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Efficacy and Safety of Ciprofol in Patients under General Anesthesia: a Systematic Review and Meta-analysis

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Huang, CH; Fei, SQ; Zhang, XQ; Li, YN; Wei, SL; Li, J.

Corresponding author:
Yongnan Li

lyngyq2006@foxmail.com

Author Affiliation:
Department of Cardiac Surgery, Lanzhou University Second Hospital, Lanzhou University, Lanzhou, China. Second Clinical Medical College, Lanzhou University, Lanzhou, China.

ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 2 April 2025 and was last updated on 2 April 2025.

INTRODUCTION

Review question / Objective This review aims to accurately evaluate the performance of ciprofol in terms of efficacy in general anesthesia, such as induction speed, depth of anesthesia, and patients' postoperative recovery, as well as its safety in relation to adverse events through conducting a meta-analysis.

Rationale Ciprofol, a newly developed intravenous anesthetic, has shown promise in the field due to its distinct pharmacological properties. It offers rapid induction of anesthesia, potentially leading to a smoother start to surgical procedures. Its relatively short-acting nature may also contribute to quicker patient recovery times, reducing the length of post-operative monitoring and potentially minimizing associated costs. However, despite these advantages, a comprehensive understanding of its overall safety and efficacy across different anesthesia scenarios is still lacking.

Existing studies often focus on specific subsets of patients, such as those undergoing a particular type of surgery or within a narrow age range. Moreover, many investigations are limited in scope, either only assessing the anesthetic's efficacy in terms of induction speed or solely focusing on a single safety parameter like the incidence of hypotension. Additionally, methodological differences among studies, including variations in dosing regimens, co-administration of other drugs, and the use of different outcome assessment tools, have led to inconsistent and sometimes conflicting results. This lack of a unified, broad-spectrum view of ciprofol's performance in anesthesia necessitates a more comprehensive analysis.

This systematic review and meta-analysis aims to synthesize all available evidence regarding the

efficacy and safety of ciprofol in anesthesia. We will provide a more accurate and holistic assessment of ciprofol's performance. The results will offer an evidence-based reference for anesthesiologists when making decisions on anesthetic agent selection. It will help them better understand the full spectrum of ciprofol's benefits and risks, leading to more informed choices in clinical practice.

Condition being studied It focuses on the efficacy of Ciprofol in patients under general anesthesia (such as the effect of anesthesia induction, maintaining the stability of anesthesia, etc.) and its safety (the presence or absence of adverse reactions, the impact on physiological indicators, etc.).

METHODS

Participant or population
Patients aged between 18 and 79 years old
Individuals scheduled to undergo general anesthesia for various surgical procedures
Patients who can provide written informed consent to participate in the study
Patients without a known allergy or hypersensitivity to ciprofol or any of its components.

Intervention General anesthesia is achieved by intravenous infusion of ciprofol.

Comparator Other anesthetics such as propofol, midazolam,etc.

Study designs to be included Both randomised studies and non-randomised studies.

Eligibility criteria
Inclusion Criteria
1. Patient Population: Patients scheduled to undergo surgery under general anesthesia are eligible.
2. Intervention Group: General anesthesia is achieved by intravenous infusion of ciprofol.
Control Group: General anesthesia induction is carried out with conventional anesthetic drugs, such as propofol, etomidate, etc.
Exclusion Criteria
1. Study Design: Studies that are not randomized controlled trials will be excluded.
2. Data Availability: Studies for which data extraction is not possible or the data cannot be used for analysis will be excluded.

Information sources
Contacting authors or experts
reference list checking
searching conference proceedings
searching dissertation and thesis databases
searching trial or study registers
looking through all the articles that cite the papers included in the review ("snowballing").

Main outcome(s) Efficacy of anesthesia induction, quality of anesthesia maintenance, recovery from anesthesia, adverse Events, etc.

Additional outcome(s) Cognitive function recovery, degree of postoperative pain, length of hospital stay, changes in immune function,etc.

Quality assessment / Risk of bias analysis Funnel plots to spot asymmetry, sensitivity analysis with different assumptions on missing data, and trial sequential analysis for evidence sufficiency.

Strategy of data synthesis Data analysis utilized Stata 14 and Review Manager 5.3. Dichotomous data were analyzed with the risk ratio (RR), and continuous data with the mean difference (MD), both with 95% confidence intervals (CI). Statistical significance was set at $P < 0.05$.The I^2 statistic assessed statistical heterogeneity: $I^2 > 50\%$ denoted high heterogeneity, while $I^2 < 50\%$ indicated low heterogeneity. For high heterogeneity, a random - effects model was applied; for low heterogeneity, a fixed-effects model was used.Sensitivity and subgroup analyses were carried out for studies with high heterogeneity levels. Publication bias was evaluated through Egger's test and a funnel plot.

Subgroup analysis Grouping by patient age: Analyze the differences in the efficacy and safety of ciprofol during general anesthesia among patients of different age groups (young, middle - aged, and elderly).
Grouping by surgical type: Divide patients into subgroups such as general surgery, neurosurgery, cardiothoracic surgery, etc.
Grouping by patient physical condition: According to the ASA (American Society of Anesthesiologists) classification of patients, patients can be divided into subgroups of ASA grade I, II, III, etc.
Grouping by adjuvant medications in the anesthetic method: If different adjuvant medications are used during general anesthesia, they can be divided into different subgroups accordingly.

Sensitivity analysis Sensitivity analysis of research quality:
Evaluate the impact of studies at different quality levels on the overall results. Observe whether there are significant differences in the efficacy and safety

indicators of ciprofol during general anesthesia due to differences in research quality. If the results of high-quality studies are consistent with those of low-quality studies, it indicates that the results are relatively robust; conversely, it suggests that the results may be affected by research quality.
Sensitivity analysis of sample characteristics:
Age factor: Analyze the sensitivity of patients of different age groups to ciprofol. If there are not significant changes in the efficacy and safety indicators of ciprofol among different age subgroups, it indicates that the age factor has a small impact on the results; if there are obvious differences, it is necessary to further explore the relationship between age and the effect of ciprofol.
Gender factor: Explore the impact of gender on the anesthetic effect of ciprofol. If there are significant differences in the results due to gender, then the influence of gender factors on the use of ciprofol needs to be considered in clinical applications; if the results are similar, it indicates that gender is not a key factor affecting the effect of ciprofol.
Sensitivity analysis of outcome indicators:
Primary outcome indicators: If the primary outcome indicators do not change significantly in different studies, it indicates that the research results are stable in the main aspects; if there are large differences, it is necessary to further analyze the reasons, which may be caused by differences in operation methods, observation standards, etc. in different studies.
Secondary outcome indicators: Conduct a sensitivity analysis of the secondary outcome indicators. If the changes in the secondary outcome indicators do not affect the evaluation of the overall efficacy and safety of ciprofol, it indicates that the results are relatively stable; if the changes in the secondary outcome indicators lead to a change in the evaluation of ciprofol, then the weights of these indicators in clinical decision-making need to be comprehensively considered.

Country(ies) involved China.

Keywords Ciprofol; Anesthesia; Surgery; Clinical efficacy.

Contributions of each author

Author 1 - Chuhan Huang.
Email: 320220920890@lzu.edu.cn
Author 2 - Shiqi Fei.
Email: m17604337939@163.com
Author 3 - Xiaoqian Zhang.
Email: z15729382456@163.com
Author 4 - Yongnan Li.
Email: lyngyq2006@foxmail.com
Author 5 - Shilin Wei.
Email: weishilinv@qq.com
Author 6 - Jian Li.
Email: lij2023@lzu.edu.cn