Original Article
DOI: https://doi.org/10.70749/ijbr.v3i5.1562

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Reduction of Postoperative Opioid Use in Oncologic Breast Surgery and The Creation of Multimodal Pain Management Guidelines and Practices

Abdul Mannan Jehangir[1], Ahsan Waris[2], Umar Sultan[3], Rihan Aslam Khan[4], Qasim Zafar[5]

[1]Chief Specialty Registrar Cancer Center, Nishtar Hospital, Multan, Punjab, Pakistan.
[2]Department of Surgery, Al-Noor Hospital, Sialkot, Punjab, Pakistan.
[3]Department of Cardiology, Punjab Institute of Cardiology Lahore, Pakistan.
[4]Department of General surgery, Dr Ziauddin Hospital Karachi, Sindh, Pakistan.
[5]Iqra Welfare Trust Mirpur AJK, Pakistan.

ARTICLE INFO

Keywords: Breast Surgery, Oncologic Surgery, Postoperative Pain, Opioid Use, Multimodal Pain Management.

Correspondence to: Abdul Mannan Jehangir
Chief Specialty Registrar Cancer Center, Nishtar Hospital, Multan, Punjab, Pakistan.
Email: abdul.mannan.3160@gmail.com

Declaration
Authors' Contribution
All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 11-04-2025 Revised: 05-05-2025
Accepted: 23-05-2025 Published: 31-05-2025

ABSTRACT

Background: Opioid-based postoperative analgesia in oncologic breast surgery is associated with significant adverse effects and risk of dependency. Multimodal pain management protocols offer a safer alternative by integrating multiple non-opioid strategies for effective analgesia. **Objective:** To evaluate the impact of a structured multimodal analgesia protocol on postoperative opioid consumption, pain control, patient satisfaction, adverse effects, and hospital stay duration in breast cancer surgery patients. **Methods:** This prospective comparative study was conducted at Nishtar Hospital, Multan, from November 2024 to April 2025. A total of 187 female patients undergoing oncologic breast surgery were enrolled and divided into two groups: Group A (pre-implementation phase, n=94) and Group B (post-implementation phase, n=93). The intervention group received a standardized multimodal protocol including non-opioid analgesics, regional nerve blocks, and preoperative education. **Results:** The post-implementation group showed a significant reduction in opioid use (18.4 ± 6.5 mg vs. 48.6 ± 10.2 mg; $p < 0.001$) and lower VAS pain scores at all time points ($p < 0.01$). Patient satisfaction was notably higher, with 71.0% rating their pain management as "very satisfied" compared to 38.3% in the control group ($p = 0.002$). The incidence of nausea, vomiting, and sedation was significantly reduced in Group B ($p < 0.01$), and the average hospital stay was shorter (2.8 ± 0.7 days vs. 3.6 ± 0.9 days; $p = 0.01$). **Conclusion:** It is concluded that multimodal analgesia protocols significantly reduce opioid consumption and improve clinical and patient-reported outcomes in oncologic breast surgery. Their routine adoption is recommended as part of enhanced recovery and opioid-sparing strategies in surgical oncology.

INTRODUCTION

Oncologic breast surgery, a critical component of breast cancer treatment, has come a long way in recent years with advances in surgical techniques, anesthesia, and perioperative care [1]. While these advancements have significantly improved the survival and quality of life for breast cancer patients, the management of postoperative pain remains a paramount concern. Historically, postoperative pain has been predominantly managed with opioids, despite the well-documented risks associated with their use, including addiction, respiratory depression, and prolonged recovery times [2]. However, a growing body of evidence suggests that the reduction of postoperative opioid use through the implementation of multimodal pain management guidelines and practices can enhance patient outcomes and experience [3].

Breast cancer is the most common cancer among women worldwide, with approximately 2.3 million new cases diagnosed in 2020 alone. Breast surgery, including mastectomy and breast-conserving surgery, is often a crucial component of the treatment plan [4]. While the primary goal of oncologic breast surgery is to remove cancerous tissue, the procedure itself can cause significant postoperative pain. Historically, opioids have been the primary means of managing this pain [5]. However, the opioid epidemic has highlighted the need for a more nuanced and effective approach to postoperative pain management. Opioid use in the postoperative period poses several challenges for patients and healthcare providers. Opioids, while effective at relieving pain, are associated with a range of adverse effects, including nausea, constipation, sedation, and the potential for addiction [6]. Additionally, the use of opioids can lead to delayed recovery, prolonged hospital stays, and an increased risk of complications. For breast cancer patients, who may already be facing a physically and emotionally taxing

journey, minimizing these risks is essential to their overall well-being [7]. Multimodal pain management is an innovative approach that seeks to reduce reliance on opioids in the postoperative period. It involves combining various non-opioid analgesic strategies to target different pain pathways, providing better pain relief with fewer side effects [8]. This approach is particularly pertinent in oncologic breast surgery, where the goal is not just to manage pain but also to facilitate recovery, enhance quality of life, and reduce the burden on the healthcare system.

The creation of multimodal pain management guidelines and practices for oncologic breast surgery represents a paradigm shift in perioperative care [9]. These guidelines encompass a spectrum of interventions that span the preoperative, intraoperative, and postoperative periods. Key components include preoperative education on pain management expectations and options, the use of non-opioid medications such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs), regional anesthesia techniques such as thoracic epidurals and paravertebral blocks, and the utilization of enhanced recovery after surgery (ERAS) protocols [10]. The fundamental principle underlying multimodal pain management is the concept of individualized care. Breast cancer patients, like all surgical candidates, have unique pain profiles and medical histories. Multimodal approaches allow healthcare providers to tailor pain management strategies to each patient, considering their specific needs and minimizing the risk of overreliance on opioids [11]. This approach is in line with the broader trend in healthcare towards personalized medicine, recognizing that one size does not fit all when it comes to pain management [12].

Objective

Through this study, we aim to contribute to the growing body of evidence supporting safer, more effective, and standardized approaches to pain management in breast cancer surgery, ultimately improving outcomes and quality of life for affected patients.

METHODOLOGY

This study was a prospective comparative interventional study conducted to evaluate the effectiveness of a structured multimodal pain management protocol in reducing postoperative opioid use among patients undergoing oncologic breast surgery. The research was carried out at Nishtar Hospital, Multan, over a six-month period from November 2024 to April 2025. A total of 187 female patients undergoing elective oncologic breast surgeries—including lumpectomy, simple mastectomy, and modified radical mastectomy (with or without reconstruction) were enrolled in the study using non-probability consecutive sampling. Patients were grouped based on the date of their surgery into: Group A (pre-implementation), surgeries performed between November 2024 and January 2025; Group B (post-implementation), surgeries performed between February and April 2025.

Inclusion criteria involved female patients aged 18 to 70 years with a confirmed diagnosis of breast cancer scheduled for surgery under general anesthesia. Exclusion criteria included patients with chronic opioid use (defined as daily use for more than three months prior to surgery), patients with renal or hepatic dysfunction, psychiatric illness interfering with pain assessment, or hypersensitivity to any of the medications used in the multimodal protocol. The multimodal pain management protocol implemented in the second phase included the following components: preoperative education about pain expectations and opioid minimization, scheduled administration of acetaminophen and NSAIDs (unless contraindicated), regional nerve blocks such as PECS I/II or paravertebral block, intraoperative use of adjuncts like dexamethasone or ketamine (as per anesthesiologist discretion), and opioids only as rescue analgesia. Data collection included demographic variables (age, BMI), type of surgery performed, duration of hospital stays, postoperative pain scores (measured using a 10-point visual analog scale at 6, 12, 24, and 48 hours), opioid consumption (converted to morphine milligram equivalents), patient satisfaction scores, and the incidence of opioid-related adverse effects such as nausea, vomiting, sedation, and respiratory depression. Statistical analysis was performed using SPSS version 26. Continuous variables were presented as mean ± standard deviation and compared using independent sample t-tests. Categorical variables were summarized as frequencies and percentages and analyzed using the chi-square test or Fisher's exact test where appropriate. A p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 187 patients were enrolled in the study, with 94 patients in the pre-implementation group (Group A) and 93 in the post-implementation group (Group B). The baseline characteristics, including mean age and BMI, were comparable between the two groups, with no statistically significant differences observed ($p > 0.05$). Opioid consumption was significantly reduced in the post-implementation group. The mean total morphine milligram equivalent (MME) used in Group A was 48.6 ± 10.2 mg, compared to 18.4 ± 6.5 mg in Group B ($p < 0.001$).

Table 1

Baseline Characteristics

Variable	Group A (n=94)	Group B (n=93)	p-value
Age (years)	47.2 ± 8.1	46.7 ± 7.8	> 0.05
BMI (kg/m^2)	26.5 ± 3.4	26.1 ± 3.1	> 0.05
Total MME Used	48.6 ± 10.2	18.4 ± 6.5	< 0.001

Postoperative pain scores, assessed using the visual analog scale (VAS), were consistently lower in Group B at all measured time points. At 6 hours, the mean VAS score was 6.5 ± 1.1 in Group A and 4.2 ± 1.3 in Group B ($p < 0.001$). Similar statistically significant reductions were noted at 12, 24, and 48 hours postoperatively (all $p < 0.01$). Patient satisfaction scores, measured on a 5-point Likert scale, were higher in the post-implementation group. The proportion of patients reporting "very satisfied" was 38.3% in Group A versus 71.0% in Group B ($p = 0.002$).

Table 2

Postoperative Pain Scores

Time Point	Group A (n=94)	Group B (n=93)	p-value

6 hours	6.5 ± 1.1	4.2 ± 1.3	< 0.001
12 hours	5.8 ± 1.2	3.6 ± 1.1	< 0.001
24 hours	4.9 ± 1.3	2.9 ± 0.9	< 0.01
48 hours	3.7 ± 1.0	2.1 ± 0.8	< 0.01
Satisfaction Level			
Very satisfied	38.3%	71.0%	0.002
Satisfied	41.5%	24.7%	
Neutral/Dissatisfied	20.2%	4.3%	

Adverse effects related to opioid use, such as nausea, vomiting, and sedation, were significantly less frequent in the post-implementation group. Nausea occurred in 29.8% of patients in Group A compared to 9.6% in Group B (p = 0.004). Similarly, vomiting and sedation were reported in 22.3% and 14.9% of Group A, versus 6.4% and 3.2% in Group B, respectively (both p < 0.01). The mean length of hospital stay was also marginally reduced, from 3.6 ± 0.9 days in Group A to 2.8 ± 0.7 days in Group B (p = 0.01), reflecting improved postoperative recovery in the MMA group.

Table 3

Opioid-related Adverse Effects

Adverse Effect	Group A (n=94)	Group B (n=93)	p-value
Nausea	29.8%	9.6%	0.004
Vomiting	22.3%	6.4%	0.006
Sedation	14.9%	3.2%	0.009
Length of Stay (days)	3.6 ± 0.9	2.8 ± 0.7	0.01

DISCUSSION

This study demonstrates that the implementation of a standardized multimodal pain management protocol in patients undergoing oncologic breast surgery led to a significant reduction in postoperative opioid consumption, improved pain control, higher patient satisfaction, fewer opioid-related adverse effects, and a shorter hospital stay. These findings reinforce the growing evidence supporting the use of multimodal analgesia (MMA) as a safer and more effective alternative to traditional opioid-centric postoperative pain regimens [13]. The notable reduction in morphine milligram equivalents in the post-implementation group (Group B) aligns with previous research suggesting that multimodal strategies can substantially reduce opioid reliance. A similar study by Moo et al. (2018) found that MMA protocols in breast surgery reduced opioid use by over 40%, without compromising analgesic effectiveness. Our study observed an even more significant reduction, potentially due to the inclusion of both scheduled non-opioid medications and regional anesthesia blocks, underscoring the synergistic effect of combining pharmacologic and non-pharmacologic modalities [14].

The opioid crisis in the United States has gained significant attention in recent years. Opioid medications, while effective for pain management, carry a substantial risk of misuse and addiction [15]. This crisis has implications for all medical specialties, including oncologic breast surgery, as patients undergoing these procedures are at risk of developing opioid dependency [16]. To address this issue, the medical community has begun shifting its focus towards multimodal pain management strategies. Multimodal pain management involves the use of various techniques and medications to manage pain, rather than relying solely on opioids 17]. The goals of multimodal pain management are not only to reduce opioid use but also to provide more effective pain relief, enhance patient comfort, and accelerate recovery. The creation of multimodal pain management guidelines and practices in oncologic breast surgery is an essential step in combating the opioid crisis and improving patient care. These guidelines should be tailored to the specific needs and challenges of breast surgery patients, considering factors such as the type of surgery, patient age, and comorbidities. They should include a combination of pharmacological and non-pharmacological approaches 18]. Non-Opioid Medications: Utilizing non-opioid medications such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) before and after surgery can significantly reduce the need for opioids. These drugs, when used in combination, can effectively control pain [19]. While our findings are compelling, several limitations must be acknowledged. First, the study was conducted at a single center, which may limit the generalizability of the results. Second, the observational nature of group allocation (based on period rather than randomization) introduces potential confounding variables. However, baseline characteristics between groups were well-matched, mitigating this risk. Lastly, long-term follow-up on chronic pain development and opioid dependency was not included, which represents a valuable direction for future research.

CONCLUSION

It is concluded that the implementation of a standardized multimodal pain management protocol significantly reduces postoperative opioid consumption in patients undergoing oncologic breast surgery. The protocol not only demonstrated superior pain control but also led to increased patient satisfaction, a lower incidence of opioid-related adverse effects, and a shorter duration of hospital stay. These findings support the adoption of multimodal analgesia as a safer, more effective, and patient-centered approach to postoperative pain management in breast surgery. Incorporating this protocol into clinical practice can enhance recovery outcomes, reduce healthcare resource burden, and contribute to the ongoing efforts to combat opioid overuse in surgical populations.

REFERENCES

1. Fearon, N. J., Kurtzman, J., Benfante, N., Assel, M., Vickers, A., Carlsson, S., Laudone, V. P., Levine, M., Simon, B. A., Mehrara, B. J., & Nelson, J. A. (2023). Reducing opioid prescribing after ambulatory breast reconstruction surgery. *Journal of Surgical Oncology*, *128*(8), 1235-1242. https://doi.org/10.1002/jso.27427
2. Bayramiçli, M. (2023). Invited discussion on: Faster return to daily activities and better pain control: A prospective study of Enhanced Recovery After Surgery protocol in breast augmentation. *Aesthetic Plastic Surgery*, *49*(1), 430-432. https://doi.org/10.1007/s00266-023-03707-2
3. Cadwell, J. B., Kim, M., Graziano, F. D., Mehta, M., Seier, K., Tan, K. S., Nelson, J. A., & Afonso, A. M. (2023). Long-term

opioid use after free flap breast reconstruction: Incidence and associated factors. *Plastic Surgery*, *33*(1), 51-58. https://doi.org/10.1177/22925503231198092

4. Lizarraga, I. M., Huang, K., Yalamuru, B., Mott, S. L., Sibenaller, Z. A., Keith, J. N., Sugg, S. L., Erdahl, L. M., & Seering, M. (2023). A randomized single-blinded study comparing preoperative with post-mastectomy PECS block for post-operative pain management in bilateral mastectomy with immediate reconstruction. *Annals of Surgical Oncology*, *30*(10), 6010-6021. https://doi.org/10.1245/s10434-023-13890-w
5. Pellegrino, P. R., & Are, M. (2023). Pain management in cancer surgery: Global inequities and strategies to address them. *Journal of Surgical Oncology*, *128*(6), 1032-1037. https://doi.org/10.1002/jso.27441
6. Uribe, A. A. (2023). Alberto A. Uribe*, Tristan E. Weaver, Marco Echeverria-Villalobos, Luis Periel, Joshua Pasek, Juan Fiorda-Diaz, Marilly Palettas, Roman J. Skoracki, Stephen J. Poteet and Jarrett A. Heard. *New Trends in Regional Analgesia and Anesthesia*, 50.
7. Xia, Z., Chen, Y., Xie, J., Zhang, W., Tan, L., Shi, Y., ... & Zeng, A. (2023). Faster return to daily activities and better pain control: a prospective study of enhanced recovery after surgery protocol in breast augmentation. *Aesthetic Plastic Surgery*, *47*(6), 2261-2267. https://doi.org/10.1007/s00266-023-03504-x
8. Elliott, Z. T., Mann, D. S., Fiorella, M., Christopher, V., Givens, A., Martin, A. M., Zhan, T., & Curry, J. (2023). Predictors of opioid requirement among patients receiving free flap reconstruction to the head and neck. *American Journal of Otolaryngology*, *44*(6), 104000. https://doi.org/10.1016/j.amjoto.2023.104000
9. McLaughlin, C. M., Hughes, A. J., Lee, C. C., Perez Holguin, R. A., Warfield, D. J., Henry, C. R., Johnson, T. S., & Potochny, J. D. (2023). Comparison of tumescent anesthesia versus pectoral nerve block in bilateral reduction Mammaplasty. *Annals of Plastic Surgery*, *90*(6S), S533-S537. https://doi.org/10.1097/sap.0000000000003521
10. Faulkner, H. R., Merceron, T., Wang, J., & Losken, A. (2023). Safe reproducible breast reduction. *Plastic and Reconstructive Surgery - Global Open*, *11*(9), e5245. https://doi.org/10.1097/gox.0000000000005245
11. Araya, S., Webster, T. K., Egleston, B., Amadio, G. M., Panichella, J. C., Elmer, N. A., & Patel, S. A. (2023). Significant reduction in length of stay in deep inferior epigastric perforator flap breast reconstruction with implementation of multimodal ERAS protocol. *Annals of Plastic Surgery*, *91*(1), 90-95. https://doi.org/10.1097/sap.0000000000003578
12. Gedda, C., Nygren, J., Garpenbeck, A., Hoffström, L., Thorell, A., & Soop, M. (2023). Multimodal analgesia bundle and postoperative opioid use among patients undergoing colorectal surgery. *JAMA Network Open*, *6*(9), e2332408. https://doi.org/10.1001/jamanetworkopen.2023.32408
13. Faur, F. I., Clim, I. A., Dobrescu, A., Isaic, A., Prodan, C., Florea, S., Tarta, C., Totolici, B., Duță, C., Pasca, P., & Lazar, G. (2023). The use of wound infiltration for postoperative pain management after breast cancer surgery: A randomized clinical study. *Biomedicines*, *11*(4), 1195. https://doi.org/10.3390/biomedicines11041195
14. Diana, K., Teh, M., Islam, T., Lim, W., Beh, Z., & Taib, N. A. (2023). Benefits of PECS block as part of the Enhanced Recovery After Surgery (ERAS) protocol for breast cancer surgery in an Asian institution: A retrospective cohort study. *World Journal of Surgery*, *47*(3), 564-572. https://doi.org/10.1007/s00268-022-06881-7
15. Kavoosi, T., Pillai, A., Rajasekaran, A., & Obayemi, A. (2024). Enhanced Recovery After Surgery protocols in Craniofacial surgery. *Facial Plastic Surgery Clinics of North America*, *32*(1), 181-187. https://doi.org/10.1016/j.fsc.2023.07.004
16. Zhou, L. Z., Li, X., & Zhou, L. M. (2023). Global trends in research of perioperative analgesia over past 10 years: A bibliometric analysis. *Journal of Pain Research*, *16*, 3491-3502. https://doi.org/10.2147/jpr.s429719
17. Ke, J. X., De Vos, M., Kojic, K., Hwang, M., Park, J., Stuart, H., Osborn, J., Flexman, A., Blake, L., & McIsaac, D. I. (2023). Healthcare delivery gaps in pain management within the first 3 months after discharge from inpatient noncardiac surgeries: A scoping review. *British Journal of Anaesthesia*, *131*(5), 925-936. https://doi.org/10.1016/j.bja.2023.08.006
18. Pierzchajlo, N., Zibitt, M., Hinson, C., Stokes, J. A., Neil, Z. D., Pierzchajlo, G., Gendreau, J., & Buchanan, P. J. (2023). Enhanced Recovery After Surgery pathways for deep inferior epigastric perforator flap breast reconstruction: A systematic review and meta-analysis. *Journal of Plastic, Reconstructive & Aesthetic Surgery*, *87*, 259-272. https://doi.org/10.1016/j.bjps.2023.10.058
19. Samargandi, O. A., Boudreau, C., MacIssac, K., McGuire, C., ElAbd, R., Helmi, A., & Tang, D. (2023). Excess opioid medication and variation in prescribing patterns following common breast plastic surgeries. *Plastic Surgery*, *32*(4), 606-613. https://doi.org/10.1177/22925503231172789