

Original Article

A Prospective Comparative Study of Intramuscular Diclofenac versus Intravenous Tramadol for Acute Ureteric Colic in the Emergency Department of Rama Medical College Hospital and Research Centre

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Abstract

Objective: The present study is done to comparatively assess the efficacy & safety in terms of relief time achieved by administering intramuscular Diclofenac 75mg and Intravenous Tramadol 50mg in patients of ureteric colic presenting in Emergency department.

Background:

Acute ureteric colic is a severe and debilitating pain commonly encountered in emergency departments, often caused by ureteral stones. Effective and rapid pain management is critical for improving patient outcomes.

Methods:

A prospective, double-blind, randomized controlled trial was conducted in the Emergency Department of Rama Medical College Hospital and Research Centre. Patient presenting with acute pain in lumbar region with or without radiation to genitals, and with (hydronephrosis and/or stone visualisation on point-of-care ultrasound) in the ED were randomly assigned to receive an intramuscular Diclofenac 75mg (IM) or Intravenous Tramadol 50mg (IV). A total of 120 patients aged 12–60 years with acute ureteric colic and a Visual Analog Scale (VAS) pain score ≥ 7 were randomized into two groups: Group A received intramuscular diclofenac (75 mg), and Group B received intravenous tramadol (50 mg). Pain scores were recorded at baseline, 15, 30, 60, and 120 minutes post-administration. Adverse effects were documented. Statistical analysis was performed using SPSS v.25.0.

Results:

Group A (diclofenac) demonstrated significantly faster and more effective pain relief compared to Group B (tramadol) at all time intervals ($p < 0.01$). At 15 minutes, mean VAS scores were 4.3 ± 1.0 for diclofenac and 6.2 ± 1.1 for tramadol. By 120 minutes, the VAS score reduced to 0.5 ± 0.2 in the diclofenac group versus 2.2 ± 0.6 in the tramadol group. Adverse effects were significantly higher in the tramadol group, including nausea (33.3%), vomiting (20%), and dizziness (16.6%).

Conclusion:

Intramuscular diclofenac is superior and safe to intravenous tramadol for the management of acute ureteric colic, providing faster pain relief with fewer adverse effects. Diclofenac should be the preferred first-line treatment in emergency settings for acute ureteric colic.

Keywords:

Acute ureteric colic, intramuscular diclofenac, intravenous tramadol, pain management, emergency medicine.

Introduction

Acute ureteric colic is one of the most severe forms of flank pain encountered in emergency settings, often caused by obstruction of passage of urine due to urinary stones, often accompanied by nausea and vomiting. Due to distal obstruction ureteric peristalsis is increased to overcome obstruction causing ureteral muscle spasms, which stimulate submucosal stretch receptors in the ureter, renal pelvis and capsule, which results in excruciating pain, arising in flanks and radiated to groin and genitals¹. Effective pain management is a cornerstone of treatment². Specific diagnosis of ureteric colic is however crucial since pain of different etiology simulating ureteric colic will have different response to pain treatment³. Nonsteroidal anti-inflammatory drugs (NSAIDs) like diclofenac and opioid analgesics like tramadol are frequently used to provide symptomatic relief⁵. This study aims to compare the efficacy and safety of intramuscular diclofenac versus intravenous tramadol for managing acute ureteric colic in a controlled emergency setting. Diclofenac, an NSAID, reduces pain by inhibiting prostaglandin synthesis, whereas tramadol, an opioid agonist, modulates pain via central nervous system mechanisms. The goal was to establish the superiority of one over the other in terms of pain relief, onset of action, and safety profile.

Methods**Study Design:**

This was a prospective, double-blind randomized controlled trial conducted over two years in the Emergency Department of Rama Medical College Hospital and Research Centre.

Sample Size:

A total of 120 patients presenting with acute ureteric colic were included in the study and randomized into two groups:

- Group A: Received intramuscular diclofenac (75 mg).
- Group B: Received intravenous tramadol (50 mg).

Inclusion Criteria:

- Patients aged between 12 and 60 years.
- Confirmed diagnosis of ureteric colic through clinical examination and point of care ultrasonography showing hydronephrosis and/or stone in ureter⁷
- Pain score ≥ 7 on a Visual Analog Scale (VAS).

Exclusion Criteria:

- Age below 12 or above 60 years.
- Associated symptoms like hematuria.
- Comorbidities including diabetes, acid peptic disease, hypertension, or chronic renal failure.
- Allergy to NSAIDs or opioids.

Study Protocol:

1. Patients were randomized into two groups using computer-generated random numbers.
2. Both the administering physician and the patient were blinded to the treatment.
3. Pain was assessed using the VAS at baseline (0 minutes), 15, 30, 60, and 120 minutes post-administration.
4. Adverse effects like nausea, vomiting, dizziness, or hypotension were recorded.
5. Patients were observed for 6 hours in the emergency department for any recurrence of pain or complications.

Statistical Analysis:

- Data were analyzed using SPSS v.25.0.
- Continuous variables were presented as mean $\pm$ standard deviation (SD).
- Categorical variables were presented as percentages.

- The independent t-test and chi-square test were used to compare outcomes between the two groups. A p-value <0.05 was considered statistically significant.

Results

Table 1: Baseline Characteristics of Patients

Parameter	Group A: Diclofenac (n=60)	Group B: Tramadol (n=60)	p- value
Mean Age (years)	37.2 ± 10.3	36.8 ± 11.1	0.75
Male-to-Female Ratio	2:1	2:1	-
Mean Baseline VAS Score	8.5 ± 1.2	8.4 ± 1.3	0.64

Table 2: Pain Relief (VAS Score) Over Time

Time Interval (minutes)	Group A: Diclofenac (Mean VAS)	Group B: Tramadol (Mean VAS)	p-value
Baseline (0)	8.5 ± 1.2	8.4 ± 1.3	0.64
15	4.3 ± 1.0	6.2 ± 1.1	<0.01
30	2.8 ± 0.8	4.8 ± 0.9	<0.01
60	1.5 ± 0.5	3.5 ± 0.7	<0.01
120	0.5 ± 0.2	2.2 ± 0.6	<0.01

Table 3: Adverse Effects

Adverse Effect	Group A: Diclofenac (n=60)	Group B: Tramadol (n=60)	p-value
Nausea	5 (8.3%)	20 (33.3%)	<0.01
Vomiting	3 (5.0%)	12 (20.0%)	<0.05
Dizziness	0 (0%)	10 (16.6%)	<0.01
Hypotension	0 (0%)	10 (16.6%)	<0.05

Key Findings:

1. Intramuscular Diclofenac showed significantly faster and better pain relief compared to intravenous tramadol at all time intervals ($p < 0.01$).
2. Tramadol was associated with a higher incidence of adverse effects, particularly nausea, vomiting, and dizziness.

Discussion

This study demonstrated the superiority of intramuscular Diclofenac over intravenous Tramadol in managing acute ureteric colic. Diclofenac provided faster pain relief, sustained efficacy, and a better safety profile, likely due to its anti-inflammatory mechanism targeting prostaglandin synthesis.

Conversely, Tramadol, while effective in reducing pain, caused significant side effects such as nausea and dizziness, which may limit its use in the emergency setting⁶. Moreover, Tramadol's slower onset of action compared to Diclofenac makes it less suitable for acute pain scenarios.

These findings align with existing literature supporting the use of NSAIDs as the first-line treatment for acute ureteric colic⁸. However, Tramadol remains a valuable alternative for patients with contraindications to NSAIDs^{9,10}.

Conclusion

Intramuscular diclofenac is superior to intravenous tramadol for acute ureteric colic in terms of pain relief and tolerability. Its rapid onset of action, sustained efficacy, and lower incidence of adverse effects make it the preferred choice in emergency settings.

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