[15] Conversely, flexible URS is economically efficient with restricted operational duration. The upper ureteric and renal pelvic stones can be accessible with semi-rigid ureteroscopy. Previous studies indicate that the stone-free rate following ESWL for proximal ureteric stones is 63.9%, whereas for renal pelvic stones, it is 70.8%.The stone-free rate of retrograde intrarenal surgery (RIRS) for upper ureteric stones is 67.7%, whereas for renal pelvic stones, it is 85%.In a comparison study by Aboutaleb H et al., the success rate for ESWL was 59%, whereas for URS it was 86.4%.Mursi et al. and Kozyrakakis et al. also employed semirigid and a mix of semirigid and flexible ureteroscopes.[6] In our study the stone free rate was 81.81% after first procedure. By managing the residual stones with additional interventions, the final stone free rate was 96.2%.

The application of semirigid ureterorenoscopy in the treatment of proximal ureteral and renal pelvic calculi is a secure approach with a minimal incidence of complications. Our investigation revealed mild hematuria in 15.9% of patients, fever in 18%, and sepsis in 1.5%. Zeng et al. reported that febrile urinary tract infections constituted 8.8%.In the meta-analysis conducted by Zheng et al., the bleeding rate was 0.5%.[6] Bekir Aras et al. reported these problems at a rate nearly identical to that observed in our study. [6]

The 2022 EAU Urolithiasis Guidelines indicate that both local anesthesia and sedation are viable options for retrograde stone removal; nonetheless, the majority of patients still receive general anesthesia. SA decreases anesthetic expenses and length of hospital stay in comparison to GA.[16] Typically, the anesthesiologist for expedited endoscopic operations recommends spinal anesthesia (SA) because to its reduced risks of allergic, vascular, pulmonary, and neurological complications, and in contrast to general anesthesia (GA), it does not entail the danger of intubation-related

issues.[17],[18]Our study is also a contribution in this small group where we concluded that upper ureteric and renal pelvic stones can be treated with semirigid URS under spinal anaesthesia.

CONCLUSION

The surgical management of stones present at upper ureter and renal pelvis by semirigid URS under spinal anaesthesia is a preferred approach especially in developing countries where financial resources are limited and disease burden is high.

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