ISSN: 2091-2749 (Print)
2091-2757 (Online)

Efficacy of intravenous Tramadol in prevention of catheter-related bladder discomfort in upper urinary tract surgery

Sujita Manandhar[1], Kishor Manandhar[2]

[1]Anesthesiologist, Dept. of Anesthesiology and Intensive Care, [2]Surgeon, Dept. of Surgery, Urology Unit, Bir Hospital, National Academy of Medical Sciences, Kathmandu, Nepal

Correspondence
Dr. Sujita Manandhar
Department Anesthesiology and Intensive Care, National Trauma Centre, National Academy of Medical Sciences
PO Box No. 10662
Kathmandu, Nepal
Email: sujitasayami@gmail.com

Peer Reviewers
Assoc. Prof. Dr. Roshana Shrestha
Kathmandu University

Asst. Prof. Dr. Anil Shrestha
Patan Academy of Health Sciences

Submitted
1 Apr 2018

Accepted
23 Sep 2019

How to cite this article
Sujita Manandhar, Kishor Manandhar. Efficacy of intravenous Tramadol in prevention of catheter-related bladder discomfort in upper urinary tract surgery. Journal of Patan Academy of Health Sciences. 2019Dec;6(2):45-50.

Abstract

Introductions: Catheter-related bladder discomfort (CRBD) is common in patients with urinary catheterization. Centrally acting intravenous opioid like Tramadol inhibits detrusor activity and incidence of CRBD. Present study aims to analyze efficacy of intravenous (IV) Tramadol in prevention of CRBD in patients undergoing upper urinary tract surgery.

Methods: Adult patients undergoing elective open upper urinary tract surgeries at Bir Hospital, National Academy of Medical Sciences (NAMS), Nepal, over a period of six months, requiring urinary catheterization were randomly divided into Control (C) and Tramadol (T) groups. After general anesthesia, patients in T-group received IV Tramadol 1.0 mg/kg and C-group received normal saline 30 minutes before extubation. In post-operative ward, CRBD was graded as mild, moderate or severe at 0, 1, 2 and 6 hours. Post-operative Ramsay sedation score and nausea vomiting were compared in two groups.

Results: There were total 70 patients, 35 in each of groups-T and C. Incidence of CRBD in T-group was significantly low compared to the C-group at all points of evaluation ($p<0.05$). Postoperative sedation score, analgesic requirement and nausea vomiting were not significantly different in two groups.

Conclusions: Intravenous Tramadol administered before extubation in upper urinary tract surgery reduces the incidence of CRBD.

Keywords: catheter related bladder discomfort (CRBD), detrusor activity, tramadol

Introductions

Catheter related bladder discomfort (CRBD) is a commonly seen problem in the postoperative period in catheterized patients. Sensation to void and burning sensation in urethra are the two most common symptoms of CRBD.[1] This can lead to exacerbated postoperative pain increasing postoperative analgesic demand.[2]

Previous studies have reported the incidence of CRBD from 50-90%.[1-7] Detrusor smooth muscles contraction of bladder is mediated by stimulation of the muscarinic receptors.[8] So, this receptor antagonist such as oxybutynin[4] and tolterodine,[2,4] ketamine,[5] Gabapentin,[6] Paracetamol[7] have been reported to be effective in reducing CRBD. Tramadol, a centrally acting synthetic opioid analgesic with weak opioid agonist properties inhibits detrusor activity by inhibiting muscarinic receptors. [9-11] Since Tramadol has such unique properties and is frequently used in our institution as a choice of post-operative analgesic, this study was conducted to find out its efficacy in preventing CRBD in open upper urinary tract surgeries.

Methods

This comparative study was carried out at Bir Hospital, National Academy of Medical Sciences (NAMS), Nepal, over a period of six months from April to September 2011. Study was conducted on adult subjects of 18 years of age and older of either sex, ASA physical status[13] I and II, undergoing elective upper urinary tract surgery requiring Foleys catheterization during surgery. Exclusion criteria were obesity (BMI>30), patients with bladder outflow obstruction, benign prostatic hyperplasia, elderly (age>60), over active bladder (urinary frequency >3 times at night and >8 times within 24 hours), end stage renal disease (urine output <500 ml/24 hours), long term opioid use, chronic pain, chronic analgesic usage and the subject that could not be extubated immediately following surgery.

As reported incidence of CRBD is up to 90% and assuming that Tramadol reduces the incidence of CRBD by 30%, with alpha value of 0.05, and beta value of 0.8, we would need at least 33 patients in each group. Total of seventy subjects were selected for the study of two equal groups viz group C (Control group) and group T (Tramadol group), consisting 35 subjects each.

After pre-anesthetic check-up, patients were explained about the study. Informed written consent was obtained. Study subjects were pre-medicated with oral diazepam (5 mg for patients weighing 50 Kgs and 10 mg for patients more than 50 kg), night before surgery.

Simple lottery for randomization was used. The first patient was assigned C or T as per the slip drawn and then alternated subsequently. Study medicine was prepared on the day of surgery by the anesthetic nurse in identical 5 ml syringes which could either be 4 ml normal saline NS (Group C) or 1.0 mg Tramadol per kg body weight diluted in NS to make 4 ml volume (Group T). The anesthetic nurse was asked to maintain confidentiality and record in a note book the study drug to be given to the patient according to the randomization in case de-blinding was necessary. The identity of the study drugs was blinded from the patients, the primary researcher anesthesiologist, and the investigator who collected the postoperative data till the data analysis was started.

Intraoperative analgesia was given with intravenous Pethidine 0.5 mg/kg. Anesthetic induction was done with Propofol 2 mg/kg and endotracheal intubation was facilitated with Vecuronium Bromide 0.12 mg/kg. Following induction of anesthesia, all study subjects were catheterized with 16 Fr Foleys catheter on properly lubricated urethra with lignocaine jelly and its balloon inflated with 10 ml distilled water. The catheter was fixed without tension and kept on free drain.

Anesthesia was maintained with intermittent positive pressure ventilation using 100 % oxygen, halothane and intermittent dosage of

Vecuronium as and when required. Inadequate analgesia was defined as an increased systolic blood pressure, heart rate or both by at least 20% of the baseline value for 5 minutes in response to surgical stimuli. In cases of inadequate analgesia, patients were given bolus doses of Pethidine 0.25 mg/kg.

Study medicine as per randomization was given IV by an anesthetic registrar on duty About 30 min prior to tracheal extubation.

At the time of extubation, all patients received a combination of Neostigmine 0.05 mg/kg and Atropine 0.02 mg/kg for reversal of muscle relaxant and after extubation, were transferred to the post anesthetic care unit (PACU). At PACU, patients received intramuscular Pethidine when needed for postoperative pain relief. Another researcher, the Surgical registrar, was instructed to watch and record incidence and severity of CRBD if any, postoperative analgesic requirement, postoperative nausea and vomiting (PONV), level of sedation, respiratory depression immediately after receiving patient (0 hr), and thereafter at 1, 2 and 6 hours.

Incidence of CRBD was noted among the groups and severity of it was labeled as none (patient who did not complain even on asking), mild (reported by patients only on questioning), moderate (reported by the patient on their own) and severe (reported by patient on their own accompanied by behavioral responses respectively). Behavioral response related to CRBD means flailing limb, strong vocal response and attempt to pull out the catheter.[2]

The postoperative pain was assessed by VAS, scoring from 0 – 100, where 0 means no pain and 100 means worst imaginable pain.[15] Postoperative analgesic requirement between the groups were noted.

Severity of PONV was graded on a four-point ordinal scales from 0 – 3, where, 0, 1, 2, & 3 mean no, mild, moderate and severe nausea +/- vomiting respectively. Inj. Ondansetron 4 mg IV was given to subject with PONV of grade 3 only.

The level of sedation was assessed by the Ramsay sedation scale[17] from 1 to 6, where scale of 1 was determined by anxious/agitated/restless, 2 co-operative/oriented/tranquil, 3 respond to command/asleep, 4 brisk response to light glabellar tap or loud noise, 5 sluggish response to light glabellar tap or loud noise and 6 no response. Subjects with Ramsay sedation scale of 4 or more was considered as sedated.

Respiratory depression was defined as ventilatory frequency of less than 8/min and/or oxygen saturation of less than 90% with oxygen supplementation.

All data were collected and analyzed with one way ANOVA, X^2 test, Z- test. SPSS 14.0 was used for statistical analysis, $P \leq 0.05$ was considered significant.

Results

Patients in both groups (35 each) were comparable, Table 1.

The incidence of CRBD was significantly high in control compared to the tramadol group at all points 0, 1, 2 and 6 hours evaluation, Table 2.

Postoperative analgesic requirement and PONV was not significantly different between the two groups. One patient from each group complained of mild nausea at 1 hour.

Table 1. Characteristics of surgery patients with Foley catheterization randomized in control group (C) and tramadol group (T) to study the incidence of Catheter related bladder discomfort (CRBD)

	C group: Mean±SD	T group: Mean±SD
Age, (in years)	42.2±11.8	40.9±13.2
Duration of surgery (in minutes)	55.9±12.3	55.7±12.4
Duration of Anesthesia (in minutes)	64.9±12.9	64.5±12.1
Intra-op Pethidine requirement (in mg)	44.1±7.6	45.1±9.2

Table 2. Incidence and severity of CRBD in patients with Foley catheter who underwent upper urinary tract surgery

Time	0 hour		1 hour		2 hours		6 hours	
Group	T	C	T	C	T	C	T	C
Patients (n)	35	35	35	35	35	35	35	35
CRBD								
None	25	14	24	13	26	16	28	21
Yes	10*	21	11*	22	9*	19	7*	14
Mild	6	10	7	11	8	9	6	9
Moderate	3	8	2	8	1	9	1	7
Severe	1	3	1	3	0	1	0	1

*P<0.05 during intergroup comparison.

Table 3. Sedation scores in patients with Foley catheter who underwent upper urinary tract surgery

Study groups	Ramsay sedation score[17]		0 Hour	1 Hour	2 Hours	6 Hours
C (N 35)	Not Sedated	0	9	14	23	34
	Sedated	1	5	12	10	1
		2	15	8	1	0
		3	5	1	1	0
		4	1	0	0	0
		5	0	0	0	0
		6	0	0	0	0
T (N 35)	Not sedated	0	10	15	24	34
	Sedated	1	6	8	9	1
		2	13	12	1	0
		3	5	1	1	0
		4	1	0	0	0
		5	0	0	0	0
		6	0	0	0	0

There were no statistical significant differences in Ramsay sedation score in two groups. One patients from each group had a score of 4 at 0 hours, and none had score of more than 3 thereafter, Table 3. None of the patients in either group suffered from respiratory depression.

Discussions

Our findings show 50% reduction in the incidence of CRBD in the Tramadol group and none of the subjects were deeply sedated in either group, except one in each group immediately after extubation. Sedation was not associated with any untoward effects and also did not hinder in assessing the CRBD at any point of the study. This might have been due to the lower dose of Tramadol (1 mg/kg) used in our study.

Tramadol has central action of opioid analgesic and also inhibits the detrusor activity by inhibiting type-1 and type-3 muscarinic receptors.[9,10] Onset of action of tramadol is within 10 minutes and peak effect occurs in about 30 minutes.

It has been shown that muscarinic receptors located in the urothelium/suburothelium and on the afferent nerves may contribute to the symptoms of CRBD.[1-5,12]

Pure muscarinic receptor antagonists such as tolterodine 2 mg administered 1 hour before surgery reduced the incidence of CRBD by 19%.[2] Oxybutinin 5 mg preoperatively has also shown to reduce CRBD by 23%.[4] However, these agents do not have analgesic properties, need to be administered orally and have undesirable effects as dry mouth, facial flushing Intravenous. Paracetamol 15 mg/kg thirty minutes before the end of surgery has

also been shown to reduce the incidence and the severity of CRBD.[7] However, Paracetamol is a drug with proven efficacy for mild to moderate post-operative pain only and additional analgesics are often required to cope with severe postoperative pain.

Since its launch in the UK in 1994, Tramadol HCl has been popular for its low adverse effects and is used almost as a drug of choice for non-steroid anti-inflammatory drugs (NSAID) intolerant patients,[14-15] the elderly and for those undergoing day case surgery.

One study showed the unique property of Tramadol beneficial on clinical ground in reducing the incidence and severity of CRBD by 50% along with the reduction in postoperative rescue analgesic dose by 20%, when administered 1.5 mg/kg IV about 30 minutes prior to the end of surgery. This study also found a higher incidence of sedation in the Tramadol group compared to the control group.[16] Similar to their study, in our study also, we found a 50% reduction in the incidence of CRBD in the Tramadol group. However, in our study, none of the subjects were deeply sedated in either group.

Intravenous tramadol HCl 1.0 mg/kg body weight seems to be the ideal drug of choice in the prevention of CRBD in postoperative patients without high incidence of sedation.

Ketamine, a phencyclidine derivative, which binds with N-methyl D-aspertate (NMDA), muscarinic and cholinergic receptors also reduce the incidence and severity of CRBD.[5] However, a higher incidence of sedation is observed even with a subhypnotic dose of ketamine. In addition, the significant value of minimal respiratory depressant effect of Tramadol continues to be emphasized. The limitation of our study is that only single dose of Tramadol for CRBD has been evaluated. Further studies on CRBD by dose response titration or continuous therapy of Tramadol in the postoperative period might be helpful.

Conclusions

Intravenous Tramadol HCL 1.0 mg/kg body weight administered about 30 minutes before extubation in open upper urinary tract surgery significantly reduced the incidence of CRBD.

References

1. Binhas M, Motamed C, Hawajri N, Yiou R, Marty J. Predictors of catheter-related bladder discomfort in the post-anaesthesia care unit. Ann Fr Anesth Reanim. 2011;30(2):122-5. DOI PubMed GoogleScholar
2. Agarwal A, Raza M, Singhal V, Dhiraaj S, Kapoor R, Srivastava A, et al. The efficacy of tolterodine for prevention of catheter related bladder discomfort: a prospective, randomized, placebo-controlled double-blind study. Anesth Analg. 2005;101(4):1065-7. DOI PubMed GoogleScholar
3. Tauzin-Fin P, Sesay M, Svartz L, Krol-Houdek MC, Maurette P. Sublingual oxybutynin reduces postoperative pain related to indwelling bladder catheter after radical retropubic prostatectomy. Br J Anaesth. 2007;99(4):572-5. DOI PubMed GoogleScholar
4. Agarwal A, Dhiraaj S, Singhal V, Kapoor R, Tandon M. Comparison of efficacy of oxybutynin and tolterodine for prevention of catheter related bladder discomfort: a prospective, randomized, placebo-controlled, double blind study. Br J Anaesth. 2006;96(3):377-80. DOI PubMed GoogleScholar
5. Agarwal A, Gupta D, Kumar M, Dhiraaj S, Tandon M, Singh PK. Ketamine for treatment of catheter related bladder discomfort: a prospective, randomized, placebo controlled and double-blind study. Br J Anaesth. 2006;96(5):587-9. DOI PubMed GoogleScholar
6. Agarwal A, Dhiraaj S, Pawar S, Kapoor R, Gupta D, Singh PK. An evaluation of the efficacy of gabapentin for prevention of catheter related bladder discomfort: a prospective, randomized, placebo-controlled, double-blind study. Anesth Analg. 2007;105(5):1454-7. DOI PubMed GoogleScholar
7. Ergenoglu P, Akin S, Cok OY, Eker E, Kuzgunbay B, Turunc T, Aribogan A. Effect of intraoperative paracetamol on catheter related bladder discomfort: a prospective, randomized, double-blind study. Current

Therapeutic Research. 2012;73(6):186-94. DOI PubMed GoogleScholar
8. Andersson KE, Schröder A. Changes in muscarinic receptors of the aging bladder. Der Urologe Ausg A. 2004;43:552-6. DOI PubMed GoogleScholar
9. Shiga Y, Minami K, Shiraishi M, Uezono Y, Murasaki O, Kaibara M, Shigematsu A. The inhibitory effects of Tramadol on muscarinic receptor-induced responses in xenopus oocytes expressing cloned M_3 receptors. Anesth Analg. 2002;95(5):1269-73. DOI, PubMed GoogleScholar
10. Shiraishi M, Minami K, Uezono Y, Yanagihara N, Shigematsu A. Inhibition by Tramadol of muscarinic receptor-induced responses in cultured adrenal medullary cells and in xenopus laevis oocytes expressing cloned M_1 receptors. J Pharmacol Exp Ther. 2001;299(1):255-60. PubMed GoogleScholar Web Link
11. Budd K, Langford R. Tramadol revisited. Br J Anaesth. 1999;82(4):493-5. DOI PubMed GoogleScholar
12. Appell RA, Sand P, Dmochowski R, Anderson R, Zinner N, Lama D, Roach M, Miklos J, Saltzstein D, Boone T, Staskin DR. Prospective randomized controlled trial of extended-release oxybutynin chloride and tolterodine tartrate in the treatment of overactive bladder: results of the OBJECT study. In Mayo Clin Proc. 2001;76(4):358-63. Elsevier. DOI, PubMed GoogleScholar
13. American Society of Anesthesiologists physical status classification system. Web link
14. Duthie DJR. Remifentanil and Tramadol. Br J Anaesth. 1998;81(1):51-7. DOI PubMed GoogleScholar
15. Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad LA, Breivik Hals EK, Kvarstein G, Stubhaug A. Assessment of pain. Br J Anaesth. 2008;101(1):117–24. DOI PubMed GoogleScholar
16. Agarwal A, Yadav G, Gupta D, Singh PK, Singh U. Evaluation of intra-operative tramadol for prevention of catheter-related bladder discomfort: a prospective, randomized, double-blind study. Br J Anaesth. 2008;101(4):506-10. DOI PubMed GoogleScholar
17. Ramsay MA, Savege TM, Simpson BR, Goodwin R. Controlled sedation with alphaxalone-alphadolone. Br Med J. 1974;2(5920):656-9 DOI PubMed GoogleScholar

Note from JPAHS editorial- The response from authors for the relevance of publishing the study conducted in 2011, “there has been lack of publication in regard to similar work in our region, except one published from Lucknow, India in 2008 (https://doi.org/10.1093/bja/aen217)”, the JPAHS editorial believes it is relevant to disseminate the important findings for the clinician in local scenario.