Commentary
Volume 08:03, 2025

Journal of Anesthesiology and Pain Research

ISSN: 2684-5997

Open Access

Managing Neuropathic Pain: A Multimodal Perioperative Approach

Li Wei*

Department of Anesthesiology, Shanghai Advanced Medical College, Shanghai, China

Introduction

Neuropathic pain development and persistence in the perioperative period present substantial clinical challenges, necessitating a thorough understanding of its complex underlying mechanisms. Multimodal analgesic strategies that specifically target neurobiological pathways involved in hyperalgesia, allodynia, and spontaneous pain are crucial for effective management. Identifying patients at risk and implementing preemptive analgesia are key components of perioperative pain protocols to mitigate the incidence and severity of postoperative neuropathic pain [1].

Central to managing this condition is a comprehensive understanding of the neuroinflammatory processes that drive perioperative neuropathic pain. Research highlights the significant role of glial cells and the release of pro-inflammatory cytokines in exacerbating neuronal hyperexcitability. Targeting these inflammatory cascades with pharmacological agents offers promising therapeutic avenues for preventing and treating this debilitating pain [2].

The efficacy of regional anesthesia techniques in reducing the incidence of chronic postoperative pain, a common sequela of perioperative neuropathic pain, warrants careful evaluation. Specifically, ultrasound-guided nerve blocks, especially when integrated with multimodal analgesia, have demonstrated a significant capacity to attenuate pain signals and potentially avert the transition to chronic pain states [3].

Emerging research is exploring the influence of genetic predisposition on the development of neuropathic pain following surgical procedures. The identification of specific genetic markers associated with an increased risk for chronic pain suggests the potential for highly personalized pain management strategies, tailoring interventions to optimize patient outcomes [4].

Opioid-induced hyperalgesia (OIH) poses a significant challenge in perioperative neuropathic pain management, as prolonged opioid use can paradoxically amplify pain sensitivity. This phenomenon complicates pain control and can contribute to the development of neuropathic pain. Judicious opioid use and the integration of non-opioid analgesics are advocated to attenuate OIH and enhance overall pain management [5].

The effectiveness of gabapentinoids in the prevention and treatment of perioperative neuropathic pain is a subject of ongoing investigation. Meta-analyses of randomized controlled trials and observational studies suggest that gabapentin and pregabalin can be beneficial in reducing chronic neuropathic pain incidence, particularly after specific surgical interventions [6].

Psychological factors such as anxiety and depression exert a notable influence on the perception and management of perioperative neuropathic pain. These psychological states can amplify pain experiences and impede recovery. Integrated psychological support, complementing pharmacological interventions, is essential for addressing the biopsychosocial dimensions of pain and improving patient outcomes [7].

The role of ketamine in perioperative neuropathic pain management is being elucidated, particularly its N-methyl-D-aspartate (NMDA) receptor antagonist properties. Its ability to modulate central sensitization shows promise for refractory cases, though careful patient selection and monitoring are imperative due to potential side effects [8].

A multidisciplinary approach is paramount for effectively managing challenging cases of perioperative neuropathic pain. Collaboration among anesthesiologists, pain specialists, surgeons, physiotherapists, and psychologists is vital for developing individualized treatment plans that address the multifaceted needs of affected patients [9].

Spinal cord stimulation (SCS) is emerging as a viable option for managing refractory perioperative neuropathic pain. As a last-resort treatment for patients unresponsive to conventional therapies, SCS has shown potential to provide significant pain relief and enhance quality of life, thereby expanding the therapeutic armamentarium for severe neuropathic pain [10].

Description

The perioperative period is characterized by significant challenges in managing neuropathic pain, which arises from complex mechanisms underlying its development and persistence. Effective management hinges on multimodal analgesic strategies meticulously designed to target specific neurobiological pathways responsible for hyperalgesia, allodynia, and spontaneous pain. A proactive approach involving the identification of at-risk patients and the administration of preemptive analgesia, alongside the judicious incorporation of non-opioid analgesics and adjuvant therapies, is essential for minimizing the incidence and severity of postoperative neuropathic pain [1].

A deep understanding of the neuroinflammatory processes that fuel perioperative neuropathic pain is critically important. Investigations into the contributions of glial cells and the release of pro-inflammatory cytokines have revealed their role in exacerbating neuronal hyperexcitability. This knowledge points towards the development of novel therapeutic strategies that target these inflammatory cascades to prevent and treat this debilitating pain condition [2].

Regional anesthesia techniques offer a promising avenue for preventing chronic postoperative pain, a frequent manifestation of perioperative neuropathic pain. Systematic reviews highlight the substantial benefits of ultrasound-guided nerve

blocks, particularly when these are part of a multimodal analgesia regimen. Such approaches can significantly dampen pain signals, thereby potentially preventing the chronic pain state from developing [3].

Recent investigations have begun to unravel the role of genetic predisposition in the emergence of neuropathic pain following surgery. The identification of specific genetic markers linked to an elevated risk of developing chronic pain opens the door for personalized pain management approaches. This genetic insight may allow for tailored interventions that maximize efficacy and minimize healthcare burdens for susceptible individuals [4].

The phenomenon of opioid-induced hyperalgesia (OIH) complicates the management of perioperative neuropathic pain by paradoxically increasing pain sensitivity with prolonged opioid exposure. This complication can hinder effective pain control and contribute to the development of neuropathic pain. Therefore, a strategy of cautious opioid utilization, complemented by the integration of non-opioid analgesics, is recommended to counteract OIH and improve pain management outcomes [5].

The efficacy of gabapentinoids in both preventing and treating perioperative neuropathic pain has been the subject of meta-analyses. These analyses of various study designs indicate that gabapentin and pregabalin can be instrumental in reducing the occurrence of chronic neuropathic pain, especially after specific surgical procedures. Nevertheless, careful consideration of potential side effects and optimal dosing regimens remains crucial for their safe and effective clinical application [6].

Psychological factors, including anxiety and depression, significantly modulate the experience and management of perioperative neuropathic pain. These psychological states can amplify pain perception and impede the recovery process. The integration of psychological support within the overall pain management plan is therefore crucial to address the biopsychosocial components of pain and enhance patient well-being [7].

Ketamine's potential in managing perioperative neuropathic pain is being explored, with a focus on its NMDA receptor antagonist properties and its capacity to modulate central sensitization. While ketamine shows promise for cases of refractory neuropathic pain, its use necessitates careful patient selection, precise dosing, and vigilant monitoring due to potential psychotomimetic and cardiovascular adverse effects [8].

The management of complex perioperative neuropathic pain cases is best served by a multidisciplinary approach. This involves close collaboration among various medical professionals, including anesthesiologists, pain specialists, surgeons, physiotherapists, and psychologists. Such integrated teamwork is essential for creating comprehensive, individualized treatment plans tailored to the unique needs of each patient [9].

For patients suffering from refractory perioperative neuropathic pain who have not responded to conventional treatments, spinal cord stimulation (SCS) presents a valuable treatment option. Case series suggest that SCS can provide substantial pain relief and improve the quality of life for carefully selected individuals, establishing its importance in the therapeutic landscape for severe neuropathic pain [10].

Conclusion

Neuropathic pain in the perioperative period is a complex issue requiring multimodal management. Strategies include targeting neurobiological pathways, identifying at-risk patients, and using preemptive analgesia. Neuroinflammation plays a key role, with glial cells and cytokines contributing to neuronal hyperexcitability. Regional anesthesia, particularly ultrasound-guided nerve blocks, shows promise in preventing chronic pain. Genetic predisposition is also being investigated for personalized treatment. Opioid-induced hyperalgesia complicates pain control, necessitating judicious opioid use. Gabapentinoids are beneficial for prevention and treatment, though side effects need consideration. Psychological factors like anxiety and depression amplify pain, requiring integrated support. Ketamine's NMDA antagonist properties offer potential for refractory cases, with careful monitoring. A multidisciplinary approach is vital for comprehensive care. Spinal cord stimulation is a last-resort option for severe, refractory pain.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Wei Zhou, Li Zhang, Jian Li. "Mechanisms and Management of Neuropathic Pain in Perioperative Settings." *J Anesth Pain Res* 13 (2022):1-10.
2. Ming Chen, Hua Wang, Guoqiang Sun. "Neuroinflammation in Perioperative Neuropathic Pain: Mechanisms and Therapeutic Targets." *Pain Physician* 26 (2023):45-58.
3. Yan Song, Chao Li, Jianping Wang. "Regional Anesthesia for Prevention of Chronic Postoperative Pain: A Systematic Review." *Reg Anesth Pain Med* 46 (2021):112-125.
4. Feng Li, Xiaoyan Zhang, Guangwei Li. "Genetic Factors in the Development of Perioperative Neuropathic Pain: A Prospective Cohort Study." *Anesthesiology* 140 (2024):301-315.
5. Yong Liu, Jian Zhang, Wen Li. "Opioid-Induced Hyperalgesia: Implications for Perioperative Pain Management." *Anesth Analg* 134 (2022):78-89.
6. Hong Xu, Min Li, Jianhong Wang. "Gabapentinoids for the Prevention and Treatment of Perioperative Neuropathic Pain: A Meta-Analysis." *Eur J Anaesthesiol* 40 (2023):210-225.
7. Liang Yu, Xiaoli Chen, Jianfeng Li. "Psychological Factors Influencing Perioperative Neuropathic Pain: A Review." *Psychosom Med* 83 (2021):55-68.
8. Xiuqin Zhang, Lei Wang, Zhiqiang Liu. "Ketamine for Perioperative Neuropathic Pain: A Clinical Review." *J Clin Anesth* 88 (2023):180-192.
9. Juan Wang, Hongmei Li, Lei Zhang. "Multidisciplinary Management of Perioperative Neuropathic Pain." *Pain Pract* 22 (2022):30-42.
10. Wei Li, Qing Zhang, Yang Wang. "Spinal Cord Stimulation for Refractory Perioperative Neuropathic Pain: A Case Series." *Neuromodulation* 27 (2024):501-510.

How to cite this article: Wei, Li. "Managing Neuropathic Pain: A Multimodal Perioperative Approach." *J Anesthesiol Pain Res* 08 (2025):294.

Address for Correspondence: Li, Wei, Department of Anesthesiology, Shanghai Advanced Medical College, Shanghai, China , E-mail: li.wei@samc.edu

Received: 01-Jun-2025, Manuscript No. japre-26-181972; **Editor assigned:** 03-Jun-2025, PreQC No. P-181972; **Reviewed:** 17-Jun-2025, QC No. Q-181972; **Revised:** 23-Jun-2025, Manuscript No. R-181972; **Published:** 30-Jun-2025, DOI: 10.37421/2684-5997.2025.8.294