Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

Evaluating the pericapsular nerve group block in hip fracture patients: A prospective observational cohort study.

Lesedi Mothiba[1], Grace Manjooran[2], Mathabe Sehlapelo[3*]

[1]BSc (Wits), MBBCH (Wits), DA (SA), Department of Anaesthesia, School of Clinical Medicine, Faculty of Health Sciences, University of the Witwatersrand.
[2]MBBCh (Wits), DA (SA), FCA (SA), MMed (Anaes) (Wits), PG Dip HSE (Wits), Department of Anaesthesia, School of Clinical Medicine, Faculty of Health Sciences, University of the Witwatersrand.
[3]MBChB (UP), DA (SA), FCA (SA), MMed (Anaes) (Wits), DTM&H (Wits), DipHivMan (SA), Higher Cert HSM (Regent), PG Dip HSE (Wits), Department of Anaesthesiology at Witwatersrand University, Chris Hani Baragwanath Academic Hospital, RSA.

Abstract

Background
This study aimed to assess the pericapsular nerve group (PENG) block combined with a spinal anaesthetic compared to only a spinal anaesthetic in patients presenting for hip fracture surgery. The objectives were to determine the ability of a patient to sit for a spinal anaesthetic, rest, dynamic hip pain scores, and the incidence of lower limb motor blockade following the block. Furthermore, time to first request for opioid analgesia post-operatively and the total opioid consumption in morphine equivalents were determined.

Methods
A prospective, observational study with 40 participants who were recruited via purposive sampling. Participants receiving the PENG block combined with a spinal anaesthetic were allocated to the PENG block (Group P, n = 20) and those receiving only a spinal anaesthetic (Group C, n = 20). Group P received bupivacaine 0.25% 20ml injected into the target site in the block area, followed by spinal after 30 minutes in theatre. Group C received a spinal only.

Results
There were no significant differences in participants' characteristics. Group P had 90% of the participants able to sit adequately without IV analgesia for a spinal versus 45% in Group C. Group P had statistically significantly lower rest ($p<0.001$) and dynamic ($p<0.001$) pain scores compared to Group C at 30 minutes following PENG block injection (T1). Thirteen (65%) participants in Group P did not have motor blockade as they were able to lift the blocked leg to 15 degrees at T1. A longer duration to first opioid analgesia required was found in Group P ($p <0.001$). The total IV morphine equivalent analgesic requirement for Group C was almost double that required for Group P ($p = 0.009$).

Conclusion
PENG block combined with spinal anaesthesia is better compared to spinal anaesthesia only.

Recommendations
A randomised controlled trial with a larger sample size is recommended.

Keywords: *Hip fracture, PENG block, Analgesic efficacy, Arthroplasty, Postoperative analgesia*
Submitted: *March 20, 2026* ***Accepted:*** *May 27, 2026* ***Published:*** *June 04, 2026*

Corresponding author: *Mathabe Sehlapelo[*]*
Email: ***mathabe.sehlapelo@wits.ac.za*** *https://orcid.org/0009-0001-5351-5396*
Senior Specialist, Department of Anaesthesiology at Witwatersrand University, Chris Hani Baragwanath Academic Hospital, RSA.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

Introduction

Hip fractures are a common orthopaedic diagnosis with an increasing incidence[1,2]. Elderly hip fracture patients are more vulnerable due to an increased risk of comorbidities.[3] An increased waiting time for surgery is associated with an increased 30-day mortality.[4] The South African (SA) state healthcare system cares for a larger proportion of the SA population,[1] which has an increasing life expectancy.[5]

Acute hip fracture pain is considered dynamic when related to movement and as rest pain when occurring without movement of the affected hip.[6] Perioperative complications associated with poor pain management include poor mobilisation[7], increased opioid requirements and their related adverse effects[7], increased length of hospital stay[7], and an increased risk of developing chronic pain[8,9]. Adequate management of acute perioperative hip fracture pain mitigates against these complications.

Spinal anaesthesia is the preferred method for hip fracture surgery according to multiple arthroplasty guidelines,[10,11,] including the South African Society for Anaesthesiologists (SASA) Arthroplasty Guidelines[7]. Patients are required to sit for the administration of a spinal anaesthetic. This may be limited by hip fracture pain.[12] Pharmacological and regional analgesia techniques may aid sitting for a spinal anaesthetic.

Various regional analgesic techniques for hip pain were found to be superior to standard multimodal analgesia.[13] These include the femoral nerve block (FN), fascia iliaca compartment block (FICB), 3-in-1 femoral nerve block, quadratus lumborum block (QL), lumbar erector spinae block (ESP), and lumbar plexus blocks.[13] The FN, QL, lumbar ESP, and lumbar plexus blocks are all associated with undesirable motor weakness.[14] This increases the risk of postoperative complications,[7,15] delayed postoperative physical therapy, and prolonged hospital stay.[7,11,15] A regional technique with a good analgesic and motor-sparing profile is required for hip fracture pain and surgery.

The pericapsular nerve group (PENG) block is a newer regional analgesic technique. Short et al.[16] described the relationship of the femoral, obturator, and accessory obturator nerve articular branches with the anterior hip capsule and bony landmarks of the hip joint. Giron-Arango et al.[17] developed the PENG block following the study by Short et al.[16]. The PENG block targets nerve fibres supplying the anterior capsule of the hip joint and prevents transmission of the afferent nociceptive stimulus from the anterior capsule. This block targets sensory nerve branches of the hip joint, potentially sparing the motor function of the joint. This small case series from 2018 reported a median pain score reduction of seven for assessments occurring prior to and 30 minutes after block placement, with a significant reduction of dynamic hip pain.[17] Studies assessed the impact of the PENG block on the patients' ability to sit for a spinal anaesthetic,[12,18] early analgesic efficacy,[19,20] postoperative pain scores, 21, and postoperative opioid analgesia requirements[19]. Reduced pain scores,[12,19,20] improved positioning for spinal anaesthetic[18] and lower opioid requirements[12,19,21] were reported. Contraindications to the PENG block include patient refusal, infection at the site of injection, bleeding disorders, and anticoagulation, as well as local anaesthetic allergy.[22] Potential complications of the block include femoral and obturator nerve injury, cephalad spread of excessive local anaesthetic volume injection blocking the femoral and fascia iliaca nerve, as well as local anaesthetic toxicity.[22]

The Enhanced Recovery After Surgery (ERAS®)[11] management pathway and SASA Arthroplasty Guidelines[7] aim to improve outcomes for hip fracture surgery. Preoperative optimisation, good perioperative analgesia, early surgical intervention, neuraxial rather than general anaesthesia and early physical therapy promote early mobilisation and reduce postoperative complications.[7,10,11] Various studies suggest that patients who received the PENG block reported lower pain scores, showed reduced postoperative opioid consumption, and experienced earlier postoperative mobilisation. [19-21]

This study aimed to assess the analgesic efficacy of the PENG block combined with spinal anaesthesia compared with spinal anaesthesia alone in patients presenting for hip fracture surgery at Chris Hani Baragwanath Academic Hospital (CHBAH), a tertiary hospital in Johannesburg, South Africa.

The primary objectives of this study were to:

determine the ability of a patient to sit adequately for a spinal anaesthetic 30 minutes following PENG block placement

determine rest and dynamic hip pain scoring 30 minutes following PENG block placement before a spinal anaesthetic

determine the incidence of ipsilateral lower limb motor blockade (utilising the 15-degree straight leg raise test) 30 minutes following PENG block placement.

The secondary objectives of this study were to:

determine the time to first request for opioid analgesia post-operatively

determine the total opioid consumption in morphine equivalents over 24 hours.

Methods

Study design

This study utilised a prospective, contextual, cohort, observational research design. The equator network reporting guideline followed was the Strengthening the

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

Reporting of Observational Studies in Epidemiology (STROBE) guideline.

Study setting

The study was conducted in the theatre complex of CHBAH affiliated to the Department of Anaesthesiology at the University of the Witwatersrand. CHBAH is a 2888-bed central tertiary hospital. The hospital has 25 theatres, of which 5 are for orthopaedic surgery. The 25 theatres perform an average of 65 000 cases annually, of which 160 are hip fracture surgeries in the orthopaedic theatres. The study was conducted from 03/01/2023 to 17/03/2024.

Participants

The study population consisted of adult patients undergoing a spinal anaesthetic for hip fracture repair surgery at CHBAH in Johannesburg.

Inclusion criteria

American Society for Anaesthesiologists (ASA) physical status class I – III, consent to participate in the study, and a baseline pain score equal to or greater than four out of ten[17,18] utilising the universal pain assessment tool (UPAT).

Exclusion criteria

Contraindications to regional anaesthesia include allergy to local anaesthetics and opioids, chronic pain syndromes, polytrauma, and motor and/or sensory nerve fallout of the affected limb.

Sampling method

A purposive sampling method was utilised. Eligible patients were identified from theatre booking lists in the CHBAH theatres the day before surgery. Patients fulfilling the inclusion criteria were approached to participate in the study.

Study size

The sample size was determined with the guidance of a biostatistician using Stata version 16. Utilising an alpha value of 0.05, power of 90%, and a clinical difference of 40%, a total sample size of 60 was calculated (30 per group), accommodating for loss to follow-up. The authors arrived at a sample size of 60 using the expert opinion of consultants who regularly perform anaesthesia for hip fracture patients at CHBAH, and revealed an average underlying event rate of 50%. These are patients who are unable to sit for a spinal anaesthetic for hip fracture surgery. Literature suggests that approximately 90% of hip fracture patients can sit for a spinal anaesthetic following PENG block administration.[18] This informed the clinical difference of 40%, representing the effect size of the PENG block. This is the proportion of patients whose pain improves enough to enable adequate positioning for a spinal anaesthetic.

Bias

To minimise bias the following were used, there was validation by a trained sonographer from the Department of Radiology affiliated with the University of the Witwatersrand to perform the ultrasound guided PENG blocks, utilising a Sonosite ultrasound machine which is standardised to depict the required images, and the participant's attending anaesthetist for the operation was only notified of patient participation in the study however they did not know whether the patient was exposed to the PENG block or not. A consecutively numbered envelope containing the group assignment was opened by the researcher at the time of group allocation. The main drawback of observational studies is that the intervention or exposure is not randomised and, therefore, confounding by indication (in case of an intervention) is likely to exist. This means that there are usually differences in measured and unmeasured confounders between the comparison groups. Observational studies often suffer from bias and confounding. The envelopes were used only to approximate randomisation. Randomisation is a hallmark of randomised controlled trials (RCTs), while the primary objective of this study was to observe and report the outcomes of the procedures performed in a real-world clinical setting. The intention was to reflect the practical application of these interventions rather than to maintain a strictly controlled experimental environment. The patient selection and data collection were designed to mirror routine clinical practice, emphasising the external validity of the findings. The approach focused more on the outcomes observed under typical conditions rather than adhering to the rigorous parameters typically mandated in an RCT.

Data collection

Participants receiving the PENG block combined with a spinal anaesthetic were allocated to Group P, and those receiving only a spinal anaesthetic to Group C. A spinal anaesthetic comprised of plain bupivacaine and fentanyl, dosed at the discretion of the attending anaesthetist.

Group P: Participants were transferred to the block area of the theatre at least an hour before surgery. T0 variables were ascertained, and the PENG block was then placed according to the SASA Guidelines for Regional Anaesthesia[23] by the primary researcher. Anatomical landmarks were identified, and skin numbed with 2 – 3ml of 2% lignocaine. An in-plane, lateral to medial,

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

ultrasound-guided technique was performed using a low frequency (2 – 5 MHz) curvilinear probe and a 10cm long 22G echogenic needle. The probe was placed approximately 45 degrees counterclockwise from the transverse plane transecting the anterior inferior iliac spine (AIIS). The needle tip was placed in the musculofascial plane between the psoas tendon and pubic ramus. Bupivacaine 0.25% 20ml was injected into the target site for the PENG block in 5ml increments following negative aspiration of blood.[24,17]

Group C: Participants were transferred to the block area of the theatre at least an hour before surgery. Two variables were ascertained, and the participants then awaited surgery.

The participant's attending anaesthetist was notified of their participation in the study and requested not to routinely supplement the spinal anaesthetic with any other regional analgesic technique or to supplement the spinal with any other drug other than fentanyl. The attending anaesthetist did not know which group the participants belonged to, as there was no clinical identifier of the PENG block injection. The anaesthetist was not restricted in the use of intravenous analgesic agents to facilitate sitting for the spinal anaesthetic.

Measured variables

The following time intervals were used in this study: time zero (T0) as the time of participant assessment upon arrival to the theatre for both groups, time one (T1) as the time of participant assessment 30 minutes following PENG block placement for Group P, and time two (T2) as the time of participant assessment at 24 hours for both groups.

At T0, baseline rest and dynamic hip pain scores were ascertained for both groups. Hip pain at rest was evaluated before any movement or intervention. Dynamic hip pain was standardised to pain on straight leg raise to 15 degrees mimicking hip flexion.[17,18] The UPAT, ranging from zero to ten was utilised to score pain. At T1 for group P, rest and dynamic hip pain scores were re-assessed, as well as motor blockade utilising the 15-degree straight leg raise test. The ability to sit for a spinal anaesthetic was assessed in the theatre by the attending anaesthetist.

Both groups were reviewed in the ward at T2 by the primary researcher. Rest and dynamic hip pain scores, time to first opioid analgesic requirement, and total opioid (in intravenous (IV) morphine equivalent doses) analgesic requirements within 24 hours were determined in both groups.

Data measurement

Data were obtained from the patients' anaesthetic and ward medication charts, with opioid use, dosage, and prescriber signature recorded. The information was transferred to a data collection tool and subsequently consolidated into a single Microsoft Excel® spreadsheet. The spreadsheet incorporated formulas to convert the various opioids into morphine equivalent doses. All entries were independently double-checked by the co-authors for accuracy.

Statistical analysis

Data was analysed using Stata version 16.1/MP. The normality of the distribution was evaluated with the Shapiro-Wilk test. The Chi-squared and Chi-squared exact tests were employed to assess categorical variables (ability to sit), the Student t test was used for age, while the 2-sample t-test was used for the analysis of continuous data (pain scores, time to first opioid dose, and total opioid consumption). A p-value of less than 0.05 was considered statistically significant for the comparisons between the two study groups.

Ethical considerations

Approval was obtained from the Post Graduate Committee (Medical) at the University of the Witwatersrand, the Human Research Ethics Committee (study number M220403), the CHBAH Medical Advisory Committee, and the National Health Research database (study number GP_202203_076).

Patient data was kept anonymous and confidential throughout the study. A study number was allocated to each patient. A list correlating the patient-identifying details with the patient number was kept electronically and separately from the data analysed for the study. The list of patient details, study numbers, and raw data remains confidential, with access provided only to the study researcher and supervisors for paper-based and electronic information. Data is stored securely after completion of the study in a locked cupboard for paper-based information, including the signed consent forms and data collection sheets, and for electronic data is kept on a password-protected database.

Informed consent

Eligible adult patients presenting for hip fracture surgery under spinal anaesthetic with a capacity to provide their own informed consent were approached preoperatively. Information regarding the study aims, objectives, the study intervention, potential benefits, possible complications, voluntariness, and the right to decline participation in the study was explained. This information

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

was shared verbally, and an information sheet was provided for them to read. The researcher answered any questions. If the patient agreed to participate in the study, they signed a consent form and kept the information sheet.

Results

The target sample size of 60 (power 90%, alpha value 0.05) was not attained due to time constraints and infrastructure challenges affecting the hospital during the data collection period. Fifty participants were recruited for the study (Figure 1). Ten participants were postponed secondary to challenges with hospital infrastructure (theatre flooding, availability of some study consumables), and subsequent time constraints (study was for Master of Medicine degree) resulted in fewer patients being recruited. The final sample size recruited and analysed was 40 participants (Group P = 20, Group C = 20) with a power of 80% and an alpha value of 0.05. This was still statistically appropriate to analyse for the study.

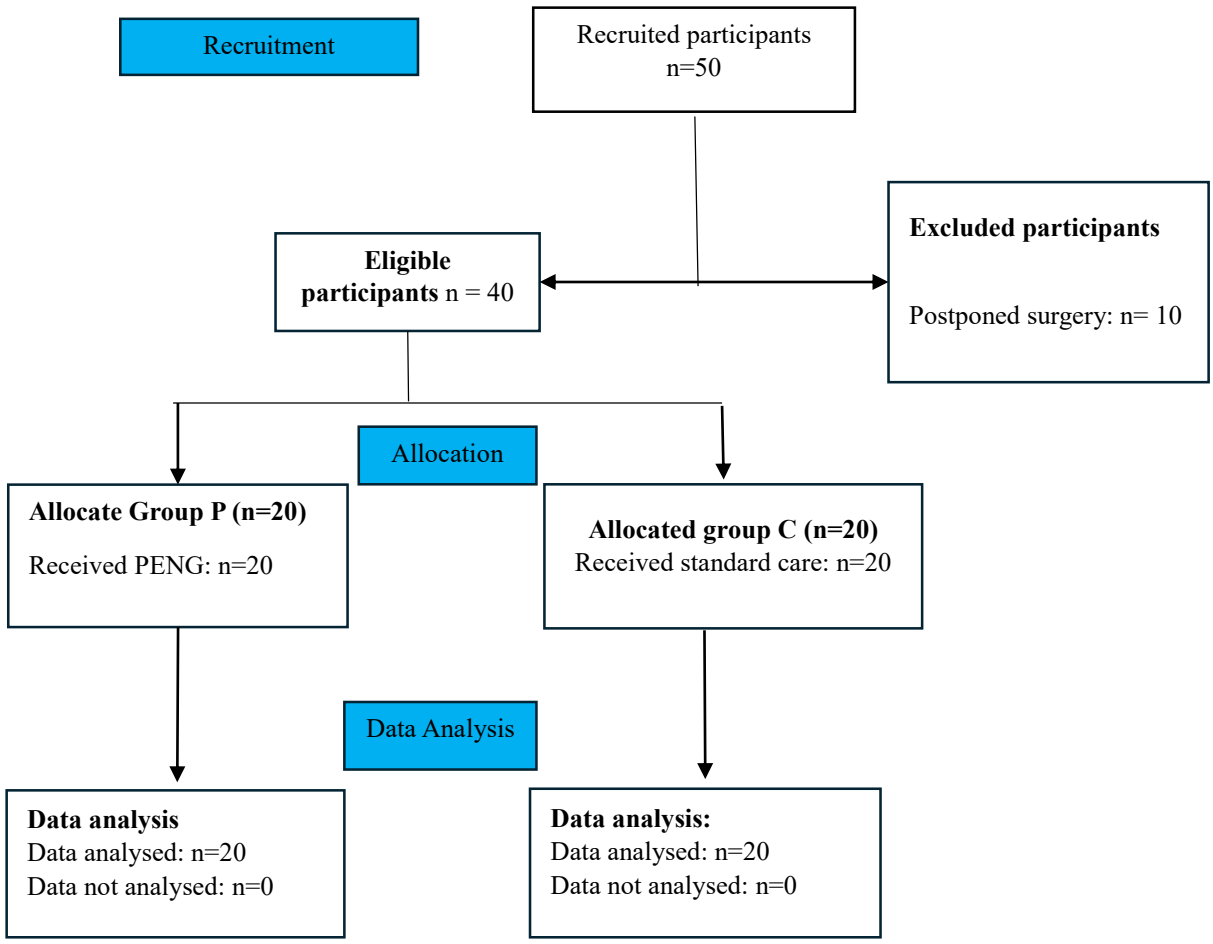

Figure 1: Case selection flow diagram.

Table I depicts the participants' characteristics. The hip pain scores at T0 were not statistically different between the two study groups. Figure 2 depicts the male and female distribution of the participants. There were more female (22) than male (18) participants, with no statistical difference between the groups (p = 0.525).

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

Table I: Participant's characteristics.

Participant's characteristics	Group P Mean (SD)	Group C Mean (SD)	p value
Age (years)	67.20 (13.60)	62.60 (12.60)	0.275
To rest hip pain scores	6.20 (2.60)	5.20 (2.80)	0.227
To dynamic hip pain scores	7.80 (1.90)	7.00 (2.50)	0.262

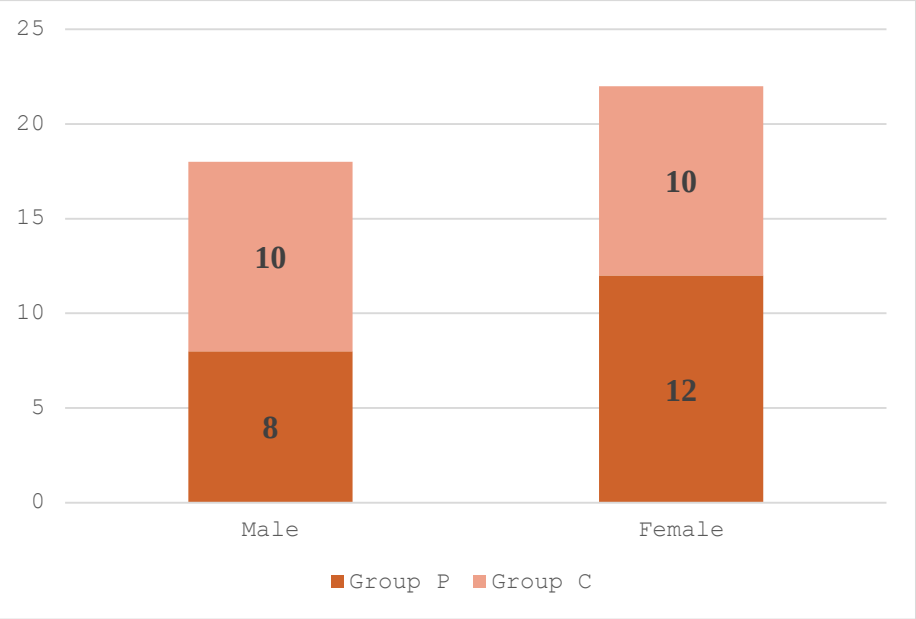

Figure 2: Male and female distribution of participants.

Table II depicts the participants' ability to sit adequately for a spinal anaesthetic.

Table II: Participants' ability to sit adequately for a spinal anaesthetic.

	Group P n (%)	Group C n (%)
Ability to sit adequately without IV analgesia	18 (90)	9 (45)
Ability to sit adequately with IV analgesia	2 (10)	7 (35)
Unable to sit, required a GA	0 (0)	4 (20)

Rest and dynamic hip pain scores at the defined time intervals are shown in Tables III and IV, respectively. Baseline hip pain scores from Group C were used for comparison with Group P at T1, as they would not have changed.

Table III: Rest hip pain scores.

Time interval	Group P Mean (SD)	Group C Mean (SD)	p value
T1	2.3 (1.50)	5.2 (2.80)	<0.001
T2	2.0 (1.70)	2.9 (1.10)	0.069

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

Table IV: Dynamic hip pain scores.

Time interval	Group P Mean (SD)	Group C Mean (SD)	p value
T1	3.30 (1.90)	7.00 (2.50)	<0.001
T2	3.30 (1.50)	4.10 (1.20)	0.070

Thirteen (65%) participants in Group P did not have motor blockade as they were able to lift the blocked leg to 15 degrees at T1.

Table V depicts the analgesic requirements in the first 24 hours postoperatively. A longer duration of the first opioid analgesia required was found in Group P. Furthermore, the total IV morphine equivalent analgesic requirement for Group C was almost double that required for Group P. Both findings were statistically significant.

Table V: Postoperative opioid analgesia requirements.

	Group P Mean (SD)	Group C Mean (SD)	p value
Time to first opioid analgesia request (hours)	9.05 (2.33)	4.90 (1.13)	<0.001
Total 24-hour morphine (IV) equivalent dose (mg)	24.50 (12.76)	40 (21.76)	0.009

Discussion

The PENG block is a method of regional pain relief with a motor-sparing effect for hip pain.[17] The literature available reports multiple benefits, including improved ability to sit for a spinal anaesthetic[12,18] and a good perioperative analgesic profile[19-21]; however, there is potential for more rigorous evidence for the growing body of literature regarding the PENG block.[19,20,22] The authors of this study did not identify an SA-based study on the PENG block in hip fracture patients.

Although not statistically different between the two study groups, the older age and predominantly female characteristics found in this study are similar to the local[1] and global[2] pattern of disease for hip fracture patients. Pain management in elderly patients is more challenging due to multiple factors.[8] The increased age associated with hip fractures also renders patients more vulnerable to postoperative complications.[19] The findings of this study promote ERAS® principles for arthroplasty. [7,10, 11, 25] Mitigating against postoperative complications utilising an effective perioperative regional analgesic technique will improve patient quality of care and minimise the cost of the burden of disease.[13] This would be further beneficial to a resource-constrained environment like the SA public healthcare system.[1]

This study found the PENG block improved the ability to sit adequately for a spinal anaesthetic. Ninety percent of the patients who received the PENG block in this study were able to sit adequately, which was similar to 87% found by Alrefaey and Abouelela[18]. They also found fewer attempts and a shorter time required for spinal anaesthetic injection for patients who received the PENG block due to a better sitting position.[18] A meta-analysis by Li et al.[12] published in 2024 concluded that pain reduction following PENG block injection improved positioning for spinal anaesthesia. Both papers support the use of the PENG block to facilitate sitting for a spinal anaesthetic for hip fracture surgery.[12,18] The results of this study are in line with their findings. ERAS® [11] and SASA Arthroplasty Guidelines[7] advocate for spinal anaesthesia for improved perioperative outcomes.

Rest and dynamic hip pain scores 30 minutes following PENG block placement before a spinal anaesthetic were lower than in patients who did not receive the PENG block. The seminal work by Giron-Arango et al.[17] found lower rest and dynamic hip pain scores 30 minutes following PENG block placement as well. Alrefaey and Abouelela[18] also reported statistically significantly lower pain scores for patients positioning for a spinal anaesthetic. Improved pain scores 30 minutes following PENG block injection were also described by Lin et al[19] and Pagano et al[20]. This management of preoperative acute hip pain may mitigate against the development of chronic pain.[9] This study further found lower rest and dynamic hip pain scores 24 hours postoperatively for the participants who received the PENG block compared to those who did not, although not statistically significant. Despite heterogeneity of the RCTs, two meta-analyses found lower 24-hour postoperative rest and dynamic hip pain scores.[12,22] Li et al. found statistically significant lower hip pain scores favouring the PENG block at 24 hours for PENG vs no nerve block studies, lower scores favouring the PENG block for the PENG block vs FICB studies were not statistically significant.[12] Pai and

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

colleagues reported statistically significantly lower dynamic hip pain scores at 24 hours; however, the lower rest hip pain scores were not statistically significant.[22] The pain score findings in this study require a more rigorous study to be comparable with the current literature.

Giron-Arango et al.[17] proposed a potential motor-sparing effect of the PENG block due to the technique only targeting the sensory innervation of the anterior capsule. This preservation of motor function allows for earlier postoperative mobilisation, physical therapy, and reduced risk of complications, rendering the PENG block more favourable.[24,15] This study found that two-thirds of patients who received the PENG block did not have ipsilateral lower limb motor blockade 30 minutes following PENG block injection. On appraisal of the literature, the authors did not find studies that assessed motor blockade at 30 minutes following the PENG block. Aliste and colleagues[26] demonstrated less ipsilateral quadriceps motor blockade with better hip adduction at 3 hours following the PENG block when compared to a suprainguinal fascia iliaca block; postoperative mobilisation was not assessed. A randomised controlled trial (RCT) from 2023 also found preserved ipsilateral quadriceps and adductor muscle strength 3 hours following the PENG block compared to the QL block, as well as a reduced time to mobilisation postoperatively. [27]

ERAS® [11] and SASA Arthroplasty Guidelines[7] recommend reduced perioperative opioid consumption to mitigate against unwarranted side effects. This study found reduced postoperative opioid analgesic requirements for patients who received the PENG block. Both an increased time to first request and a reduced 24-hour consumption were found. The lower rest and dynamic pain scores 24-hours postoperatively for patients who received the PENG block are in keeping with the overall lower opioid consumption. Farag et al.[28] concluded the PENG block does provide lower opioid consumption in the first 24-hours postoperatively, similar to this study. A 2024 meta-analysis by Li and colleagues[12] found a statistically significant lower 24-hour postoperative opioid consumption for patients who received the PENG block compared to patients who did not receive a nerve block or those who received the FICB. An increased time to first opioid request was also found to be lower for patients receiving the PENG block compared to those who did not receive a nerve block.[12] Similar findings were reported in this study.

Pai and colleagues[22] found zero incidence of complications in eight studies that recorded complications, including infection, from the PENG block.

Generalizability

The results of this prospective cohort observational study are mainly relevant to adult patients receiving a spinal anaesthetic for hip fracture surgery in similar urban public-sector central tertiary hospitals in South Africa. As the research was conducted at a single hospital in central Johannesburg, the findings are most applicable to populations with comparable public healthcare systems, referral patterns, availability, and perioperative practices. The findings of this study can still be considered to guide institutional arthroplasty protocols akin to the ERAS® [10, 11, 25] and SASA Arthroplasty Guidelines[7].

Conclusion

This study found an improved ability to sit adequately for a spinal anaesthetic, a 35% incidence of ipsilateral lower limb motor blockade, as well as reduced rest and dynamic hip pain scores following PENG block injection in patients presenting for hip fracture surgery. Postoperatively, an increased time to first opioid analgesia request and reduced 24-hour IV morphine equivalent consumption were found following PENG block injection. This study concludes that the PENG block combined with a spinal anaesthetic was better compared to a spinal anaesthetic only in patients presenting for hip fracture surgery.

Limitations

The limitations of this study are the small sample size and the fact that the study was conducted in one hospital; hence, these results cannot be generalised. This study also did not explore the association between the motor-sparing effect of the PENG block and postoperative mobilisation, as well as the complications emanating directly from PENG block injection.

Recommendations

A more robust multi-centre study, like an RCT, with a larger sample size, may provide more conclusive evidence regarding the perioperative efficacy of the PENG block. Studies assessing the association of the motor-sparing effect of the PENG block and the time to postoperative mobilisation are recommended. Furthermore, studies assessing puncture-site and joint-space infection following PENG block injection are also recommended.

Acknowledgement

This research was done in partial fulfilment of a Master of Medicine degree. We acknowledge the support of the Department of Orthopaedics at CHBAH and Dr. Clement Nyuyki as the statistician.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

List of abbreviations

AIIS Anterior inferior iliac spine
ASA American Society of Anaesthesiologists
CHBAH Chris Hani Baragwanath Academic Hospital
ERAS® Enhanced recovery after surgery
ESP Erector spinae
FICB Fascia iliaca compartment block
FN Femoral nerve
NRS Numerical ratings scale
PENG Pericapsular nerve group
QL Quadratus lumborum
RCT Randomised controlled trial
SA South Africa
SASA South African Society of Anaesthesiologists
UPAT Universal Pain Assessment Tool

Conflict of interest

The authors declare no conflict of interest.

Funding statement

No funding was received to complete this study.

Data availability

Data is available from the corresponding author upon request.

Author contributions

Lesedi Mothiba: Conceptualisation, literature search, study design, methodology, protocol drafting, data collection, manuscript drafting.
Grace Manjooran: Supervision, conceptualisation, methodology, validation, review, revising based on feedback, editing, and ensuring the work is accurate and properly cited.
Mathabe Sehlapelo: Supervision, conceptualisation, methodology, validation, review, editing, revising based on feedback, ensuring the work is accurate and properly cited. Ensuring adherence to ethical considerations. All authors have read and approved the final version of the manuscript.

Author biography

Lesedi Mothiba is an anaesthetist in private practice. She completed her registrar training in anaesthesiology at Chris Hani Baragwanath Academic Hospital and the University of the Witwatersrand, South Africa. She has a keen interest in the management of acute pain, orthopaedic surgery, and anaesthesia for non-cardiac surgery in cardiac patients.
Grace Manjooran is a senior anaesthesiologist at Chris Hani Baragwanath Academic Hospital and a Lecturer in the Department of Anaesthesiology, University of the Witwatersrand, Johannesburg, South Africa. Her research interests include postgraduate education, paediatric anaesthesia, and perioperative pain management.
Mathabe Sehlapelo is a senior anaesthesiologist at Chris Hani Baragwanath Academic Hospital and Lecturer in the Department of Anaesthesiology, University of the Witwatersrand, Johannesburg, South Africa. She is the domain head of airway management, breast, and endocrine. She is committed to health sciences education through innovative pedagogy, student mentorship, health system management, and community engagement.

References

1. Dela SS, Paruk F, Brown SL, Lukhele M, et al. Ethnic and gender-specific incidence rates for hip fractures in South Africa: A multi-centre study. Bone. 2020;133:115253.https://doi.org/10.1016/j.bone.2020.115253 PMid:31987987
2. Fernandez MA, Griffin XL, Costa ML. Management of hip fracture. Br Med Bull. 2015;115(1):165-72. https://doi.org/10.1093/bmb/ldv036 PMid:26311503
3. Krickl J, Ittermann T, Thannheimer A, Schmidt W, et al. The rising problem of hip fractures in geriatric patients: analysis of surgical influences on the outcome. Journal of Personalized Medicine. 2023;13(8). https://doi.org/10.3390/jpm13081271 PMid:37623521 PMCid:PMC10455730
4. Pincus D, Ravi B, Wasserstein D, Huang A, et al. Association between wait time and 30-day mortality in adults undergoing hip fracture surgery. JAMA. 2017;318(20):1994-2003.https://doi.org/10.1001/jama.2017.17606 PMid:29183076 PMCid: PMC5820694
5. Mid-year population estimates. Republic of South Africa: Statistics South Africa; 2024. Available from: https://www.statssa.gov.za/?page_id=1854&PPN=P0302&SCH=73952%20
6. Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, et al. Assessment of pain. British Journal of Anaesthesia. 2008;101(1):17-24. https://doi.org/10.1093/bja/aen103 PMid:18487245
7. Shmukler D, Griffiths A, Fourtunas M, Anamourlis C, Pegu K. SASA arthroplasty guidelines 2024: South African Society of Anaesthesiologists 2024. Available from: https://www.sasaweb.com/wp-content/uploads/2024/02/SASA-Arthroplasty-Guidelines-2024-FINAL-with-Cover.pdf.
8. Chetty S, Hodgson E, Milner A, Travers A, et al. Guidelines for the management of acute pain in specific scenarios: South African Society of Anaesthesiologists 2022. Available from: https://sasaweb.com/wp-content/uploads/2024/05/SASA-Acute-Pain-Guidelines-2022.pdf.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

9. Sinatra R. Causes and consequences of inadequate management of acute pain. Pain Medicine. 2010;11(12):1859-71. https://doi.org/10.1111/j.1526-4637.2010.00983.x PMid:21040438
10. NICE. Hip fracture: Management: National Institute for Health and Care Excellence; 2011. Available from: https://www.nice.org.uk/guidance/cg124.
11. Wainwright TW, Gill M, McDonald DA, G Middleton R, et al. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced recovery after surgery (ERAS®) society recommendations. Acta Orthopaedica. 2019;91(1):3-19. https://doi.org/10.1080/17453674.2019.1683790 PMid:31663402 PMCid:PMC7006728
12. Li S, An J, Qian C, Wang Z. Efficacy and safety of pericapsular nerve group block for hip fracture surgery under spinal anesthesia: A meta-analysis. International Journal of Clinical Practice. 2024;2024:6896066. https://doi.org/10.1155/2024/6896066 PMid:38510561 PMCid:PMC10954362
13. Dizdarevic A, Farah F, Ding J, Shah S, et al. A comprehensive review of analgesia and pain modalities in hip fracture pathogenesis. Curr Pain Headache Rep. 2019;23(10):72. https://doi.org/10.1007/s11916-019-0814-9 PMid:31388846
14. Kukreja P, Avila A, Northern T, Dangle J, et al. A retrospective case series of pericapsular nerve group (PENG) block for primary versus revision total hip arthroplasty analgesia. Cureus. 2020;12(5):e8200. https://doi.org/10.7759/cureus.8200
15. Kamel HK, Iqbal MA, Mogallapu R, Maas D, Hoffmann RG. Time to ambulation after hip fracture surgery: Relation to hospitalization outcomes. The Journals of Gerontology: Series A. 2003;58(11):M1042-M5. https://doi.org/10.1093/gerona/58.11.M1042 PMid:14630887
16. Short AJ, Barnett JJG, Gofeld M, Baig E, et al. Anatomic study of innervation of the anterior hip capsule: Implications for image-guided intervention. Reg Anesth Pain Med. 2018;43(2):186-92. https://doi.org/10.1097/AAP.0000000000000701 PMid:29140962
17. Giron-Arango L, Peng PWH, Chin KJ, Brull R, Perlas A. Pericapsular nerve group (PENG) block for hip fracture. Reg Anesth Pain Med. 2018;43(8):859-63. https://doi.org/10.1097/ AAP.0000000000000847 PMid:30063657 PMCid:PMC11459890
18. Alrefaey AK, Abouelela MA. Pericapsular nerve group block for analgesia of positioning pain during spinal anesthesia in hip fracture patients, a randomized controlled study. Egyptian Journal of Anaesthesia. 2020;36(1):234-9. https://doi.org/10.1080/11101849.2020.1828017.
19. Lin X, Liu CW, Goh QY, Sim EY, et al. Pericapsular nerve group (PENG) block for early pain management of elderly patients with hip fracture: A single-center double-blind randomized controlled trial. Reg Anesth Pain Med. 2023;48(11):535-9. https://doi.org/10.1136/rapm-2022-104117 PMid:37055189
20. Pagano T, Scarpato F, Chicone G, Carbone D, et al. Analgesic evaluation of ultrasound-guided pericapsular nerve group (PENG) block for emergency hip surgery in fragile patients: A case series. Arthroplasty. 2019;1(1):18. https://doi.org/10.1186/s42836-019-0018-0 PMid:35240764 PMCid:PMC8796512
21. Pascarella G, Costa F, Del Buono R, Pulitanò R, et al. Impact of the pericapsular nerve group (PENG) block on postoperative analgesia and functional recovery following total hip arthroplasty: A randomised, observer-masked, controlled trial. Anaesthesia. 2021;76(11):1492-8. https://doi.org/10.1111/anae.15536 PMid:34196965 PMCid:PMC8519088
22. Pai P, Amor D, Lai YH, Echevarria GC. Use and clinical relevance of pericapsular nerve block (PENG) in total hip arthroplasty: A systematic review and meta-analysis. Clin J Pain. 2024;40(5):320-32. https://doi.org/10.1097/AJP.0000000000001196 PMid:38268183
23. Sheldon J, Nejthardt M, Quan C, Retief F, et al. SASA guidelines for regional anaesthesia in South Africa, South African Society of Anaesthesiologists; 2016. Available from: https://sasaweb.com/wp-content/uploads/2022/07/SASRA-guidelines-2016.pdf.
24. Kolli S, Nimma SR, Kukreja P, P. How I do it: Pericapsular nerve group (peng) block. ASRA Pain Medicine News [Internet]. 2023; 48. Available from: https://doi.org/10.52211/asra080123.007.
25. AAOS. Management of hip fractures in older adults: evidence-based clinical practice guideline.American Academy of Orthopaedic Surgeons; 2021. Available from: https://www.aaos.org/globalassets/quality-and-practice-resources/hip-fractures-in-the-elderly/hipfxcpg.pdf.
26. Aliste J, Layera S, Bravo D, Jara A, et al. Randomized comparison between pericapsular nerve group (PENG) block and suprainguinal fascia iliaca block for total hip arthroplasty. Reg Anesth Pain Med. 2021;46(10):874-8. https://doi.org/10.1136/rapm-2021-102997 PMid:34290085
27. Et T, Korkusuz M. Comparison of the pericapsular nerve group block with the intra-articular and quadratus lumborum blocks in primary total hip arthroplasty: A randomized controlled trial. Korean J Anesthesiol. 2023;76(6):575-85. https://doi.org/10.4097/kja.23064 PMid:37013389 PMCid:PMC10718628
28. Farag A, Hendi NI, Diab RA. Does the pericapsular nerve group block have limited analgesia in the initial

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2527
Original Article

post-operative period? Systematic review and meta-analysis. J Anesth. 2023;37(1):138-53. https://doi.org/10.1007/s00540-022-03129-5. PMid:36342537 PMCid: PMC9870839

PUBLISHER DETAILS

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa