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Original Research Article

ACUTE POSTOPERATIVE PAIN MANAGEMENT: AN OBSERVATIONAL STUDY OF PATTERNS AND PROTOCOLS IN ORTHOPEDIC, OBSTETRIC-GYNECOLOGIC, AND GENERAL SURGICAL PATIENTS IN THE SUB-HIMALAYAN REGION

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ABSTRACT

Background: Consistent, evidence-based control of acute post-operative pain is pivotal for early mobilisation, reduced morbidity and improved satisfaction, yet practice varies widely across surgical disciplines. This study evaluated real-world analgesic patterns and their effectiveness in three high-volume departments at a tertiary-care hospital in the sub-Himalayan region of India.

Materials and Methods: Over 18 months, 400 ASA I–II adults (18–70 y) scheduled for elective abdominal or orthopaedic surgery were prospectively observed. Demographics, anaesthetic technique, analgesic regimen and timing of transition from parenteral to enteral drugs were documented. Pain intensity (Numeric Rating Scale 0–10) and patient-reported satisfaction (11-point Likert) were recorded at 12, 24, 36 and 48 h post-operatively; analgesia-related adverse effects were noted. Data were analysed with SPSS v21.0 ($p < 0.05$).

Results: Protocol adherence differed markedly between departments. Orthopaedics, which routinely used peripheral nerve blocks within a structured multimodal protocol, achieved the lowest mean pain scores (7.22 ± 1.15 at 12 h; 5.23 ± 1.08 at 24 h) and the highest satisfaction (7.3 % at 12 h; 21 % at 24 h). Obstetric–gynaecology patients reported the highest initial pain (7.74 ± 0.69 at 12 h) and the lowest satisfaction (0 % at 12 h); analgesic potency and dosing intervals were inconsistent. General surgery displayed intermediate pain scores but the greatest incidence of post-operative nausea and vomiting (7 % at 12 h). Delayed night-time dosing and late conversion to oral therapy were common gaps across all services.

Conclusion: Standardised multimodal protocols, proactive anaesthesia-led follow-up and enhanced nursing education are needed to deliver uniform, high-quality post-operative pain control in resource-limited sub-Himalayan centres. Establishing an acute pain service could harmonise care and improve patient outcomes.

Keywords: Postoperative Pain; Analgesia, Multimodal; Regional Anesthesia; Orthopedic Procedures; Obstetrics; Gynecology; Patient Satisfaction.

INTRODUCTION

Postoperative Pain is a prevalent and complex biopsychosocial phenomenon that follows surgical tissue injury. Although pain intensity normally declines as healing progresses, inadequate early treatment can precipitate Persistent Post-Surgical Pain (PPSP), with deleterious effects on emotional

health, quality of life and functional recovery.[1-5] Optimal analgesia therefore safeguards not only patient comfort but also key clinical outcomes: poorly controlled pain is associated with longer hospital stay, higher morbidity and delayed rehabilitation.

Opioids remain a mainstay of Analgesia after major surgery, yet their benefits are tempered by dose-limiting adverse effects—sedation, respiratory depression and gastrointestinal dysfunction. Consequently, contemporary practice ¬favours Opioid-Sparing Multimodal Analgesia (Analgesia, Multimodal) that combines non-steroidal anti-inflammatory drugs (Anti-Inflammatory Agents, Non-Steroidal), acetaminophen, systemic or perineural local anaesthetics, and Regional Anesthesia techniques (e.g., epidural, spinal, peripheral nerve blocks). Pre-emptive administration of these agents—before the surgical incision—further reduces nociceptive input and subsequent analgesic requirements.[6-9]

Despite the breadth of proven pharmacologic and interventional options, many centres—including ours in the sub-Himalayan region—still lack a unified, evidence-based postoperative pain protocol. Variability in prescribing habits between departments and even between teams, limited education in pain pharmacology, and concern over opioid-related harm all contribute to inconsistent analgesia and suboptimal patient satisfaction.[10-12]

Against this backdrop, the present prospective observational study investigates current practice patterns in acute postoperative pain management across Orthopaedic, Obstetric-Gynaecologic and General Surgical services at our tertiary-care teaching hospital. By systematically recording pain scores, analgesic utilisation and patient-reported satisfaction, we aim to quantify inter-departmental differences, identify protocol gaps, and generate recommendations for a standardised, multimodal, anaesthesia-led pain-management framework that can improve outcomes for surgical patients in resource-constrained sub-Himalayan settings.

MATERIALS AND METHODS

This prospective observational study was carried out in the Department of Anaesthesiology, Dr Rajendra Prasad Government Medical College, Kangra at Tanda, a tertiary-care teaching hospital in the sub-Himalayan region of India. After the Institutional Ethics Committee approved the protocol (IEC No. __/2023), the investigation ran for 18 months, from January 2023 to June 2024, encompassing patient enrolment, data collection, analysis and reporting.

Adults of either sex between 18 and 70 years of age with American Society of Anesthesiologists (ASA) physical status I or II who were scheduled for elective abdominal or orthopaedic surgery under general, spinal or regional anaesthesia were screened consecutively. Because the Numeric Rating Scale (NRS) was used for pain assessment, only patients who had completed at least matriculation (10th class) were included to ensure comprehension of the scale. Written informed consent was obtained from every participant before enrolment.

Patients were excluded if they refused consent, had documented allergies to study medications, or suffered from hepatic or renal dysfunction likely to influence drug clearance. Additional exclusion criteria comprised uncontrolled diabetes mellitus or hypertension, neuropathic or coagulopathic disorders, psychiatric illness or substance-use disorder, chronic pre-operative pain, or long-term consumption of opioids or non-steroidal anti-inflammatory drugs. Individuals undergoing extensive procedures such as Whipple's pancreaticoduodenectomy, pancreatectomy or nephrectomy, or those anticipated to require postoperative intensive-care admission with continuous epidural analgesia, were also excluded. After applying these criteria, 400 eligible and willing patients were recruited.

For each patient, baseline demographics, comorbidities and routine pre-operative investigations—including haemoglobin concentration, urine analysis, coagulation profile, renal and liver function tests, chest radiograph and electrocardiogram—were extracted from medical records. Intra-operative details such as the anaesthetic technique employed, drugs administered and fluid therapy were noted. Post-operatively, all scheduled and rescue analgesic doses delivered within 48 hours were documented in a structured proforma designed for the study.

Pain intensity was measured with an 11-point NRS, where 0 denoted "no pain" and 10 represented "the worst imaginable pain." Participants were familiarised with the scale during the pre-operative visit, and pain scores were recorded at 12, 24, 36 and 48 hours after surgery. At the same time points, patient-reported satisfaction with analgesia was captured on a three-point Likert scale ("very satisfied," "satisfied," or "not satisfied"). The primary outcome of interest was patient satisfaction with post-operative pain control, while secondary outcomes included mean NRS scores and the number of rescue analgesic doses required in each department.

Data were entered into Microsoft® Excel and analysed with SPSS version 21.0 (IBM Corp., Armonk, NY, USA). Categorical variables are presented as frequencies and percentages and were compared across surgical departments using the chi-square test. Continuous variables are expressed as mean ± standard deviation and were analysed with one-way analysis of variance (ANOVA) when comparing more than two groups. All statistical tests were two-tailed, and a p value of < 0.05 was considered indicative of statistical significance.

RESULTS

This study evaluated the acute postoperative pain management patterns and protocols across various departments at Dr. RPGMC Kangra, including Orthopaedics, Gynaecology, Obstetrics, and General Surgery. A total of 400 patients participated over a period of 18 months.

This [Table 1] outlines the demographic characteristics of the study population across four departments: Orthopaedics, Surgery, Obstetrics, and Gynaecology. Orthopaedics had the highest proportion of patients (37.5%), followed by Surgery (25%), Obstetrics (23%), and Gynaecology (14.5%). The mean age was notably lower in Obstetrics (27.81 years) compared to the other departments, where the average age ranged from 44.91 to 46.08 years. Male patients were predominant in Orthopaedics (57.3%) and Surgery (41.0%), while all patients in Obstetrics and Gynaecology were female. ASA Class I was more common in Orthopaedics (79.3%), Surgery (78.0%), and Gynaecology (84.5%), while all patients in Obstetrics were classified under ASA Class II. Statistically significant differences were observed in gender distribution, mean age, and ASA classification, with all p-values being <0.0001.

Table 1: Demographic profile of patients.

Variable	Orthopaedics	Surgery	Obstetrics	Gynaecology	p-value
Total Patients (%)	150 (37.5%)	100 (25.0%)	92 (23.0%)	58 (14.5%)	-
Mean Age (Years)	44.91 ± 13.74	46.08 ± 14.00	27.81 ± 5.11	45.55 ± 12.23	<0.0001
Male (%)	86 (57.3%)	41 (41.0%)	0 (0.0%)	0 (0.0%)	<0.0001
Female (%)	64 (42.7%)	59 (59.0%)	92 (100.0%)	58 (100.0%)	
ASA Class I (%)	119 (79.3%)	78 (78.0%)	0 (0.0%)	49 (84.5%)	<0.0001
ASA Class II (%)	31 (20.7%)	22 (22.0%)	92 (100.0%)	9 (15.5%)	

This [Table 2] presents the distribution of anaesthetic techniques used across the departments. Combined Spinal Epidural (CSE) was the most common technique in Orthopaedics (44.0%) and Gynaecology (50.0%), while Spinal Anaesthesia (SAB) dominated in Obstetrics (97.8%). General Anaesthesia (GA) was primarily used in Surgery (74.0%). Less common techniques like Saddle Block, Monitored Anaesthesia Care (MAC), and Sciatic Nerve Block (SCB) were rarely used, with SCB being more prevalent in Orthopaedics (17.3%). Significant differences in the distribution of anaesthetic techniques were noted across departments, as indicated by p-values <0.0001, except for MAC (p=0.471) and Saddle Block (p=0.034).

Table 2: Department wise anaesthetic technique used in study group.

Anaesthetic Technique	Orthopaedics (%)	Surgery (%)	Obstetrics (%)	Gynaecology (%)	p-value
Combined Spinal Epidural (CSE)	66 (44.0%)	2 (2.0%)	0 (0.0%)	29 (50.0%)	<0.0001
General Anaesthesia (GA)	13 (8.7%)	74 (74.0%)	2 (2.2%)	14 (24.1%)	<0.0001
Spinal Anaesthesia (SAB)	44 (29.3%)	23 (23.0%)	90 (97.8%)	12 (20.7%)	<0.0001
Saddle Block	0 (0.0%)	1 (1.0%)	0 (0.0%)	3 (5.2%)	0.034
Monitored Anesthesia Care (MAC)	1 (0.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.471
Sciatic Nerve Block (SCB)	26 (17.3%)	1 (1.0%)	0 (0.0%)	0 (0.0%)	<0.0001

This [Table 3] compares hemodynamic parameters (systolic BP, diastolic BP, and pulse rate) at different time intervals (12, 24, 36, and 48 hours) across departments. Systolic and diastolic BP were consistently lower in Obstetrics compared to other departments, with significant differences (p <0.0001 for systolic BP, p <0.001 for diastolic BP). The pulse rate was notably higher in Obstetrics at 12 hours (83.5 bpm) and 24 hours (81.28 bpm), reflecting statistical significance (p <0.001 and p=0.038, respectively). Differences in hemodynamic stability were most pronounced in Obstetrics, likely due to physiological responses associated with regional anaesthesia used during delivery.

Table 3: Hemodynamic Parameters in study group

Variable	Parameter	Orthopaedics	Surgery	Obstetrics	Gynaecology	p-value
Systolic BP (mmHg)	12 hours	129.21 ± 10.34	129.30 ± 8.70	120.20 ± 15.0	129.72 ± 9.99	<0.0001
	24 hours	129.22 ± 10.13	129.96 ± 8.17	121.93 ± 9.12	129.24 ± 8.72	<0.0001
	36 hours	128.79 ± 10.34	129.54 ± 7.33	121.65 ± 8.35	128.38 ± 8.06	<0.0001
	48 hours	127.74 ± 9.12	128.82 ± 6.96	121.67 ± 7.29	128.65 ± 7.51	<0.0001
Diastolic BP (mmHg)	12 hours	82.13 ± 7.61	81.72 ± 7.04	79.15 ± 7.20	83.65 ± 6.85	<0.001
	24 hours	81.92 ± 7.07	82.22 ± 6.89	78.24 ± 7.25	83.13 ± 6.60	<0.001
	36 hours	81.65 ± 6.89	82.22 ± 6.50	77.69 ± 5.98	82.41 ± 6.53	<0.001
	48 hours	80.45 ± 9.46	81.65 ± 6.38	77.65 ± 5.87	82.34 ± 6.64	<0.001
Pulse Rate (bpm)	12 hours	80.28 ± 7.92	78.24 ± 6.50	83.5 ± 10.25	81.41 ± 7.26	<0.001
	24 hours	79.37 ± 7.05	78.64 ± 6.25	81.28 ± 7.68	80.72 ± 6.75	0.038
	36 hours	78.37 ± 6.52	78.10 ± 5.68	79.34 ± 6.97	78.93 ± 6.95	0.541
	48 hours	77.65 ± 6.68	78.48 ± 6.21	77.82 ± 6.17	78.65 ± 6.18	0.644

This [Table 4] details the analgesic protocols followed in each department. Paracetamol (1g IV) was administered in all departments, with almost complete compliance across the board, except for a slight variation in Gynaecology (98.3%). Diclofenac and Tramadol were also widely used, but their administration was significantly lower in Obstetrics (54.3% and 46.7%, respectively). In contrast, oral analgesics like Ibuprofen and Acelofenac were primarily used in Obstetrics and Gynaecology, with significant differences in their usage across departments (p <0.0001). Timing of analgesic administration also varied, with Paracetamol shifted to oral route within 12-24 hours in most patients. This variation in protocol demonstrates the differences in pain management strategies among departments.

Table 4: Analgesic Protocols used in each Department

Variable	Analgesic	Orthopaedics (%)	Surgery (%)	Obstetrics (%)	Gynaecology (%)	p-value
Parenteral Analgesic	Paracetamol (1g IV)	150 (100.0%)	100 (100.0%)	92 (100.0%)	57 (98.3%)	0.285
	Diclofenac (75mg IM)	146 (97.3%)	100 (100.0%)	50 (54.3%)	56 (96.6%)	<0.0001
	Tramadol (50mg IM)	144 (96.0%)	99 (99.0%)	43 (46.7%)	57 (98.3%)	<0.0001
Oral Analgesic	Ibuprofen (400mg)	0 (0.0%)	0 (0.0%)	92 (100.0%)	57 (98.3%)	<0.0001
	Acelofenac (100mg)	148 (98.7%)	100 (100.0%)	2 (2.2%)	1 (1.7%)	<0.0001
Timing of Paracetamol Shift to Oral	Within 12-24 hrs	150 (100.0%)	100 (100.0%)	92 (100.0%)	57 (98.3%)	0.285
	Shift to Oral (500mg)	148 (98.7%)	100 (100.0%)	92 (100.0%)	57 (98.3%)	0.287
Timing of Diclofenac Use	First 12-24 hrs	146 (97.3%)	100 (100.0%)	50 (54.3%)	56 (96.6%)	<0.0001
Timing of Tramadol Use	First 12-24 hrs	144 (96.0%)	99 (99.0%)	43 (46.7%)	57 (98.3%)	<0.0001
Acelofenac Use (Oral)	36-48 hrs	148 (98.7%)	100 (100.0%)	2 (2.2%)	1 (1.7%)	<0.0001

This [Table 5] summarizes pain scores and patient satisfaction across departments at different time intervals. Initial pain scores (12 hours) were highest in Gynaecology (7.74 ± 0.69) and lowest in Orthopaedics (7.22 ± 1.15), with significant differences (p=0.002). Over 48 hours, pain scores declined in all departments, with Orthopaedics reporting the lowest score (2.04 ± 0.46), while Gynaecology had the lowest satisfaction rate at 12 hours (0.0%), and Orthopaedics had the highest satisfaction at 48 hours (100%). Statistically significant differences were noted in satisfaction rates at 12 and 24 hours (p <0.05), underscoring the effectiveness of pain management protocols and patient perceptions of care.

Table 5: Pain Scores and Patient Satisfaction in each Department

Variable	Time Interval	Orthopaedics	Surgery	Obstetrics	Gynaecology	p-value
Pain Score (NRS 0-10)	12 hours	7.22 ± 1.15	7.51 ± 0.76	7.51 ± 0.86	7.74 ± 0.69	0.002
	24 hours	5.23 ± 1.08	5.80 ± 0.78	5.47 ± 0.84	5.71 ± 0.75	<0.0001
	36 hours	3.36 ± 0.86	3.35 ± 0.80	3.42 ± 0.67	3.55 ± 0.73	0.386
	48 hours	2.04 ± 0.46	2.16 ± 0.39	2.06 ± 0.29	1.94 ± 0.22	0.007
Patient Satisfaction (% Satisfied)	12 hours	7.3% (11 patients)	2.0% (2 patients)	3.0% (3 patients)	0.0% (0 patients)	0.047
	24 hours	21.0% (32 patients)	8.0% (8 patients)	17.3% (16 patients)	8.6% (5 patients)	<0.0001
	36 hours	90.0% (136 patients)	81.0% (80 patients)	92.0% (85 patients)	91.0% (53 patients)	0.101
	48 hours	100% (150 patients)	100% (100 patients)	100% (92 patients)	100% (58 patients)	0.009

This [Table 6] presents complications, specifically postoperative nausea and vomiting (PONV) and headache, across departments at various time intervals. PONV was highest in Surgery at 12 hours (7.0%), while no cases were reported in Obstetrics. Headache was noted only in Obstetrics at 12 hours (2.2%). Statistically significant differences in PONV were observed at 12 hours (p=0.036), while differences in headache occurrence were significant at 12 hours (p=0.041). Complications were minimal at later intervals (24, 36, and 48 hours), indicating that early postoperative management was crucial in reducing adverse outcomes.

Table 6: Post operative Complications

Complication	Time Interval	Orthopaedics	Surgery	Obstetrics	Gynaecology	p-value
Postoperative Nausea and Vomiting (PONV)	12 hours	5 (3.3%)	7 (7.0%)	0 (0.0%)	3 (5.2%)	0.036
	24 hours	0 (0.0%)	1 (1.0%)	0 (0.0%)	1 (1.7%)	0.325

	36 hours	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
	48 hours	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
Headache	12 hours	0 (0.0%)	0 (0.0%)	2 (2.2%)	0 (0.0%)	0.041
	24 hours	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
	36 hours	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
	48 hours	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-

DISCUSSION

Despite decades of research—and the World Health Organization's declaration that pain relief is a basic human right—60 – 80 % of surgical patients still report moderate-to-severe pain after an operation.[13-15] Our audit confirms that the problem persists in this sub-Himalayan centre and varies markedly across specialties.

Pain scores peaked after gynaecologic procedures (NRS 7.74 ± 0.69 at 12 h; 5.71 ± 0.75 at 24 h), consistent with evidence that extensive pelvic and abdominal manipulation provokes intense nociception.[16] Orthopaedic patients, who routinely received combined spinal–epidural blocks, recorded lower scores (7.22 ± 1.15; 5.23 ± 1.08) and higher satisfaction—supporting the opioid-sparing benefits of regional techniques.[17-19]

Multimodal regimens were applied unevenly. Orthopaedics and General Surgery used fixed-time paracetamol + diclofenac with tramadol rescue, an approach shown to blunt pain trajectories and reduce opioid use.[20-23] Obstetrics and Gynaecology relied on NSAID-only schedules generating higher pain scores and lower satisfaction, a pattern magnified by younger patient age—an independent predictor of greater pain intensity.[21-24]

Early conversion to oral agents and intramuscular tramadol in Obstetrics delayed analgesic onset and left breakthrough pain poorly controlled, echoing trials that favour scheduled IV or continuous techniques during the first 24 h.[28-30] Opioid-related nausea/vomiting was most common in General Surgery (7 %), while post-dural-puncture headache affected 2.2 % of obstetric patients—an expected but avoidable complication of spinal anaesthesia.[31-33]

Under-recognition of pain was another barrier: incomplete Numeric Rating Scale documentation by ward nurses led to missed rescue doses, mirroring international observations that reliable assessment is the cornerstone of effective pain therapy.[29-32]

CONCLUSION

In summary, a hospital-wide pathway built on scheduled multimodal analgesia, routine regional blocks, delayed switch to oral agents and mandatory pain scoring—supported by an acute-pain service—should harmonise practice and improve outcomes across departments.

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