



Caudal Dexmedetomidine vs Tramadol with Bupivacaine for Postop Analgesia in Pediatric Infraumbilical Surgery: A Prospective Study

Adeel Riaz¹, Shahid Nishtar², Ahmad Riaz², Muhammad Umair Amjad², Mariam Arif³, Nouman Arif⁴

1. Rutgers Cancer Institute, New Brunswick, NJ

2. DHQ Teaching Hospital Sahiwal, Sahiwal, Pakistan

3. Lincoln Medical Center, Bronx, NY

4. United Lincolnshire Teaching Hospitals, NHS Trust, Boston, UK.



Introduction

Caudal anesthesia is safe and frequently used regional pediatric anesthesia for infraumbilical surgeries (1). Although bupivacaine provides effective analgesia, its duration is often limited, prompting investigation into safe and effective adjuvants prolonging postoperative analgesia (2).

Dexmedetomidine, a selective α_2 adrenergic agonist, and tramadol, a centrally acting analgesic, are commonly studied adjuvants (3,4). This study aims to compare the analgesic efficacy and safety of dexmedetomidine versus tramadol when used with bupivacaine in pediatric infraumbilical surgeries.

Methods

Sixty patients (ages 2–8 years) undergoing elective infraumbilical surgeries received a caudal block with 1 mL/kg of 0.25% bupivacaine under general anesthesia. Patients were randomly allocated to receive either dexmedetomidine (group D) 0.5 μ g/kg (n=30) or tramadol (group T) 1 mg/kg (n=30) as a caudal adjuvant. Institutional IRB approval was obtained before starting the study. We recorded hemodynamic parameters, FLACC pain scores, sedation levels, time to first rescue analgesia, and adverse effects. Continuous variables were analyzed using independent t-tests, and categorical variables using Chi-square tests. A p-value < 0.05 was considered statistically significant.

Results

Both groups (n=30 each) were comparable in demographic and perioperative baseline characteristics. The primary end point of duration of time to first rescue analgesia was significantly longer in Group D (812.7 ± 46.1 min; ~13.5 hrs.) compared to Group T (605.5 ± 45.1 min; ~10 hrs.) (p=0.0001) with a mean difference of 3.4 hours. Group D also had significantly lower FLACC scores and required fewer total rescue analgesic doses (mean 1.4 doses vs 2.5 doses) within 24 hours (p< 0.001). Group D exhibited mild, transient bradycardia in 3 patients, responsive to atropine, and slightly higher sedation scores, though within acceptable clinical limits. Group T experienced higher rates of postoperative nausea/vomiting (5 vs 1 patients, p = 0.04). No episodes of respiratory depression, urinary retention, pruritus, or block-related complications occurred.

Conclusions

This study confirms that both dexmedetomidine and tramadol effectively prolong bupivacaine's duration in pediatric caudal blocks with significant superiority for dexmedetomidine. It provided a substantially longer time to first rescue analgesia (13.5 vs. 10 hours), resulted in lower overall pain scores and reduced analgesic requirements within 24 hours. Hemodynamic changes and increased sedation with dexmedetomidine were mild and clinically manageable. Critically, postoperative nausea and vomiting was significantly higher with tramadol, highlighting safety advantage for dexmedetomidine.

References

1. Dobereiner EF, Cox RG, Ewen A, Lardner DR. Evidence-based clinical update: Which local anesthetic drug for pediatric caudal block provides optimal efficacy with the fewest side effects?. Can J Anaesth. 2010;57(12):1102-1110. doi:10.1007/s12630-010-9386-1
2. Dr.P.Krishnaprasad, et. al. "Comparison of Analgesic Efficacy of Caudal Dexmedetomidine Versus Caudal Tramadol With Ropivacaine In Pediatric Urogenital Surgeries- A Prospective, Randomized, Comparative Study." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), 19(12), 2020, pp. 19-25.
3. Kamal M, Mohammed S, Meena S, Singariya G, Kumar R, Chauhan DS. Efficacy of dexmedetomidine as an adjuvant to ropivacaine in pediatric caudal epidural block. Saudi J Anaesth. 2016;10(4):384-389. doi:10.4103/1658-354X.177325
4. Doda M, Mukherjee S. Postoperative Analgesia in Children- Comparative Study between Caudal Bupivacaine and Bupivacaine plus Tramadol. Indian J Anaesth. 2009;53(4):463-466.

Adeel Riaz, MD, MPhil.
Adeel447@gmail.com