

**Atomized Intranasal Ketorolac Versus Intravenous Ketorolac for the Treatment of Severe Renal Colic in the Emergency Department: A Double-Blind, Randomized Controlled Trial**

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Published: November 22,

2023 DOI: <https://doi.org/10.1016/j.annemergmed.2023.10.009>

## ***Study objective***

Atomized intranasal (IN) drug administration offers an alternative to the intravenous (IV) route. We aimed to evaluate the analgesic efficacy of IN versus IV ketorolac in emergency department patients with acute renal colic.

# *Methods*

We conducted a double-blind, randomized controlled trial on adult patients (aged 18 to 64 years) with severe renal colic and numerical rating scale pain ratings  $\geq 7.0$ . They were randomly assigned (1:1) to receive single doses of either IN or IV ketorolac. Our main outcomes were differences in numerical rating scale reduction at 30 and 60 minutes. A 95% confidence interval (CI) was calculated for each mean difference, with a minimum clinically important difference set at 1.3 points. Secondary outcomes included treatment response, adverse events, rescue medications, and emergency department revisits. We analyzed using intention-to-treat.

# ***Results***

A total of 86 and 85 patients with similar baseline characteristics were allocated to the IV and IN groups, respectively.

# Baseline characteristics

Characteristic	Group Allocation, n (%)	
	IV Ketorolac (n=86)	IN Ketorolac (n=85)
<b>Age (y)*</b>	35.4 (8.4)	35.9 (8.5)
<b>Sex</b>		
Man	72 (83.7)	71 (83.5)
Woman	14 (16.3)	14 (16.5)
<b>Confirmed calculi</b>	60 (69.8)	57 (67.1)
<b>Calculi location</b>		
Renal	20 (35.1) <sup>†</sup>	17 (30.4) <sup>‡</sup>
Proximal ureter	7 (12.3) <sup>†</sup>	11 (19.6) <sup>‡</sup>
Mid-ureter	5 (8.8) <sup>†</sup>	4 (7.1) <sup>‡</sup>
Distal ureter	25 (43.9) <sup>†</sup>	24 (42.9) <sup>‡</sup>
<b>Obstructive stone</b>	27 (47.4) <sup>†</sup>	30 (53.6) <sup>‡</sup>
<b>Stone size (mm)*</b>	5.3 (2.5)	5.0 (1.8)
<b>Pain medication prior to ED presentation</b>	12 (14.0)	6 (7.1)
<b>Vitals at presentation</b>		
Systolic BP (mmHg)*	137 (20)	136 (17)
Diastolic BP (mmHg)*	82 (15)	82 (13)
Pulse rate (beats/minute)*	85 (15)	86 (13)
Respiratory rate (breaths/minute)*	19 (2)	20 (3)
Temperature (°C)*	36.7 (0.3)	36.8 (0.3)

Mean numerical rating scale scores were 8.52 and 8.65 at baseline, 3.85 and 4.67 at 30 minutes, and 2.80 and 3.04 at 90 minutes, respectively. The mean numerical rating scale reduction differences between the IV and IN groups were 0.69 (95% CI -0.08 to 1.48) at 30 minutes and 0.10 (95% CI -0.85 to 1.04) at 60 minutes. There were no differences in secondary outcomes.

## ***Secondary outcome measures***

Outcome	IV Ketorolac (N= 86)	IN Ketorolac (N=85)	Difference (95% CI)
Need for rescue analgesia	10 (11.6%)	9 (10.6%)	1% (-8.8% to 10.8%)
Responded to treatment	60 (69.8%)	57 (67.1%)	2.7% (-11.1% to 16.4%)
Responders with confirmed renal stones	66.7% (40/60)	63.2% (36/57)	3.5% (-13.4% to 20.3%)
Responders without confirmed renal stones	76.9% (20/26)	75.0% (21/28)	1.9% (-20.7% to 23.9%)
ED revisit within 48 h	16 (18.6%)	15 (17.6%)	1% (-10% to 12%)

# ***Conclusion***

Neither IN or IV ketorolac was superior to the other for the treatment of acute renal colic, and both provided clinically meaningful reductions in pain scores at 30 to 60 minutes.



A spiral-bound notebook is shown at an angle, resting on a light blue wooden surface. The notebook's pages are white, and the text is printed in a bold, black, sans-serif font. The text is arranged in three lines, centered on the page. The spiral binding is visible at the top of the notebook.

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