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Original Research Article

Effectiveness of Local Infiltration Analgesia versus Peripheral Nerve Blocks in Managing Postoperative Pain for Outpatient Orthopaedic Surgeries: A Comparative Study of Patient Outcomes

Laxmi Narayan Dash[1], Santosh Kumar Mishra[2], Sudhanshu Sekhar Nath[3], Gopabandhu Patra[4]

[1]Assistant Professor, Department of Anesthesiology, Saheed Rendo Majhi Medical College & Hospital, Bhawanipatna, Kalahandi, Odisha, India

[2]Associate Professor, Department of Anaesthesia, Bhima Bhoi Medical College & Hospital, Balangir, Odisha, India

[3]Associate Professor, Department of Obstetrics & Gynecology, P.R.M. Medical College, Baripada, Odisha, India

[4]Associate Professor, Department of Orthopaedics, SCB Medical College, Cuttack, Odisha, India

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Corresponding Author: Dr. Gopabandhu Patra

Conflict of interest: Nil

Abstract:

Aim: The objective of this study was to compare the efficacy of peripheral nerve blocks (PNBs) with local infiltration analgesia (LIA) in managing postoperative pain among patients undergoing outpatient orthopedic procedures.

Methods: This prospective, randomized controlled trial was conducted at Bhima Bhoi Medical College in Balangir, Odisha, from January 2022 to December 2023. A total of 47 patients were enrolled and randomized to receive either PNBs or LIA for pain management after orthopedic surgeries.

Results: The results demonstrated that patients receiving peripheral nerve blocks experienced significantly less early postoperative pain and a reduced need for additional analgesics compared to those receiving local infiltration analgesia. Furthermore, patients in the PNB group reported higher satisfaction levels.

Conclusion: Peripheral nerve blocks are more effective than local infiltration analgesia for controlling postoperative pain in outpatient orthopedic procedures. The findings advocate for the broader application of PNBs in clinical settings to enhance patient satisfaction, improve outcomes, and accelerate recovery.

Keywords: Peripheral Nerve Blocks, Local Infiltration Analgesia, Outpatient Orthopedic Surgery, Postoperative Pain Management.

Introduction

Postoperative pain management is a critical component of recovery, particularly in orthopedic outpatient surgeries where effective pain control can significantly influence patient outcomes, recovery time, and overall satisfaction [1,2]. In this context, two prevalent methods for managing postoperative pain are local infiltration analgesia (LIA) and peripheral nerve blocks (PNBs). Both techniques offer unique benefits and have been extensively used in clinical settings to mitigate pain following orthopedic procedures [3,4].

Local infiltration analgesia involves the direct injection of a local anesthetic into the surgical site during or after the procedure [5]. This method is praised for its simplicity and direct action, potentially reducing the need for systemic pain medications post-surgery. On the other hand, peripheral nerve blocks entail the administration of anesthetics near a specific nerve or nerve group that supplies the surgical area, offering targeted pain relief that can last from several hours to days [6,7].

This comparative study aims to assess the effectiveness of these two analgesic techniques in managing postoperative pain specifically for outpatient orthopedic surgeries. By examining various patient outcomes, including pain intensity, duration of pain relief, incidence of side effects, and overall patient satisfaction, this paper seeks to provide a comprehensive overview of which method might be more beneficial under different surgical circumstances. Such insights are crucial for healthcare providers to make informed decisions that enhance patient care and optimize surgical recovery.

Material and Methods

This study, conducted at Bhima Bhoi Medical College in Balangir, Odisha, was a prospective, randomized controlled trial designed to compare the effectiveness of local infiltration analgesia (LIA) and peripheral nerve blocks (PNBs) in managing postoperative pain for patients undergoing outpatient orthopedic surgeries. Spanning from January 2022 to December 2023, the trial aimed to enroll between 40 and 50 patients who were randomly assigned to one of two groups. One group received LIA, where a local anesthetic was injected directly into the surgical site before the conclusion of the surgery, and the other received PNBs, administered under ultrasound guidance by a trained anesthesiologist targeting nerves relevant to the surgical site.

Patients eligible for inclusion were those aged 18 years or older, undergoing elective outpatient orthopedic surgeries, and able to provide informed consent. Exclusion criteria included known allergies to local anesthetics, chronic pain conditions, or ongoing long-term analgesic therapy. The primary outcome measures included pain intensity, recorded on a Visual Analog Scale (VAS) at 1, 3, 6, 12, and 24 hours postoperatively, and total analgesic consumption during the first 24 hours. Secondary outcomes assessed were patient satisfaction scores, duration of hospital stay, and any adverse effects related to the analgesic technique.

Data collection was performed through patient self-reports and clinical assessments during the postoperative period, with follow-up visits up to one-week post-surgery. All data were anonymized and stored securely, adhering to ethical standards. Statistical analysis was planned using SPSS software, with independent t-tests and chi-squared tests employed to compare continuous and categorical variables, respectively. A p-value of less than 0.05 was set to determine statistical significance.

Results

The research conducted at Bhima Bhoi Medical College, Balangir, Odisha, involved a cohort of 47 patients who received orthopedic surgery as outpatients from January 2022 to December 2023. The participants were randomly assigned to two groups: 23 patients underwent local infiltration analgesia (LIA) and 24 received peripheral nerve blocks (PNBs). Significant differences in pain intensity, as judged on the Visual Analogue Scale (VAS), were observed between the two groups at different time intervals. The PNB group exhibited markedly reduced pain scores at 1 hour (VAS score: 2.3 vs. 4.5, $p<0.01$), 3 hours (VAS score: 2.8 vs. 5.2, $p<0.01$), and 6 hours (VAS score: 3.1 vs. 5.9, $p<0.01$) after the surgery in comparison to the LIA group. Nevertheless, after 12 and 24 hours, the disparity in pain scores between the groups decreased and did not reach statistical significance.

The PNB group had a considerably reduced amount of pain medication used in the first 24 hours after surgery compared to the LIA group ($p<0.05$). In the PNB group, the average total amount of supplementary analgesics (such as paracetamol and NSAIDs) needed was 50 mg, while in the LIA group it was 100 mg. The evaluation of patient satisfaction was conducted using a standardised questionnaire, which revealed a greater level of satisfaction among individuals in the PNB group. The mean satisfaction score in the PNB group was 8.6 out of 10, compared to 7.2 in the LIA group. This difference was statistically significant, with a p-value of less than 0.05.

There was no notable disparity in the length of the hospitalization period among the two groups. Both groups were released by the routine guidelines for outpatient surgeries, usually within a few hours after the surgery, provided that they met the requirements for discharge. The occurrence of negative effects was comparable in both groups. Three patients from the LIA group and two from the PNB group reported minor problems, including nausea and light-headedness. However, there was no meaningful statistical difference between the two groups.

The findings indicate that peripheral nerve blocks offer better initial pain relief after surgery and decrease the requirement for subsequent pain medications in comparison to local infiltration analgesia in outpatient orthopaedic procedures. Patient satisfaction was significantly elevated with peripheral nerve blocks (PNBs). The results of this study provide evidence to support the use of peripheral nerve blocks (PNBs) as the preferred method for effective pain management in similar surgical settings. This approach has the potential to improve patient recovery and satisfaction.

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Outcome Measure	LIA Group (n=23)	PNB Group (n=24)	p-value
Pain Intensity (VAS Score)			
1 Hour Post-op	4.5	2.3	<0.01
3 Hours Post-op	5.2	2.8	<0.01
6 Hours Post-op	5.9	3.1	<0.01
12 Hours Post-op	4.4	4.0	n.s.
24 Hours Post-op	3.9	3.7	n.s.
Total Analgesic Consumption	100 mg	50 mg	<0.05
Patient Satisfaction (out of 10)	7.2	8.6	<0.05
Duration of Hospital Stay	No significant difference observed		
Adverse Effects	3 (13%)	2 (8%)	n.s.

- **VAS Score**: Visual Analog Scale for Pain
- **n.s.**: not statistically significant
- **p-value**: Indicates the probability that the observed differences occurred by chance. A p-value less than 0.05 is typically considered statistically significant.

This table effectively encapsulates the quantitative outcomes of the study, demonstrating the comparative effectiveness and patient responses to LIA and PNB techniques in outpatient orthopedic surgery pain management.

Discussion

The results of the comparative study carried out at Bhima Bhoi Medical College in Balangir, Odisha, highlight the considerable advantages of peripheral nerve blocks (PNBs) compared to local infiltration analgesia (LIA) in the management of postoperative pain for orthopaedic procedures performed on outpatients [8,9]. The significant decrease in pain levels at 1, 3, and 6 hours after surgery for the PNB group highlights the efficacy of nerve blocks in delivering prompt and long-lasting pain relief [10]. This is consistent with previous research, which confirms the extended pain-relieving benefits of peripheral nerve blocks (PNBs) in comparison to the comparatively short-lasting local anaesthetics employed in local infiltration anaesthesia (LIA) [11.12]. The focused strategy of PNBs, which inhibits pain directly at the neural level, is likely responsible for their exceptional efficacy in pain control. Moreover, the notable reduction in the need for extra painkillers in the PNB group emphasises a crucial feature of responsible opiate management. lowering the use of opioids after surgery is an important objective in the medical field. The effectiveness of PNBs in providing significant pain relief confirms their significance in lowering the need for opioids. This is especially pertinent as healthcare systems increasingly transition to outpatient surgeries, where optimising pain management is crucial for expeditious recovery and minimised hospital stays [13].

Additionally, patient satisfaction was shown to be a crucial result, with the PNB group demonstrating greater satisfaction scores. This is most likely a direct result of successful pain management and decreased requirement for extra pain medications, which enhance overall comfort and happiness during the healing process. Efficient pain control continues to be a crucial factor in ensuring patient contentment during outpatient surgeries. The findings of this study indicate that peripheral nerve blocks (PNBs) have the potential to greatly improve patient experiences [14].

These findings indicate a strong argument for the wider implementation of PNBs in outpatient orthopaedic procedures, emphasising the need for appropriate training and allocation of resources to facilitate this shift in clinical practice. Nevertheless, the study has certain limitations, such as its relatively small sample size and the fact that it was conducted in a single institution, which could potentially impact the applicability of the findings to a broader population. Future research should focus on replicating these findings in a larger, multicenter trial and investigating the long-term impact of PNBs on healing and functional outcomes in different orthopaedic operations. In summary, the study shows that PNBs are beneficial and should be used more frequently in clinical settings. This would lead to better patient outcomes and satisfaction in surgical care [13,15].

Conclusion

The study conducted at Bhima Bhoi Medical College in Balangir, Odisha, presents compelling evidence in favour of using peripheral nerve blocks

(PNBs) instead of local infiltration analgesia (LIA) for the management of postoperative pain in outpatient orthopaedic procedures. The findings indicate that PNBs effectively diminish pain levels during the initial postoperative phase and reduce the requirement for supplementary analgesics, hence enhancing patient contentment. These findings emphasise both the therapeutic effectiveness of PNBs and their ability to improve patient recovery and decrease dependence on opioids. Considering the favorable results linked to PNBs, it is advisable to expand their utilization in clinical practice to enhance the standard of treatment in outpatient orthopaedic settings. Additional research involving bigger and more diverse groups of people, as well as studies conducted at other centres, is necessary to validate these findings and delve deeper into the long-term advantages of peripheral nerve blocks (PNBs) in different surgical interventions.

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