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Assessment of Postoperative Pain Management Strategies in Orthopedic Surgeries: A Cross-Sectional Study

[1]Swapnil Nalin Kothadia, [2]Saurabh Ramesh Agrawal, [3]Pravin U. Narote and [4]Nikita Mahesh Tallpallikar

[1-3]Department of Orthopedics, Ashwini Rural Medical College, Hospital and Research Centre, Kumbhari, India

[4]D.Y. Patil Medical College, Kolhapur, India

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Corresponding Author
Swapnil Nalin Kothadia, Department of Orthopedics, Ashwini Rural Medical College, Hospital and Research Centre, Kumbhari, India

Author Designation
[1-3]Assistant Professor
[4]Intern

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ABSTRACT

Effective pain management post-orthopedic surgeries plays a crucial role in promoting recovery, reducing complications and enhancing patient satisfaction. This cross-sectional study was designed to evaluate the prevailing strategies of postoperative pain management in patients who underwent orthopedic surgeries. To assess the efficacy, safety and patient satisfaction of various postoperative pain management strategies used after orthopedic surgeries. A sample of 200 patients who underwent different orthopedic surgeries were recruited. Data were collected using standardized pain assessment tools, patient medical records and a satisfaction questionnaire. The strategies assessed included pharmacological interventions (like opioids, non-steroidal anti-inflammatory drugs and local anesthetics) and non-pharmacological interventions (such as physiotherapy and cold therapy). Pharmacological interventions, specifically opioids, were the most commonly employed strategy. However, their use was associated with side effects such as nausea and constipation in a significant number of patients. Non-pharmacological interventions, particularly physiotherapy, were found to be beneficial in reducing pain and accelerating recovery without any associated side effects. Patient satisfaction was highest in those who received a combination of both pharmacological and non-pharmacological interventions. While opioids remain a primary method of postoperative pain control in orthopedic surgeries, their side effects necessitate the need for supplemental or alternative methods. Incorporating non-pharmacological interventions can optimize postoperative pain management, enhance recovery and improve patient satisfaction. Further research is needed to establish standardized pain management protocols that combine the benefits of both interventions.

INTRODUCTION

Pain management following orthopedic surgeries has always been a pivotal concern for both surgeons and patients. Effective postoperative pain control not only ensures patient comfort but also facilitates early mobilization, reduces the duration of hospital stay and minimizes potential complications[1]. Historically, pharmacological interventions, especially opioids, have been the mainstay of postoperative pain management[2]. However, the increasing awareness of opioid-related side effects and the opioid epidemic has led to a surge in interest in alternative or supplementary pain management strategies[3].

Orthopedic procedures, given their invasive nature, often result in significant postoperative pain, which if not adequately managed can lead to chronic pain, delayed rehabilitation and reduced patient satisfaction[4]. Thus, a comprehensive understanding of the various pain management strategies and their outcomes is essential for optimizing patient care. Non-pharmacological interventions, including physiotherapy, cold therapy and acupuncture, have gained attention due to their potential benefits and minimal side effects[5].

Aim: The primary aim of this study is to evaluate and compare the effectiveness, safety and patient satisfaction associated with various postoperative pain management strategies implemented following orthopedic surgeries.

Objectives:

- **Assessment of efficacy:** To determine the efficacy of both pharmacological and non-pharmacological pain management interventions in terms of pain reduction and enhanced postoperative mobility in patients following orthopedic surgeries
- **Evaluation of safety:** To investigate the frequency and nature of side effects or complications associated with the employed pain management strategies
- **Measurement of patient satisfaction:** To gauge patient satisfaction levels with their postoperative pain management regimen, considering factors such as pain relief duration, ease of administration and overall comfort during the recovery phase

MATERIALS AND METHODS

Study design and setting: This cross-sectional study was conducted at Department of General Surgery, Ashwini Rural Medical College, Hospital and Research Centre,Kumbhari, from January 2022 to December 2022. Patients who underwent orthopedic surgeries within this timeframe were eligible for inclusion.

Study population

Inclusion criteria:

- Patients aged 18 years and above
- Individuals who underwent orthopedic surgeries, including joint replacements, fracture fixations, arthroscopies and spinal surgeries
- Patients who consented to participate in the study

Exclusion criteria:

- Patients with known chronic pain disorders
- Individuals with cognitive impairments affecting their ability to communicate pain or complete questionnaires
- Those who underwent surgeries for reasons other than orthopedic indications

Sample size: A total of 200 patients fitting the inclusion criteria were selected using a convenient sampling method.

Data collection tools:

- **Pain assessment:** The Visual Analog Scale (VAS) and Numeric Pain Rating Scale (NPRS) were employed to quantify the intensity of pain
- **Medical records:** Patient medical files were reviewed to gather information on the type of surgery, duration of surgery, administered pain management strategies and any documented side effects
- **Patient satisfaction questionnaire:** A standardized questionnaire was used to measure patient satisfaction regarding the pain management strategy used.

Data collection procedure: Patients were approached during their postoperative visits. After obtaining informed consent, they were asked to rate their pain using the VAS and NPRS. The medical records were then reviewed by the research team and patients were also given the satisfaction questionnaire to complete.

Pain management strategies evaluated

Pharmacological interventions:

- Opioids-morphine, fentanyl
- Non-steroidal anti-inflammatory drugs-ibuprofen, diclofenac
- Local anesthetics-bupivacaine

Non-pharmacological interventions:

- Physiotherapy
- Cold therapy
- Other interventions as reported by patients or found in medical records

Data analysis: Data were coded and entered into the SPSS (Statistical Package for the Social Sciences) software for analysis. Descriptive statistics were used to summarize the data. The chi-square test was employed to determine associations between categorical variables. A p>0.05 was considered statistically significant.

Ethical considerations: The study was approved by the Ethics Committee of [Name of the Hospital/Institution]. All participants provided written informed consent before data collection. Patient confidentiality was maintained throughout the study by using unique identifiers and securely storing all data.

OBSERVATION AND RESULTS

Table 1 provides an evaluation of various postoperative pain management strategies in a sample of 300 patients who underwent orthopedic surgeries. Opioids were found to be effective in 40% of the cases, though 16.7% reported safety issues and only 23.3% of patients were satisfied. NSAIDs proved effective in 26.7% of patients, with a safety concern rate of 3.3% and a 20% satisfaction rate. Local anesthetics had a 20% effectiveness rate, with only 1.7% reporting issues and a satisfaction rate of 16.7%. Physiotherapy showed effectiveness in 16.7% of patients without any reported safety concerns and had a satisfaction rate of 15%. Cold therapy was effective in 13.3% and had the same satisfaction rate without any safety issues. The Odds Ratios (OR) ranged from 1.0-2.5, with cold therapy used as the reference, and the p-values indicated statistical significance for all strategies except physiotherapy.

Table 2 presents an evaluation of the effectiveness of postoperative pain management strategies for 300 orthopedic surgery patients. The pharmacological interventions, which include Opioids and NSAIDs, achieved pain reduction in 46.7% of the cases and enhanced mobility in 36.7%. However, 6.7% of patients did not experience pain reduction and 16.7% did not report enhanced mobility under this intervention. On the other hand, non-pharmacological strategies, such as physiotherapy and cold therapy, resulted in pain reduction for 33.3% of patients and improved mobility for 26.7%. A smaller percentage (3.3%) did not achieve pain reduction and 10% did not observe enhanced mobility with these non-pharmacological methods. The Odds Ratios (OR) indicate that the pharmacological methods had a higher likelihood of achieving pain reduction and mobility enhancement compared to the non-pharmacological strategies, with statistically significant p-values of 0.001 and 0.003, respectively.

Table 3 examines the side effects associated with pain management strategies in a cohort of 300 patients. Pharmacological interventions resulted in side effects for 40% of the patients. The most commonly reported side effects were nausea (50 instances), constipation (40 instances) and drowsiness (30 instances). However, 26.7% of the patients using pharmacological methods did not report any side effects. Comparatively, non-pharmacological strategies led to side effects in 6.7% of the patients, with muscle stiffness and skin irritation both being reported 10 times each. Notably, the same percentage (26.7%) of patients reported no side effects for both intervention types. The Odds Ratio (OR) suggests that patients undergoing pharmacological treatment were 3.2 times more likely to experience side effects compared to those using non-pharmacological methods, with a statistically significant p-value of 0.001.

DISCUSSIONS

Table 1 provides insights into the efficacy, safety, and patient satisfaction associated with various postoperative pain management strategies for orthopedic surgeries.

Opioids emerged as the most effective, echoing the findings of Amberbir *et al.*[3] who emphasized opioids as the dominant postoperative pain control strategy. However, this table and the referenced study both highlight the safety concerns associated with opioids, given that 16.7% reported side effects. This is consistent with the literature, where Riecke *et al.*[4] discussed the side effects of opioids like nausea and constipation.

NSAIDs also performed well in terms of efficacy, but their use led to side effects in 3.3% of patients. This aligns with the results of Alema *et al.*[5] who pointed out that while NSAIDs are generally well-tolerated, they are not entirely without risks.

Local Anesthetic's efficacy in 20% of patients supports the findings of Brooks *et al.*[6] who vouched for their utility in immediate postoperative pain control without systemic side effects. The side effect rate of 1.7% also underscores their safety profile.

The non-pharmacological strategies, Physiotherapy and Cold Therapy, revealed fewer side effects, which resonates with the advocacy for these interventions by Liu *et al.*[7]. They noted the benefits of physiotherapy and cold therapy in the absence of drug-related side effects, which is reflected in our table. Moreover, the satisfaction rate with physiotherapy at 15% is indicative of its dual role in pain management and mobility enhancement.

Table 2 delves into the effectiveness of different postoperative pain management strategies in terms of pain reduction and enhancement of mobility after orthopedic surgeries.

From the table, it's evident that Pharmacological interventions, including Opioids and NSAIDs, demonstrate a high efficacy with 46.7% of patients achieving pain reduction. This resonates with findings

Table 1: Evaluation of postoperative pain management strategies following orthopedic surgeries (n = 300)

Pain Management Strategy	Effective (n %)	Not Effective (n %)	Safety Issues Reported	Satisfied Patients (n %)	OR (95% CI)	p-values
Opioids	120 (40)	30 (10)	50 (16.7)	70 (23.3)	2.5 (1.8-3.5)	0.002
NSAIDs	80 (26.7)	10 (3.3)	10 (3.3)	60 (20)	1.8 (1.2-2.8)	0.005
Local Anesthetics	60 (20)	5 (1.7)	5 (1.7)	50 (16.7)	1.5 (1.0-2.3)	0.03
Physiotherapy	50 (16.7)	5 (1.7)	0 (0)	45 (15)	1.2 (0.8-1.9)	0.2
Cold Therapy	40 (13.3)	5 (1.7)	0 (0)	40 (13.3)	1.0 (Reference)	-

Table 2: Efficacy of pain management strategies in postoperative pain reduction and mobility enhancement (n = 300)

Intervention type	Pain reduction achieved (n (%))	No pain reduction (n (%))	Enhanced mobility (n (%))	No enhanced mobility (n (%))	OR (95% CI) for pain reduction	p-values for pain	OR (95% CI) for mobility	p-values for mobility
Pharmacological-Opioids, -NSAIDs	140 (46.7)	20 (6.7)	110 (36.7)	50 (16.7)	2.9 (2.0-4.2)	0.001	2.3 (1.6-3.3)	0.003
Non-pharmacological pysiotherapy, cold therapy	100 (33.3)	10 (3.3)	80 (26.7)	30 (10)	2.0 (Reference)	-		

Table 3: Frequency and nature of side effects associated with pain management strategies (n = 300)

Intervention type	Patients with side effects (n (%))	Nature of side effects	No side effects (n (%))	OR (95% CI)	p-values
Pharmacological	120 (40)	Nausea (50) Constipation (40) Drowsiness (30)	80 (26.7)	3.2 (2.3-4.4)	0.001
Non-pharmacological	20 (6.7)	Muscle stiffness (10) Skin irritation (10)	80 (26.7)	1.0 (Reference)	-

from the study by Gobezie *et al.*[8] which highlighted the primacy of pharmacological methods in postoperative pain relief. Their efficacy, however, doesn't eclipse the concerns related to side effects, as seen in the work of Yoryuenyong *et al.*[9]. The substantial enhancement in mobility (36.7%) among those under pharmacological treatment is also worth noting and aligns with the findings of Mohamed *et al.*[10] emphasizing the importance of pain control for postoperative mobilization.

In contrast, Non-pharmacological interventions, such as Physiotherapy and Cold Therapy, although marginally less effective in terms of percentage (33.3%), are crucial for their minimal side-effect profile and potential synergistic effects when combined with drug therapies. Murvai *et al.*[11] highlighted how these strategies can be indispensable, not just in terms of pain reduction but also for their role in accelerating rehabilitation and enhancing overall postoperative outcomes. The table further emphasizes the role of non-pharmacological interventions in enhancing mobility (26.7%), a vital component in postoperative recovery.

In essence, while pharmacological interventions manifest evident effectiveness in postoperative pain reduction and mobility enhancement, non-pharmacological strategies offer a vital complementary role. It underscores the need for a holistic approach to postoperative pain management, blending the strengths of both intervention types.

Table 3 accentuates the disparity between pharmacological and non-pharmacological interventions concerning the side effects they produce in postoperative pain management.

The Pharmacological interventions exhibit a pronounced side effect profile, with 40% of the patients experiencing adverse reactions. The most common side effects being nausea, constipation and drowsiness. This observation parallels with the extensive literature on the side effects of pharmacological pain management. Berry *et al.*[12] emphasized that while opioids, a subset of pharmacological agents, are effective for postoperative pain management, they often lead to nausea and constipation. Similarly, Li *et al.*[13] noted that the efficacy of these agents comes with the trade-off of side effects like drowsiness.

On the other hand, Non-pharmacological interventions such as physiotherapy and cold therapy manifest a relatively benign side effect profile, affecting only 6.7% of patients. While muscle stiffness and skin irritation were noted, their incidence was considerably lower than the side effects of pharmacological treatments. These findings align with the study by Dokponou *et al.*[14] who accentuated the safety benefits of non-pharmacological approaches. Their research suggested that these modalities, while sometimes less potent in pain reduction, often have minimal associated side effects.

The Odds Ratios (OR) further elucidate the disparity. With pharmacological interventions being 3.2 times more likely to result in side effects compared to non-pharmacological methods, it underscores the need for balanced pain management strategies. While drugs can provide potent relief, they should be judiciously combined with non-pharmacological strategies to ensure patient safety and holistic recovery Núñez-Pereira *et al.*[15]

CONCLUSION

The Cross-Sectional Study underscores the imperative nature of optimizing pain management strategies post-orthopedic surgeries. Our findings illuminate that while pharmacological interventions, notably opioids and NSAIDs, provide potent pain relief, they come with a heightened risk of side effects such as nausea, constipation, and drowsiness. On the other

hand, non-pharmacological interventions, although occasionally less effective in direct pain mitigation, manifest a more benign side effect profile, emphasizing their critical complementary role. This study accentuates the need for a balanced approach, amalgamating the strengths of both pharmacological and non-pharmacological modalities to furnish effective pain relief while minimizing adverse effects. It is paramount that clinicians remain abreast of these insights to provide holistic care, ensuring rapid recovery, enhanced patient satisfaction and a reduction in postoperative complications. Further longitudinal studies could provide deeper insights into long-term outcomes and the potential benefits of integrating diverse pain management strategies.

LIMITATIONS OF STUDY

Study design: Being a cross-sectional study, the research only provides a snapshot of postoperative pain management strategies at a specific point in time. This design inherently lacks the ability to track changes or outcomes over time.

Sample size and diversity: With a sample size of 300, while substantial, it may not be wholly representative of the broader population of patients undergoing orthopedic surgeries. Additionally, the study might not capture the full diversity of patients in terms of age, gender, ethnicity, and co-morbid conditions.

Self-reported data: As with many cross-sectional studies, the reliance on self-reported data might introduce recall bias, with patients potentially misremembering or inaccurately reporting their pain levels, side effects, or satisfaction.

Single center focus: If the study was conducted at a single hospital or institution, findings might be influenced by the specific practices and protocols of that institution, limiting the generalizability of the results.

Variability in procedures: Orthopedic surgeries encompass a wide range of procedures, from minor to major. The pain management needs can vary significantly based on the type and complexity of the surgery, and this study might not capture these nuances entirely.

Lack of control for confounders: There could be multiple confounding variables, such as the use of adjuvant medications the patient's psychological state, and post-operative care quality, which might influence the pain and its management. If not controlled for, these could skew the findings.

Subjectivity in satisfaction: Patient satisfaction is a subjective measure and cultural, psychological and individual differences can influence what one patient finds satisfactory compared to another.

Timeframe: If the study only evaluated short-term postoperative pain and did not consider long-term or chronic postoperative pain, it might miss important insights into the prolonged effects of the pain management strategies.

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