INTRODUCTION

The choice of anesthetic technique can significantly influence postoperative outcomes, including pain control, opioid consumption, and length of stay (LOS) after total hip arthroplasty. However, the optimal anesthesia modality for minimizing these outcomes remains unclear. Given inconsistent results across prior studies, this meta-analysis evaluates whether regional anesthesia (RA) offers advantages over general anesthesia (GA) in adult patients undergoing elective primary hip replacement.

In this meta-analysis of 10 RCTs with 894 patients, regional anesthesia was associated with significantly lower pain scores, reduced opioid requirements, and shorter hospital stays compared with general anesthesia.

Distinguishing data on the abstract:

- Regional anesthesia was associated with significantly lower pain scores (mean difference –1.42; 95% CI: -1.67 to –1.17), reduced opioid consumption (-6.26 MME; 95% CI: -7.17 to –5.36), and shorter LOS (-1.07 days; 95% CI: -1.24 to –0.90).

HEALTHCARE IMPACT

The findings of this meta-analysis have meaningful healthcare implications. Regional anesthesia (RA) not only improves clinical outcomes but also enhances healthcare efficiency. The significant reduction in postoperative pain and opioid use supports safer recovery pathways and may help reduce opioid-related adverse events and dependence risk. Additionally, the one-day decrease in hospital length of stay (LOS) observed with RA can translate into lower hospitalization costs, improved bed availability, and greater operating room throughput. As total hip arthroplasty volumes continue to rise, incorporating RA into enhanced

METHODS

Guidelines & Registration

- Conducted according to **PRISMA 2020** guidelines
- Prospectively registered in **PROSPERO**: CRD420251061095

Literature Search

- Databases: **PubMed, Embase, and Cochrane CENTRAL**
- Publication period: **May 2015-May 2025**
- Predefined search terms were used
- Reference lists of included studies were manually screened

Risk of Bias & Evidence Certainty

- Risk of bias assessed independently by two reviewers using **Cochrane RoB 2.0**
- Certainty of evidence assessed using **GRADE**

Statistical Analysis

- Random-effects meta-analysis using the **DerSimonian-Laird** method
- Continuous outcomes reported as **mean differences (MD) with 95% CI**
- Heterogeneity assessed using **I^2 statistic**
- Analyses and forest plots generated using **Python 3.10**

Eligibility Criteria

- Randomized controlled trials involving **adults undergoing elective total hip arthroplasty (THA)**
- Compared **regional anesthesia** (spinal or epidural) with **general anesthesia**
- Reported at least one:
  - Postoperative pain scores
  - Opioid consumption
  - Hospital length of stay

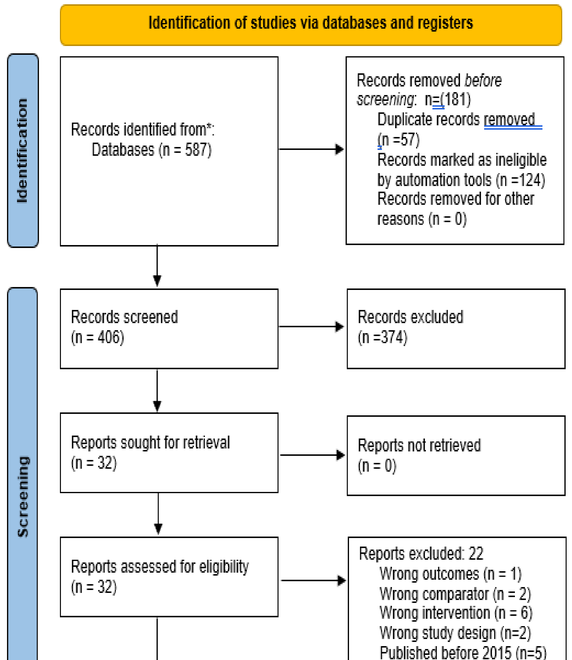
Exclusion Criteria

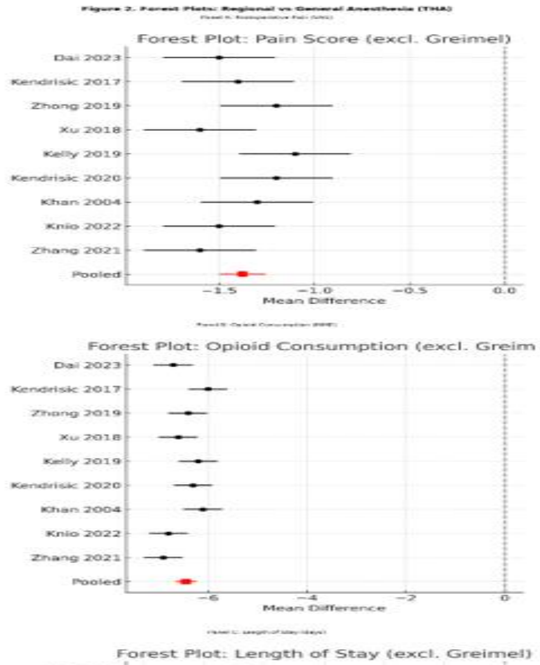
- Hip fracture surgery
- Revision arthroplasty
- Emergency procedures
- Unclear anesthetic regimen
- Nonextractable data

Study Selection & Data Extraction

- Two independent reviewers performed:
  - Title/abstract screening
  - Full-text assessment
- Disagreements resolved by consensus

RESULTS





DISCUSSION

This meta-analysis of 10 randomized controlled trials found that regional anesthesia (RA) provides clinically meaningful advantages over general anesthesia (GA) in elective total hip arthroplasty. RA significantly reduced postoperative pain, lowered opioid use, and shortened hospital length of stay. Patients receiving RA reported a 1.4-point decrease in pain scores and required 6.3 fewer milligrams of morphine equivalents, supporting its role in opioid-sparing perioperative care. RA was also associated with a 1-day reduction in hospital stay, suggesting improved recovery efficiency and potential cost savings.

Although differences in anesthetic techniques and outcome measurement introduced moderate heterogeneity, overall effect trends were consistent across studies. Pain outcomes varied due to timing differences, while length of stay showed no heterogeneity ($I^2 = 0\%$), reinforcing the reliability of that finding. Most studies had low to moderate risk of bias, though blinding was rarely feasible. Limitations include variability in outcome reporting and lack of long-term functional data.

Conclusion: RA improves early postoperative outcomes in THA and should be considered when not contraindicated (e.g., anticoagulation, infection, hemodynamic instability, or severe aortic stenosis). These findings support incorporating RA into enhanced recovery pathways for hip arthroplasty.

REFERENCES

1. American Academy of Orthopaedic Surgeons. Management of Osteoarthritis of the Hip: Evidence-Based Clinical Practice Guideline. Rosemont, IL: American Academy of Orthopaedic Surgeons; 2023.