

Impacts of anesthesia on postoperative recovery and possible complications

Impactos da anestesia na recuperação pós-operatória e possíveis complicações

Impactos de la anestesia en la recuperación postoperatoria y posibles complicaciones

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REVISA

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RESUMO

Objetivo: Avaliar os impactos da anestesia na recuperação e complicações pós-operatórias. **Metodologia:** Revisão integrativa (2020–2025) na base PubMed, incluindo 10 revisões sistemáticas e meta-análises. **Resultados:** A anestesia influencia na dor, tempo de internação, complicações respiratórias e efeitos cognitivos como delírium. Estratégias como anestesia regional, protocolos multimodais e ventilação protetora reduzem complicações e melhoram a recuperação. **Conclusão:** A escolha adequada da anestesia e o manejo multimodal da dor são fundamentais para otimizar a recuperação e reduzir riscos.

Palavras-chave: Anestesia; Pós-operatório; Complicações.

ABSTRACT

Objective: To assess the impact of anesthesia on postoperative recovery and complications. **Methodology:** Integrative review (2020–2025) in PubMed, including 10 systematic reviews and meta-analyses. **Results:** Anesthesia affects pain, length of stay, respiratory complications, and cognitive effects such as delirium. Strategies like regional anesthesia, multimodal protocols, and protective ventilation reduce complications and enhance recovery. **Conclusion:** Appropriate anesthetic choice and multimodal pain management are key to optimizing recovery and minimizing risks.

Keywords: Anesthesia; Postoperative; Complications.

RESUMEN

Objetivo: Evaluar los impactos de la anestesia en la recuperación y complicaciones postoperatorias. **Metodología:** Revisión integrativa (2020–2025) en la base PubMed, con 10 artículos de revisiones sistemáticas y metaanálisis. **Resultados:** La anestesia influye en el dolor, la duración de la hospitalización, complicaciones respiratorias y efectos cognitivos como el delirium. Estrategias como anestesia regional, protocolos multimodales y ventilación protectora reducen complicaciones y mejoran la recuperación. **Conclusión:** La elección adecuada de la anestesia y el manejo multimodal del dolor son esenciales para optimizar la recuperación y disminuir riesgos.

Descriptores: Anestesia; Postoperatorio; Complicaciones.

REVISÃO

Introduction

Anesthesia is an essential component of surgical procedures, responsible for maintaining the patient's comfort and stability during the operation. However, its repercussions in the postoperative period are broad and can directly influence the quality and time of patient recovery. Among the main aspects related to the impact of anesthesia on the postoperative period, the occurrence of respiratory and cardiovascular complications, cognitive effects such as delirium and neurocognitive dysfunction, in addition to the influence on pain and the length of hospital stay stand out.¹⁻³

Factors such as the type of anesthesia, depth, ventilation strategies, use of multimodal protocols, and the patient's pre-existing conditions can significantly alter outcomes in the postoperative period. Strategies such as regional anesthesia, light sedation anesthesia, individualized protective ventilation, and the use of intrathecal morphine in enhanced recovery protocols have been studied to reduce complications and accelerate the functional recovery of patients undergoing surgery.^{4-7, 10}

Thus, understanding the impacts of anesthesia on postoperative recovery and complications is essential to optimize perioperative care, reduce morbidity and mortality, and improve the patient's experience during the surgical process and recovery. This study aims to analyze in an integrated manner the effects of anesthesia on the postoperative recovery of patients undergoing surgical procedures, highlighting how these variables influence recovery time, the occurrence of complications, and the quality of the patient's experience.^{5,9}

Method

This integrative review was developed following the criteria of the PVO strategy, which means: Population or Problem, Variables, and Outcome. The population analyzed was "patients undergoing surgical procedures under anesthesia," exposed to the variable "effects of anesthesia in the postoperative period, considering factors such as pain, nausea, functional recovery, length of stay, and cognitive effects," seeking to confirm the outcome "quality and time of recovery in the postoperative period," based on the following research question: "What are the effects of anesthesia on the postoperative recovery of patients undergoing surgery, and how do these effects influence the recovery time, the occurrence of complications, and the quality of the patient's experience?"

The searches were conducted in the PubMed Central (PMC) database. The following search terms were used, combined with the Boolean operators AND and OR, using the following search strategy: (("postoperative period"[MeSH Terms] OR "postoperative recovery" OR "postoperative care") AND ("anesthesia"[MeSH Terms] OR "general anesthesia" OR "regional anesthesia" OR "local anesthesia") AND ("treatment outcome"[MeSH Terms] OR "postoperative complications" OR "pain, postoperative" OR "recovery of function")). The initial search resulted in 3831 articles, which were subsequently submitted to the selection criteria. The inclusion

criteria adopted were: articles published in English; in the period from 2020 to 2025; that addressed the proposed themes of this research; systematic review and meta-analysis type studies; and that were available in full. The exclusion criteria were: duplicated articles; articles available only in abstract form; studies that did not directly address the proposed topic; and those that did not meet the other inclusion criteria.

Results

The analysis of the selected studies demonstrated that different anesthetic strategies significantly influence functional recovery in the postoperative period. Deep general anesthesia was associated with reduced immediate pain, but without a positive impact on complications or mortality, in addition to a higher risk of delirium. In contrast, light anesthesia presented a lower incidence of early delirium, without significant changes in inflammatory markers or evaluated cognitive parameters.

Regional anesthesia was related to the reduction of complications and a more favorable recovery compared to general anesthesia, without detriment to neurocognitive function. The use of xenon anesthesia proved promising, being associated with a decrease in recovery time, without an increase in the incidence of cognitive dysfunction.

Among the adjuvant strategies, individualized protective ventilation during general anesthesia demonstrated reduced pulmonary complications. The administration of intrathecal morphine, when included in multimodal protocols such as Enhanced Recovery After Surgery (ERAS), showed efficacy in controlling postoperative pain and facilitated early mobilization, with a low risk of respiratory depression. Finally, the adequate management of obstructive sleep apnea contributed to the reduction of complications in at-risk patients undergoing surgical procedures.

To synthesize the findings related to this topic, Table 1 presents a comparative view of the main anesthetic strategies and their effects on pain, functional recovery, and complications.

Table I - Anesthetic and perioperative strategies and their effects on pain, recovery, and complications.

Anesthetic/Perioperative Strategy	Impact on Pain	Impact on Recovery	Complications and Cognitive Effects
Deep general anesthesia	Reduced early pain	No reduction in complications or mortality	Higher risk of delirium
Light anesthesia	No significant difference	Lower risk of early delirium	Lower incidence of delirium

Regional anesthesia	No specific data	Lower risk of complications	No negative impact on cognition
Xenon anesthesia	No significant change	Shorter recovery time	No increase in cognitive dysfunction
Individualized protective ventilation	-	Lower risk of pulmonary complications	-
Intrathecal morphine in ERAS protocol	Reduced pain (effective analgesia)	Facilitates early mobilization	Low risk of respiratory depression
Management of obstructive sleep apnea (OSA)	-	Reduced complication in patients with apnea	-

Source: Souza ER, et al; 2025.

Discussion

The present study demonstrates that anesthesia exerts a significant influence on postoperative recovery. The findings show that the type of anesthesia and its depth are directly associated with pain and cognitive effects.^{1,3,8} Adjuvant strategies, such as regional anesthesia and protective ventilation, proved relevant for respiratory complications.^{7,10}

Cognitive dysfunction and delirium were widely associated with general anesthesia, especially in elderly patients or those with comorbidities, possibly by mechanisms related to neuroinflammation and oxidative stress.^{1,2} The results showed that light anesthesia reduces the incidence of early delirium, corroborating previous findings that point to the importance of monitoring anesthetic depth.³ Strategies such as the use of xenon also stand out as safe alternatives, promoting a reduction in recovery time without increasing the risk of cognitive deficits.⁴

Another relevant point identified was the management of pain in the postoperative period, a determining factor for the quality of recovery. The administration of intrathecal morphine, in multimodal protocols such as Enhanced Recovery After Surgery (ERAS), proved effective in reducing pain and favored early mobilization, contributing to a shorter length of stay.⁶ Although deep anesthesia reduces immediate pain, this strategy was associated with an increased risk of delirium, reinforcing the need to balance adequate analgesia with cognitive safety.⁸

Respiratory and cardiovascular complications also appeared as notable events in the analyzed studies, being directly related to the type of anesthesia and the patient's clinical profile. Screening for conditions such as obstructive sleep apnea proved essential to reduce risks,⁵ while regional anesthesia presented advantages by reducing complications compared to general anesthesia.⁷ Individualized protective

ventilation was identified as an effective strategy to minimize pulmonary complications, confirming the importance of personalizing intraoperative management.¹⁰

Finally, the analysis evidenced that the personalization of anesthetic management, combined with the use of evidence-based protocols, is fundamental to optimize postoperative outcomes. The systematic incorporation of quality of recovery scales, still little used as a primary outcome, can contribute to more comprehensive and targeted monitoring.⁹ Preoperative screening for comorbidities, associated with careful adjustment of the type and depth of anesthesia, constitutes one of the pillars for reducing complications and favoring functional recovery.¹

Final Considerations

Anesthesia exerts significant impacts on postoperative recovery, influencing recovery time, the quality of functional return, the occurrence of complications, and cognitive outcomes. The choice of anesthesia type, the level of depth, pain management, and the implementation of protective ventilation strategies are determining factors for optimizing recovery and reducing complications, especially in elderly patients and those with comorbidities. The use of quality of recovery scales and the screening of pre-existing conditions, such as obstructive sleep apnea, are relevant practices for effective follow-up in the postoperative period. Furthermore, although strategies such as xenon anesthesia and the use of intrathecal morphine in multimodal protocols demonstrate benefits, the personalization of care remains central to the safe and effective management of these patients. New studies focusing on quality of life outcomes and recovery scales are needed to strengthen clinical decision-making in the anesthetic context.

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