

REVIEW ARTICLE

Analgesia and anesthesia for closed reduction of dislocated total hip arthroplasty: Protocol for a scoping review

Rasmus Linnebjerg Knudsen^{1,2}  | Rikke Helene Frølund Bjulf¹  |
Aurelien-Xuan Rosendal Bahuet¹  | Mathias Therkel Steensbæk¹  |
Anne-Sofie Linde Jellestad¹  | Kai Henrik Wiborg Lange^{1,2}  |
Lars Hyldborg Lundstrøm^{1,2}  | Anders Kehlet Nørskov^{1,2} 

¹Department of Anesthesiology, Copenhagen University Hospital—North Zealand, Hillerød, Denmark

²Department of Clinical Medicine, University of Copenhagen, Copenhagen, Denmark

Correspondence

Rasmus Linnebjerg Knudsen, Department of Anesthesiology, Copenhagen University Hospital—North Zealand, Hillerød, Dyrehavevej 29, Entrance 52B, 4th Floor, 3400 Hillerød, Denmark.
Email: rasmus.linnebjerg.knudsen.03@regionh.dk

Abstract

Background: Total hip arthroplasty is a common surgical procedure, but dislocation remains a significant complication often requiring closed reduction. Current anesthetic practices for closed reduction of total hip arthroplasty vary widely, and evidence on the efficacy, safety, and cost-effectiveness of different anesthetic and analgetic regimens is limited.

Methods: This scoping review follows the Joanna Briggs Institute (JBI) guidelines and PRISMA-ScR framework. A systematic search will be conducted in major databases to identify studies on anesthetic approaches for closed reduction of dislocated total hip arthroplasty. Eligible studies will include adult patients and focus on outcomes such as success rate, complications, patient satisfaction, and procedural efficiency. Data will be extracted and synthesized narratively and descriptively.

Results: The review will map the existing evidence on anesthetic and analgetic regimens, including their success rates, associated complications, and cost-effectiveness. It will also highlight gaps in the literature and variations in practice across different settings.

Conclusion: By summarizing current evidence and identifying research gaps, this scoping review aims to inform clinical practice and guide future studies, ultimately improving the safety, effectiveness, and efficiency of anesthetic strategies for closed reduction of dislocated total hip arthroplasties.

KEYWORDS

anesthetic and analgetic regimens, closed reduction, dislocation, scoping review protocol, total hip arthroplasty

1 | INTRODUCTION

Total hip arthroplasty (THA) is one of the most frequently performed surgical procedures,¹ successfully alleviating joint pain and improving mobility.^{2–4} The increasing demand for THA, driven by an aging population

and higher expectations for quality of life,^{5,6} is expected to result in more complications, including dislocation.^{2,7,8} Dislocation of THA occurs in 1%–10% of patients within 2 years and requires closed reduction.^{9–11}

Closed reduction can be a challenging procedure, requiring effective analgesia and anesthesia to minimize patient stress and ensure

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2025 The Author(s). *Acta Anaesthesiologica Scandinavica* published by John Wiley & Sons Ltd on behalf of Acta Anaesthesiologica Scandinavica Foundation.

success. General anesthesia is commonly recommended but is associated with risks such as adverse events,¹² high costs,¹³ and delays due to the need for operating theaters and trained personnel. Alternatively, performing closed reduction in the emergency department under safe and efficient sedation may reduce costs, shorten hospital stays, and improve patient satisfaction. Besides a potentially lower success rate of reduction,¹⁴ this approach may induce risks of hypoxia due to respiratory depression, aspiration of gastric content, and circulatory instability,¹⁵ particularly in non-specialized settings.

Anesthetic and sedation practices vary globally. Commonly used drugs include benzodiazepines, opioids, ketamine, and/or propofol,¹⁶ while in Denmark, general anesthesia is the standard approach.¹⁷ Despite its clinical relevance, patient satisfaction is less frequently studied when evaluating anesthetic and sedation protocols, though it may offer valuable insights into their effectiveness and acceptability.

1.1 | Rationale

The success rates, complications, and cost-effectiveness of different anesthetic and analgetic regimens for closed reduction of dislocated THA remain unclear. A comprehensive synthesis of existing evidence is needed to consolidate findings, identify gaps, and guide future research to improve safety, effectiveness, and patient-centered outcomes.

1.2 | Objectives

This scoping review aims to systematically describe and synthesize results from the literature regarding the analgetic and anesthetic approach, including location and organization, for closed reduction of dislocated THA at the hospital. Furthermore, it aims to map the existing evidence, identify gaps in the literature, and provide insights on where further research may be needed to establish effective, safe, and cost-efficient anesthetic strategies.

2 | METHODS

The protocol adheres to the JBI Manual for best practice guidance and reporting items for the development of scoping review protocols,¹⁸ and the subsequent review will adhere to the Preferred Reporting Items for Systematic review and Meta-Analyses (PRISMA) extension for scoping reviews (PRISMA-ScR).¹⁹

2.1 | Eligibility criteria

2.1.1 | Population and studies

- Studies on adult patients (defined in the individual studies) with dislocated THA, describing the anesthetic management used for the closed reduction.
- Peer-reviewed articles published in English.

2.1.2 | Concept

- Closed reduction of dislocated THA performed under any kind of sedation, analgesia, or anesthesia.

2.1.3 | Context

- Studies performed in any geographical location, investigating the closed reduction of dislocated THA in hospitals from the origin until the present.

2.2 | Information sources and search strategy

A search string adapted to the PubMed, EMBASE, Cochrane Central Register of Controlled Trials, and CINAHL databases was developed by a medical librarian experienced in database literature searches and further specified through team discussion.

The search strategy for PubMed can be found in Appendix A.

2.3 | Data management, selection process, and data collection process

All studies will be entered into Covidence — a systematic review software (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia). Duplicate studies will be removed, and Covidence will be used for screening and data extraction. Two independent authors will screen titles and abstracts of the studies. Two independent authors will likewise perform full-text screening. Any disagreements will be resolved through discussion between the screening authors. Data from the included studies will be extracted by two independent authors, with a consensus reached by a third author. A PRISMA 2020 flow diagram will be used to illustrate the screening process.²⁰

2.4 | Data items

Data for each study will be collected regarding trial characteristics (study design, year of publication, country, outcomes, etc.), anesthesia characteristics (type, agents, airway management, etc.), location of the procedure, and surgical/procedure-related outcomes (including success rate, complications, etc.).

The data extraction form that will be used is shown in Appendix B.

2.5 | Outcomes

1. The success rate of closed reduction performed under different sedation and anesthetic regimens.
2. The types and doses of analgesia and anesthesia used.
3. The locations where the procedure is performed (e.g., operating theater, emergency department).

4. The airway management (e.g., spontaneous respiration, face mask ventilation, supraglottic airway devices, tracheal intubation)
5. Any complications related to the analgesia or anesthesia.
6. Measurements of time and/or cost-effectiveness and resource utilization.
7. Patient satisfaction.
8. Satisfaction with the procedure is evaluated by the personnel performing the reduction.

2.6 | Data synthesis

Extracted data will be presented in tables and figures and supported by narrative descriptions to map the key findings in the existing literature. If necessary, descriptive statistics will be used to summarize quantitative data.

3 | DISCUSSION

The scoping review will synthesize existing knowledge regarding sedation and anesthesia for closed reduction of dislocated THA and provide an overview of the different characteristics of the procedures performed in clinical practice. The review will present pros and cons regarding complications, patient satisfaction, and cost-effectiveness. The findings obtained from the scoping review seek to find gaps in the literature to potentially guide further research with the possibility of improving current practice.

The scoping review aligns with the PRISMA-ScR guidelines¹⁹ and includes a pre-published protocol.

4 | CONCLUSION

This protocol outlines a scoping review to evaluate the sedation and anesthetic approach for closed reduction of dislocated THA. It aims to summarize current evidence, identify gaps in the literature, and provide insights into areas where further research is needed to provide evidence-based, effective, safe, and cost-efficient anesthetic regimens for this procedure.

AUTHOR CONTRIBUTIONS

All authors will meet the recommendations for authorship defined by The International Committee of Medical Journal Editors.

ACKNOWLEDGMENTS

The authors acknowledge Jette Meelby, a medical librarian who participated in the study. The authors declare no conflicts of interest.

FUNDING INFORMATION


No financial funding is received for this scoping review.

DATA AVAILABILITY STATEMENT

No data were generated or analyzed in this study protocol; thus, data sharing does not apply to this article.

ORCID

Rasmus Linnebjerg Knudsen  <https://orcid.org/0009-0003-8466-5009>

Rikke Helene Frølund Bjulf  <https://orcid.org/0009-0001-0551-7223>
Aurelien-Xuan Rosendal Bahuet  <https://orcid.org/0009-0000-7069-9767>

Mathias Therkel Steensbæk  <https://orcid.org/0009-0008-3225-2516>

Anne-Sofie Linde Jellestad  <https://orcid.org/0000-0002-4816-1554>

Kai Henrik Wiborg Lange  <https://orcid.org/0000-0003-4510-5888>

Lars Hyldborg Lundstrøm  <https://orcid.org/0000-0002-2179-1433>

Anders Kehlet Nørskov  <https://orcid.org/0000-0002-6908-7832>

REFERENCES

1. Kunutsor SK, Barrett MC, Beswick AD, et al. Risk factors for dislocation after primary total hip replacement: a systematic review and meta-analysis of 125 studies involving approximately five million hip replacements. *Lancet Rheumatol*. 2019;1:e111-e121.
2. Stibolt RD, Patel HA, Huntley SR, Lehtonen EJ, Shah AB, Naranje SM. Total hip arthroplasty for posttraumatic osteoarthritis following acetabular fracture: a systematic review of characteristics, outcomes, and complications. *Chin J Traumatol*. 2018;21:176-181.
3. Price AJ, Kang S, Cook JA, et al. The use of patient-reported outcome measures to guide referral for hip and knee arthroplasty: part 1: the development of an evidence-based model linking preoperative score to the probability of gaining benefit from surgery. *Bone Jt J*. 2020;102-B:941-949.
4. Dainty JR, Smith TO, Clark EM, et al. Trajectories of pain and function in the first five years after total hip and knee arthroplasty: an analysis of patient reported outcome data from the national Joint registry. *Bone Jt J*. 2021;103-B:1111-1118.
5. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *J Bone Jt Surg*. 2007;89:780-785.
6. Rasmussen MB, El-Galaly A, Daugberg L, Nielsen PT, Jakobsen T. Projection of primary and revision hip arthroplasty surgery in Denmark from 2020 to 2050. *Acta Orthop*. 2022;93:849-853.
7. Phillips CB, Barrett J, Losina E, et al. Incidence rates of dislocation, pulmonary embolism, and deep infection during the first six months after elective total hip replacement. *J Bone Jt Surg*. 2003;85:20-26. doi:10.2106/00004623-200301000-00004
8. Petis S, Howard JL, Lanting BL, Vasarhelyi EM. Surgical approach in primary total hip arthroplasty: Anatomy, technique and clinical outcomes. *Can J Surg*. 2015;58:128-139.
9. Referenceprogram Dansk Ortopædisk Selskab. 2006.
10. Gillinov SM, Joo PY, Zhu JR, Moran J, Rubin LE, Grauer JN. Incidence, timing, and predictors of hip dislocation after primary total hip arthroplasty for osteoarthritis. *J Am Acad Orthop Surg*. 2022;30:1047-1053.
11. Dargel J, Oppermann J, Brüggemann GP, Eysel P. Dislocation following total hip replacement. *Dtsch Arztebl Int*. 2014;111:884-891.
12. Harris M, Chung F. Complications of general anesthesia. *Clin Plast Surg*. 2013;40:503-513.
13. Dilbone ES, Moore-Lotridge SN, Gabbard M, et al. Location of initial closed reduction attempt significantly increases cost and length of stay in total hip arthroplasty. *Arthroplast Today*. 2022;15:102-107.

14. Lawrey E, Jones P, Mitchell R. Prosthetic hip dislocations: is relocation in the emergency department by emergency medicine staff better? *Emerg Med Australas*. 2012;24:166-174.
15. Jacques KG, Dewar A, Gray A, Kerslake D, Leal A, Lees F. Procedural sedation and analgesia in a large UK Emergency Department: factors associated with complications. *Emerg Med J*. 2011; 28:1036-1040.
16. Saiz AM, Lum ZC, Pereira GC. Etiology, evaluation, and management of dislocation after primary total hip arthroplasty. *JBJS Rev*. 2019;7(7): e7. doi:[10.2106/JBJS.RVW.18.00165](https://doi.org/10.2106/JBJS.RVW.18.00165)
17. Holler CP, Lohse N, Foss NB. Anaesthesia practice in Denmark for relocation of the dislocated hip after total hip arthroplasty. *Dan Med J*. 2018;65:3-7.
18. Peters MDJ, Godfrey C, Mclnerney P, et al. Best practice guidance and reporting items for the development of scoping review protocols. *JBI Evid Synth*. 2022;20:953-968.
19. Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169:467-473.
20. Page MJ, Mckenzie J, Bossuyt P, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *PLoS Med*. 2021;18:1-15.

How to cite this article: Knudsen RL, Bjulf RHF, Bahuet A-XR, et al. Analgesia and anesthesia for closed reduction of dislocated total hip arthroplasty: Protocol for a scoping review. *Acta Anaesthesiol Scand*. 2025;69(3):e70006. doi:[10.1111/aas.70006](https://doi.org/10.1111/aas.70006)

APPENDIX A

Search String

Domain 1: Primary operations (THA)	Domain 2: Anesthesia, analgesia, and sedation	Domain 3: Closed reduction	Domain 4: Language
((“arthroplasty, replacement, hip”[MeSH Terms] OR (“arthroplasty”[All Fields] AND “replacement”[All Fields] AND “hip”[All Fields]) OR “hip replacement arthroplasty”[All Fields] OR (“total”[All Fields] AND “hip”[All Fields] AND “arthroplasty”[All Fields]) OR “total hip arthroplasty”[All Fields] OR (“hemiarthroplasty”[MeSH Terms] OR “hemiarthroplasties”[All Fields] OR (“hip”[MeSH Terms] OR “hip”[All Fields]) AND (“arthroplasty”[MeSH Terms] OR “arthroplasties”[All Fields])) OR “Prosthetic hip”[All Fields] OR “hip dislocation”[All Fields])	((“sedate”[All Fields] OR “sedated”[All Fields] OR “sedating”[All Fields] OR “sedation”[All Fields] OR “sedations”[All Fields] OR “thiopental”[MeSH Terms] OR “diazepam”[MeSH Terms] OR (“remimazolam”[Supplementary Concept] OR “remimazolam”[All Fields]) OR “benzodiazepines”[MeSH Terms] OR “barbiturates”[MeSH Terms] OR “sevoflurane”[MeSH Terms] OR “nitrous oxide”[MeSH Terms] OR “Propofol”[MeSH Terms] OR “Etomidate”[MeSH Terms] OR “Ketamine”[MeSH Terms] OR “Midazolam”[MeSH Terms] OR “Hypnotics and Sedatives”[MeSH Terms] OR “Anesthesia”[All Fields] OR “Anesthesia”[MeSH Terms] OR “anaesthesia”[All Fields])	((“reduct*”[All Fields] OR “relocat*”[All Fields] OR (“close”[All Fields] OR “closed”[All Fields] OR “closely”[All Fields] OR “closeness”[All Fields] OR “closes”[All Fields] OR “closing”[All Fields] OR “closings”[All Fields]) AND (“reduction”[All Fields] OR “reductions”[All Fields])) OR (“reposit”[All Fields] OR “reposited”[All Fields] OR “reposition”[All Fields] OR “repositioned”[All Fields] OR “repositioning”[All Fields] OR “repositionings”[All Fields] OR “repositions”[All Fields]))	(english [Filter])

APPENDIX B

- Year of publication.
- Publishing journal.
- First author.
- Corresponding author contact details.
- Country(ies) in which the study was conducted.
- Type of study.
- Number of patients included.
- Primary outcome.
- Type of analgesia and anesthesia for the procedure.
- Dose of analgesia and anesthesia for the procedure.
- Airway management (spontaneous respiration, face mask ventilation, laryngeal mask, intubation).
- Success rate of closed reduction provided (Y/N).
- Success rate of closed reduction (if provided).
- Provision of complications related to the sedative or anesthetic regime (Y/N).
- Complications related to the analgesia and anesthesia described (Y/N).
- Complications related to the analgesia and anesthesia (if described).
- Patient satisfaction examined (Y/N).
- Patient satisfaction (if reported).
- Cost-effectiveness of the procedure discussed.
- Time from hospital admission to closed reduction.
- Provider satisfaction with anesthetic protocol.
- Procedure location (emergency department, operation theater).
- Length of hospital stay.