Clinical Images and Case Reports

Received 11 May 2025 | Accepted 11 Jun 2025 | Published Online 14 Jul 2025

Published By: Vision Publisher

CICR 3 (7), 1-6

ISSN 2942-0776

Clinical Experience with Caudal Epidural Block in Adult Anorectal Surgery: A Case Series

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Abstract:

This prospective, observational case series evaluated the postoperative analgesic efficacy and safety of caudal epidural blocks in 36 adult patients undergoing elective hemorrhoidectomy under general anesthesia at Centro Médico ABC from March 2024 to February 2025. Postoperative pain scores remained consistently low, with median Visual Analog Scale (VAS) scores of 0 in the Post-Anesthesia Care Unit (PACU), 1 at 6 hours, 2 at 12 hours, and 2 at 24 hours. No patient required rescue analgesia in the PACU, and fewer than 15% required opioid or NSAID rescue medication at any point within the first 24 hours. The anesthetic mixture typically included ropivacaine (mean 37.5 mL) and lidocaine (mean 100 mL), with clonidine administered in 55.6% of cases. Intraoperative hypotension (MAP < 65 mmHg) occurred in 55.6% of patients and was managed with ephedrine in 50% of cases. Importantly, no block-related complications, such as urinary retention or systemic toxicity, were reported. These findings suggest that caudal epidural block is a viable, safe, and effective regional anesthetic technique for providing sustained postoperative analgesia in adult anorectal surgery, potentially reducing opioid exposure and facilitating ambulatory recovery.

Keywords: Caudal epidural block, Anorectal surgery, Postoperative analgesia, Hemorrhoidectomy, Regional anesthesia

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BACKGROUND

Postoperative pain after hemorrhoidectomy remains a significant clinical challenge, often requiring multimodal analgesia for adequate control. Conventional approaches typically include systemic opioids and non-steroidal anti-inflammatory drugs (NSAIDs), yet these are frequently associated with side effects such as nausea, vomiting, urinary retention, or delayed recovery, especially in ambulatory surgical settings. In this context, regional anesthesia techniques have emerged as valuable tools to enhance postoperative analgesia and reduce opioid consumption. (1-2)

The caudal epidural block, although historically more common in pediatric anesthesia, has gained renewed interest in adult patients undergoing anorectal procedures. Its theoretical advantages include the ability to provide bilateral and predictable coverage of sacral dermatomes, thus potentially improving pain control in surgeries involving the perianal region. However, recent literature evaluating the analgesic efficacy of caudal blocks in adult patients is limited and heterogeneous, particularly in comparison to other regional techniques such as pudendal nerve blocks. (3)

Despite these gaps, some studies suggest that caudal blocks may offer effective immediate and prolonged analgesia following hemorrhoidectomy, with low complication rates and favorable recovery profiles. Still, clinical adoption has been inconsistent, partly due to concerns over technical complexity, duration of effect, and risk-benefit ratio in adult populations.(4-5)

This study aims to describe the postoperative analgesic efficacy of caudal blocks in adult patients undergoing hemorrhoidectomy under general anesthesia, using pain scores, rescue analgesia requirements, and recovery indicators to assess outcomes. Our findings may help clarify the role of this regional technique in modern anorectal surgery and support its potential inclusion in enhanced recovery protocols.

2.1. Study Design

This was a prospective, observational, descriptive study aimed at evaluating the postoperative analgesic efficacy of the caudal epidural block in adult patients undergoing elective hemorrhoidectomy under general anesthesia. The study was designed to describe the analgesic outcomes associated with this regional technique, including pain intensity, rescue analgesia requirements, intraoperative hemodynamic stability, and adverse events, without comparison to other interventions.

2.2. Setting and Timeline

The study was conducted at Centro Médico ABC, covering both Santa Fe and Observatorio campuses, with full access to surgical infrastructure, anesthesia services, and postanesthesia care units. Patient enrollment and data collection were carried out from March 2024 to February 2025.

2.3. Patient Selection and Enrollment

Patients were recruited consecutively from the elective surgery program. All participants met predefined eligibility criteria and provided written informed consent.

Inclusion criteria:

- Adults (≥18 years old)
- Scheduled for elective hemorrhoidectomy under general anesthesia
- ASA physical status I or II
- Consent for caudal block and data use for research purposes

Exclusion criteria:

- ASA III or greater
- Local infection at the sacral hiatus
- Known allergy to local anesthetics

- Active coagulopathy or anticoagulant therapy
- Cognitive or psychiatric conditions limiting reliable pain reporting
- Failure to perform or complete the caudal block

2.4. Anesthetic Technique

All patients underwent general anesthesia followed by a single-shot caudal epidural block administered in the surgical prone position. The block was performed via the sacral hiatus, following aseptic technique, using a standard dose and volume of long-acting local anesthetic, based on institutional protocol. The procedure was performed by experienced anesthesiologists, with documentation of technical success and any block-related complications.

2.5. Outcomes and Variables

Data were collected using standardized clinical forms by trained personnel. The main outcomes included:

- Postoperative pain, measured using the Visual Analog Scale (VAS) at 0 (PACU), 6, 12, and 24 hours
- Rescue analgesia use, including tramadol or NSAIDs within the first 24 hours
- Intraoperative hypotension, defined as MAP <65 mmHg and treated with ephedrine
- Total intraoperative opioid dose, expressed in milligrams
- Postoperative complications, related to the block or analgesic regimen

Demographic data (age, sex, weight, height, BMI) and comorbidities were also recorded.

2.6. Statistical Analysis

Descriptive statistics were used to summarize the findings. Continuous variables were tested for normality using the Shapiro-Wilk test. Normally distributed variables were reported as mean ± standard deviation (SD); non-normally distributed data as median and interquartile range (IQR). Categorical variables were expressed as frequencies and percentages. All analyses were performed using R software. Graphs were generated using the ggplot2 package to visually support key outcomes.

Results

A total of 36 patients undergoing elective hemorrhoidectomy under general anesthesia with caudal epidural block were included in the analysis. Demographic, intraoperative, and postoperative data were analyzed. Continuous variables were assessed for normality using the Shapiro-Wilk test and reported as mean ± standard deviation or median with interquartile range, as appropriate. Categorical variables were summarized using absolute and relative frequencies. Table 1 presents a complete descriptive overview of the study population.

Table 1. Descriptive analysis of patients undergoing hemorrhoidectomy with caudal block.

Variable	Summary
Patient Number	49.50 (IQR 40.75–58.25)
Age	41.00 (IQR 33.00–54.50)
Weight (kg)	69.36 ± 11.88
Height (cm)	165.00 (IQR 159.00–174.50)
IV Opioid	150.00 (IQR 150.00–200.00)
Total Dose (opioid)	150.00 (IQR 150.00–200.00)
Hypotension < 65 mmHg	1.00 (IQR 0.00–1.00)
Hypotension Duration	10.42 ± 6.90
Ropivacaine in Block	37.50 ± 0.00

Lidocaine in Block	100.00 ± 0.00
Clonidine in Block	150.00 (IQR 0.00–150.00)
VAS in PACU	0.00 ± 0.00
VAS at 6 Hours	1.00 (IQR 0.00–1.00)
VAS at 12 Hours	2.00 (IQR 1.00–3.00)
VAS at 24 Hours	2.00 (IQR 2.00–3.00)
BMI	25.55 (IQR 22.58–26.71)
Sex	Femenine: 21 (58.3%); Masculine: 15 (41.7%)
Comorbidities	No: 21 (58.3%); Yes: 15 (41.7%)
Comorbidity Type	None: 21 (58.3%); Hypothyroidism: 6 (16.7%); Arterial Hypertension: 6 (16.7%); Cardiac Failure: 1 (2.8%); Pulmonar fibrosis: 1 (2.8%); Type 2Diabetes: 1 (2.8%)
Smoking	NO: 23 (63.9%); Yes: 13 (36.1%)
IV Dexmedetomidine	NO: 35 (97.2%);Yes: 1 (2.8%)
Dexmedetomidine Dose	NO: 35 (97.2%); 35 mcg: 1 (2.8%)
Ephedrine Dose	NO: 18 (50.0%); 20: 11 (30.6%); 10: 6 (16.7%); 15: 1 (2.8%)
IV NSAID	dynastat: 17 (47.2%); ketoprofeno: 11 (30.6%); KETOPROFENO: 6 (16.7%); DYNASTAT: 2 (5.6%)
Rescue in PACU	NO: 36 (100.0%)
Rescue at 6 Hours	NO: 33 (91.7%); DYNASTAT: 3 (8.3%)
Rescue at 12 Hours	NO: 31 (86.1%); TRAMADOL: 3 (8.3%); SI TRAMADOL: 2 (5.6%)
Rescue at 24 Hours	NO: 33 (91.7%); TRAMADOL: 2 (5.6%); SI TRAMADOL: 1 (2.8%)
Complications	NO: 36 (100.0%)

Table 1 summarizes the demographic and clinical characteristics of the 36 patients who received a caudal epidural block for anorectal surgery. The median age was 41 years (IQR 33–54.5), with a slight female predominance (58.3%). The average weight was 69.4 ± 11.9 kg and median BMI was 25.6 (IQR 22.6–26.7). Most procedures were hemorrhoidectomies (97.2%). Comorbidities were present in 41.7% of patients, mainly hypothyroidism and hypertension.

Intraoperatively, all patients received ropivacaine (mean 37.5 mL) and lidocaine (mean 100 mL) for the caudal block, while clonidine was used variably. Hypotension occurred in a minority (median 1 episode), with a mean duration of 10.4 ± 6.9 minutes. Ephedrine was administered in 50% of cases.

Pain scores were low throughout the first 24 hours, with median VAS of 0 in PACU, 1 at 6 hours, 2 at 12 hours, and 2 at 24 hours. No rescue analgesia was needed in PACU, and over 85% of patients did not require additional analgesics at later time points. No complications related to the caudal block were reported.

Intraoperative findings

All patients received a standardized caudal block using ropivacaine (mean 37.5 mL) and lidocaine (mean 100 mL). Clonidine was administered in 55.6% of cases (150 µg), while 44.4% did not receive it. Intraoperative hypotension (MAP < 65 mmHg) occurred in 55.6% of patients, while 44.4% remained hemodynamically stable. Ephedrine was given in 50% of cases, most frequently in doses of 20 mg or 10 mg. IV NSAIDs were used in all patients, predominantly parecoxib (dynastat) and ketoprofen.

Pain trajectories and rescue analgesia

Postoperative pain scores remained consistently low. Median VAS was 0 in the PACU, 1 at 6 hours, 2 at 12 hours, and 2 at 24 hours. No patient required rescue analgesia in the PACU. Rescue analgesia was administered in 8.3% of cases at 6 hours, 13.9% at 12 hours, and 8.3% at 24 hours, mostly with tramadol or additional NSAIDs. These findings suggest that caudal block provided effective and sustained postoperative analgesia during the first 24 hours.

Safety and complications

No block-related complications were reported. There were no cases of urinary retention, motor block persistence, systemic toxicity, or local infection. All patients completed the procedure and postoperative follow-up without adverse events attributable to the regional technique.

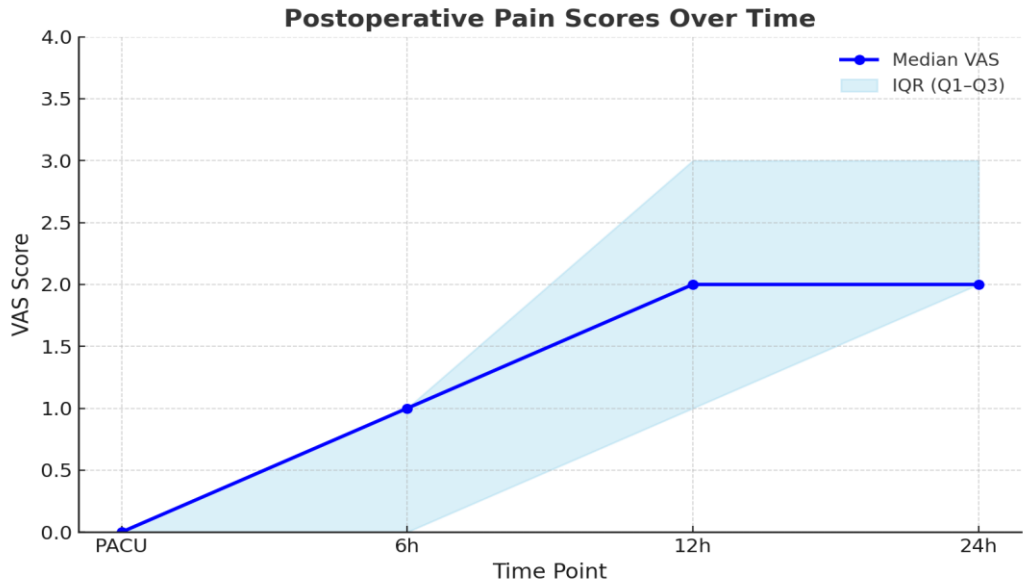

Figure 1. Median postoperative pain scores (VAS) at different time points following caudal epidural block. Error bands represent the interquartile range (Q1–Q3) at each time point: PACU, 6 hours, 12 hours, and 24 hours. Pain remained low throughout the first postoperative day.

Discussion

In this case series, we describe the clinical outcomes of 36 patients undergoing minor anorectal procedures under general anesthesia and caudal epidural block. Pain control was effective across all postoperative time points, with a median VAS score of 1 at 6 hours, 2 at 12 hours, and 2 at 24 hours. Notably, no patient required rescue analgesia in the PACU, and fewer than 15% required opioid or NSAID rescue medication at any point within the first 24 hours. No complications were reported.

Our findings align with prior literature supporting the effectiveness of regional anesthesia in anorectal surgery. Cañas et al. demonstrated superior postoperative analgesia between 6 and 12 hours in patients receiving regional blocks compared to saddle spinal anesthesia, with fewer adverse effects such as urinary retention. Similarly, Parras et al. reported that caudal anesthesia in adult hemorrhoidectomy provided prolonged analgesia with minimal hemodynamic impact, suggesting a favorable safety profile for ambulatory settings.(2,5)

Additionally, prior studies that evaluated caudal anesthesia as a sole technique for anorectal surgery in adults. Vadhanan et al. conducted a feasibility study using ultrasound-guided caudal epidural anesthesia in 50 adult patients and reported a 100% success rate, high patient and surgical satisfaction, and minimal adverse events, supporting its safety and acceptability in ambulatory settings. Similarly, another study described the successful use of caudal blocks for proctologic procedures, also noting minimal complications and high satisfaction levels. In contrast, while our study did not use ultrasound guidance and relied on landmark-based techniques, we still achieved excellent analgesia, no complications, and complete patient satisfaction in a fully general anesthetic context. This suggests that with appropriate technique and anesthetic mixture, caudal blocks may remain effective even without advanced imaging guidance, particularly in controlled surgical settings.(6,7)

The consistent pain control observed in our cohort may be attributed to the use of a multimodal caudal anesthetic mixture including ropivacaine, lidocaine, and clonidine. Although clonidine was not administered in all patients, its use in 55.6% of cases likely contributed to the low VAS scores, as described in previous studies where it enhanced duration and quality of analgesia.

Berstock et al., showed that caudal anesthesia significantly reduced postoperative opioid requirements—by up to 79% and facilitated earlier return of bowel function in patients undergoing hemorrhoidectomy. (8) These benefits were attributed to the prolonged effect of bupivacaine and reduced opioid exposure. Similarly, Xu et al. demonstrated that adding dexmedetomidine to ropivacaine in adult caudal anesthesia significantly prolonged sensory block duration and postoperative analgesia without notable adverse effects. These results support the rationale behind the multimodal caudal approach used in our series, where the combination of ropivacaine, lidocaine, and clonidine likely contributed to sustained analgesia and minimal rescue requirements. Although dexmedetomidine was not used in our cohort, the comparable outcomes in terms of low pain scores and absence of complications suggest that appropriately selected adjuvants in caudal anesthesia can achieve similar efficacy and safety in ambulatory anorectal procedures.(9-10)

The absence of complications in our series is also noteworthy, especially in comparison to reports of lumbar puncture site pain and urinary retention associated with spinal anesthesia. While our study lacked a comparator group, the absence of intraoperative or postoperative adverse events and the low analgesic requirements suggest caudal anesthesia is a viable, safe, and effective technique in select adult anorectal surgery cases.

These results support the incorporation of caudal blocks as an alternative to spinal or general anesthesia in non-septic anorectal procedures, particularly when aiming to reduce opioid exposure and facilitate ambulatory recovery. In addition to its analgesic benefits, the consistent comfort levels observed in our patients suggest that caudal block may contribute positively to overall patient satisfaction—an aspect increasingly relevant in modern perioperative care. Future comparative or prospective studies are warranted to validate these findings in larger populations and different surgical contexts.

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