

Anaesthesia Technique and Incidence of Post-Operative Urinary Retention in Patients Undergoing Transurethral Ureteroscopic Lithotripsy: An Observational Study

Manish Paul¹, Aniket Kulkarni², Gurbuneet S Basra³

ABSTRACT

Introduction: Post-operative urinary retention (POUR) is one of the known complications associated with any surgical procedure requiring anaesthesia. POUR and its management can be a reason for significant morbidity and complications leading to increased length of stay and cost of management. With this study we intend to study the incidence of POUR and its association with the technique of anaesthesia and other risk factors, in the patients presenting for URSL at our centre.

Material and methods: Male patients above 18 years undergoing URSL were recruited over 2 years in this observational study to study relation of incidence of POUR and various factors such as age, anaesthesia technique, presence of Diabetes or Hypertension, quantity of intra-op fluids and duration of procedure.

Results: Risk factors for higher incidence of POUR were recorded as age more than 50 years, Spinal Anaesthesia(SA), Diabetes Mellitus, increased fluid administration, prolonged duration and bilateral procedure.

Conclusion: Intra-op strategies focussed at reducing incidence of POUR would include conduct of procedure under GA(without the use of opiates and anticholinergics), limiting the procedure to under one hour and restricting use of intra-op fluids to less than 1.5 litres.

Keywords: Post-op Urinary Retention, URSL, POUR, Ureteric calculus

INTRODUCTION

Post-operative urinary retention (POUR) is one of the known complications associated with any surgical procedure requiring anaesthesia. It has been recorded in past literature with variable incidence, varying between 5% to 70% depending upon the patient characteristics or the type of surgery involved. Various authors have defined it differently, however one of the most commonly described as inability to initiate adequate micturition despite a distended bladder in the early post-operative period.¹

POUR by itself can be a reason for significant morbidity and complications, further its management by means of urethral catheterisation is also fraught with complications such as urethral trauma. All these lead to increased length of stay and cost of management.^{2,3,4,5}

Ureteric calculus is a common ailment, and management is aimed at removing this obstruction to the flow. One such procedure is Transurethral Ureteroscopic Lithotripsy (URSL) using laser to break stones assisting in their removal. The procedure is performed under anaesthesia.

Previous literature has brought out various mechanisms in which the micturition physiology gets affected by General Anaesthesia(GA) and Spinal Anaesthesia(SA).^{1,6} In our study we intend to study the incidence of POUR and its association with the technique of anaesthesia and other risk factors, in the patients presenting for URSL at our centre.

With the aim of studying relationship between incidence of POUR and technique of anaesthesia following objectives were set

- Primary Objective: Compare incidence of POUR in patients undergoing URSL under GA and SA
- Secondary Objective: Record incidence of POUR associated with other known risk factors in the subset of patients presenting to our centre

MATERIAL AND METHODS

Study population selected were male patients above the age of 18 years who presented for URSL. Patients who did not provide consent, ASA grade more than II, known drug allergies to any of the drugs used in study and patients who require drugs other than those in the study were excluded from the study.

Protocols for anaesthesia were formulated in the department for conduct of URSL, known risk factors causing POUR such as use of anticholinergics and opioids were avoided in formulating protocols for GA and SA for this procedure.

Institutional ethics clearance was obtained, and eligible patients presenting to our centre for URSL were recruited. Patients were evaluated a day prior and written informed consents were obtained from patients after explaining the procedure. The study was conducted over a period of 24 months.

Patients who were administered GA, to facilitate conduct of URSL, were not paralysed and supraglottic airway

¹Associate Professor, Department of Anaesthesiology and Critical Care, Base Hospital, Delhi Cantt, ²SHO, Station Medicare Center, Hindan, ³Assistant Professor, Army Hospital Research & Referral, Delhi Cantt, India

Corresponding author: Dr. Gurbuneet S Basra, Air Force Station Hindan, Ghaziabad, UP 201004, India

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devices were used for maintenance of patent airway. When URSL is conducted under SA a fixed dose of 2.5 ml of 0.5% Bupivacaine in hyperbaric solution is administered in subarachnoid space. Patients in whom anticholinergics or opioids had to be administered due to any specific clinical indication, or those in whom GA had to be administered due to failure of SA were excluded from the study.

To achieve the aims and objectives of the study following variables were recorded

- Age (less than or more than 50 years)
- Anaesthesia technique (GA or SA)
- Diabetes (Yes or No)
- Hypertension (Yes or No)
- Fluid administered (less than or more than 1.5 L)
- Duration of procedure (less than or more than 1 hour)
- Side of procedure

RESULTS

A total of 386 cases were recruited in the study during the two year period of the study, however 12 cases were excluded either due to variation from the protocol or due to change in technique after failed spinal anaesthesia. A total of 374 cases were included in the study and 18 cases developed POUR making the overall incidence 4.81%.

As the data which was collected was of qualitative nature, chi square test was applied to analyse statistical significance in the difference in incidence, data in **Table**. The patients were classified into those who were in 18 to 50 years group and those above 50 years, in our study patients who were aged above 50 years had a significantly higher incidence of POUR. Other variables associated with higher incidence of POUR, which was statistically significant were, undergoing procedure under SA(7.11%), patients with Diabetes Mellitus(19.05%), higher than 1.5L intra-op fluid administration(7.65%) and procedure lasting more than 1 hour(11.94%). Although not significant statistically but incidence of POUR was noticed to be higher in those undergoing bilateral URSL(8.57%).

No statistically significant difference in incidence of POUR

was noted in patients were hypertensive neither was there any significant difference in incidence between those undergoing left or right unilateral URSL.

DISCUSSION

Urinary bladder is essentially a muscular bag which is controlled both by the autonomic and somatic nervous supply. The muscles making the bladder include the Detrusor which makes the body or the dome of the bladder while the neck has an internal layer of smooth muscle that forms the internal urethral sphincter. The external sphincter is made up of straited muscles of pelvic floor. The innervation of bladder is by efferent somatic, the parasympathetic and sympathetic nerves. The signals from bladder are conveyed to the central nervous system by afferent visceral fibres of type C and A Delta. These arise from bladder wall and are stretch receptors.⁷

Micturition is described by two phases of storage and emptying respectively. Micturition is controlled by two pontine brainstem centres which are called storage and micturition centres. The parasympathetics supplying the detrusor initiate contraction while the neck is relaxed. The sympathetic do just the opposite i.e. relax the detrusor and contract the neck thereby stopping emptying.⁸

Urge to void urine is first felt when the volume of 150 ml is reached which is conveyed by the stretch receptors to the spinal cord. The parasympathetic neurons on activation stimulates efferent pelvic nerves resulting in detrusor contraction and micturition is initiated. The same if not desired then the proprioceptive inputs from urethra, penis, vagina, rectum and anal sphincters accompany the inputs from stretch receptors of the bladder activate the sympathetics and the external urethral sphincter, the parasympathetics being inhibited. The central control of the frontal and pontine centres also gets activated to prevent micturition.⁹

There are various risk factors for post operative urinary retention. The most common factor being age. Age related bladder dysfunction subsequent to neuronal degeneration is a known fact.¹⁰ Although majority of the patients were

Parameter	Variable	Total Number	Patients with POUR (incidence)	P value
Age	18-50 years	312	7(2.24%)	<0.01
	>50 years	62	11(17.74%)	
Anaesthesia Technique	GA	163	3(1.84%)	0.03
	SA	211	15(7.11%)	
Diabetes	Yes	42	8(19.05%)	<0.01
	No	332	10(3.01%)	
Hypertension	Yes	59	3(5.08%)	0.82
	No	315	15(4.76%)	
Intra-op Fluid Status	<1.5 L	204	5(2.45%)	0.04
	>1.5 L	170	13(7.65%)	
Duration	<1 hour	307	10(3.26%)	0.01
	>1 hour	67	8(11.94%)	
Side	Left	174	8(4.60%)	0.54
	Right	165	7(4.24%)	
	Bilateral	35	3(8.57%)	

Table-1: Incidence of POUR and relation with variables recorded in the study

from younger age group, still it can be observed that patients above 50 years had higher incidence of POUR.

Other common causes for postoperative bladder atony would include overstretching of bladder wall due excessive collection of urine in the perioperative period. This could be to various reasons like prolonged duration of surgery, excessive infusion of fluids and incomplete drainage of bladder at the end of the procedure.^{11,12,13,14}

Surgery related factors include anorectal surgery, gynaecological and orthopaedic surgery.⁶ Our study included only endoscopic procedures in the ureter which have negligible pain post procedure.

Co-morbidities like CVA and diabetes mellitus are known to affect micturition.² In the current study diabetic precondition was recorded and evaluated. It is evident from the data that patients with comorbidity of Diabetes Mellitus had higher incidence of POUR.

Drugs have a significant bearing on the incidence of post operative urinary retention. The most commonly used drugs in anaesthesia practice, atropine and glycopyrrrolate being anticholinergic block the parasympathetic mediated detrusor contraction and also caused bladder hypertonia.¹ In the current study no patient was administered anticholinergics in either group.

Intrathecal local anaesthetics used in spinal anaesthesia block the afferent and efferent supply to and from the bladder. In our study spinal anaesthesia was established using a fixed dose of hyperbaric 0.5% Bupivacaine. Likewise, addition of opioids to local anaesthetics in intra thecal space adds to the problem of urinary retention by action on 'mu' and 'delta' opioid receptors. In our study no opioid was added to the local anaesthetic in spinal anaesthesia.¹⁵

The incidence of POUR after GA was significantly lower than that of those undergoing SA, this can be attributed to the special protocol adopted for GA in patients undergoing URSL which excludes use of opiates and anticholinergics.

CONCLUSION

From our study it can be concluded that the risk of POUR is higher in patients above 50 years and those who have Diabetes Mellitus. Intra-op strategies focussed at reducing incidence of POUR would include conduct of procedure under GA (without the use of opiates and anticholinergics), limiting the procedure to under one hour and restricting use of intra-op fluids to less than 1.5 litres.

Our study was limited by the fact that the population on which the study was conducted were those who undergo regular medical screening from employer and strict control over health parameters is done. Therefore, generalisation of the outcomes to population at large would need further studies designed to compare these variables in large population base.

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