Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Regional anesthesia strategy does not influence postoperative opioid consumption after anterior total hip arthroplasty: a large retrospective cohort study

Juliette Aristée-Gasselin
Ramsay Health
Mathilde Allier
Ramsay Health
Olivia Koussawo
Groupe Hospitalier Diaconesses Croix Saint-Simon
Franck Verdonk
Sorbonne University
Philippe Nguyen
philippe.nguyen.pro@gmail.com
Ramsay Health

Research Article

Keywords: Arthroplasty, Replacement, Hip, Anesthesia, General, Nerve Block, Analgesia, Postoperative, Opioids

Posted Date: March 28th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9209911/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Regional anesthesia is widely used to improve analgesia after total hip arthroplasty (THA). However, in contemporary anterior THA performed within standardized multimodal analgesic pathways, the impact of specific regional anesthesia strategies on postoperative opioid consumption remains uncertain.

Methods

We conducted a retrospective cohort study in a single high-volume orthopedic center including consecutive patients undergoing elective anterior primary THA between November 1, 2024, and April 30, 2025. Of 464 patients screened, 354 receiving general anesthesia were included in the primary analysis. Patients were allocated to four anesthetic strategies: general anesthesia (GA) alone (n = 18), GA combined with femoral nerve block (FNB; n = 62), suprainguinal fascia iliaca block (SIFIB; n = 91), or lumbar plexus block (LPB; n = 183). All blocks were ultrasound-guided. The primary outcome was cumulative oral morphine equivalents (OME) during the first 24 postoperative hours. Analysis of covariance adjusted for age, sex, body mass index, ASA physical status, intraoperative sufentanil dose, and duration of surgery. Secondary outcomes included post-anesthesia care unit (PACU) opioid consumption, PACU length of stay, and postoperative pain scores.

Results

After adjustment, cumulative opioid consumption during the first 24 hours did not differ significantly between anesthetic strategies (overall adjusted $p = 0.439$). Adjusted marginal means showed overlapping confidence intervals across groups. In contrast, PACU opioid consumption differed significantly between strategies ($p < 0.001$), as did PACU length of stay ($p = 0.002$), with higher opioid requirements and longer stays observed in patients receiving femoral nerve block. Postoperative pain scores in PACU and during the first 24 hours were similar across groups.

Conclusions

In patients undergoing anterior THA under general anesthesia within a contemporary multimodal analgesic framework, regional anesthesia strategy was not associated with differences in cumulative opioid consumption during the first 24 hours. However, anesthetic strategy influenced early postoperative recovery, highlighting the importance of considering PACU outcomes when selecting regional anesthesia techniques.

KEY POINTS

- In anterior total hip arthroplasty under general anesthesia, regional anesthesia strategy did not influence 24-hour postoperative opioid consumption.

- No regional anesthesia technique demonstrated a clinically meaningful opioid-sparing effect at 24 hours.

- Early postoperative recovery differed between strategies, with higher opioid use and longer PACU stay after femoral nerve block.

- Postoperative pain scores during hospitalization were similar regardless of regional anesthesia strategy.

INTRODUCTION

Total hip arthroplasty (THA) is one of the most frequently performed orthopedic procedures worldwide, with a steadily increasing volume driven by population aging and expanding indications [1, 2]. Effective postoperative pain management is a cornerstone of enhanced recovery pathways, as inadequate analgesia is associated with delayed mobilization, prolonged hospitalization, increased opioid consumption, and reduced patient satisfaction [3].

Regional anesthesia techniques have long been used to optimize postoperative analgesia after THA [4–6]. Traditional approaches such as femoral nerve block [7–8] and lumbar plexus block [9–11] have been shown to reduce early postoperative pain and opioid requirements compared with general anesthesia (GA) alone. More recently, local infiltration analgesia has emerged as a simpler alternative integrated into multimodal analgesic protocols, with variable reported benefits on pain control and early functional recovery.

In parallel, newer regional anesthesia techniques have been developed with the aim of providing effective analgesia while preserving motor function. Among these, the suprainguinal fascia iliaca block has gained increasing attention [12–15]. By targeting the femoral, lateral femoral cutaneous, and obturator nerves more proximally, the suprainguinal approach has been proposed as a more consistent and potentially motor-sparing alternative to conventional femoral nerve block. However, despite its growing adoption, clinical evidence supporting its superiority over other established strategies remains limited and heterogeneous.

Importantly, most available studies evaluating regional anesthesia techniques for THA were conducted in the context of posterior or lateral surgical approaches, higher baseline postoperative pain, and less standardized multimodal analgesic regimens [10]. In contrast, contemporary anterior THA could be associated with reduced tissue trauma, earlier mobilization, and lower postoperative pain intensity [16, 17]. In this modern surgical and anesthetic context, the incremental benefit of different regional anesthesia strategies including newer techniques such as the suprainguinal fascia iliaca block on clinically meaningful outcomes remains uncertain.

While postoperative pain scores are frequently reported, cumulative opioid consumption may provide a more integrative measure of analgesic effectiveness and perioperative opioid exposure. Whether the

choice of regional anesthesia strategy influences postoperative opioid requirements after anterior THA performed under standardized multimodal analgesia has not been clearly established.

The primary objective of this study was therefore to evaluate the association between regional anesthesia strategy, including the suprainguinal fascia iliaca block, and cumulative opioid consumption within the first 24 postoperative hours in a large cohort of patients undergoing elective anterior total hip arthroplasty. Secondary objectives included the assessment of early recovery outcomes, such as opioid requirements and length of stay in the post-anesthesia care unit.

METHODS

Study design and ethical approval

This retrospective cohort study was conducted in a single high-volume orthopedic center specializing in elective total joint arthroplasty in Paris, France between November 1, 2024 and April 30, 2025. The study was conducted in accordance with the Declaration of Helsinki and followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [18]. Ethical approval for this study (IRB N° 00010254 – 2025–079) was provided by the Ethical Committee of the French Society of Anesthesia and Critical Care, Paris, France (Chairperson Dr V. BILLARD) on June 9, 2025. In accordance with national regulations for retrospective non-interventional studies, the requirement for written informed consent was waived. All data were anonymized prior to analysis.

Patient selection

All consecutive adult patients undergoing elective primary THA for primary osteoarthritis through an anterior surgical approach were screened for inclusion. Exclusion criteria were revision surgery, surgery for fracture or inflammatory disease, bilateral procedures, and incomplete perioperative data. Patients receiving spinal anesthesia were excluded from the primary analysis in order to ensure homogeneity of anesthetic exposure, given the well-established impact of spinal anesthesia on early postoperative analgesia and opioid requirements.

Anesthetic management and regional anesthesia strategies

All patients included in the primary analysis received standardized GA according to institutional practice. Induction and maintenance techniques (volatile or intravenous agents) were performed at the discretion of the attending anesthesiologist. Patients were managed with one of four anesthetic strategies, based on routine clinical practice and anesthesiologist preference: 1/ General anesthesia alone (GA alone); 2/ General anesthesia combined with femoral nerve block (FNB); 3/ General anesthesia combined with lumbar plexus block (LPB); 4/ General anesthesia combined with suprainguinal fascia iliaca block (SIFIB). Regional anesthesia techniques were performed preoperatively under ultrasound guidance by

experienced anesthesiologists. FNB was performed using 20 mL of ropivacaine 0.2%. BPL was performed using 20 mL of ropivacaine 0.2%. SIFIB was performed using 40 mL of ropivacaine 0.1%. No continuous peripheral nerve block catheters were used.

Multimodal analgesia protocol

Multimodal analgesia protocol
All patients received a standardized multimodal analgesic regimen, including acetaminophen and non-steroidal anti-inflammatory drugs unless contraindicated. Intraoperative opioid administration followed institutional protocols. Postoperative analgesia was managed according to standardized protocols in the post-anesthesia care unit (PACU) and surgical ward. Opioids were administered as required for pain control. All opioid doses were converted to oral morphine equivalents for analysis.

Outcomes

The primary outcome was cumulative postoperative opioid consumption, expressed as oral morphine equivalents (OME), during the first 24 postoperative hours. Secondary outcomes included opioid consumption in the PACU, length of stay in the PACU, postoperative pain scores assessed using a numerical rating scale, opioid consumption during the postoperative hospital stay.

Data collection

Data were extracted from electronic medical records and anesthesia charts. Collected variables included patient demographics, body mass index, American Society of Anesthesiologists (ASA) physical status, anesthetic and surgical characteristics, intraoperative opioid administration, postoperative opioid consumption, pain scores, and PACU duration.

Statistical analysis

Continuous variables are reported as mean ± standard deviation. Categorical variables are reported as counts and percentages. Baseline characteristics were compared across anesthetic strategy groups using analysis of variance for continuous variables and chi-square tests for categorical variables. The association between anesthetic strategy and postoperative opioid consumption was assessed using analysis of covariance (ANCOVA) adjusted a priori for clinically relevant covariates, including age, sex, body mass index, ASA physical status, and intraoperative opioid consumption. Estimated marginal means with 95% confidence intervals were calculated for the primary outcome. All statistical tests were two-sided, and a p value < 0.05 was considered statistically significant. Statistical analyses were performed using Jamovi software (Version 2.6).

RESULTS

Study population

Between November 1, 2024, and April 30, 2025, 464 patients underwent total hip arthroplasty at Clinique Jouvenet, Paris, France. Eleven patients were excluded because of non-degenerative surgical indications, including revision total hip arthroplasty (n = 3), hip fracture (n = 4) and hip dysplasia (n = 4). Eight additional patients who received a pericapsular nerve group (PENG) block were excluded due to insufficient group size for meaningful comparison. Ninety-one patients receiving spinal anesthesia were excluded to ensure homogeneity of anesthetic exposure. Ultimately, 354 patients receiving general anesthesia were included in the primary analysis. Patient selection and exclusions are summarized in Figure 1. Patients were allocated to one of four anesthetic strategies: GA alone (n = 18), GA combined with femoral nerve block (FNB, n = 62), suprainguinal fascia iliaca block (SIFIB, n = 91), or lumbar plexus block (LPB, n = 183).

Baseline characteristics

Baseline demographic and clinical characteristics are presented in Table 1. Age, sex distribution, and body mass index were comparable across anesthetic strategy groups. However, significant differences were observed in ASA physical status distribution. Intraoperative characteristics also differed between groups, with significant variability in duration of surgery, intraoperative sufentanil dose, and dexamethasone administration.

TABLE 1 - Baseline characteristics of patients undergoing anterior total hip arthroplasty under general anesthesia

	GA alone N=18	FNB N=62	SIFIB N=91	LPB N=183	p
Patient characteristics					
Age, years	74 ± 10	71 ± 9	72 ± 10	70 ± 9	0.056
Female sex, n (%)	12 (67)	42 (68)	49 (54)	105	0.311
Body mass index, kg/m²	27 ± 5	26 ± 4	25 ± 4	25 ± 4	0.242
ASA physical status, n (%)					<0.001
- I	2 (11)	4 (6)	19 (21)	58 (31)	
- II	14 (78)	53 (85)	66 (72)	120 (66)	
- III	2 (11)	5 (8)	6 (7)	5 (3)	
Comorbidities					
Hypertension, n (%)	12 (67)	26 (42)	31 (34)	56 (31)	0.013
Diabetes mellitus, n (%)	2 (11)	2 (3)	2 (2)	12 (7)	0.241
Cardiovascular disease, n (%)	4 (22)	13 (21)	22 (24)	23 (13)	0.067
Chronic respiratory disease, n (%)	3 (17)	3 (5)	10 (11)	4 (2)	0.003
Chronic kidney disease, n (%)	0	7 (11)	6 (7)	5 (3)	0.052
Chronic medications					
Chronic opioid use (WHO step II), n (%)	1 (6)	2 (3)	3 (3)	6 (3)	0.798
Antidepressant use, n (%)	1 (6)	4 (6)	7 (8)	13 (7)	1.000
Anxiolytic use, n (%)	2 (11)	3 (5)	8 (9)	13 (7)	0.656
Intraoperative characteristics					
Duration of surgery, min	66 ± 22	60 ± 20	65 ± 17	69 ± 19	0.024
Intraoperative sufentanil dose (mg)	15 ± 5	18 ± 5	13 ± 6	13 ± 3	<0.001
Dexamethasone administration, n (%)	14 (78)	35 (56)	81 (89)	109 (60)	<0.001

Baseline demographic, clinical, and intraoperative characteristics of patients included in the primary analysis, according to anesthetic strategy. Data are presented as mean ± standard deviation or number

(percentage), as appropriate. P values correspond to unadjusted comparisons between groups. ASA: American Society of Anesthesiologists physical status; WHO: World Health Organization.

Primary outcome: postoperative opioid consumption at 24 hours

Unadjusted postoperative opioid consumption during the first 24 hours varied numerically across anesthetic strategies. However, after adjustment for age, sex, body mass index, ASA physical status, intraoperative sufentanil dose, and duration of surgery, no significant association was observed between anesthetic strategy and cumulative oral morphine equivalent consumption at 24 hours. Adjusted estimates derived from the ANCOVA model demonstrated similar oral morphine equivalent consumption across all groups, with overlapping 95% confidence intervals (overall adjusted p = 0.439). Adjusted marginal means and confidence intervals are reported in Table 2 and graphically displayed in Figure 2.

TABLE 2 - Postoperative opioid consumption during the first 24 hours (primary outcome)

Anesthetic strategy	N	OME 0-24 h, mg (mean ± SD)	Adjusted OME 0-24 h, mg (EMMean, 95% CI)
GA Alone	18	17±14	19 (6-32)
FNB	62	19±19	18 (8-27)
SIFIB	91	24±16	24 (18-30)
LPB	183	28±20	27 (20-34)
Overall adjusted p value			**0.439**

Unadjusted and adjusted postoperative opioid consumption during the first 24 postoperative hours, expressed as oral morphine equivalents (OME), according to anesthetic strategy. Adjusted values represent estimated marginal means (EMMeans) with 95% confidence intervals derived from analysis of covariance. Adjusted analyses were performed in patients receiving general anesthesia only and included age, sex, body mass index, ASA physical status, intraoperative sufentanil dose, and duration of surgery as covariates. The adjusted p value corresponds to the overall effect of anesthetic strategy in the multivariable model. EMMeans : estimated marginal means; OME: oral morphine equivalents; CI: confidence interval.

Secondary outcomes: early postoperative recovery

Early postoperative recovery is depicted in Table 3. Opioid consumption in the post-anesthesia care unit was significantly higher in some groups, particularly in patients receiving femoral nerve block, compared with other strategies ($p < 0.001$). Similarly, post-anesthesia care unit length of stay differed significantly between groups ($p = 0.002$). Maximum pain scores in the post-anesthesia care unit and during the first 24 postoperative hours did not differ significantly between anesthetic strategies. Postoperative pain trajectories during hospitalization were comparable across all groups.

TABLE 3 - Early postoperative recovery outcomes

Anesthetic strategy	N	PACU IV opioid consumption, mg (mean ± SD)	PACU length of stay, min (mean ± SD)	Maximum NRS in PACU (mean ± SD)	Maximum NRS during first 24 h (mean ± SD)
GA Alone	18	7±6	114±50	38±35	48±27
FNB	62	4±5	122±45	28±29	33±27
SIFIB	91	2±4	97±42	20±28	32±28
LPB	183	2±4	101±43	21±28	30±25
Overall p value		**<0.001**	**0.002**	**0.082**	**0.083**

Early postoperative recovery outcomes according to anesthetic strategy, including opioid consumption and length of stay in the post-anesthesia care unit (PACU), as well as postoperative pain scores. Data are presented as mean ± standard deviation. P values correspond to unadjusted global comparisons between groups.

PACU: post-anesthesia care unit; IV: intravenous; NRS: numerical rating scale; OME: oral morphine equivalents.

DISCUSSION

In this large retrospective cohort of patients undergoing anterior total hip arthroplasty under general anesthesia, we found that the choice of regional anesthesia strategy was not independently associated with cumulative postoperative opioid consumption during the first 24 hours. After adjustment for relevant confounders, postoperative opioid requirements were comparable across anesthetic strategies, including femoral nerve block, suprainguinal fascia iliaca block, lumbar plexus block, and general anesthesia alone. In contrast, anesthetic strategy significantly influenced early postoperative recovery, with differences observed in opioid requirements and length of stay in the post-anesthesia care unit, while postoperative pain intensity during hospitalization remained similar between groups.

These findings suggest that, in the context of modern anterior total hip arthroplasty performed within a standardized multimodal analgesic framework, the incremental analgesic benefit of complex regional anesthesia techniques on cumulative opioid consumption at 24 hours may be limited. Compared with historical cohorts, contemporary anterior approaches are associated with reduced soft tissue trauma, earlier mobilization, and lower baseline postoperative pain, which may attenuate the relative impact of regional anesthesia techniques on overall postoperative opioid requirements [17, 19].

Cumulative opioid consumption over 24 hours represents an integrative and clinically meaningful endpoint, reflecting the combined effects of intraoperative management, regional anesthesia, and postoperative analgesic strategies. The absence of a significant difference across anesthetic strategies

in this study suggests that, in this specific clinical setting, the choice of regional anesthesia technique does not translate into clinically relevant reductions in opioid exposure during the first postoperative day.

While no difference was observed in cumulative opioid consumption at 24 hours, anesthetic strategy was associated with distinct early postoperative recovery profiles. In particular, patients receiving femoral nerve block exhibited higher opioid requirements and longer stays in the post-anesthesia care unit compared with other strategies. Several mechanisms may account for this observation, including incomplete analgesic coverage, motor blockade affecting early mobilization, or differences in intraoperative or emergence-related factors. In contrast, suprainguinal fascia iliaca block and lumbar plexus block were associated with more favorable early recovery profiles, without corresponding differences in postoperative pain scores during hospitalization.

These findings underscore the importance of distinguishing between early recovery outcomes and longer-term postoperative analgesic endpoints. Benefits observed during the immediate postoperative period do not necessarily persist beyond the post-anesthesia care unit, and reliance on early pain or opioid metrics alone may overestimate the sustained clinical impact of certain regional anesthesia techniques.

Previous studies evaluating regional anesthesia for total hip arthroplasty have reported heterogeneous results, with some suggesting reductions in postoperative pain and opioid consumption, while others have found minimal or no benefit [20–25]. However, much of the existing literature predates contemporary surgical approaches and standardized multimodal analgesic pathways. Our results are consistent with more recent evidence questioning the incremental value of increasingly complex regional anesthesia techniques in modern hip arthroplasty, and suggest that the clinical context in which these techniques are applied may be more important than the specific block itself.

From a clinical perspective, these findings suggest that regional anesthesia strategies for anterior total hip arthroplasty should not be selected primarily on the expectation of reducing cumulative postoperative opioid consumption at 24 hours. Instead, factors such as safety, technical complexity, reproducibility, resource utilization, and impact on early recovery may represent more relevant considerations when choosing an anesthetic strategy in this setting.

This study has several strengths, including the inclusion of a large consecutive cohort from a high-volume orthopedic center, standardized surgical and perioperative management, and the use of a clinically meaningful primary outcome. Multivariable adjustment accounted for key confounders known to influence postoperative opioid consumption, enhancing the robustness of the findings.

Several limitations should also be acknowledged. The retrospective, non-randomized design precludes causal inference and may be subject to residual confounding despite adjustment. Anesthetic strategy was determined by clinician preference rather than random allocation, which may reflect unmeasured patient or procedural factors. The relatively small size of the general anesthesia-only group may have limited power for some comparisons. In addition, the findings are specific to anterior total hip

arthroplasty performed under general anesthesia and may not be generalizable to other surgical approaches or anesthetic techniques.

CONCLUSION

In this large retrospective cohort of patients undergoing anterior total hip arthroplasty under general anesthesia within a contemporary multimodal analgesic framework, the choice of regional anesthesia strategy was not associated with differences in cumulative opioid consumption or postoperative pain during the first 24 hours. However, anesthetic strategy influenced early postoperative recovery, particularly opioid requirements and length of stay in the post-anesthesia care unit. These findings support a pragmatic, context-driven approach to regional anesthesia selection for anterior total hip arthroplasty, prioritizing safety and early recovery outcomes rather than expectations of reduced postoperative opioid consumption.

Abbreviations

ANCOVA
analysis of covariance
ASA
American Society of Anesthesiologists physical status
FNB
femoral nerve block
GA
general anesthesia
IRB
Institutional Review Board
LPB
lumbar plexus block
OME
oral morphine equivalents
PACU
post–anesthesia care unit
SIFIB
suprainguinal fascia iliaca block
THA
total hip arthroplasty.

Declarations

Assistance with the study

None declared.

Financial support and sponsorship

None declared.

Conflicts of interest

None declared.

Presentation

None declared.

Author Contribution

J.A. and P.N. contributed to study conception and design, data collection, data analysis, and drafting of the manuscript. M.A., O.K., and F.V. contributed to supervision of the study and critically revised the manuscript for important intellectual content. All authors reviewed and approved the final version of the manuscript.

References

1. Ackerman IN, Bohensky MA, Zomer E, Tacey M, Gorelik A, Brand CA, de Steiger R. The projected burden of primary total knee and hip replacement for osteoarthritis in Australia to the year 2030. BMC Musculoskelet Disord. 2019;20(1):90. 10.1186/s12891-019-2411-9. PMID: 30797228; PMCID: PMC6387488.
2. Pincus D, Jenkinson R, Paterson M, Leroux T, Ravi B. Association Between Surgical Approach and Major Surgical Complications in Patients Undergoing Total Hip Arthroplasty. JAMA. 2020;323(11):1070–6. 10.1001/jama.2020.0785. PMID: 32181847; PMCID: PMC7078797.
3. Guay J, Johnson RL, Kopp S. Nerve blocks or no nerve blocks for pain control after elective hip replacement (arthroplasty) surgery in adults. Cochrane Database Syst Rev. 2017;10(10):CD011608. 10.1002/14651858.CD011608.pub2. PMID: 29087547; PMCID: PMC6485776.
4. Anger M, Valovska T, Beloeil H, Lirk P, Joshi GP, Van de Velde M, Raeder J. PROSPECT Working Group* and the European Society of Regional Anaesthesia and Pain Therapy. PROSPECT guideline for total hip arthroplasty: a systematic review and procedure-specific postoperative pain management recommendations. Anaesthesia. 2021;76(8):1082–97. 10.1111/anae.15498. Epub 2021 May 20. PMID: 34015859.
5. Memtsoudis SG, Cozowicz C, Bekeris J, Bekere D, Liu J, Soffin EM, Mariano ER, Johnson RL, Go G, Hargett MJ, Lee BH, Wendel P, Brouillette M, Kim SJ, Baaklini L, Wetmore DS, Hong G, Goto R, Jivanelli B, Athanassoglou V, Argyra E, Barrington MJ, Borgeat A, De Andres J, El-Boghdadly K,

Elkassabany NM, Gautier P, Gerner P, Gonzalez Della Valle A, Goytizolo E, Guo Z, Hogg R, Kehlet H, Kessler P, Kopp S, Lavand'homme P, Macfarlane A, MacLean C, Mantilla C, McIsaac D, McLawhorn A, Neal JM, Parks M, Parvizi J, Peng P, Pichler L, Poeran J, Poultsides L, Schwenk ES, Sites BD, Stundner O, Sun EC, Viscusi E, Votta-Velis EG, Wu CL, YaDeau J, Sharrock NE. Peripheral nerve block anesthesia/analgesia for patients undergoing primary hip and knee arthroplasty: recommendations from the International Consensus on Anesthesia-Related Outcomes after Surgery (ICAROS) group based on a systematic review and meta-analysis of current literature. Reg Anesth Pain Med. 2021;46(11):971–85. 10.1136/rapm-2021-102750. Epub 2021 Aug 25. PMID: 34433647.

6. Wainwright TW, Gill M, McDonald DA, Middleton RG, Reed M, Sahota O, Yates P, Ljungqvist O. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. Acta Orthop. 2020;91(1):3–19. doi: 10.1080/17453674.2019.1683790. Epub 2019 Oct 30. Update in: Acta Orthop. 2020;91(3):363. doi: 10.1080/17453674.2020.1724674. PMID: 31663402; PMCID: PMC7006728.
7. Wiesmann T, Steinfeldt T, Wagner G, Wulf H, Schmitt J, Zoremba M. Supplemental single shot femoral nerve block for total hip arthroplasty: impact on early postoperative care, pain management and lung function. Minerva Anestesiol. 2014;80(1):48–57. Epub 2013 Jul 23. PMID: 23877305.
8. Kratz T, Dette F, Schmitt J, Wiesmann T, Wulf H, Zoremba M. Impact of regional femoral nerve block during general anesthesia for hip arthoplasty on blood pressure, heart rate and pain control: A randomized controlled study. Technol Health Care. 2015;23(3):313 – 22. 10.3233/THC-150898. PMID: 25669214.
9. Polania Gutierrez JJ, Ben-David B. Lumbar Plexus Block. [Updated 2023 Jan 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK556116/
10. Evangelista T, Pugno C, Finazzi S, Colombi A, Bugada D. Regional anesthesia for hip surgery: A review of current approaches and their application to clinical practice. Saudi J Anaesth 2025 Apr-Jun;19(2):164–73. 10.4103/sja.sja_68_25. Epub 2025 Mar 25. PMID: 40255351; PMCID: PMC12007850.
11. Grinman L, Elmore B, Ardon AE, Hussain A, Malik MF, Hernandez N, Jacoby MJ. Use of Peripheral Nerve Blocks for Total hip Arthroplasty. Curr Pain Headache Rep. 2024;28(11):1113–21. 10.1007/s11916-024-01287-7. Epub 2024 Jun 22. PMID: 38907794; PMCID: PMC11461552.
12. Zhang C, Dai W, He K. 95% effective volume of ropivacaine for ultrasound-guided supra-inguinal fascia iliaca compartment block. BMC Anesthesiol. 2023;23(1):98. 10.1186/s12871-023-02049-5. PMID: 36991333; PMCID: PMC10053470.
13. Yamada K, Inomata S, Saito S. Minimum effective volume of ropivacaine for ultrasound-guided supra-inguinal fascia iliaca compartment block. Sci Rep. 2020;10(1):21859. 10.1038/s41598-020-79059-7. PMID: 33318589; PMCID: PMC7736848.
14. Chen L, Shen Y, Liu S, Cao Y, Zhu Z. Ultrasound-guided supra-inguinal fascia Iliaca compartment block for older adults admitted to the emergency department with hip fracture: a randomized

controlled, double-blind clinical trial. BMC Geriatr. 2021;21(1):669. 10.1186/s12877-021-02646-4. Erratum in: BMC Geriatr. 2022;22(1):5. doi: 10.1186/s12877-021-02698-6. PMID: 34852764; PMCID: PMC8638559.

15. Safa B, Trinh H, Lansdown A, McHardy PG, Gollish J, Kiss A, Kaustov L, Choi S. Ultrasound-guided suprainguinal fascia iliaca compartment block and early postoperative analgesia after total hip arthroplasty: a randomised controlled trial. Br J Anaesth. 2024;133(1):146–51. Epub 2024 May 18. PMID: 38762396; PMCID: PMC11213984.
16. Ang JJM, Onggo JR, Stokes CM, Ambikaipalan A. Comparing direct anterior approach versus posterior approach or lateral approach in total hip arthroplasty: a systematic review and meta-analysis. Eur J Orthop Surg Traumatol. 2023;33(7):2773–92. 10.1007/s00590-023-03528-8. Epub 2023 Apr 3. PMID: 37010580; PMCID: PMC10504117.
17. Miller LE, Gondusky JS, Bhattacharyya S, Kamath AF, Boettner F, Wright J. Does Surgical Approach Affect Outcomes in Total Hip Arthroplasty Through 90 Days of Follow-Up? A Systematic Review With Meta-Analysis. J Arthroplasty. 2018;33(4):1296–302. Epub 2017 Nov 14. PMID: 29195848.
18. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370(9596):1453-7. 10.1016/S0140-6736(07)61602-X. PMID: 18064739.
19. Zawadsky MW, Paulus MC, Murray PJ, Johansen MA. Early outcome comparison between the direct anterior approach and the mini-incision posterior approach for primary total hip arthroplasty: 150 consecutive cases. J Arthroplasty. 2014;29(6):1256–60. Epub 2013 Dec 1. PMID: 24405626.
20. Kukreja P, MacBeth L, Sturdivant A, Morgan CJ, Ghanem E, Kalagara H, Chan VWS. Anterior quadratus lumborum block analgesia for total hip arthroplasty: a randomized, controlled study. Reg Anesth Pain Med. 2019 Oct 25:rapm-2019-100804. 10.1136/rapm-2019-100804. Epub ahead of print. PMID: 31653800.
21. Hussain N, Brull R, Speer J, Hu LQ, Sawyer T, McCartney CJL, Abdallah FW. Analgesic benefits of the quadratus lumborum block in total hip arthroplasty: a systematic review and meta-analysis. Anaesthesia. 2022;77(10):1152–62. 10.1111/anae.15823. Epub 2022 Aug 10. PMID: 35947882.
22. Wang Y, Zhu L. Quadratus lumborum block vs femoral/fascia iliaca block for hip surgeries: A systematic review and meta-analysis. Pak J Med Sci. 2025;41(4):1193–201. 10.12669/pjms.41.4.11531. PMID: 40290215; PMCID: PMC12022575.
23. Takeda Y, Tsujimoto K, Okamoto T, Nakai T, Fukunishi S, Tachibana T. Efficacy of Anterior Quadratus Lumborum Block and Pain After Total Hip Arthroplasty: A Randomized Controlled Trial. J Arthroplasty. 2023;38(11):2386–92. 10.1016/j.arth.2023.05.044. Epub 2023 Jun 14. PMID: 37321519.
24. Kim JY, Lee JS, Kim JY, Yoon EJ, Lee W, Lee S, Kim DH. Iliopsoas plane block does not improve pain after primary total hip arthroplasty in the presence of multimodal analgesia: a single institution

randomized controlled trial. Reg Anesth Pain Med. 2025;50(3):257–263. 10.1136/rapm-2023-105092. PMID: 38286736.

25. Liu P, Wu Y, Liang Z, Deng Y, Meng Q. Comparing the efficacy of pain managements after total hip arthroplasty: A network meta-analysis. J Cell Biochem. 2019;120(3):4342–4354. 10.1002/jcb.27720. Epub 2018 Oct 9. Erratum in: J Cell Biochem. 2020;121(12):4991–4992. doi: 10.1002/jcb.29567. PMID: 30302812.

Figures

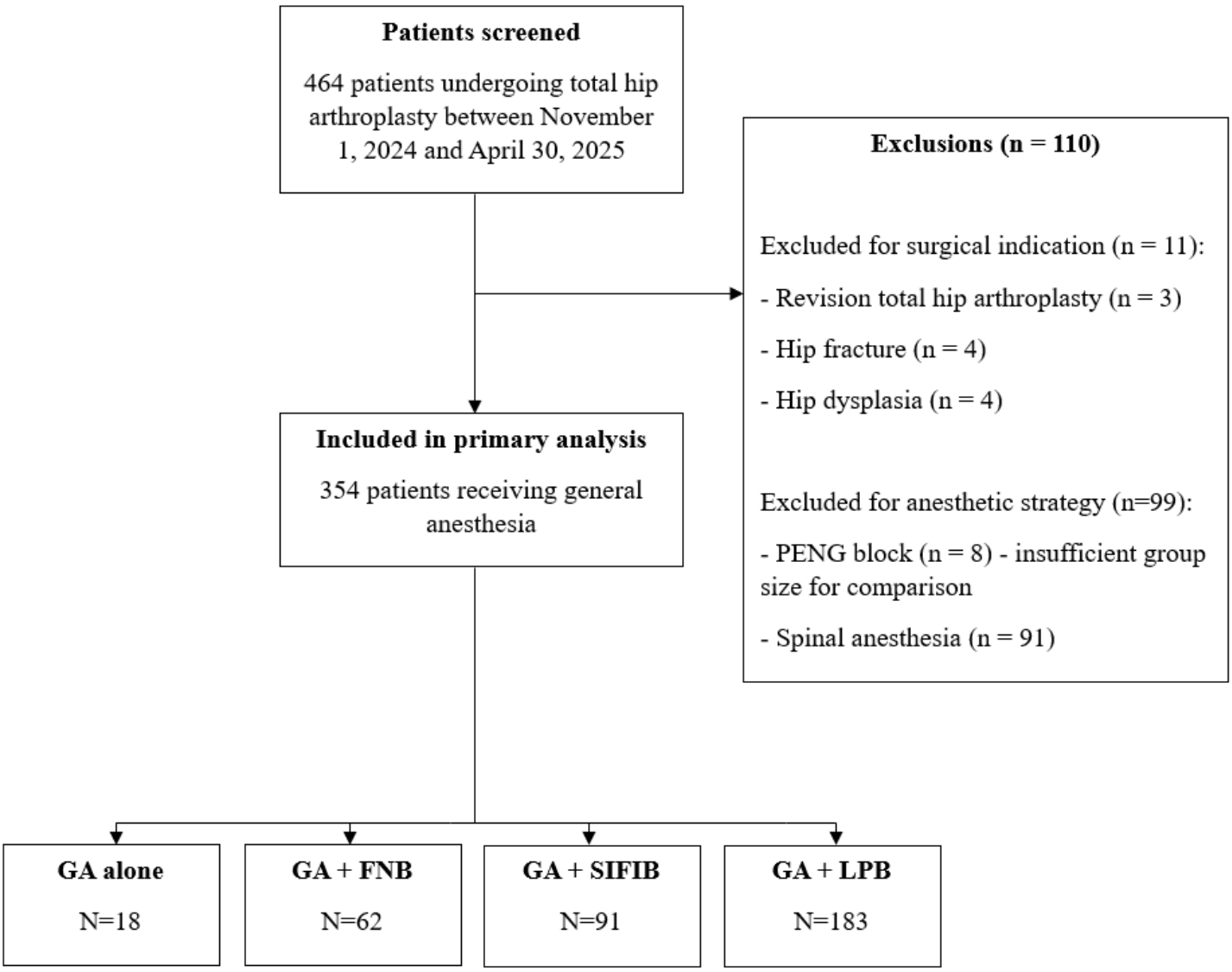


Figure 1

Flow diagram of patient selection

Flow diagram illustrating patient selection and inclusion in the primary analysis. Between November 1, 2024, and April 30, 2025, 464 patients underwent total hip arthroplasty at Clinique Jouvenet, Paris,

France. Patients were excluded for non-degenerative surgical indications, insufficient group size (pericapsular nerve group block), or spinal anesthesia. A total of 354 patients receiving general anesthesia were included in the primary analysis and allocated according to anesthetic strategy.

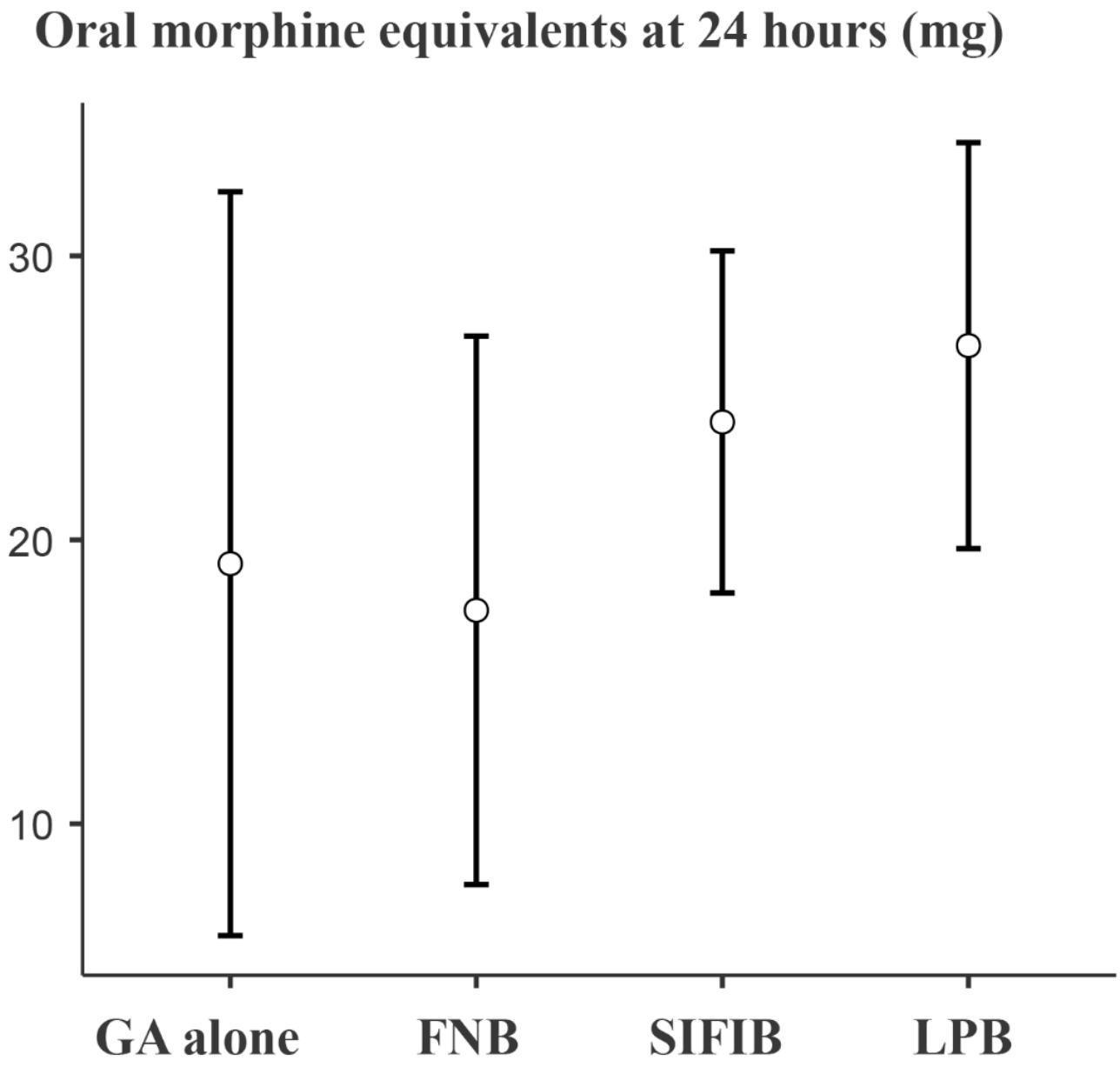


Figure 2

Adjusted postoperative opioid consumption at 24 hours

Adjusted postoperative opioid consumption during the first 24 hours following anterior total hip arthroplasty, expressed as oral morphine equivalents (OME), according to anesthetic strategy. Data represent estimated marginal means with 95% confidence intervals derived from analysis of covariance adjusted for age, sex, body mass index, ASA physical status, intraoperative sufentanil dose, and duration

of surgery. Analyses were restricted to patients receiving general anesthesia. OME: oral morphine equivalents; CI: confidence interval.