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OPIOID-FREE ANESTHESIA AND THE QUALITY OF EARLY RECOVERY AFTER SURGERY

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Abstract: Opioid-free anesthesia (OFA) has emerged as a promising alternative to conventional opioid-based anesthesia, with the aim of minimizing adverse effects such as nausea, vomiting and addiction, and promoting a higher quality perioperative recovery. This study reviewed the efficacy and safety of OFA, using a methodology based on a literature review and the PVO strategy. Twenty-seven articles were selected from the PubMed database, published between 2020 and 2024, which addressed the impact of OFA on the quality of postoperative recovery, incidence of chronic pain and quality of life. The results indicate that OFA reduces respiratory complications, postoperative nausea and vomiting, as well as showing greater hemodynamic stability in different surgical contexts. Studies have highlighted its effectiveness in minimally invasive surgeries and specific populations, such as patients with myotonic dystrophy. However, limitations include variations in efficacy according to the type of surgery, logistical and economic challenges, and the need for specialized training. We can see that OFA has the potential to enrich anesthetic management, especially when integrated with personalized multimodal strategies. However, gaps remain regarding its applicability in complex surgeries and economic viability, suggesting the need for robust multicenter studies to consolidate its clinical and operational implications.
Keywords: opioid-free anesthesia, multimodal analgesia, perioperative recovery, chronic pain.

INTRODUCTION

Opioid-based general anesthesia has been widely used as an essential component of perioperative pain management. However, growing evidence suggests that intraoperative opioid use may be associated with significant complications, including addiction, respiratory adverse effects and the development of chronic post-surgical pain (CPP) (Feenstra *et*

al., 2023). In addition, the need for prolonged analgesia after surgery has raised concerns about the long-term impacts of this approach. In this scenario, opioid-free anesthesia (OFA) has emerged as a promising alternative, with the aim of prioritizing patient safety, minimizing postoperative complications and promoting early recovery (Blum *et al*., 2024).

OFA is based on multimodal analgesia, which combines different classes of drugs, such as local anesthetics, N-methyl-D-aspartate (NMDA) antagonists and analgesic adjuvants, with the aim of providing pain relief without the need for opioids (Chia; Cannesson; Bui, 2020). This approach seeks to minimize the adverse effects associated with opioids and reduce the risk of long-term dependence. Preliminary studies indicate that OFA protocols are associated with faster postoperative recovery and lower rates of respiratory and neurological complications (Bohringer; Astorga; Liu, 2020). However, the effectiveness of this approach in different surgical contexts is still questioned, as are the logistical and clinical challenges related to its implementation (Belltall *et al*., 2024).

Although initial studies point to potential benefits, the introduction of OFA into clinical practice still faces significant barriers. Challenges include the risk of drug interactions in the use of multimodal analgesics, the need for specialized training for professionals and the variability in individual patient responses (Chia *et al*., 2020). In addition, managing patients' expectations regarding postoperative pain control requires special attention, especially in major or complex surgeries.

The available results on OFA suggest immediate benefits in terms of early recovery, such as shorter time in the immediate post--anesthetic period and reduced adverse effects (Gupta *et al*., 2020). However, multicenter studies of longer duration are needed to assess the impacts on the incidence of chronic pain and on patients' quality of life in the long term (Sakan et al., 2023; Forget *et al*., 2021).

This article aims to evaluate the efficacy and safety of opioid-free anesthesia compared to conventional opioid-based anesthesia, focusing on the quality of early recovery, the incidence of chronic pain and the quality of life of patients undergoing different types of surgery. This analysis aims to contribute to the creation of safer and more effective anesthetic practices, promoting more positive and sustainable perioperative outcomes.

METHODOLOGY

This is a literature review developed according to the criteria of the PVO strategy, which stands for: population or research problem, variables and outcome. It was used to prepare the research through its guiding question: "How does opioid-free anesthesia impact the quality of early recovery in patients undergoing surgery compared to opioid anesthesia protocols?"

The searches were carried out using the PubMed - MEDLINE (Medical Literature Analysis and Retrieval System Online) databases. The search terms were used in combination with the Boolean terms "AND", "OR" using the following search strategy: (opioid free anesthesia) AND ((postoperative symptoms) OR (postoperative recovery)). From this search, 221 articles were found, which were then submitted to the selection criteria. The inclusion criteria were: articles in English; published between 2020 and 2024 and which addressed the themes proposed for this research, review--type studies, meta-analysis, observational studies, experimental studies, available in full. The exclusion criteria were: duplicate articles, available in abstract form, which did not directly address the proposal studied and which did not meet the other inclusion criteria. After applying the search strategy to the database, a total of 221 articles were found. After applying the inclusion and exclusion criteria, 27 articles were selected from the PubMed database to make up this study's collection.

DISCUSSION

SUMMARIZING KEY FINDINGS

Opioid-free anesthesia (OFA) has emerged as a promising approach in various surgical settings, with the aim of minimizing the adverse effects associated with opioid use, improving the quality of recovery and reducing perioperative complications. According to Beloeil *et al*. (2021), OFA has significant benefits, including a lower incidence of postoperative nausea and vomiting (PONV) and greater hemodynamic stability, especially in minimally invasive procedures. Similarly, Hao *et al*. (2023) highlighted the improvement in the quality of recovery assessed by the QoR-15 in patients undergoing laparoscopic cholecystectomy, demonstrating the efficacy of OFA in specific surgical scenarios.

On the other hand, Yan *et al*. (2023) pointed out that OFA with esketamine significantly reduced chronic pain after video-assisted thoracoscopic surgeries, but had limitations in controlling acute pain in the first 24 hours. According to López *et al*. (2021), ketamine, used as the main component of OFA, proved to be more effective than opioids in preventing acute postoperative pain in breast cancer surgeries, with lower rates of rescue analgesia and greater patient satisfaction.

According to Ulbing *et al*. (2023), the use of OFA in laparoscopic hysterectomy procedures showed benefits in controlling acute pain and reducing the use of opioids in the immediate postoperative period. According to Cha *et al*. (2023), the use of intravenous lidocaine as the main component of OFA in hysteroscopies provided a higher quality of postoperative recovery and a lower incidence of PONV. Martin *et al*. (2023) also reported that the implementation of OFA protocols in pediatric populations was effective in reducing complications and opioid consumption, without compromising safety.

For Ergun, Ozturk and Zengin (2023), the addition of the erector spinae muscle plane block (ESPB) in video-assisted thoracic surgeries contributed significantly to reducing postoperative opioid consumption and improved the quality of patient recovery. Choi *et al*. (2024) pointed out that although OFA with ketamine improved pain control and reduced adverse effects in the short term, the overall benefits were limited by logistical issues and hemodynamic control. According to Anupama *et al*. (2024), the use of dexmedetomidine in OFA demonstrated hemodynamic stability and shorter emergency times in neurological surgeries, reinforcing the effectiveness of this approach in specialized contexts.

According to Gurbuz and Saracoglu (2020), the use of OFA in patients with type 1 myotonic dystrophy has been shown to be effective in minimizing complications related to opioid use, and has demonstrated safety when combined with regional anesthesia. The approach was particularly important for avoiding adverse effects in populations with neuromuscular comorbidities.

CONTEXT AND CRITICAL ANALYSIS

The comparison between OFA and opioid-based anesthesia (OA) approaches reveals both agreement and divergence in the literature. For Malo-Manso *et al*. (2020), OFA showed a significant reduction in the use of postoperative opioids in bariatric surgeries, as well as greater respiratory stability. However, Bao *et al*. (2024) indicated that OFA did not significantly reduce the incidence of PONV compared to balanced anesthesia, highlighting the need for complementary measures to optimize results.

The analysis by Mulier *et al*. (2021) corroborated the benefits of OFA in reducing minor complications in DIEP flap surgeries, but there was no impact on major complications.

These findings suggest that while OFA has clear advantages in immediate outcomes, such as pain control and reduction of PONV, its effectiveness may vary depending on the type of surgery and the protocols used. Jose, Kaniyil and Ravindran (2023) highlighted the reduction in anesthetic consumption and shorter recovery times with OFA in mastectomies, results corroborated by studies in neurological surgeries, as pointed out by Anupama *et al*. (2024).

The study by Gurbuz and Saracoglu (2020) adds an important perspective on the applicability of OFA in patients with specific disorders, such as myotonic dystrophy, reinforcing its importance for populations with greater sensitivity to opioids.

IMPLICATIONS OF THE FINDINGS

The studies reviewed show that OFA can enrich theoretical and practical knowledge in the field of anesthesiology. According to Assaf *et al*. (2020), the integration of regional blocks into OFA enhances its analgesic effects, highlighting its applicability in vulnerable populations, such as elderly patients undergoing orthopaedic surgery. Ergun, Ozturk and Zengin (2023) reinforced this idea by highlighting the benefits of ESPB in improving the quality of recovery and reducing postoperative complications.

In addition, the research by Jose, Kaniyil and Ravindran (2023) highlights the positive impact of OFA on reducing anaesthetic consumption and recovery time, highlighting practical applications that can influence hospital policies and accelerated recovery protocols (ERAS).

SUGGESTIONS FOR FUTURE RESEARCH

Despite the advances described, there are important gaps to be addressed. According to Raguapathy *et al*. (2022), there is a lack of multicenter studies evaluating the efficacy of OFA in more complex surgeries. Similarly, Arun *et al*. (2024) highlighted the need to assess the economic viability of OFA in scenarios of limited resources.

Future directions should explore the personalization of OFA, as suggested by Mogianos, Undén and Persson (2024), who investigated the stratification of patients by pain sensitivity. Further studies should include robust methodologies, larger sample sizes and diverse populations to increase the applicability of the findings.

FINAL CONSIDERATIONS

This study reviewed the efficacy and safety of opioid-free anesthesia (OFA) compared to conventional opioid-based protocols, focusing on the quality of early recovery, the incidence of chronic pain and the quality of life of patients undergoing surgery. Evidence shows that OFA has important benefits, such as a lower incidence of postoperative nausea and vomiting (PONV), greater hemodynamic stability and less dependence on opioids in the immediate postoperative period. In addition, in specific populations, such as patients with myotonic dystrophy or undergoing minimally invasive surgery, OFA has demonstrated high levels of safety and efficacy.

However, the results also highlighted limitations and variations in effectiveness depending on the type of surgery and the protocols used. Although OFA is promising in reducing minor complications and recovery time, there are gaps related to its applicability in highly complex surgeries, as well as logistical and economic challenges to its widespread implementation.

The implications of these findings suggest that OFA can contribute significantly to safer and more effective anesthetic practices, especially when integrated with multimodal and personalized strategies. However, multicenter studies with diverse populations and robust methodologies are needed to validate and expand the use of OFA in different clinical contexts.

Finally, there is a need to investigate strategies to optimize postoperative pain control and assess the economic and operational viability of OFA in resource-limited scenarios. This approach could transform perioperative management, promoting more favorable and sustainable outcomes for patients.

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