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A Comparative Analysis of the Various Postoperative Pain Management Modalities employed Following Open Hemorrhoidectomy: A Retrospective Institutional Study

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ABSTRACT
Background: Postoperative pain after open hemorrhoidectomy is frequent and recovery-limiting, yet the optimal, opioid-sparing analgesic strategy remains uncertain in our setting. Objective: To compare the effectiveness of postoperative pain-management techniques following open hemorrhoidectomy. **Methods:** This single-centre, retrospective observational comparative study at Department of General Surgery, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, 603103, Tamilnadu, India (Jan 2024–Jun 2025) reviewed records of 60 adults (<65 years) undergoing open hemorrhoidectomy for Grade III–IV hemorrhoids. Baseline variables and postoperative outcomes – VAS pain at 6, 12, 24, 48 h and POD5, rescue analgesia, complications, ambulation time, length of stay, and satisfaction – were compared across primary analgesic-modality groups (oral-only, oral+IV, oral+topical, multimodal, non-pharmacological). **Results:** Among 60 patients (mean age 46.2 ± 10.8 years; 63.3% male), most had Grade III hemorrhoids (60.0%); BMI averaged 24.8 ± 3.6 kg/m² with 40.0% obese. Comorbidities included hypertension 23.3% and diabetes 13.3%. Anemia occurred in 30.0% and fasting glucose suggested dysglycemia (43.3% prediabetes, 13.3% diabetes). Spinal anesthesia was used in 70.0%. Postoperatively, oral systemic analgesics predominated (90.0%; NSAID-only 55.6%), IV agents were used in 43.3%, and topical therapies in 53.3% (mainly lidocaine); non-pharmacological measures were frequent (86.7%). Across five modality groups, complications were low and similar (urinary retention 10–25%). Pain trajectories favored multimodal therapy: VAS at 12 h was 4.5 ± 0.8 versus 6.5 ± 1.1 with non-pharmacological only ($p=0.002$), diverging further at 24 h (3.0 ± 0.7 vs 5.8 ± 1.0; $p<0.001$) and POD5 (1.2 ± 0.4 vs 3.5 ± 0.9; $p<0.001$). Rescue analgesia was least with multimodal (25.0%) and greatest with non-pharmacological only (83.3%; $p=0.024$). Ambulation was faster (1.0 ± 0.2 days; $p=0.014$) and satisfaction highest (9.3 ± 0.6; $p<0.001$) with multimodal care. **Conclusion:** Multimodal, opioid-sparing analgesia after open hemorrhoidectomy provided superior pain control from 12 hours through POD5, reduced rescue-analgesia needs, hastened ambulation, and improved satisfaction without increasing complications compared with single-modality or non-pharmacological approaches.

INTRODUCTION:

Hemorrhoids are a common benign anorectal condition characterized by symptomatic enlargement and distal displacement of the anal cushions; although many patients respond to office-based therapies, advanced (Goligher grade III–IV) disease often requires excisional hemorrhoidectomy, which is consistently associated with substantial early postoperative pain.(1) Optimal pain control after hemorrhoidectomy matters clinically because inadequate analgesia delays mobilization, increases unplanned care, and amplifies risks such as postoperative urinary retention (POUR).(2) Contemporary guidelines from the American Society of Colon and Rectal Surgeons (ASCRS) emphasize individualized, evidence-based management and recognize excisional surgery as appropriate for advanced symptomatic hemorrhoids; however, they provide latitude in postoperative analgesic selection, reflecting heterogeneous practices and an evolving evidence base.(3)

Over three decades of perioperative science support an opioid-sparing, multimodal strategy – combining agents and techniques that act on complementary pain pathways – to improve analgesia while minimizing opioid-related adverse effects.(4, 5) Across surgical disciplines and within enhanced-recovery pathways, routine use of non-opioid foundations (e.g., NSAIDs, acetaminophen) with adjuvant modalities reduces pain scores and opioid consumption and facilitates earlier mobilization.(6) In hemorrhoidectomy specifically, topical therapies that modulate internal anal sphincter tone – glyceryl trinitrate (GTN) and calcium-channel blockers (diltiazem or nifedipine) – have shown meaningful early pain reductions, consistent with a pathophysiologic role for sphincter spasm; GTN's benefit must be balanced against dose-related headache.(7-9) Additionally, growing evidence indicates that topical (and some oral) metronidazole regimens can attenuate pain during the first postoperative week, though optimal formulation and duration are still being refined.(10, 11)Even so, a lot of people don't go to the doctor because they're embarrassed, they don't want to be seen as having an anorectal ailment, or they can't afford it, especially in places where resources are limited.(32)

MATERIALS AND METHODS:

This was a single centre , hospital-based, retrospective, observational, comparative study conducted in the Department of General Surgery, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, 603103, Tamil Nadu, India over a period of 18 months between January 2024 and June 2025. The study was approved by the Institutional Human Ethics Committee (IHEC) with reference number IHEC-I/4163/25 dated 10-9-2025. Patients less than 65 years of age, of both genders, without prior anorectal surgery, undergoing open hemorrhoidectomy for Grade 3 or 4 hemorrhoids, with complete postoperative records including VAS pain scores and analgesic details were included in the study. However, patients with coexisting anorectal pathologies (e.g., fissures, fistula); chronic analgesic or steroid use before surgery; incomplete follow-up data; and severe comorbidities precluding standard analgesic protocols were excluded.

The sample size was estimated using the two-sample means formula with $\alpha=0.05$ ($Z=1.96$), 80% power ($Z=0.84$), and a conservative standardized effect size of $d=0.70$, informed by Lohsiriwat et al.(12) showing 1–2-point differences on a 0–10 pain scale between postoperative analgesic modalities after hemorrhoidectomy. Accounting for these assumptions and feasibility in case retrieval, the final total sample size was set at 60. A detailed review of the hospital records (retrieved using nonprobability sampling technique – convenience sampling) and follow-up charts was done to extract relevant data. Comprehensive baseline details including age, sex, BMI, comorbidities (diabetes, hypertension, smoking, nutritional status), hemorrhoid grade, operative findings, and type of anesthesia were collected. Preoperative work-up included routine investigations such as complete blood count, renal and liver function tests, coagulation profile, blood glucose, chest X-ray, and ECG as per anesthetic guidelines. Postoperative pain management modalities employed were recorded and categorized into groups, including systemic analgesics (NSAIDs, opioids) – oral, intravenous analgesics, topical applications (lidocaine gel, nitroglycerin ointment, calcium channel blocker creams), non-pharmacological measures like sitz baths and ice packs, or combinations thereof. Patients received standardized postoperative care as per institutional protocol with regular monitoring for complications such as urinary retention, bleeding, or wound infection. Pain was assessed using validated Visual

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Analog Scale (VAS) scores at multiple intervals: 6 hours, 12 hours, 24 hours, and 48 hours postoperatively, and on postoperative day 5 during follow-up visits. Additional parameters assessed included need for rescue analgesia, duration of hospital stay, time to comfortable ambulation, and patient satisfaction.

Statistical analysis: Continuous variables were summarized as mean (SD); categorical variables as n (%). Normality was assessed with the Shapiro–Wilk test and homogeneity of variances with Levene's test. Between-group comparisons across the five primary postoperative analgesic-modality groups used one-way ANOVA for continuous outcomes (VAS scores at 6, 12, and 24 hours; 48 hours; and postoperative day 5; length of stay; time to comfortable ambulation; and satisfaction). Binary/categorical outcomes (rescue analgesia, urinary retention, postoperative bleeding, wound infection) were compared using Pearson's χ^2 test, with Fisher's exact or Fisher–Freeman–Halton tests when expected cell counts were <5. A significance level of α=0.05 (two-tailed) was used. All analyses were conducted in R (v4.3.x).

RESULTS:

The study enrolled 60 patients with a mean age of 46.2 ± 10.8 years, most commonly in the 40–49 age group (36.7%), and the majority were male (63.3%) (Table 1). The mean BMI was 24.8 ± 3.6 kg/m², with 40.0% classified as obese and 23.3% overweight. Among comorbidities and lifestyle factors, hypertension was present in 23.3%, diabetes in 13.3%, and 28.3% were current smokers. Hemorrhoids were predominantly Grade III (60.0%), while 40.0% were Grade IV. Spinal (saddle block) anesthesia was the most frequently used technique (70.0%), followed by general anesthesia (16.7%) and local with sedation (13.3%). Operatively, three columns were excised in 66.7% of patients, and two columns in 33.3%. Mixed internal–external hemorrhoids were the most common finding (73.3%), while internal hemorrhoids alone were noted in 26.7%.

In the preoperative laboratory profile of 60 patients, the mean haemoglobin was 12.8 ± 1.6 g/dL, with anemia detected in 30.0%. The average total leukocyte count was 8.1 ± 2.2 ×10⁹/L, where 83.3% were normal, 13.3% showed leukocytosis, and 3.3% leukopenia (Table 2). Platelet counts averaged 262.0 ± 62.0 ×10⁹/L, with most (93.3%) within the normal range. Renal function tests showed a mean serum creatinine of 0.9 ± 0.2 mg/dL (3.3% elevated) and blood urea of 24.6 ± 6.8 mg/dL (1.7% elevated). Liver enzymes were mildly elevated in some: AST 27.4 ± 8.6 IU/L with 8.3% abnormal, ALT 29.1 ± 9.4 IU/L with 10.0% abnormal, and bilirubin 0.8 ± 0.3 mg/dL with 3.3% elevated. Serum albumin averaged 4.2 ± 0.4 g/dL, with hypoalbuminemia in 6.7%. Coagulation studies showed mean INR of 1.0 ± 0.1 (5.0% prolonged) and aPTT of 31.2 ± 3.8 s (5.0% prolonged). Fasting plasma glucose was 108.4 ± 21.7 mg/dL, with 43.3% normal, 43.3% prediabetic, and 13.3% diabetic.

Systemic oral analgesics were most widely used (90.0%), with NSAIDs alone given in 55.6%, NSAID–opioid combinations in 40.7%, and opioids alone in only 3.7%. The mean oral dose frequency in the first 24 hours was 2.6 ± 1.0, with nearly 41.0% requiring three or more doses (Table 3). Intravenous agents were administered in 43.3% of patients, most commonly NSAIDs (69.2%), while opioids accounted for 30.8%; the mean IV dose frequency was 1.6 ± 0.7 in the first 24 hours. Topical agents were used in 53.3%, most often lidocaine gel (62.5%), followed by nitroglycerin ointment (25.0%) and calcium-channel blocker creams (12.5%), with an average duration of 5.1 ± 1.8 days—predominantly 4–7 days (62.5%). Non-pharmacological measures were highly prevalent (86.7%), with sitz baths alone in 42.3%, ice packs alone in 7.7%, and both combined in 50.0%.

Across the five postoperative pain-management groups (n=60), complication rates were generally low and comparable, with urinary retention observed in 10–25%, minor bleeding in 0–12.5%, and wound infection in up to 16.7% (p>0.3 for all). Pain intensity, however, showed significant differences: at 12 hours, mean VAS scores ranged from 4.5 ± 0.8 in the multimodal group to 6.5 ± 1.1 in the nonpharmacological-only group (p=0.002), with progressively greater divergence by 24 hours (3.0 ± 0.7 vs. 5.8 ± 1.0, p<0.001) and postoperative day 5 (1.2 ± 0.4 vs. 3.5 ± 0.9, p<0.001). Rescue analgesia was most frequently required in the nonpharmacological group (83.3%) and least in multimodal therapy (25.0%), reaching significance (p=0.024). Length of hospital stay was similar across groups (2–3 days, p=0.200), but time to comfortable ambulation was significantly shorter with multimodal analgesia (1.0 ± 0.2 days) compared to oral-only (1.7 ± 0.5 days) and nonpharmacological measures (1.9 ± 0.6 days, p=0.014). Patient satisfaction mirrored analgesic efficacy, highest in the multimodal group (9.3 ± 0.6) and lowest in nonpharmacological-only (6.5 ± 1.1), with highly significant differences (p<0.001). Overall, multimodal regimens offered superior pain relief, earlier mobilization, and greater satisfaction compared with single-modality or nonpharmacological approaches (Table 4).

DISCUSSION:

The demographic and clinical profile of our cohort is broadly consistent with prior epidemiologic descriptions of patients undergoing excisional hemorrhoidectomy. The predominance of middle age (mean 46.2 years; peak 40–49 years) and male sex mirrors classic population data showing hemorrhoids cluster in midlife and are common in men, although true sex differences vary by sampling frame (e.g., community vs hospital).(1, 13) The high proportion of Grade III–IV disease (60% and 40%, respectively) aligns with surgical indications summarized in contemporary guidance, which recommend excisional hemorrhoidectomy for advanced, symptomatic internal hemorrhoids or when office procedures fail.(3, 14) The anesthesia pattern – predominantly spinal (70%) with lesser use of general or local with sedation – reflects common practice in South and East Asia; however, recent observational and perioperative literature note that spinal anesthesia may increase the risk of acute urinary retention compared with general anesthesia combined with local infiltration, underscoring the need to individualize anesthetic strategy in high-risk patients.(15, 16) Preoperative laboratory findings were largely unremarkable, but a 30% anemia prevalence is notable in the context of chronic anorectal bleeding. Although hemorrhoid-related iron deficiency anemia is generally considered uncommon at the population level, Kluiber et al. reported clinically meaningful anemia in a subset of patients with brisk or prolonged bleeding, with hemoglobin recovery after definitive surgery.(17) Our data therefore fit a recognized – if minority – phenotype within hemorrhoidal disease. Abnormalities in liver enzymes and coagulation were infrequent, consistent with elective surgical selection and the exclusion of severe comorbidity.

Analgesic utilization in our patients mirrors the current shift toward opioid-sparing, multimodal regimens. The dominant reliance on NSAIDs (oral in 90.0% overall, with NSAID-only regimens in 55.6%) is concordant with multimodal analgesia principles championed since the 1990s to enhance pain control while reducing opioid exposure (Kehlet and Dahl) and reaffirmed in modern reviews.(5, 18) Evidence from perioperative trials and systematic reviews supports the efficacy of non-opioid agents (paracetamol/acetaminophen, aceclofenac NSAIDs, COX-2 inhibitors) as foundational components of balanced analgesia, with meaningful opioid-sparing effects.(19) Topical therapies – used here in 53.3% (most commonly ligncaine(2%), then nitroglycerin and calcium-channel blocker creams) – also have an evidentiary basis in hemorrhoidectomy: randomized and meta-analytic data show that chemical “sphincterotomy” with glyceryl trinitrate (GTN) or calcium-channel blockers (nifedipine or diltiazem) can reduce early postoperative pain by relieving internal sphincter spasm.(20-22) Similarly, topical 10% metronidazole has repeatedly demonstrated analgesic benefit after excisional hemorrhoidectomy, with more recent syntheses refining its role relative to oral dosing.(10, 11, 23)

The comparative effectiveness signal in our study – superior pain control with multimodal regimens and worst trajectories with non-pharmacological measures alone – tracks closely with the broader multimodal paradigm. Multimodal approaches target distinct nociceptive pathways (peripheral inflammation, central sensitization, muscle spasm) to produce additive or synergistic analgesia while minimizing any single drug’s adverse effects, an effect documented across surgical domains and reiterated in strategy papers on balanced analgesia.(5, 18) In our cohort, between-group separation in VAS scores emerged by 12 h and widened through 24–48 h and day 5, exactly when pain typically peaks and then resolves after hemorrhoidectomy in trajectory studies.(24, 25) The non-pharmacological-only group’s higher pain burden and frequent need for rescue medication (83.3%) are compatible with recent randomized data suggesting that while sitz baths may modestly improve comfort, their analgesic effect is small and inconsistent, and ice packs may be comparable or superior depending on timing and protocol.(26-28) The implication is not that non-pharmacological measures lack value – they remain useful adjuncts for hygiene and short-term soothing – but that they should be embedded within, not substituted for, structured multimodal analgesia.

Topical agent choices in our cohort correspond to high-quality evidence. For calcium-channel blockers, multicentre randomized trials show nifedipine–lidocaine ointment reduces pain versus lidocaine alone across the first postoperative day and beyond, with favorable safety.(21) For GTN, prospective studies and meta-analyses indicate a meaningful analgesic effect in the intermediate period (days 3–7), balanced against dose-dependent headache risk.(20, 29) Diltiazem cream has also repeatedly lowered pain scores without major adverse effects in randomized settings.(22, 30) Our observed association between topical use (alone or combined with oral systemic agents) and better VAS trajectories is therefore biologically and empirically plausible.

Rescue-analgesia patterns further reinforce the comparative advantage of multimodal therapy. Lower rescue requirements in the multimodal group (25.0%) align with the opioid-sparing

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premise and with enhanced-recovery pathways in ambulatory anorectal surgery, which demonstrates less pain and fewer unplanned contacts when standardized multimodal protocols are implemented.(31) The near-universal availability and low cost of NSAIDs and topical agents, combined with educational bundles on timed dosing and defecation-related pain strategies (e.g., stool softeners, osmotics), likely contribute to these outcomes – an approach consistent with the 2024 ASCRS guideline emphasis on individualized, evidence-based care and robust patient instruction.(3)

Our complication rates were low and comparable across groups. Urinary retention occurred in 10–25% depending on group – within reported ranges after anorectal surgery under spinal or general anesthesia. Predictors of AUR include spinal anesthesia, prolonged operative time, higher intrathecal local anesthetic doses, and perioperative fluid balance.(15, 24) Recent comparative work suggests that general anesthesia with local infiltration may attenuate retention risk relative to spinal in selected patients, but these findings are predominantly observational and should be interpreted cautiously pending randomized confirmation.(16) Bleeding and wound infection were uncommon in our study; this, together with low creatinine and normal coagulation parameters, likely reflects careful selection and protocolized care. Functional recovery metrics in our data – shorter time to comfortable ambulation and higher satisfaction with multimodal therapy – fit well with the broader recovery literature. Balanced analgesia facilitates earlier mobilization and bowel function through better pain control and fewer opioid-related adverse effects (nausea, constipation, sedation), and patient-reported satisfaction closely tracks pain relief.(18) Importantly, our length-of-stay did not differ substantially by modality (2–3 days overall), which is typical in systems where discharge is influenced by social and logistical factors as much as clinical readiness. Still, the significant advantage in early ambulation for multimodal care is clinically meaningful, given known benefits for thromboembolism prevention and overall recovery.

Several therapeutic nuances warrant emphasis for practice. First, structured topical therapy (e.g., lignocaine(2%) for immediate analgesia plus GTN or diltiazem to reduce sphincter spasm) appears to meaningfully complement systemic NSAIDs in the early postoperative window.(21, 30) Second, metronidazole – topical or oral – has a signal for pain reduction up to two weeks, although heterogeneity in regimens and mixed results in newer datasets suggest it should be applied judiciously and within antimicrobial-stewardship principles.(10, 11) Third, while sitz baths and ice are widely prescribed and generally safe, clinicians should calibrate expectations and incorporate them as adjuncts rather than primary therapy; the latest randomized trials show modest or mixed analgesic benefits, and protocols (temperature, timing, duration) matter.(26) Finally, aligning postoperative care with enhanced-recovery elements – standardized education, scheduled non-opioid analgesics, early mobilization, laxatives to ease first defecations – can improve outcomes and reduce unscheduled contacts, even in short-stay anorectal surgery.

This study has several limitations. First, the nonprobability (convenience) sampling and lack of randomization introduces selection bias and confounding by indication, as analgesic modalities were chosen clinically rather than assigned. Second, reliance on charted data risks misclassification and missingness (e.g., dosing intervals, adherence to topical regimens, completeness of VAS recordings and satisfaction scales), and pain assessment was unblinded and potentially influenced by expectations. Third, although the overall sample was 60, some subgroups were small – particularly multimodal (n=4) and nonpharmacological-only (n=6) – limiting power for between-group comparisons and precision of estimates and increasing the chance of type II error. Fourth, perioperative management was heterogeneous (variation in anesthetic technique, local infiltration, and postoperative nursing instructions), and criteria for rescue analgesia and discharge were not protocolized, which may confound outcomes such as ambulation time and length of stay. Finally, the single-institution setting (Department of General Surgery, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, 603103,) may limit generalizability to other populations and practice environments.

CONCLUSION:

In this single-centre retrospective cohort of 60 patients undergoing open hemorrhoidectomy for Grade III–IV disease, we found that an opioid-sparing, multimodal postoperative analgesic strategy provided clinically, and statistically superior recovery compared with single-modality or nonpharmacological approaches. Multimodal regimens yielded lower VAS pain scores from 12 hours onward through postoperative day 5, reduced the need for rescue analgesia, enabled earlier comfortable ambulation, and achieved higher patient satisfaction, without increasing rates of urinary retention, postoperative bleeding, or wound infection. These findings support routine adoption of balanced analgesia centered on scheduled non-

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opioid systemic agents (e.g., NSAIDs) complemented by targeted topical therapy and simple supportive measures, delivered within standardized postoperative care pathways.

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Table 1: Baseline characteristics (N=60)

Variable		Overall (N=60)
Age (years), Mean (SD)		46.2 (10.8)
Age (years), n (%)	<30	4 (6.7)
	30–39	14 (23.3)
	40–49	22 (36.7)
	50–59	16 (26.7)
	≥60	4 (6.7)
Sex, n (%)	Male	38 (63.3)
	Female	22 (36.7)
BMI (kg/m²), Mean (SD)		24.8 (3.6)
BMI (kg/m²), n (%)	Underweight (<18.5)	3 (5.0)
	Normal (18.5–22.9)	19 (31.7)
	Overweight (23.0–24.9)	14 (23.3)
	Obese (≥25.0)	24 (40.0)
Comorbidities & Lifestyle, n (%)	Diabetes mellitus	8 (13.3)
	Hypertension	14 (23.3)
	Current smoking	17 (28.3)
Hemorrhoid grade (Goligher), n (%)	Grade III	36 (60.0)
	Grade IV	24 (40.0)
Type of anesthesia, n (%)	Spinal (saddle block)	42 (70.0)
	General	10 (16.7)
	Local + sedation	8 (13.3)
Operative findings, n (%)	Two columns excised	20 (33.3)
	Three columns excised	40 (66.7)
	Mixed internal–external	44 (73.3)
	Internal only	16 (26.7)
SD, Standard deviation; BMI, Body mass index		

Table 2: Preoperative laboratory work-up (N=60)

Variable		Overall (N=60)
Haemoglobin (g/dL), Mean (SD)		12.8 (1.6)
Anemia (sex-specific WHO thresholds), n (%)		18 (30.0)
Total leucocyte count (×10⁹/L), Mean (SD)		8.1 (2.2)
Total leucocyte count (×10⁹/L), n (%)	Leukopenia (<4.0)	2 (3.3)
	Normal (4.0–11.0)	50 (83.3)
	Leukocytosis (>11.0)	8 (13.3)
Platelet count (×10⁹/L), Mean (SD)		262.0 (62.0)
Platelet count (×10⁹/L), n (%)	Thrombocytopenia (<150)	3 (5.0)
	Normal (150–450)	56 (93.3)
	Thrombocytosis (>450)	1 (1.7)
Serum creatinine (mg/dL), Mean (SD)		0.9 (0.2)
Serum creatinine (mg/dL), n (%)	Elevated (>1.2 mg/dL)	2 (3.3)
Blood urea (mg/dL), Mean (SD)		24.6 (6.8)
Blood urea (mg/dL), n (%)	Elevated (>40 mg/dL)	1 (1.7)
AST (SGOT) (IU/L), Mean (SD)		27.4 (8.6)
AST (SGOT) (IU/L), n (%)	Elevated (>40 IU/L)	5 (8.3)
ALT (SGPT) (IU/L), Mean (SD)		29.1 (9.4)
ALT (SGPT) (IU/L), n (%)	Elevated (>40 IU/L)	6 (10.0)
Total bilirubin (mg/dL), Mean (SD)		0.8 (0.3)
Total bilirubin (mg/dL), n (%)	Elevated (>1.2 mg/dL)	2 (3.3)
Serum albumin (g/dL), Mean (SD)		4.2 (0.4)
Serum albumin (g/dL), n (%)	Hypoalbuminemia (<3.5 g/dL)	4 (6.7)
INR, Mean (SD)		1.0 (0.1)
INR, n (%)	Prolonged (>1.2)	3 (5.0)
aPTT (seconds), Mean (SD)		31.2 (3.8)
aPTT (seconds), n (%)	Prolonged (>35 s)	3 (5.0)
Fasting plasma glucose (mg/dL), Mean (SD)		108.4 (21.7)
Fasting plasma glucose (mg/dL), n (%)	Normal (<100)	26 (43.3)
	Prediabetes (100–125)	26 (43.3)
	Diabetes (≥126)	8 (13.3)
ALT, Alanine aminotransferase; aPTT, Activated partial thromboplastin time; AST, Aspartate aminotransferase; INR, International normalized ratio; SD, Standard deviation; SGOT, Serum glutamic-oxaloacetic transaminase; SGPT, Serum glutamic-pyruvic transaminase; WHO, World Health Organization		

Table 3: Postoperative Pain-Management Modalities (N=60)

Category		n	Percentage
Systemic analgesics – oral		54	90.0
Systemic analgesics – oral	NSAID only	30	55.6
	Opioid only	2	3.7

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	NSAID + opioid	22	40.7
Oral doses in first 24 hours, Mean (SD)		2.6 (1.0)	
Oral doses in first 24 hours	1 dose	10	18.5
	2 doses	22	40.7
	≥3 doses	22	40.7
Intravenous (IV) analgesics		26	43.3
Intravenous (IV) analgesics	IV NSAID (e.g., Paracetomol /diclofenac)	18	69.2
	IV opioid (e.g., tramadol)	8	30.8
IV doses in first 24 hours, Mean (SD)		1.6 (0.7)	
IV Doses in first 24 hours	1 dose	12	46.2
	≥2 doses	14	53.8
Topical agents		32	53.3
Topical agents	Lignocaine gel (2%)	20	62.5
	Nitroglycerin ointment	8	25.0
	Calcium-channel blocker cream (e.g., diltiazem/nifedipine)	4	12.5
Duration of topical therapy (days), Mean (SD)		5.1 (1.8)	
Duration of topical therapy (days)	≤3 days	8	25.0
	4–7 days	20	62.5
	>7 days	4	12.5
Non-pharmacological		52	86.7
Non-pharmacological	Sitz baths only	22	42.3
	Ice packs only	4	7.7
	Both sitz baths and ice packs	26	50.0

Table 4: Postoperative Outcomes by Primary Analgesic Modality

	Oral-only systemic (NSAID ± opioid) (n=8)	**Oral + IV systemic (± topical) (n=22)**	**Oral systemic + topical (no IV) (n=20)**	**Multimodal (≥3 modalities) (n=4)**	**Nonpharmacological only (n=6)**	**p-value**
Postoperative complications, n (%)						
Urinary retention	2 (25.0)	4 (18.2)	2 (10.0)	1 (25.0)	1 (16.7)	0.865
Postoperative bleeding	1 (12.5)	1 (4.5)	1 (5.0)	0 (0.0)	0 (0.0)	0.830
Wound infection	0 (0.0)	1 (4.5)	0 (0.0)	0 (0.0)	1 (16.7)	0.341
Visual analogue scale scores, Mean (SD)						
6 h	6.8 (1.1)	6.2 (1.0)	6.0 (1.0)	5.6 (0.8)	7.0 (1.2)	0.093
12 h	6.1 (1.0)	5.4 (1.0)	5.0 (0.9)	4.5 (0.8)	6.5 (1.1)	0.002*
24 h	5.0 (1.1)	4.2 (0.9)	3.8 (0.8)	3.0 (0.7)	5.8 (1.0)	<0.001*
48 h	3.9 (1.0)	3.2 (0.8)	2.7 (0.7)	2.2 (0.5)	4.6 (0.9)	<0.001*
POD5	2.7 (0.9)	2.1 (0.7)	1.6 (0.6)	1.2 (0.4)	3.5 (0.9)	<0.001*
Need for rescue analgesia, n (%)						
Required	5 (62.5)	7 (31.8)	6 (30.0)	1 (25.0)	5 (83.3)	0.024*
Hospital length of stay (days)						
Mean (SD)	2.7 (0.8)	2.5 (0.7)	2.3 (0.6)	1.9 (0.4)	2.8 (0.9)	0.200
Time to comfortable ambulation (days)						
Mean (SD)	1.7 (0.5)	1.5 (0.5)	1.3 (0.4)	1.0 (0.2)	1.9 (0.6)	0.014*
Patient satisfaction (Likert 1–10)						
Mean (SD)	7.4 (1.0)	8.2 (0.9)	8.8 (0.8)	9.3 (0.6)	6.5 (1.1)	<0.001*
*Statistically significant at p<0.05						

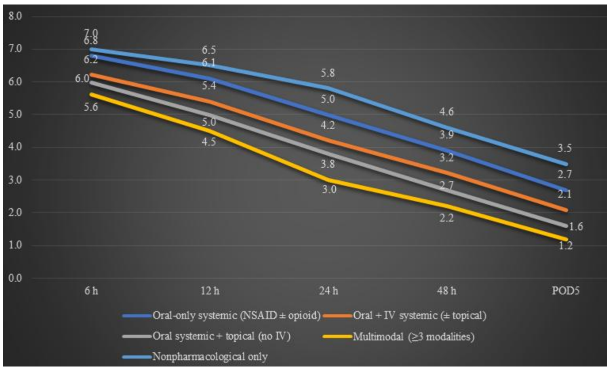

Figure 1: Visual analogue scale scores by Primary Analgesic Modality