INPLASY PROTOCOL

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None declared.

The impact of regional versus general anesthesia on postoperative neurocognitive outcomes in elderly patients undergoing hip fracture surgery: a systematic review and meta-analysis

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Review question / Objective: **To investigate the prevalence of postoperative delirium (POD) or postoperative cognitive dysfunction (POCD) between regional and general anesthesia in older patients undergoing hip fracture surgery.**
Condition being studied: **About 1.6 million people suffer hip fractures each year globally1. The risk of hip fracture-related postoperative mortality within 30 days approximately was 8.2% in December 2020, up 1.5% from December 2016. Across the world, the aging population is growing, and a significant number of elderly patients are undergoing various kinds of orthopedic surgeries. Age as an important independent high-risk factor is associated with perioperative neurocognitive disorders (PNDs), which not only increases the rate but also causes a serious economic and social burden. One previous study investigated that between 2012 and 2016, the absolute total number of hip fractures in people aged 55 and older increased by about 4 times due to an aging population12. In addition, Bhushan et al. reported that along with the increasing aging of society, the incidence rate of POCD is 5% to 56% in the elderly over 55 years old after surgery morbidity and mortality but also causes a serious economic and social burden.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 June 2022 and was last updated on 28 June 2022 (registration number INPLASY202260110).

INTRODUCTION

Review question / Objective: **To investigate the prevalence of postoperative delirium (POD) or postoperative cognitive dysfunction (POCD) between regional and general anesthesia in older patients undergoing hip fracture surgery.**

Rationale: **Perioperative neurocognitive disorders (PNDs) are regarded as the most common postoperative complication in**

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older surgical patients, which includes postoperative delirium (POD) and postoperative cognitive dysfunction (POCD). POD or POCD usually occurs in elderly patients, and the incidence of POD or POCD increases significantly in patients over 65 years of age. Previous data also reported that 70% of elderly patients, 30% experienced a reduction in functionality after a hip fracture due to the decline of compensatory function of the central nervous system, and 20% suffered serious complications during their acute hospital stay, which is a huge burden placed on the health service. The incidence of POD or POCD in elderly patients undergoing hip fractures who underwent regional anesthesia and general anesthesia are remaining controversial.

Condition being studied: About 1.6 million people suffer hip fractures each year globally1. The risk of hip fracture-related postoperative mortality within 30 days approximately was 8.2% in December 2020, up 1.5% from December 2016. Across the world, the aging population is growing, and a significant number of elderly patients are undergoing various kinds of orthopedic surgeries. Age as an important independent high-risk factor is associated with perioperative neurocognitive disorders (PNDs), which not only increases the rate but also causes a serious economic and social burden. One previous study investigated that between 2012 and 2016, the absolute total number of hip fractures in people aged 55 and older increased by about 4 times due to an aging population12. In addition, Bhushan et al. reported that along with the increasing aging of society, the incidence rate of POCD is 5% to 56% in the elderly over 55 years old after surgery morbidity and mortality but also causes a serious economic and social burden.

METHODS

Search strategy: (((((TS=(Anesthesia, Conduction)) OR TS=(Conduction Anesthesia)) OR TS=(regional anesthesia)) OR TS=(spinal anesthesia)) OR TS=(spinal anesthesias)) AND (TS=(General anesthesia)) OR TS=(General anesthesias) AND (TS=(Elderly patients)) OR TS=(Elderly) AND (((((((((TS=(Arthroplasties, Replacement, Hip)) OR TS=(Arthroplasty, Hip Replacement)) OR TS=(Hip Prosthesis Implantation)) OR TS=(Hip Prosthesis Implantations)) OR TS=(Hip Replacement Arthroplasty)) OR TS=(Replacement Arthroplasty, Hip)) OR TS=(Arthroplasties, Hip Replacement)) OR TS=(Hip Replacement Arthroplasties)) OR TS=(Total Hip Replacement)) OR TS=(Total Hip Replacements) AND (((((((TS=(Postoperative Cognitive Complications")) OR TS=(Cognitive Complication, Postoperative)) OR TS=(Postoperative Cognitive Complication)) OR TS=(Postoperative Cognitive Dysfunction)) OR TS=(Postoperative Cognitive Dysfunctions)) OR TS=(Postoperative Decline)) OR TS=(Cognitive Dysfunctions)) OR TS=(Postoperative delirium))))))).

Participant or population: Elderly patients over 65 years old with ASA grades I-IV undergoing hip fracture surgery.

Intervention: Elderly patients receiving regional anesthesia (spinal anesthesia (SA), or combined spinal and epidural anesthesia (CSEA), or epidural anesthesia (EA)Elderly patients receiving regional anesthesia (spinal anesthesia, or combined spinal and epidural anesthesia, CSEA, or epidural anesthesia, EA).

Comparator: Elderly patients undergoing hip fracture surgery with general anesthesia (GA).

Study designs to be included: We only included randomized controlled trials in elderly patients undergoing hip fracture surgeryWe only inlcuded randomized controlled trials in elderly patients undergoing hip fracture surgery.

Eligibility criteria: The inclusion criteria were based on the PICOS framework: P (patients), elderly patients over 65 years old with ASA grades I-IV undergoing hip fracture surgery; I (interventions), elderly patients receiving regional anesthesia (spinal anesthesia (SA), or combined spinal

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and epidural anesthesia (CSEA), or epidural anesthesia (EA); C (control), elderly patients undergoing hip fracture surgery with general anesthesia (GA); O (outcomes), the primary outcome was the incidence of POD or POCD at 24 h, 3 days, and 7 days postoperatively; the secondary outcomes included 30 days mortality, intraoperative hypotension, blood transfusion, postoperative pulmonary complications, acute myocardial infarction, renal failure, and the length of hospital stay. We only included randomized controlled trials in elderly patients undergoing hip fracture surgery.

Information sources: We systematically searched electronic databases including PubMed, The Cochrane Library, Embase, and Web of Science citation index from inception to February 2022 for RCTs meeting the listed inclusion criteria. The following search terms were selected: "elderly patients", "total hip arthroplasty", "total hip replacement", "regional anesthesia", "nerve block", "epidural analgesia" and "postoperative analgesia". We also screened references to the identified articles. There were no language restrictions on searching for articles. We also searched the grey literature by supplementary hand searching. The PRISMA guidelines were used to conduct this systematic review and meta-analysis.

Main outcome(s): The primary outcome was the incidence of POD or POCD at 24 h, 3 days, and 7 days postoperatively.

Additional outcome(s): The secondary outcomes included 30 days of mortality, intraoperative hypotension, blood transfusion, postoperative pulmonary complications, acute myocardial infarction, renal failure, and the length of hospital stay.

Data management: Two investigators (XX and YY) independently extracted the data and transferred it into Microsoft Excel 2019 without interposing each other until both of their tasks were completed.

Quality assessment / Risk of bias analysis: The quality of individual studies was assessed by XX and YY independently according to the Cochrane Risk of Bias Tool for Randomized Controlled Trials (RCTs). The quality was evaluated using the following potential sources of bias: sequence generation, allocation concealment, blinding of participants or outcome assessors, incomplete data, and selective reporting. The methodology for each study was graded as "high," "low," or "unclear," which reflects the risk of bias.

Strategy of data synthesis: Heterogeneity among the studies was estimated by I2 statistics. A random-effect model was performed if I2>50%, suggesting the existence of high heterogeneity, whereas if I2≤50%, a fixed-effect model was performed.

Subgroup analysis: For the subgroup analysis, we did it both in primary and secondary outcomes in the current review.

Sensitivity analysis: With sensitivity analyses for GA vs. spinal anesthesia (SA), drawing on data only from randomized studies.

Language: English.

Country(ies) involved: China.

Keywords: Regional anesthesia; General anesthesia; Perioperative neurocognitive disorders.

Contributions of each author:

Author 1 - Sandeep Bhushan - Concept design. Data collection; statistic analysis.
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Author 3 - Zongwei Xiao - Concept design. Data collection.
Author 4 - Yuanqiong Duan - Concept design. Data collection.

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