

## Comparing non-stented, stented and intra ureteral bupivacaine instillation treatment after ureteroscopic stone fragmentation

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**Objective:** To determine the most optimum bupivacaine therapy after a ureteroscopic stone fragmentation.

**Methodology:** One hundred consecutive patients at Asian Institute of Medical and Health Sciences between May 2017 to October 2019 who underwent uncomplicated ureteroscopic intracorporeal lithotripsy participated in this study. The patients had stone size between 5-12mm. Ureteroscopy was carried out with 8.5 F rigid endoscope, where pneumatic lithotripter was used as the source of energy. Patients had stent and bupivacaine instillation or only ureteric bupivacaine. All patients were evaluated for supra pubic and flank pain, symptoms of irritation, peritonism, analgesic use frequency, infection of urinary tract, hospitalization duration, post discharge analgesic usage, post discharge visit (due to renal colic), readmission and residual

stones.

**Results:** Patients with both stent and bupivacaine instillation, only one patient had moderate pain while five patients reported only mild pain. Combination of instillation of bupivacaine and stent placement had relatively lower frequency of urinary tract symptoms at one-week postoperative follow-up ( $p=0.001$ ).

**Conclusion:** A combination of bupivacaine instillation and stent placement lowered the frequency of postoperative pain among patients undergoing ureteroscopy. However, a thorough exploration with longitudinal studies is needed to ensure the efficacy of such interventions and improve patient outcome, postoperatively. (Rawal Med J 202;46:75-78).

**Keywords:** Bupivacaine instillation, postoperative pain, ureteroscopic stone fragmentation.

## INTRODUCTION

In recent decades, the global prevalence of kidney stones has been increasing. As demonstrated in a recent NHANES study, 10.6% was the recorded prevalence in males and 7.1% in females.<sup>1</sup> Ureteroscopy has been popular since the 1980s for both diagnosis of intra-renal conditions and removal of stones from the kidney and ureter. Since the rigid ureteroscope was first introduced in 1980, we have seen many technological advances in the design and size of the scopes, energy sources used to break the stone, retrieval baskets, access methods, development of new techniques and training imparted to surgeons.<sup>2</sup> This procedure may often result in some degree of ureteral trauma. Some of the consequences secondary to ureteral trauma include swelling, obstruction of the ureter, and flank pain. These complications may often require subsequent interventions such as secondary placement of ureteral stent and hospital admission.

Temporary ureteral stents may be placed prophylactically, but the medical utility of doing so remains unclear.<sup>3</sup> During the procedure, a small, pliable tube is placed from the kidney to the bladder.<sup>4</sup> Stents allow unhindered access of urine from kidney to the bladder even in the instance that obstruction follows the ureteroscopic procedure.<sup>5</sup> Urolithiasis guidelines state that routine stenting is contraindicated for uncomplicated procedures. However, there is inconsistency in literature regarding the optimum management followed by routine urological procedure.<sup>6,7</sup>

There is no general agreement that out of non-stented, stented or intra ureteral bupivacaine instillation treatment after ureteroscopic stone fragmentation which provide the greatest relief from pain and other complications.<sup>8-10</sup> The current study was undertaken to compare the postoperative pain in non-stented, stented and intra ureteral bupivacaine instillation treatment after a

ureteroscopic stone fragmentation procedure in our populations.

## METHODOLOGY

The data for this study were collected at Asian Institute of Medical and Health Sciences (AIMS), a tertiary care hospital in Hyderabad. One hundred consecutive patients between May 2017 to October 2019 who underwent uncomplicated ureteroscopic intracorporeal lithotripsy were included in the study. Patients with elevated serum creatinine ( $>2\text{mg/dl}$ ), urinary tract infection (UTI), congenital anomalies or previous pyelo-uretral surgery, severe obesity, and severe skeletal malformations were excluded from the study. Patients have been diagnosed with the stone size between 5-12mm.

Ureteroscopy was carried out with 8.5 F rigid endoscope, where pneumatic lithotripter was used as the source of energy. After the stone fragmentation, patients were divided into four groups, randomly as follows: In Group A, 5F polyurethane catheters were passed through the ureter with the end attached to a 16F Foleys, which was removed after 24 hours, in Group B, Intra ureteral 10 cc (un-diluted) bupivacaine instillation was done, in Group C, neither stent nor instillation of local anesthetic was performed and in Group D, both instillation of bupivacaine and stent was placed.

We used visual analog scale (VAS) for determining pain. All patients were evaluated for supra pubic and flank pain, symptoms of irritation, peritonism, analgesic use frequency, infection of urinary tract, hospitalization duration, post discharge analgesic usage, post discharge visit (due to renal colic), readmission and residual stones. Patients were requested to visit regularly for follow-ups and the severity of their pain and other complications were documented on a predefined proforma.

**Statistical Analysis:** Statistical analysis was performed using SPSS version 26.  $p < 0.05$  was considered significant.

## RESULTS

Out of 100 patients, 70(70%) were male and 30(30%) female. The further break-up of patients was done in four groups (Table 1). It was observed that in group D with bupivacaine instillation as well

as ureteral stent, comparatively fewer patients complained of pain at one-week postoperatively ( $p < 0.0001$ ) (Table 2). However, there was no difference in the perception of pain among the other three groups ( $P > 0.05$ ) (Fig.).

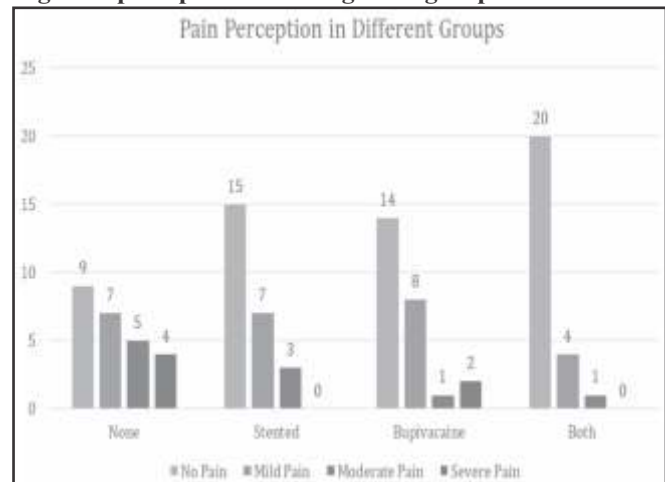
**Table 1. Gender distribution according to the groups (n=100).**

Group	Gender	
	Male	Female
A (None)	19 (76%)	6 (24%)
B (Ureteral stent)	17 (68%)	8 (32%)
C (Bupivacaine instillation)	17 (68%)	8 (32%)
D (Both)	17 (68%)	8 (32%)

**Table 2. Postoperative pain according to the groups.**

Group	Pain		P-value
	Yes	No	
None	16 (64%)	9 (36%)	0.18
Ureteral stent	10 (40%)	15 (60%)	0.15
Bupivacaine instillation	11 (44%)	14 (56%)	0.15
Both	5 (20%)	20 (80%)	$<0.0001$
<b>Total</b>	42	58	0.18

**Fig. Pain perception according to the group.**



**Table 3. Lower urinary tract symptoms at one-week postoperative follow-up.**

Group	LUTS		P-value
	Yes	No	
None	14	11	0.681
Ureteral stent	13	12	0.561
Bupivacaine instillation	8	17	0.08
Both	3	22	0.001

It was found that patients with both stent and bupivacaine instillation, only one patient had moderate pain while five patients reported only mild pain. It was observed that a combination of instillation of bupivacaine and stent placement had relatively lesser frequency of the lower urinary tract symptoms at one-week postoperative follow-up ( $p=0.001$ ) (Table 3).

## DISCUSSION

One of the most waxing complaints associated with ureteroscopy stone fragmentation is the postoperative pain, which can last up to weeks. Several analgesics have been used to reduce the pain during and postoperatively among patients with kidney stones. The present study aimed at comparing the efficacy of non-stented, stented and intra ureteral bupivacaine instillation or infiltration after ureteroscopic stone fragmentation in relieving the postoperative pain and alleviating the frequency of lower urinary tract symptoms.

Previously, Kirac et al evaluated the effectiveness of bupivacaine infiltration in relieving postoperative pain during percutaneous nephrolithotomy (PCNL). The authors reported that bupivacaine significantly reduced VAS pain scores in patients.<sup>11</sup> Similarly, another study by Girgin et al reported that patients who received intraurethral bupivacaine during flexible cystoscopy experienced low levels of pain as compared to those who received lidocaine gel as analgesic.<sup>12</sup>

A study by Haleblan et al evaluated the efficacy of bupivacaine (marcaine) infiltration after PCNL. A total decreased use of narcotics in patients who were administered bupivacaine infiltration was reported relative to the control group. However, a difference in postoperative pain scores between the two groups with any statistical significance was not observed.<sup>13</sup> Ahn et al studied the incidence of severe pain in patient after ureteroscopy.<sup>14</sup> The authors reported a strikingly high stone free rate of 95% without any intraoperative complications. They further divulged that about one-fourth of the patients experienced postoperative acute pain.

The risk factors associated with severe

postoperative pain include larger size of the stone, history of urinary tract infections, younger age, and longer duration of operation.<sup>14-16</sup> In contrast to our study, Al Harrech et al demonstrated that patients without stent experienced lesser discomfort and pain, fewer urinary symptoms and decreased analgesic use postoperatively and lesser rate of late complications.<sup>17</sup> In a review, Foreman et al debated for and against the use of stenting after ureteropyeloscopy. The article argued that stenting post ureteropyeloscopy helps in prevention of obstruction, reduces pain, and avoids renal failure secondary to ureteric edema. They further argued that due to modern instruments with decreased caliber size, the occurrence of iatrogenic injury/stent-related ureteral trauma has been decreased significantly.<sup>18</sup>

In our study, we observed no statistically significant difference in frequency of postoperative pain in patients who had neither a ureteral stent nor were they administered bupivacaine, patients who only had ureteral stent, and patients who bupivacaine instillation post ureteroscopy. However, the combination of bupivacaine instillation and ureteral stent was the most effective therapy in preventing postoperative pain among patients. Clinical trials are imperative in taking steps towards patient care, with advancement in modern science more and more treatments are available to address patient need and concerns regarding pain and aesthetic element to it.

The current study findings showed that a combination of bupivacaine instillation and stent placement not only resulted in lesser postoperative pain among patients but also reduced frequency of LUTS after ureteroscopic stone fragmentation.

## CONCLUSION

The current study indicated that a combination of bupivacaine instillation and stent placement lowered the frequency of postoperative pain among patients. However, a thorough exploration with longitudinal studies is needed to ensure the efficacy of such interventions and improve patient outcome, postoperatively.

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**Conflict of Interest:** None declared

Rec. Date: Oct 22, 2020 Revision Rec. Date: Jan 19, 2021 Accept Date: Jan 31, 2021

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