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MD ANAESTHESIOLOGY

SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR- 563101

ULTRASOUND GUIDED PERICAPSULAR NERVE GROUP BLOCK VERSUS SUPRAINGUINAL FASCIA ILIACA COMPARTMENT BLOCK FOR EASE OF POSITIONING DURING SPINAL ANAESTHESIA FOR HIP FRACTURE SURGERIES: A RANDOMIZED CONTROLLED STUDY

BY:

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2025

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Kou-Ting Huang, Hsin-I Tsai, Sheng-Chin Kao. "Supra-inguinal fascia iliaca block versus peri-capsular nerve group (PNEG) block for pain management in patients with hip fracture: A double-blind randomised comparative trial", Injury, 2024

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https://mail.pjms.org.pk/index.php/pjms/article/download/10715/2532/

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Małgorzata Domagalska, Bahadir Ciftci, Tomasz Reysner, Jerzy Kolasiński, Katarzyna Wieczorowska-Tobis, Grzegorz Kowalski. "Pain Management and Functional Recovery after Pericapsular Nerve Group (PENG) Block for Total Hip Arthroplasty: A Prospective, Randomized, Double-Blinded Clinical Trial", Journal of Clinical Medicine, 2023

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Mariem Keskes, Mohamed Ali Mtibaa, Ameur Abid, Nizar Sahnoun, Salma Ketata, Rahma Derbel, Imen Zouche, Hichem Cheikhrouhou. "Pericapsular nerve group block versus fascia iliaca block for perioperative analgesia in hip fracture surgery: a prospective randomized trial", Pan African Medical Journal, 2023

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Luckapa Nuthep, Suwattana Klanarong, Suwimon Tangwiwat. "The Analgesic effect of adding ultrasound-guided pericapsular nerve group block to suprainguinal fascia iliaca compartment block for hip fracture surgery: A prospective randomized controlled trial", Medicine, 2023

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Title: Ultrasound Guided Pericapsular Nerve Group Block versus Suprainguinal Fascia Iliaca Compartment Block For Ease Of Positioning During Spinal Anaesthesia For Hip Fracture Surgeries: A Randomized Controlled Study ABSTRACT: Background Hip fractures represent a significant clinical challenge, particularly in the elderly, due to the associated morbidity and the necessity for timely surgical intervention. Perioperative pain management is vital in ensuring patient comfort, enabling optimal positioning for subarachnoid block (SAB), and improving perioperative outcomes. Among the various regional anaesthesia techniques, Pericapsular Nerve Group (PENG) block and Suprainguinal Fascia Iliaca Compartment Block (S-FICB) have gained popularity for their effectiveness in managing preoperative pain. Despite their increasing use, direct comparative data on the relative benefits of these two blocks remain scarce. Objectives The purpose of this study was to check the effectiveness of ultrasound-guided PENG block compared to S-FICB in people undergoing surgery for hip fractures. Those outcomes considered were patient positioning, the level of discomfort during positioning, stable blood pressure during surgery and how well postoperative pain was managed. Methods Adult patients with hip fractures (72 in total) who underwent procedures using spinal anaesthesia were part of this study. People were divided at random into Group A (PENG Block) and Group B (S-FICB). The procedures were carried out using ultrasound and all the technicians followed the same guidelines on how to do them and use drugs. Before and during the block, the Visual Analog Scale (VAS) was measured - first at rest (VAS-R) and then again during movement (VAS-M) - at several intervals: before the block (T0), at 5 minutes (T5), 15 minutes (T15) and at the time of SAB positioning (S0). While the procedure and surgical intervention was underway, the ASA monitor was used to watch over the heart rate and mean arterial pressure, to see how the patient responded. How quickly analgesia was provided and the amount of paracetamol and tramadol consumed during postoperative care were recorded to check on postoperative analgesia. Results VAS scores decreased significantly after administration of both blocks, indicating effective pain control. The PENG group exhibited slightly lower average VAS scores at T5, T15, and S0 as compared to those of S-FICB group; however, these differences were not of statistical significance. Hemodynamic parameters remained stable in both groups throughout the observation period, although a modest reduction in heart rate was noted in the S-FICB group during the initial measurements. Conclusion Our study is in line with the existing literature showing the pivotal role of regional anaesthesia in the management of hip fractures. Our findings show that both the Pericapsular Nerve Group (PENG) block and the Suprainguinal Fascia Iliaca Compartment Block (S-FICB) are

ACKNOWLEDGEMENT

First and foremost, I express my profound gratitude to my Parent's **MR. N K RAJESH & MRS. DEEPA RAJAN,** *My brother* **ADINARAYANA** *and my Husband* **Dr MUKTESH BHAIRAVI** *for all their blessings & for giving me constant encouragement, unfailing support and unconditional love.*

I would like to acknowledge all those who have supported me, not only to complete my dissertation, but throughout my post-graduation course.

I wish to express my heartful indebtedness and owe a deep sense of gratitude to my mentor and guide **Dr. SURESH KUMAR N** *Professor and HOD, Department of Anaesthesiology for being very helpful throughout the study and offered their invaluable guidance and support to fully understand and complete this study. Through their vast professional knowledge and expertise, he ensured that I understood everything before I apply the information in my study. Without their constant supervision and advice completion of this dissertation would have been impossible. Their stature, sense of punctuality, strict adherence to academic schedule, humility and knowledge have been highly inspirational for the whole of my post-graduation period.*

It gives me immense pleasure to extend my sincere thanks to Professor **Dr. Kiran N**, *Professor, and Department of Anaesthesiology. Who is a pioneer in academics and teaching activities, taking it to high standards for a post graduate student and keep encouraging, guiding in correct path to be knowledgeable and successful in the field of Anaesthesiology.*

I wish to express my heartfelt sense of gratitude to **Dr Ravi M,** *Professor, Department of Anaesthesiology for offering his invaluable guidance and moral support during my entire post-graduate course, which enabled me to complete my work.*

I am extremely thankful to ***Dr. SUJATHA, Dr. LAVANYA, Dr. VISHNUVARDHAN, Dr. SUMANTH*** *for their constant help and guidance throughout the course. They were the source of encouragement, support and for patient perusal, to which I am deeply obliged.*

My heartfelt thanks to my seniors ***Dr. ASWIN, Dr. RAHUL Dr. ARUNSETH, Dr. NAGASOBBANAA, Dr. HAZRATH NABI, Dr. DINESH KATTA, Dr. HARITHA, Dr. RUKMINI & Dr. USHA*** *for their support and help in carrying this study and throughout the graduation course.*

I express my sincere thanks to my colleagues and dear friends ***Dr. RATAN, Dr. HIMAJA, Dr. SIRI, Dr. SUSMITHA, Dr. DINESH, Dr. SADVI, Dr. MEGHANA, Dr. BHARATH, Dr. AKHIL, Dr. TARUN, Dr. MUTTU and Dr. SHOBHET*** *for their constant support.*

I am also thankful to all the OT and PARAMEDICAL STAFF for their valuable help while performing this study.

I express my special thanks to all my PATIENTS and their families, who in the final conclusion are the best teachers and without whom this study would have been impossible.

DR. NAMRATHA K R

TITLE

ULTRASOUND GUIDED PERICAPSULAR NERVE GROUP BLOCK VERSUS SUPRAINGUINAL FASCIA ILIACA COMPARTMENT BLOCK FOR EASE OF POSITIONING DURING SPINAL ANAESTHESIA FOR HIP FRACTURE SURGERIES: A RANDOMIZED CONTROLLED STUDY

ABSTRACT:

Background

Hip fractures represent a significant clinical challenge, particularly in the elderly, due to the associated morbidity and the necessity for timely surgical intervention. Perioperative pain management is vital in ensuring patient comfort, enabling optimal positioning for subarachnoid block (SAB), and improving perioperative outcomes. Among the various regional anaesthesia techniques, Pericapsular Nerve Group (PENG) block and Suprainguinal Fascia Iliaca Compartment Block (S-FICB) have gained popularity for their effectiveness in managing preoperative pain. Despite their increasing use, direct comparative data on the relative benefits of these two blocks remain scarce.

Objectives

The purpose of this study was to check the effectiveness of ultrasound-guided PENG block compared to S-FICB in people undergoing surgery for hip fractures. Those outcomes considered were patient positioning, the level of discomfort during positioning, stable blood pressure during surgery and how well postoperative pain was managed.

Methods

Adult patients with hip fractures (72 in total) who underwent procedures using spinal anaesthesia were part of this study. People were divided at random into Group A (PENG Block) and Group B (S-FICB). The procedures were carried out using ultrasound and all the technicians followed the same guidelines on how to do them and use drugs. Before and during the block, the Visual Analog Scale (VAS) was measured - first at rest (VAS-R) and then again during movement (VAS-M) - at several intervals: before the block (T0), at 5 minutes (T5), 15 minutes (T15) and at the time of SAB positioning (S0). While the procedure and surgical intervention was underway, the ASA monitor was used to watch over the heart rate and mean arterial pressure, to see how the patient responded. How

quickly analgesia was provided and the amount of paracetamol and tramadol consumed during postoperative care were recorded to check on postoperative analgesia.

Results

VAS scores decreased significantly after administration of both blocks, indicating effective pain control. The PENG group exhibited slightly lower average VAS scores at T5, T15, and S0 as compared to those of S-FICB group; however, these differences were not of statistical significance. Hemodynamic parameters remained stable in both groups throughout the observation period, although a modest reduction in heart rate was noted in the S-FICB group during the initial measurements. The quantity of analgesics consumed postoperatively and the timing of first rescue medication were comparable between the two groups. Importantly, no complications or adverse effects related to the blocks were reported.

Conclusion

Ultrasound-guided PENG and S-FICB blocks are both reliable in providing good perioperative analgesia in patients with hip fractures. While the overall effectiveness and hemodynamic profiles were similar, the PENG block showed a trend toward quicker onset and improved pain relief during positioning for SAB. Its anatomical precision and potential for preserving motor function may offer advantages, especially in older patients or those at risk for postoperative mobility delays. These findings advocate for the inclusion of the PENG block in perioperative care strategies, particularly within Enhanced Recovery After Surgery (ERAS) protocols. Further research involving larger and more diverse patient populations is recommended to validate these results and guide clinical practice.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

INTRODUCTION:

Hip fractures, especially in the geriatric population, present an increasingly frequent and formidable challenge in anaesthetic practice. As anaesthesiologists, we often encounter these patients at their most vulnerable—frail, in severe pain, and often burdened with multiple comorbidities. The pathophysiological stress imposed by a hip fracture is compounded by pain-induced sympathetic activation, which can precipitate cardiovascular instability, respiratory compromise, and delirium in high-risk patients.[1]

Our role in optimizing perioperative care begins not in the operating theatre, but at the bedside, where early, effective analgesia can significantly alter the trajectory of a patient's surgical and recovery experience. A critical component of this involves facilitating safe, comfortable positioning for neuraxial blockade, most often spinal anaesthesia, which remains the anaesthetic of choice for hip fracture surgeries due to its favorable hemodynamic profile and reduced incidence of postoperative delirium in the elderly. However, effective positioning is frequently hampered by pain, limiting patient cooperation and complicating the procedure [2].

Traditionally, systemic analgesics such as opioids and NSAIDs have been the mainstay of pain control in these settings [1]. Yet, in elderly patients, these agents carry a significant risk of adverse effects, including respiratory depression, sedation, gastrointestinal bleeding, delirium, and renal impairment. Consequently, there has been a paradigm shift toward employing regional anaesthesia techniques to achieve site-specific, opioid-sparing analgesia with a superior safety profile.

Among the earliest regional techniques employed for hip fracture analgesia was the "**Fascia Iliaca Compartment Block (FICB)**", a relatively simple block initially performed using landmark techniques. The classical infrainguinal approach, however, has demonstrated variable success in blocking the obturator nerve, a key contributor to anterior hip joint innervation. This inconsistency led to the development of the **suprainguinal fascia iliaca compartment block (SFICB)**—a refinement based on sonographic guidance and anatomical understanding, which allows local anaesthetic spread more proximally, potentially covering the lateral femoral cutaneous nerve, femoral nerve and obturator nerve more reliably [3].

In our practice, the SFICB has been a widely accepted and well-tolerated technique, especially useful for preoperative analgesia and facilitating spinal anaesthesia in hip fracture patients. Previous studies done by Desmet et al. (2017) [4] show that the suprainguinal approach provides superior sensory blockade compared to the infrainguinal approach. Additionally, its motor-sparing effect relative to femoral nerve blocks has made it an attractive option in fast-track surgical pathways.

Despite these advantages, even the SFICB may fall short in completely anesthetizing the hip capsule, particularly the anterior region, which receives innervation from articular branches of the "**obturator nerve**, **femoral nerve** and often, the **accessory obturator nerve**." These nerves, critically involved in nociception following femoral neck fractures, are not consistently reached by traditional FICB techniques.

It is against this backdrop that a novel technique, the "**Pericapsular Nerve Group (PENG) block"**, emerged in 2018[5], described by "Girón-Arango et al." [2] PENG block was conceptualized based on cadaveric dissection and radiological imaging that mapped the "articular nerve branches supplying the anterior hip capsule." This block targets "the plane between the **psoas muscle** and the **superior pubic ramus**, adjacent to **iliopubic eminence**, where the articular branches converge." The theoretical advantage is precise analgesia of the anterior hip capsule without causing quadriceps weakness—a frequent and sometimes undesirable side effect of femoral nerve or fascia iliaca blocks, especially in the postoperative period.

From an anaesthetists' standpoint, the PENG block offers an appealing combination of effective pain control and motor preservation. Numerous early studies, including those by Aliste et al.[3](2021) and Morrison et al. [6] have demonstrated significant reductions in VAS pain scores, improved patient satisfaction, and enhanced ease of positioning for neuraxial blocks following PENG. Moreover, its favorable safety profile—owing to its relatively superficial approach and the absence of major vascular structures in the target area—makes it a low-risk, high-reward intervention in the perioperative setting.

Despite this promise, real-world comparative data between the PENG block and other regional techniques such as the SFICB remain limited. Most available literature focuses on single-arm observational studies or small cohort comparisons, often with varying methodologies and endpoints. From the clinician's perspective, choosing the optimal block often involves a trade-off between onset time, reliability, technical complexity, and risk of motor blockade. Therefore, head-to-head comparisons that address these practical concerns are essential to guide informed clinical decision-making.

In our daily practice, the ease of spinal anaesthesia positioning is an outcome that is both clinically relevant and logistically important. A patient in severe pain may be unable to achieve the required flexion or remain still, increasing the difficulty of spinal needle placement and potentially leading to failed or traumatic attempts. Moreover, delays in positioning can prolong operating room turnover times and contribute to anaesthetist fatigue and procedural stress. Therefore, the block that can best facilitate painless and cooperative positioning becomes a vital tool in the anaesthetist's arsenal.

The **rationale** for this randomized controlled study is thus built on two critical needs: (1) to directly compare the **analgesic efficacy and positioning comfort** provided by the "**ultrasound-guided PENG block** and **S-FICB** in patients undergoing hip fracture surgeries" and (2) to evaluate these techniques in a controlled, standardized manner that reflects real-world clinical practice. By doing so, we hope to generate evidence-based data that can be translated into day-to-day anaesthesia protocols.

The foundational work of Girón-Arango et al. (2018)[2] remains central to the PENG block's development, while cadaveric studies such as those by Short et al. (2018) support its anatomical accuracy. Comparative effectiveness data by Morrison et al.[7] , as well as systematic reviews documented by Aliste et al. (2021)[3], add to the growing body of literature that positions the PENG block as a viable, perhaps superior, alternative for hip fracture analgesia. At the same time, the extensive work on FICB, especially the suprainguinal variant, cannot be ignored. The refined technique advocated by Desmet et al. and the clinical insights from studies conducted by Kukreja et al.[8] and Vermeylen et al.[4] continue to validate its use as a robust, time-tested block with good clinical outcomes.

Ultimately, this study aims to answer a very practical question faced by anaesthesiologists every day: **Which block—PENG or SFICB—better facilitates pain-free, cooperative positioning for spinal anaesthesia in patients with hip fractures?** Through careful methodology, objective evaluation, and adherence to anaesthetic best practices, we aim to provide clarity and confidence in this critical decision.

Need for the study:

Given the anatomical complexity of the hip joint and the intensity of pain associated with fractures in this region, effective regional analgesia has become a cornerstone of modern anaesthetic management for hip fracture surgeries. As described, both the PENG block and the suprainguinal FICB have emerged as promising modalities to alleviate pain during patient positioning for subarachnoid block. While preliminary reports and isolated studies support their efficacy, the growing popularity of these blocks has outpaced the accumulation of robust comparative evidence, especially in terms of their relative effectiveness, onset time, and functional outcomes during spinal anaesthesia positioning.

From an anaesthesiologist's standpoint, the key objective is not merely pain relief but also the facilitation of optimal positioning with minimal patient discomfort and without compromising motor function—thus allowing for a swift, smooth, and successful neuraxial block. While the PENG block offers a primarily sensory blockade with preserved motor function, which is particularly advantageous for avoiding delay in postoperative mobilisation, the suprainguinal FICB's broader nerve coverage may offer more consistent analgesia in certain patients. However, due to anatomical variability and differences in spread patterns of local anaesthetic, its efficacy may differ between individuals, especially without advanced ultrasound guidance.

What further complicates the decision-making process is the lack of direct head-to-head comparisons between the two techniques in controlled clinical settings. Although some observational data and smaller randomized studies have evaluated these blocks independently, the literature remains sparse in providing high-level evidence that can confidently guide clinical practice when choosing the most appropriate block for patients with fractured hips requiring spinal anaesthesia. Furthermore, factors such as ease of performance, time to perform, ultrasound visibility, haemodynamic effects, and the need for rescue analgesia during positioning are often under-reported in the available studies.

There is also an increasing emphasis on enhancing the perioperative experience for elderly and frail patients, who form the bulk of the hip fracture demographic. Minimizing systemic opioid use, reducing the risk of delirium, and enabling early mobilisation through motor-sparing analgesic techniques are goals that align with the principles of Enhanced Recovery after Surgery (ERAS) protocols. Both PENG and suprainguinal FICB are theoretically well-suited for this purpose, but their comparative utility in real-world settings needs to be more clearly established through well-structured research.

Thus, the **present study was designed as a randomized controlled trial** to directly compare the efficacy of ultrasound-guided "Pericapsular Nerve Group block versus" the Suprainguinal Fascia Iliaca Compartment block in facilitating patient positioning during spinal anaesthesia in hip fracture surgeries. By systematically evaluating pain scores, ease of positioning, block performance time, and other procedural parameters, this study aims to generate clinically meaningful data that can inform and optimize anaesthetic practice.

This investigation is particularly significant in light of the limited high-quality evidence currently available, and it is expected to address an important clinical gap. The insights derived from this study could potentially influence regional anaesthesia protocols, enhance patient comfort, and improve perioperative outcomes in orthopaedic trauma care.

AIMS & OBJECTIVES

OBJECTIVES OF THE STUDY

Primary objective

- To determine the effectiveness of PENG block and S-FICB with help of Pain score for patient positioning during subarachnoid block.

Secondary objective

- “To compare the duration of postoperative analgesia.”

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Anatomy and Innervation Relevant to Hip Fractures[10]

The hip joint is a "ball-and-socket synovial joint", consisting of the "femoral head articulating with the acetabulum of the pelvis." It is richly innervated by branches from the lumbar and sacral plexuses. Specifically, the anterior capsule of the hip is innervated by":

- **"Femoral nerve" (L2–L4)**
- **"Obturator nerve" (L2–L4)**
- **Accessory "obturator nerve" (if present in 10–30% of the population)**

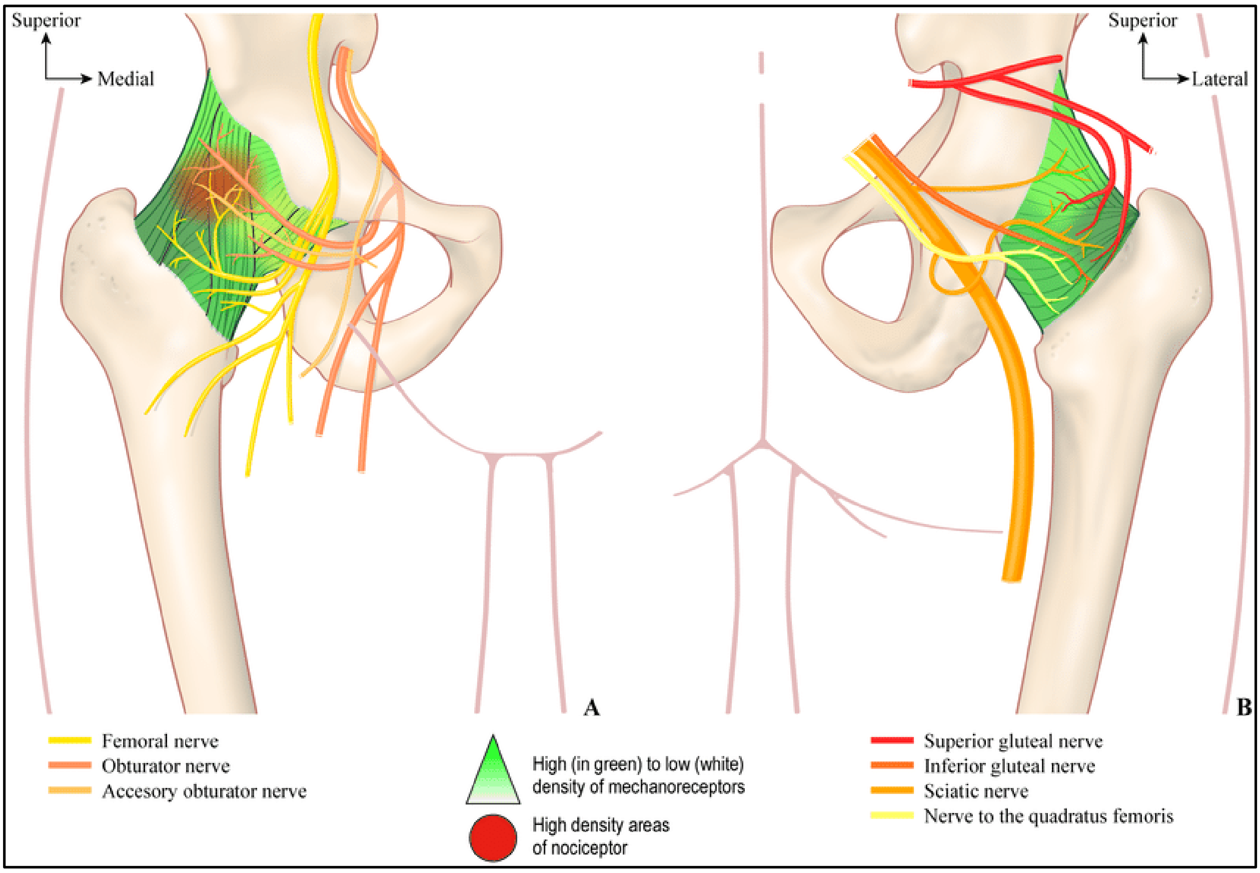


Fig 1: "Summary of the sensory innervation of the hip joint based on review of the literature: (A) anterior, and (B) posterior views."

These nerves carry nociceptive fibers from the anterior capsule, which is the primary pain generator in hip fractures. The posterior capsule, in contrast, receives contributions from the **sciatic and superior gluteal nerves**, which are less significant in mediating pain during fracture or surgical manipulation.

Given the complexity of the innervation, regional anaesthesia targeting only a single nerve may not provide adequate analgesia. Hence, a block targeting multiple articular branches such as the **Pericapsular Nerve Group (PENG)** or **Suprainguinal Fascia Iliaca Compartment Block (S-FICB)** has gained attention for perioperative analgesia and positioning.

Pericapsular Nerve Group (PENG) Block[10]

"The PENG block was first described by Girón-Arango et al. in 2018 as a motor-sparing block that targets the articular branches of the femoral nerve, obturator nerve, and accessory obturator nerve using a single injection at the iliopubic eminence. It utilizes a high-frequency linear ultrasound probe" to visualize:

- **"Anterior Inferior Iliac Spine (AIIS)"**
- **"Iliopubic eminence"**
- **"Psoas tendon"**

By depositing local anaesthetic in this plane, PENG block achieves targeted sensory blockade while preserving motor function—a major advantage for elderly patients with hip fractures requiring early mobilisation post-operatively.

Suprainguinal Fascia Iliaca Compartment Block (S-FICB)[11]

S-FICB is a modification of the classical fascia iliaca block, introduced to improve the spread of local anaesthetic to the lumbar plexus. The suprainguinal approach allows cephalad spread under the fascia iliaca, potentially covering:

- **Femoral nerve**
- **Lateral femoral cutaneous nerve**
- **Obturator nerve (inconsistently)**

Hebbard et al. (2011)[1] described this technique using ultrasound guidance to enhance the precision and efficacy. Though S-FICB is not specifically articular-branch targeted, its broader nerve coverage often translates into effective analgesia for hip fracture patients.

Clinical Need and Evolution

Hip fractures are associated with intense pain, and positioning for spinal anaesthesia often aggravates discomfort, complicating neuraxial access. The increasing geriatric population means more patients with hip fractures are presenting for surgical fixation, often with multiple comorbidities.

Historically, systemic opioids or landmark-based nerve blocks were used for analgesia. However, opioid-related side effects (delirium, respiratory depression) and variable success rates of blind nerve blocks have led to increased adoption of **ultrasound-guided nerve blocks**, which are safer and more effective.

Comparative Evidence Between PENG and S-FICB[12]

Recent literature has started comparing the two blocks in terms of efficacy for spinal positioning, pain control, and safety:

- **Aliste et al.**[3] conducted a trial comparing PENG and FICB and found that PENG provided superior pain relief during patient positioning without significant motor blockade

- A systematic review by Jadon et al[5] emphasized the anatomical rationale behind the superior analgesia offered by the PENG block due to its precise targeting of articular branches.

Despite the growing body of evidence, **randomized controlled trials comparing PENG and S-FICB head-to-head are limited**, and conclusions about superiority are not definitive. This forms the rationale for conducting the present study.

Ultrasound Guidance in Regional Anaesthesia

Ultrasound has revolutionized regional anaesthesia by enabling real-time visualization of anatomical structures and needle trajectory[13]. The advantages include:

- Improved block success rates
- Reduced volume of local anaesthetic required
- Decreased incidence of complications such as vascular puncture or nerve injury

For both PENG and S-FICB, "ultrasound allows accurate deposition of the drug in the desired fascial" or interfascial plane[13].

Physiological Benefits of Effective Pre-Spinal Analgesia[14]

Pain and anxiety during spinal anaesthesia positioning can result in:

- Hypertension and tachycardia
- Increased catecholamine levels
- Agitation, especially in elderly patients

Effective pre-procedural nerve blocks help mitigate these physiological responses, making spinal anaesthesia smoother and reducing the risk of adverse events such as myocardial ischemia.

Gaps in Literature and Need for Study

Despite theoretical advantages of PENG over S-FICB, the existing literature lacks high-quality randomized trials comparing these two blocks for the specific purpose of spinal anaesthesia positioning. Moreover, the effect of these blocks on ease of positioning, onset of analgesia, and patient satisfaction has not been well-explored.

This study aims to fill this gap by:

- Employing a prospective, randomized controlled design
- Using ultrasound for accurate block placement
- Evaluating pain scores, time to spinal positioning, and patient satisfaction
- Ensuring standardized local anaesthetic volumes and concentration across groups

Such research will help refine best practices in the anaesthetic management of hip fracture surgeries, particularly in elderly and high-risk patients.

Literature Review

1. **Kulkarni et al[15].** conducted a randomized, double-blinded prospective clinical study to compare the analgesic efficacy of two ultrasound-guided nerve blocks—"**Pericapsular Nerve Group (PENG) block** and **Supra-inguinal Fascia Iliaca Compartment Block (FICB)**—in patients undergoing spinal anesthesia for hip fracture surgery. The study aimed not only to assess pain relief but also to evaluate

the ease of positioning and patient satisfaction during the administration of spinal anesthesia."

"A total of 60 adult patients (ASA I–II, BMI 18–35 kg/m²) scheduled for elective hip fracture surgery were randomized into two groups: PENG block (n=30) and supra-inguinal FICB (n=30), both administered under ultrasound guidance with 20 ml of 0.25% bupivacaine. Pain intensity was measured using the Numerical Rating Scale (NRS) at baseline, pre-repositioning, and during repositioning for spinal anesthesia. The anesthetist performing the spinal anesthesia was blinded to the group allocation."

The results demonstrated a significant reduction in pain scores in both groups ($p<0.001$), confirming the analgesic efficacy of both blocks. Although the PENG group showed a trend toward superior pain relief—particularly in cases involving fracture of the femoral neck—this difference was not statistically significant ($p=0.853$). Additionally, both techniques provided similar levels of patient acceptance and ease of positioning for spinal anesthesia.

Anatomically, the PENG block may offer more targeted analgesia for femoral neck fractures by effectively blocking the articular branches of the femoral, obturator, and accessory obturator nerves. Conversely, the supra-inguinal approach to FICB may offer broader cranial spread of local anesthetic, enhancing lumbar plexus coverage with a similar volume.

The study concluded that both PENG and supra-inguinal FICB are effective, safe, and clinically feasible options for managing perioperative pain and facilitating patient positioning in hip fracture surgeries. The authors recommended further research with larger samples and subgroup analyses to explore potential benefits in specific fracture patterns such as femoral neck fractures.

2. Bauiomy et al [16]. "conducted a randomized, double-blinded clinical trial to compare the efficacy of Pericapsular Nerve Group (PENG) block and Supra-inguinal Fascia Iliaca Compartment Block (S-FICB) in patients presenting with hip fractures", with a focus on their utility in facilitating patient positioning for neuraxial anesthesia. A secondary objective was to evaluate analgesic outcomes when dexamethasone was used as an adjuvant to ropivacaine in both blocks.

The study enrolled 60 patients aged ≥40 years with "ASA physical status I–III, all scheduled for hip fracture surgery under spinal anesthesia. Participants were randomly divided into two equal groups. Group I received the S-FICB, while Group II received the PENG block." Both blocks were administered under ultrasound guidance using 23 ml of 0.25% ropivacaine with 2 ml (8 mg) of dexamethasone. Pain assessment was conducted at rest and during passive movement using the "Numerical Rating Scale (NRS)", before and 20 minutes after the block. "Ease of positioning for spinal anesthesia (EOSP)" was rated on a 4-point scale. Additional outcomes included postoperative analgesia duration, tramadol requirements, patient satisfaction, and block-related complications.

The findings revealed that the "PENG group showed significantly better positioning scores ($p<0.001$) and greater reductions in NRS scores at both rest ($p=0.015$) and during movement ($p=0.010$) compared to the S-FICB group. However, the duration of postoperative analgesia, time to first analgesic requirement, and total tramadol use over 24 hours were not significantly different between the two groups. Patient satisfaction scores were also comparable."

Anatomically, the PENG block targets the articular branches of the femoral, obturator, and accessory obturator nerves, which are primary mediators of anterior hip capsule pain—making it particularly suited for immediate pain relief in hip fracture patients. In contrast, the S-FICB covers a broader nerve distribution but may lack the same specificity for the anterior capsule.

The use of dexamethasone as an adjuvant is consistent with prior evidence suggesting its role in prolonging the analgesic duration of peripheral nerve blocks. The study acknowledged limitations such as the subjective nature of pain assessment and the absence of data on hospitalization duration.

Overall, both blocks were effective and safe; however, the PENG block provided superior immediate analgesia and facilitated easier positioning for spinal anesthesia, suggesting it may be the more favorable technique in this clinical setting.

3. Jadon et al.[11] carried out a randomized, double-blinded trial to directly compare the analgesic effectiveness and clinical utility of "supra-inguinal fascia iliaca compartment block (S-FICB) and pericapsular nerve group (PENG) block in facilitating patient positioning for spinal anesthesia (SA) in individuals undergoing surgery for hip fractures." The study focused on evaluating both immediate pain relief and overall perioperative analgesia.

Sixty-six adult patients (≥40 years), all presenting with recent hip fractures and persistent pain, were included. Participants were randomized into two equal groups: one receiving the ultrasound-guided S-FICB and the other the PENG block. Both techniques utilized 25 ml of 0.25% bupivacaine mixed with 8 mg of dexamethasone. Pain levels were assessed using the Numerical Rating Scale (NRS) at baseline and again 30 minutes post-intervention, both at rest and during passive elevation of the affected limb. The ease of spinal positioning

(EOSP) was graded on a 0–3 scale. Standardized postoperative analgesia included intravenous paracetamol and tramadol, with rescue fentanyl administered if necessary

Both groups demonstrated significant reductions in NRS scores post-block ($p < 0.0001$), but the PENG group achieved significantly lower resting pain scores ($p = 0.000$) and higher EOSP scores (mean 2.15 ± 0.6) compared to the S-FICB group (1.39 ± 0.49), suggesting that patients in the PENG group were more comfortably positioned for SA. The total tramadol use and timing of the first postoperative analgesic request were not statistically different between groups, indicating comparable efficacy in extended postoperative pain control.

No block-related adverse events were reported. Patient satisfaction was high and similar across both groups. Although resting NRS scores at 12 hours post-surgery were slightly better in the PENG group, movement-related pain at 24 hours was marginally lower in the S-FICB group, though not statistically significant.

The findings support the PENG block's superior effectiveness for immediate pain control and facilitating positioning for neuraxial anesthesia, which is likely due to its targeted blockade "of the articular branches of the femoral, obturator, and accessory obturator nerves." The use of dexamethasone in both techniques possibly enhanced the duration and quality of analgesia, aligning with previous literature on steroid adjuvants.

Despite these advantages, the study acknowledged certain limitations, including the lack of postoperative motor assessment and reliance on clinician-administered analgesia rather than patient-controlled options. These factors could influence the precision of pain management metrics.

In conclusion, both S-FICB and PENG blocks are effective options for perioperative pain control in hip fracture patients, but the PENG block appears to provide better immediate analgesia and ease of positioning, making it a preferred choice in pre-spinal anesthesia preparation.

4. Keskes et al.[17] "conducted a prospective, randomized clinical trial to evaluate and compare the Pericapsular Nerve Group (PENG) block and the Supra-Inguinal Fascia Iliaca Compartment Block (SI-FICB) in terms of their effectiveness in providing perioperative analgesia and facilitating patient positioning for spinal anesthesia (SA) in elderly patients with hip fractures."

The study involved 89 patients aged over 65 years "undergoing surgical repair of hip fractures under spinal anesthesia." Eligible participants were classified as ASA I–III and reported significant pain during limb mobilization (VAS > 5). Patients were randomly assigned to one of two groups: the PENG group (n = 44), which received 10 ml of 0.25% bupivacaine with 10 ml of 2% lidocaine via ultrasound-guided PENG block; and the SI-FICB group (n = 45), which received the same drug combination using the supra-inguinal approach.

Pain scores "were recorded using the Visual Analogue Scale (VAS) at four time points: at rest before the block (T1), during movement before the block (T2), 20 minutes after the block at rest (T3), and in the sitting position (T4). The ease of spinal positioning (EOSP), time taken for block administration, postoperative opioid requirements, and pain scores at 3, 6, 12, and 24 hours" were also evaluated.

Both blocks significantly reduced pain at rest and during movement 20 minutes post-intervention ($p < 0.01$). Notably, the PENG group experienced lower pain scores during positioning for SA (mean VAS 1.82 ± 0.582) compared to the SI-FICB group (2.16 ± 0.824), with statistical significance ($p = 0.046$). "However, no significant difference was found in EOSP scores between groups ($p = 0.328$). Similarly, morphine consumption and VAS scores during the 24-hour postoperative period were comparable ($p > 0.05$ at all time points)", suggesting equivalent analgesic effectiveness beyond the immediate preoperative period.

The authors highlighted the PENG block's targeted analgesic benefit during patient positioning, likely due to its effect on "the articular branches of the femoral and obturator nerves, which innervate the anterior hip capsule." Despite this advantage in positioning-related analgesia, overall EOSP scores were not significantly different, possibly due to patient-related factors such as anxiety or anatomical variations that influence positioning beyond pain levels alone.

Both techniques were safe and free from block-related complications, and the combination of lidocaine and bupivacaine likely facilitated a rapid onset and prolonged duration of analgesia. The study's limitations included potential variability in pain reporting among elderly patients, non-standardized surgical techniques, and a relatively short postoperative follow-up.

In summary, while both PENG and SI-FICB are effective for perioperative analgesia in elderly patients with hip fractures, the PENG block provided superior pain relief during positioning for spinal anesthesia, making it a favorable option in pre-anesthetic care. Postoperative analgesia was comparable between techniques, affirming the clinical utility of both blocks for sustained pain control in this population.

5. **Desmet et al.**[4] investigated the efficacy and safety of a **high-volume longitudinal "supra-inguinal fascia iliaca compartment block (FICB)** for postoperative analgesia in patients undergoing **total hip arthroplasty (THA)"** via the anterior approach. Their study aimed to address the limitations of conventional FICB techniques and reduce opioid consumption, a major goal in contemporary postoperative care.

The prospective, randomized, double-blind controlled trial included "**88 adult patients** scheduled for elective THA. Participants were randomly assigned to receive either a **supra-inguinal FICB with 40 ml of 0.5% ropivacaine** or no block (control group)." Pain intensity was measured using standard scales, and **total morphine consumption within 24 hours** was the primary outcome. A subset of patients also underwent pharmacokinetic assessment to evaluate serum levels of total and unbound ropivacaine, ensuring safety at high dosages.

The results showed a **significant reduction in morphine usage** in the FICB group (mean 10.25 mg) compared to the control group (mean 19.0 mg), with a **p-value of 0.004**, indicating both clinical and statistical significance. Importantly, the pharmacokinetic analysis in 10 patients from the FICB group confirmed that **serum ropivacaine levels remained within safe limits**, and **no systemic toxicity** was observed.

The study's methodology—particularly the use of a high-volume, proximally placed block—likely enhanced anesthetic spread to the **lumbar plexus**, ensuring better coverage of the femoral and obturator nerves, which innervate the anterior hip region. This anatomical targeting aligns with emerging evidence emphasizing the importance of proximal anesthetic deposition for effective nerve blockade.

While the study was robust in design, limitations included its focus solely on the anterior surgical approach and a small pharmacokinetic sample size. Additionally, long-term pain outcomes and comparisons with other regional techniques like **PENG block** or **lumbar plexus block** were not assessed.

In conclusion, the findings support the **longitudinal supra-inguinal FICB as an effective and safe option** for reducing postoperative opioid requirements in anterior THA. The technique offers a promising addition to multimodal analgesia protocols and warrants further investigation in broader surgical settings.

6. Gerhardt et al. [18] undertook a detailed anatomical study to map and classify the neural structures surrounding the human hip joint, with a focus on identifying the distribution and density of sensory nerve fibers and mechanoreceptors. While previous research had primarily addressed the hip's structural and vascular anatomy, this study emphasized its sensory innervation, which holds critical implications for pain management and regional anesthesia techniques in orthopedic care.

The research involved dissection of eight cadaveric hips, with ten samples collected from each joint across specific regions of the hip capsule—superiolateral, anterior, posterior, and inferior. Using histological staining and microscopy, the authors assessed nerve distribution by quantifying the mean number of nerve fibers per high-power field (mnf/hpf) and identifying specialized sensory structures such as Ruffini corpuscles, which are responsible for joint proprioception and pressure detection.

Key findings demonstrated that nerve fibers and mechanoreceptors were unevenly distributed across the joint. The superiolateral capsule had the highest concentration of mechanoreceptors (mean 9.6 mnf/hpf), while the anterior acetabular labrum was also richly innervated (3.4 mnf/hpf for nerve fibers, 4.3 mnf/hpf for mechanoreceptors). These areas were dominated by Ruffini endings, indicating their significant role in proprioception and nociception.

The study highlighted that the anterior and superiolateral capsule and anterior labrum are especially sensitive regions, likely contributing to pain perception and joint stabilization. These findings provide a solid anatomical basis for the clinical symptoms seen in anterior hip disorders and explain why interventions targeting these regions—such as the Pericapsular Nerve Group (PENG) block—can be effective in managing hip pain.

From a clinical perspective, this anatomical mapping enhances the understanding of why certain hip pathologies, such as labral tears, result in significant anterior hip pain. It also supports the design and optimization of nerve block techniquesthat aim to relieve pain while preserving joint proprioception by avoiding disruption of mechanoreceptors.

Although the study's findings were based on cadaveric specimens, limiting direct correlation with live physiological responses, the data offer a foundational reference for further clinical investigations. The comprehensive identification of sensory innervation zones in the hip has important implications for surgeons, anesthesiologists, and pain specialists, informing both diagnosis and treatment planning.

In conclusion, Gerhardt et al. provide valuable insight into the sensory architecture of the hip joint, reinforcing the need for targeted regional anesthesia approaches that account for the distribution of nerve-rich areas. Their work contributes to a more nuanced understanding of hip joint innervation, paving the way for improved management of hip-related pain and function.

7.Kalashetty et al. [19] conducted a double-blind, randomized controlled trial to assess the comparative efficacy of two regional anesthesia techniques—Pericapsular Nerve Group (PENG) block and Fascia Iliaca Compartment Block (FICB)—in managing preoperative pain during positioning for spinal anesthesia (SA) in adult patients undergoing hip surgeries.

The study included 90 adult patients scheduled for hip surgery under SA, who were randomized into two groups of 45 each. One group received a PENG block with 20 ml of 0.25% bupivacaine, while the other received an FICB using 30 ml of 0.25% bupivacaine. Both blocks were administered under ultrasound guidance to ensure precise delivery. Pain levels were assessed using the Visual Analog Scale (VAS) at rest and during passive limb movement (15° leg raise), both before and 30 minutes after the block. A blinded observer conducted the assessments, and patients with inadequate pain relief (VAS >3) received rescue analgesia with intravenous fentanyl.

The results demonstrated that both blocks significantly reduced pain scores, but the PENG block was markedly more effective. The mean VAS score at rest was 2.16 ± 0.67 in the PENG group versus 4.07 ± 0.69 in the FICB group ($p = 0.001$). During passive movement, the PENG group reported a mean VAS of 3.29 ± 0.73, compared to 5.11 ± 0.71 in the FICB group ($p = 0.001$). In addition, the PENG group showed greater reductions in hemodynamic parameters (heart rate, systolic and diastolic blood pressure), suggesting superior analgesic efficacy. No complications were reported in either group.

The authors attributed the greater effectiveness of the PENG block to its focused action on the articular branchesinnervating the anterior hip capsule, which is known to be a dense nociceptive zone based on prior anatomical studies (e.g., Gerhardt et al.). In contrast, the FICB acts on a broader array of nerves (femoral, lateral femoral cutaneous, and obturator), but may not provide equally targeted analgesia.

Strengths of the study include its robust double-blind, randomized design, the use of objective pain and hemodynamic measurements, and an adequate sample size. However, it was limited by its exclusive focus on preoperative pain, without evaluation of postoperative analgesia duration, opioid consumption, or functional recovery. Also, variability in surgical procedures could have influenced pain responses.

In summary, this study provides strong evidence favoring the PENG block over the FICB for pre-spinal positioning analgesia in hip surgery patients. Its superior pain relief and physiological stability make it a promising technique for improving patient comfort and reducing reliance on systemic opioids in the perioperative period. Further studies assessing postoperative outcomes and patient satisfaction are warranted.

8. Kumar et al.[20] conducted a prospective, randomized trial to compare the infrainguinal versus suprainguinal approaches of the fascia iliaca compartment block (FICB) for postoperative analgesia following total hip arthroplasty (THA). The aim was to determine which technique provided more effective pain control and minimized opioid consumption in the immediate postoperative period.

Forty patients undergoing elective THA were randomly allocated into two groups: Group S (suprainguinal FICB) and Group I (infrainguinal FICB). Each patient received 40 ml of 0.2% bupivacaine under ultrasound guidance. All participants had access to patient-controlled analgesia (PCA) with morphine post-surgery, and pain levels were assessed using the Visual Analog Scale (VAS) at 3, 6, 12, and 24 hours. Additionally, the total morphine consumption and time to first PCA request were recorded.

The results indicated that patients in the suprainguinal group experienced lower VAS scores at 6 hours, though pain levels were comparable at later time points. Importantly, time to first morphine request was significantly longer in the suprainguinal group (356.28 ± 33.32

minutes vs. 291.48 ± 37.17 minutes; $p < 0.001$), and cumulative morphine use over 24 hours was significantly reduced (6.95 ± 2.14 mg vs. 10.50 ± 2.24 mg; $p < 0.001$). These findings suggest prolonged and more effective analgesia with the suprainguinal technique.

The study attributed the enhanced efficacy of the suprainguinal approach to better cephalad spread of the local anesthetic, which may lead to more consistent coverage of the femoral, lateral femoral cutaneous, and obturator nerves—key contributors to hip joint innervation. While the findings are promising, limitations included the small sample size and lack of nerve-specific sensory testing. Nonetheless, the study supports the suprainguinal FICB as a more effective option for postoperative pain control in THA.

9. Wallace et al.[21] performed a randomized controlled study to compare the fascia iliaca compartment block (FICB) and the 3-in-1 nerve block for postoperative pain management in patients undergoing knee arthroscopy and meniscal repair. Although not focused on hip surgery, the findings offer relevant insights into the characteristics of lower-limb regional anesthesia techniques.

Sixty adult patients undergoing arthroscopic knee procedures under general anesthesia were randomized to receive either FICB or a 3-in-1 block. Both groups received the same local anesthetic formulation. Outcomes assessed included onset time of sensory and motor block, duration of postoperative analgesia, pain intensity, time to first analgesic request, and patient satisfaction.

The 3-in-1 block showed a faster onset of action, which could be advantageous in scenarios requiring rapid anesthesia. In contrast, the FICB group experienced a longer duration of postoperative analgesia, suggesting a benefit in managing post-surgical pain during recovery. Patient satisfaction was similar in both groups.

The authors suggested that the choice between FICB and 3-in-1 block should be guided by specific clinical goals—such as prioritizing quicker block onset versus extended pain relief. Although not directly applicable to THA due to anatomical and procedural differences, the study's findings align with broader trends in regional anesthesia literature that show FICB can provide prolonged analgesia, supporting its use in more invasive surgeries such as THA.

10. Gao et al.[22] conducted a systematic review and meta-analysis to evaluate the analgesic efficacy and safety of the fascia iliaca compartment block (FICB) in patients undergoing total hip arthroplasty (THA). The study aimed to clarify the role of FICB in reducing postoperative pain, opioid requirements, and other clinical outcomes, given ongoing uncertainties regarding its effectiveness in the perioperative setting.

Using a structured literature search across major databases (PubMed, Medline, Cochrane Library, and Web of Science), the authors identified seven randomized controlled trials (RCTs) that met strict inclusion criteria. These trials collectively involved 325 patients, comparing FICB with either placebo or standard care. The analysis focused on key outcomes including pain scores at 12 and 24 hours postoperatively, cumulative opioid consumption, hospital stay duration, and adverse event profiles.

The pooled data demonstrated that FICB significantly lowered pain intensity at both 12 hours (WMD = –0.285, p = 0.002) and 24 hours (WMD = –0.391, p = 0.021) postoperatively. In addition, opioid consumption was notably reducedin the FICB group at both time points—by over 5 mg at 12 hours and more than 6 mg at 24 hours—with both findings reaching statistical significance. These results underscore the opioid-sparing potential of FICB, which is particularly beneficial in older adults vulnerable to opioid-related complications.

However, FICB did not significantly affect hospital length of stay ($p = 0.354$), and the data on adverse events were insufficient to make definitive conclusions regarding complication rates. Nevertheless, the reduction in opioid use may indirectly contribute to improved safety by minimizing the risk of nausea, sedation, and respiratory depression.

The authors highlighted the strengths of their study, notably the methodological rigor, including bias assessment and standardization of data extraction. Still, they acknowledged heterogeneity across trials in terms of FICB technique (suprainguinal vs. infrainguinal), local anesthetic type and volume, and postoperative analgesic protocols. These variations may have influenced the pooled outcomes and point to the need for further standardized comparative studies.

In conclusion, this meta-analysis provides robust evidence in support of FICB as an effective component of multimodal analgesia for THA, affirming its capacity to improve early postoperative pain control and reduce opioid dependency. The findings complement prior research by Desmet et al. and Kumar et al., reinforcing the clinical value of FICB in enhancing recovery and patient comfort in hip arthroplasty.

11. Kukreja et al. (2020)[8] – Analgesic Effectiveness of PENG Block in THA
In a retrospective case series conducted by Kukreja and colleagues, the pericapsular nerve group (PENG) block was evaluated for its role in managing postoperative pain following total hip arthroplasty (THA), both in primary and revision surgeries. The authors noted that postoperative pain control after THA is particularly challenging due to the complex

innervation of the hip joint. Traditional regional anesthesia techniques often fail to provide comprehensive analgesia due to their limited coverage of key articular nerve branches.

The PENG block, a relatively novel interfascial plane block, was designed to selectively anesthetize the articular branches of the femoral, obturator, and accessory obturator nerves. In this study, the block was administered under ultrasound guidance with patients in the supine position, targeting the space anterior to the anterior inferior iliac spine at the level of the ilio-pubic eminence, lateral to the femoral artery.

The primary outcomes assessed included postoperative pain scores and opioid consumption, with opioid doses reported in morphine equivalents. Though the study lacked a standardized pain protocol and control group, it provided valuable insights into the standalone efficacy of the PENG block in primary THA, showing promising analgesic benefits and suggesting a possible reduction in the need for additional pain control interventions. Conversely, in revision THA cases, where surgical complexity and trauma are higher, the PENG block was found to be a useful component within a multimodal analgesic strategy rather than a sole modality.

An important observation was the block’s motor-sparing properties, which likely contribute to early mobilization, a critical component in enhanced recovery protocols, particularly in elderly patients. However, the study's retrospective nature and absence of randomization limit the generalizability of its findings. Further prospective and controlled trials are warranted to validate its efficacy and clarify its comparative advantage over other regional anesthesia techniques in both primary and revision hip arthroplasties.

12. Bansal et al. (2022) [23] – Suprainguinal vs. Infrainguinal FICB for Postoperative Analgesia In a randomized, double-blind controlled trial conducted at a tertiary care center, Bansal et al. evaluated the comparative effectiveness of suprainguinal and infrainguinal approaches of the fascia iliaca compartment block (FICB) in managing postoperative pain in patients undergoing above-knee orthopedic surgeries under spinal anesthesia.23

The FICB is a well-established regional anesthesia technique targeting the femoral nerve, lateral femoral cutaneous nerve, and, to a variable extent, the obturator nerve, through deposition of local anesthetic beneath the fascia iliaca. This block can be performed via two main ultrasound-guided techniques: the infrainguinal approach (distal to the inguinal ligament) and the suprainguinal approach (proximal to the inguinal ligament), each differing in anatomical needle placement and potential cranial spread of anesthetic.

This study included 32 adult patients, randomly assigned to receive either the suprainguinal (Group S) or infrainguinal (Group I) FICB postoperatively. All blocks were performed using 30 mL of 0.2% ropivacaine under ultrasound guidance, and outcome assessors were blinded to the group allocation. Pain was assessed using the Numeric Rating Scale (NRS) at regular intervals over a 24-hour period, and intravenous tramadol was administered as rescue analgesia when NRS ≥4.

Both approaches were effective in controlling postoperative pain, but the suprainguinal group reported significantly lower NRS scores at 12 and 20 hours post-surgery. Additionally, total tramadol consumption in 24 hours was lower in Group S, indicating reduced opioid dependence. Although the duration of analgesia and time to first rescue analgesic did not significantly differ between groups, patient satisfaction was higher in the suprainguinal group.

The authors concluded that the suprainguinal approach may offer more prolonged and effective analgesia, potentially due to superior cranial spread of local anesthetic, leading to better blockade of lumbar plexus branches. Methodological strengths included blinding, uniform anesthetic dosing, and standardized outcome assessment. Limitations cited were the small sample size and restricted surgical population, which may affect generalizability.

These findings support the use of the suprainguinal FICB as a potentially superior technique for postoperative pain management in above-knee surgeries. Further large-scale, multicentric studies are needed to validate these results and assess broader applicability.

13. Choi et al. (2022) [24]– Comparative Study of PENG Block and Supra-Inguinal FICB for THA Choi et al. conducted a prospective, randomized clinical trial to compare the analgesic efficacy and motor preservation between the Pericapsular Nerve Group (PENG) block and the supra-inguinal Fascia Iliaca Compartment Block (FICB) in patients undergoing total hip arthroplasty (THA) under general anesthesia.24 The study aimed to determine whether differences in anatomical targets between these two blocks influenced postoperative pain control or quadriceps muscle strength.

A total of 58 patients were randomized into two equal groups following induction of general anesthesia: one group received the PENG block, designed to selectively anesthetize the articular branches of the femoral, obturator, and accessory obturator nerves; the other group received the supra-inguinal FICB, which delivers local anesthetic beneath the fascia iliaca proximal to the inguinal ligament, targeting the femoral and lateral femoral cutaneous nerves, with inconsistent coverage of the obturator nerve.

Both blocks were performed under ultrasound guidance with a standardized dose of local anesthetic, and all patients received a uniform multimodal analgesic regimen. Postoperative pain scores (at rest and during movement) were recorded at multiple time intervals up to 48 hours, using the Numeric Rating Scale (NRS). Quadriceps strength was also evaluated preoperatively and postoperatively at set time points.

The results indicated no statistically significant difference in pain scores between the two groups at any measured interval ($p > 0.05$), though numerically lower pain levels were observed in the PENG group during the initial 24 hours. Opioid consumption over 48 hours and quadriceps strength preservation were also similar between groups, with no significant differences reported.

The study concluded that both regional techniques provided comparable levels of postoperative analgesia and motor preservation. The anticipated motor-sparing effect of the PENG block did not result in superior functional outcomes compared to the supra-inguinal FICB. Limitations included the short 48-hour follow-up duration, lack of long-term functional outcome assessment, and exclusive use of general anesthesia, which may influence early pain perception.

These findings suggest that either block can be effectively integrated into multimodal analgesia protocols for THA, with the choice depending on clinical setting, practitioner preference, or patient-specific anatomical considerations. Further research is warranted to evaluate long-term functional outcomes and efficacy in other anesthesia modalities.

14. Aliste et al. (2021)[3] – Comparison of PENG Block and Suprainguinal FICB for THA

In a randomized controlled trial, Aliste and colleagues assessed the motor-sparing properties and analgesic efficacy of the Pericapsular Nerve Group (PENG) block in comparison to the suprainguinal fascia iliaca compartment block (FICB) in patients undergoing total hip arthroplasty (THA).3 The study was predicated on the hypothesis that the PENG block, due to its selective targeting of the articular branches of the anterior hip capsule, would result in reduced motor blockade while maintaining effective analgesia.

A total of 40 patients scheduled for elective primary THA under spinal anesthesia were randomly allocated into two groups: Group P received a PENG block (20 mL of 0.5% levobupivacaine with epinephrine), and Group F received a suprainguinal FICB (40 mL of 0.25% levobupivacaine with epinephrine). Both procedures were ultrasound-guided and conducted by experienced clinicians. Postoperative assessments were carried out by a blinded observer, focusing on quadriceps motor function (knee extension and hip adduction), sensory distribution, pain intensity at rest and movement, morphine consumption, and participation in physiotherapy.

The study's primary outcome was the incidence of quadriceps motor block. Results showed that significantly fewer patients in the PENG group exhibited motor weakness at both 3 and 6 hours postoperatively, with only 45% and 25% affected, respectively, compared to 90% and 85% in the FICB group ($p < 0.001$). Hip adduction was also better preserved in the PENG group ($p = 0.023$ at 3 hours). Sensory impairment in the thigh was consistently less in the PENG group across all measured zones ($p \leq 0.014$).

Despite these differences in motor and sensory blockade, pain scores at all postoperative intervals (up to 48 hours) did not differ significantly between the two groups. Likewise, cumulative morphine consumption and opioid-related side effects were comparable. Functional outcomes such as participation in physiotherapy sessions and hospital stay duration also showed no statistically significant differences.

The findings underscore the motor-sparing advantage of the PENG block without compromising analgesic quality, a benefit that could enhance postoperative mobility and reduce fall risk in the early recovery phase. The study was strengthened by its double-blind design and robust assessment protocols. However, limitations included a small sample size and the exclusive use of spinal anesthesia, which may have masked subtle differences in analgesic performance during the initial hours.

These outcomes suggest that the PENG block may offer a preferable regional anesthesia option for THA, particularly when early mobilization is a key objective. Further investigations with larger populations, longer follow-up, and diverse anesthetic techniques are warranted to explore the broader implications of these findings.

METHODOLOGY

METHODOLOGY

Study Design

"This prospective, randomized, single-blinded clinical trial was carried out in a tertiary care center's Anaesthesiology Department to assess the comparative effectiveness of ultrasound-guided PENG block and S-FICB in improving patient positioning during spinal anaesthesia for hip fracture surgeries."

Eligibility Criteria

Inclusion Criteria:

- Patients who are aged above 18 years of age up to 80 years of age.
- Diagnosed with unilateral hip fractures and posted for surgical fixation.
- Classified as ASA physical status I–III.
- Patients who could comprehend and respond to the Numeric Rating Scale (NRS) for pain.

Exclusion Criteria:

- Refusal to provide consent.
- Local infection at the site of injection.
- Known hypersensitivity to local anaesthetics.
- History of bleeding diathesis or current anticoagulant therapy.
- Pre-existing neurological or cognitive impairment.
- Deformity or infection precluding positioning or block performance.

Sample Size Calculation

As per Das et al.[9], (2016) the sample size formula given below

$$n = \frac{2 \times \left(z_{1-\alpha/2} - z_{1-\beta}\right)^2 \times \sigma^2}{d^2}$$

Where n = minimum required sample size

$z_{1-\alpha/2}$= The critical value (Table value) "from a standard normal distribution that the test statistic must exceed in order to show a statistically significant result at" 'α' level of significance.

$z_{1-\beta}$= Standard normal table value for the power of the test

$(1-\beta)$

σ = Standard deviation of the response variable (obtained from previous study

"d = the effect size = the minimum clinically important difference that the investigator wishes to detect."

In the present case, $z_{1-\alpha/2} = 2.58$ at 1 % level of significance

$z_{1-\beta}$ = 1.28 at 90 % power

In the previous study (Jaidon et al., 2021) SD of the two groups were found to be 0.49 and 0.6 in the PENG and FSIB group while positioning. Hence, pooled variance computed is 0.548. ie. s = 0.548. Investigator assumed a minimum difference of 0.65 in pain score would be clinically important to detect significance. So, d =0.65

Then the minimum required sample size in each group was computed as **21.2 @ 21**

Sampling Procedure

Universal sampling was applied to all eligible participants during the study period. Participants were randomized into two groups using computer-generated block randomization with a 1:1 allocation ratio, employing the Sealed Envelope Ltd. 2022 software. Allocation concealment was maintained using sealed opaque envelopes.

Preoperative Assessment

- Routine and specific investigations were conducted, including CBC, coagulation profile (PT, aPTT, INR).
- An intravenous line was secured, and IV fluids were administered.
- Baseline Visual Analogue Scale (VAS) scores were recorded for pain during rest and movement (before the block).
- Continuous monitoring of HR, NIBP, and SpO_2 was done throughout the procedure.

Group Allocation and Interventions;

Participants were divided into two groups:

Group A (PENG Block)

- Received 21 mL of 0.5% Ropivacaine with Dexmedetomidine 1 mcg/kg.
- Performed in supine position using a low-frequency curvilinear probe.
- Probe placement: transverse orientation at the ASIS, moved inferiorly to visualize the AIIS.
- Probe pivoted towards pubic symphysis to visualize the iliopubic eminence (IPE).
- A 23G spinal needle was introduced "in-plane, lateral-to-medial, targeting the fascial plane between psoas tendon and ilium." [Figure 1]
- After negative aspiration, the drug was injected slowly under ultrasound guidance.

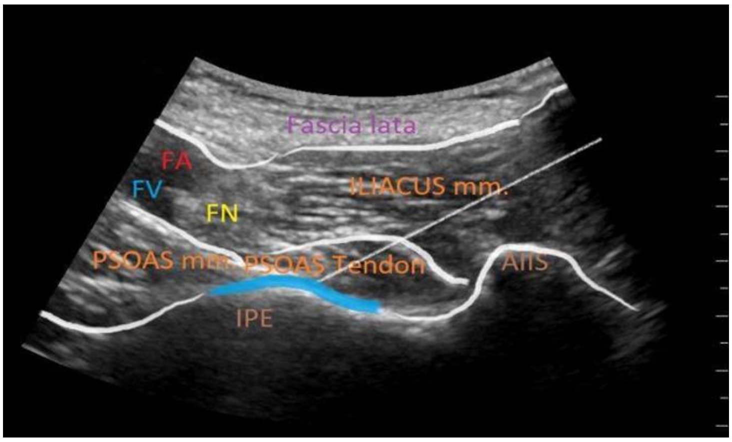


Figure 1:

The target of the PENG block is obtained by pivoting the medial part of the probe towards the pubic symphysis to align the transducer with both the AIIS and the iliopubic eminence (IPE).

FA= femoral artery; FV = femoral vein; FN= femoral nerve,

AIIS = antero inferior iliac spine; IPE = iliopubic eminence

Group B (S-FICB Block)

- Received 21 mL of 0.5% Ropivacaine with Dexmedetomidine 1 mcg/kg.
- Performed in supine position using a high-frequency linear ultrasound probe (6–13 MHz).
- Probe placed sagittally over the inguinal ligament, inferiomedial to ASIS.
- "Bow-tie sign" identified (Sartorius and Internal Oblique muscles).
- A 23G spinal needle introduced in-plane; 2 mL sterile water used to confirm fascial plane between iliacus muscle and fascia iliaca.
- Following negative aspiration, the drug was injected incrementally into the target plane. [figure 2]

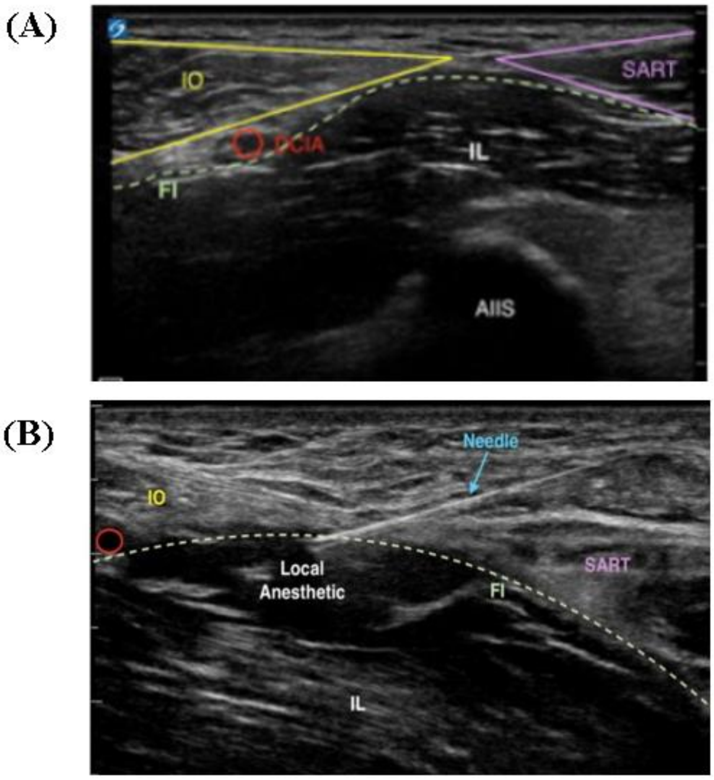


Figure 2

The "bow tie" appearance of the internal oblique and sartorius muscles is highlighted in (A).

In (B), the block needle can be seen piercing the fascia iliaca, with local anesthetic dividing the fascia from the underlying iliacus. The DCIA is seen above the fascia in red.

IO = internal oblique, SART = sartorius, DCIA = deep circumflex iliac artery,

Fl = fascia iliaca, IL = iliacus muscle, AllS = anterior inferior iliac spine.

Outcome Assessment

Primary Outcome

- VAS score for pain during positioning for subarachnoid block at predefined intervals:
  - T0: Pre-block.
  - T5: 5 minutes post-block.
  - T15: 15 minutes post-block.
  - S0: Time of spinal anaesthesia positioning.

Secondary Outcome

- Duration of postoperative analgesia.
- “Time to first rescue analgesic.”
- “Total analgesic consumption in 24 hours.”
- Any adverse events such as local “anaesthetic systemic toxicity (LAST), hypotension”, bradycardia, or block failure were recorded.

Data Collection and Statistical Analysis

Data were recorded using a structured proforma. “All collected data were entered into Microsoft Excel and analyzed using SPSS Version 25.0.Continuous variables were presented as mean ± SD and analyzed using Student's t-test. Categorical variables were presented as counts and percentages and analyzed using the Chi-square test or Fisher's exact test. A p-value < 0.05 was considered statistically significant.”

Ethical Clearance and Registration

"The study protocol was approved by the Institutional Ethics Committee before initiation." All participants provided written informed consent after being explained the procedure, benefits, and risks involved. "The trial adhered to the principles of the Declaration of Helsinki."

RESULTS

RESULTS

Table 1: Distribution of Study Participants by Type of Block

	Frequency	Percent (%)
Pericapsular Nerve Group Block (PENG)	36	50.0
Suprainguinal Fascia Iliaca Compartment Block (S-FICB)	36	50.0

This table shows the equal allocation of participants to each intervention arm. Both Pericapsular Nerve Group (PENG) block and Suprainguinal Fascia Iliaca Compartment Block (S-FICB) groups included 36 patients each, indicating successful randomization and balanced group sizes.

Figure 1: Distribution of Participants According to Type of Block (PENG vs. S-FICB)

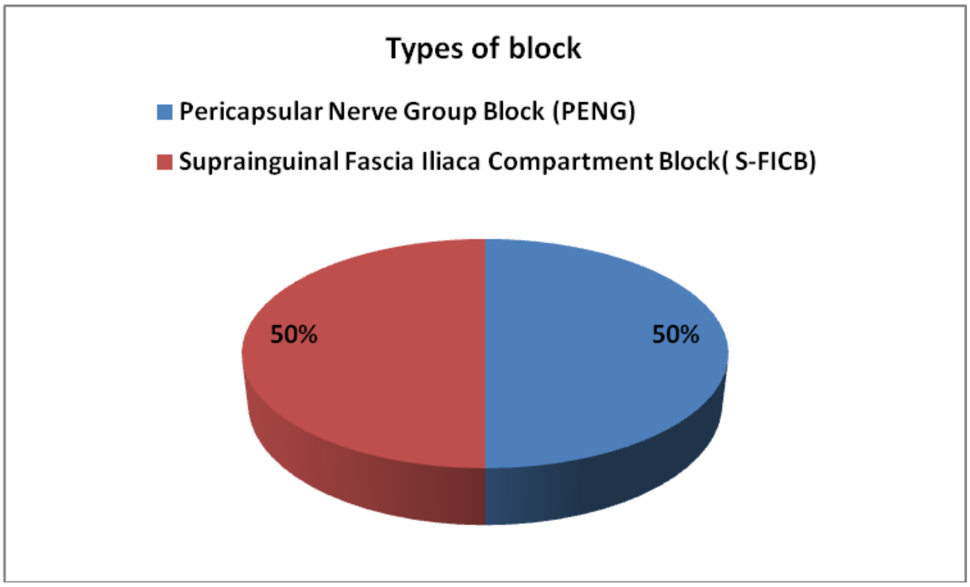


Table 2: Comparison of Mean Age Between Block Groups

	Block types	N	Mean	SD	p value
Mean Age	PENG	36	51.22	14.269	.184
	S-FICB	36	54.03	11.920	

Mean age was slightly lower in the PENG group (51.22 ± 14.27) compared to the S-FICB group (54.03 ± 11.92), but the difference was not statistically significant (p = 0.184).

Figure 2: Comparison of Mean Age Between PENG and S-FICB Groups

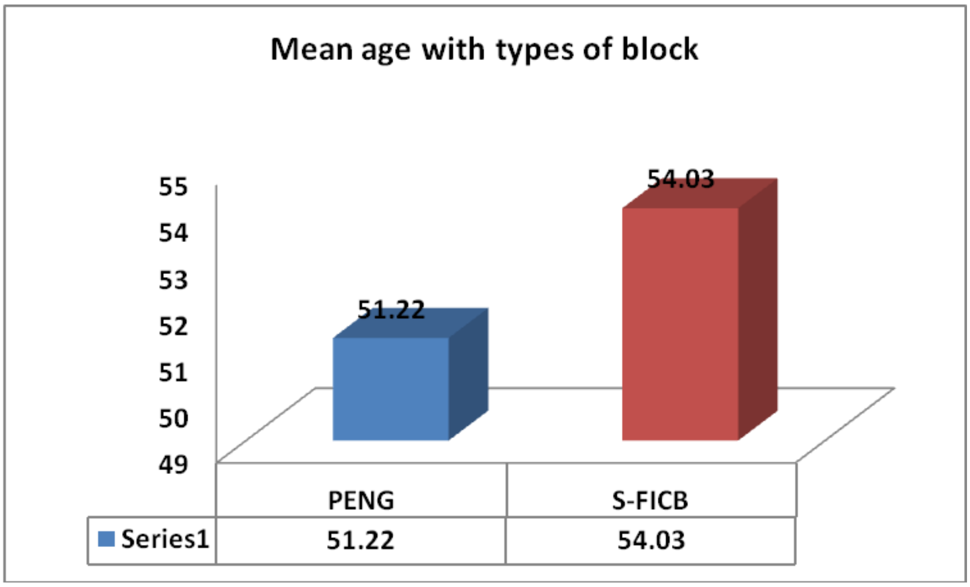


Table 3: Association of gender with types of block among the study participants

	PENG	S-FICB	p value
Female	19(55.9%)	15(44.1%)	.345
Male	17(44.7%)	21(55.3%)	

Female predominance was noted in the PENG group (55.9%) compared to S-FICB (44.1%), while more males were in the S-FICB group. The difference was statistically non-significant (p = 0.345).

Figure 3: Gender Distribution Across PENG and S-FICB Groups

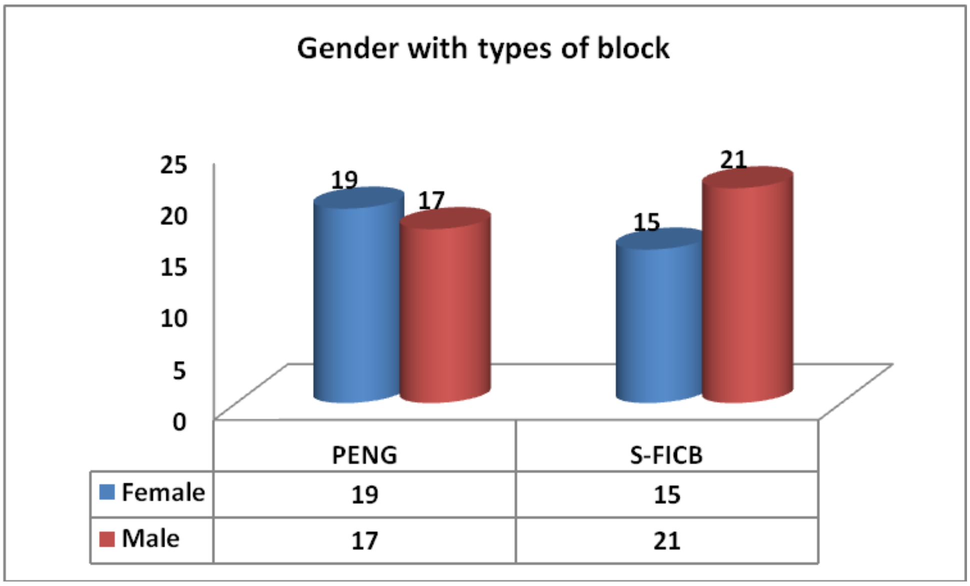


Table 4: Association of weight with types of block among the study participants

	Block types	N	Mean	SD	p value
Weight	PENG	36	62.61	6.086	.457
	S-FICB	36	62.89	6.684	

The mean weight was nearly identical between the PENG (62.61 ± 6.08 kg) and S-FICB (62.89 ± 6.68 kg) groups, with no significant difference (p = 0.457).

Figure 4: Mean Weight Comparison Between PENG and S-FICB Groups

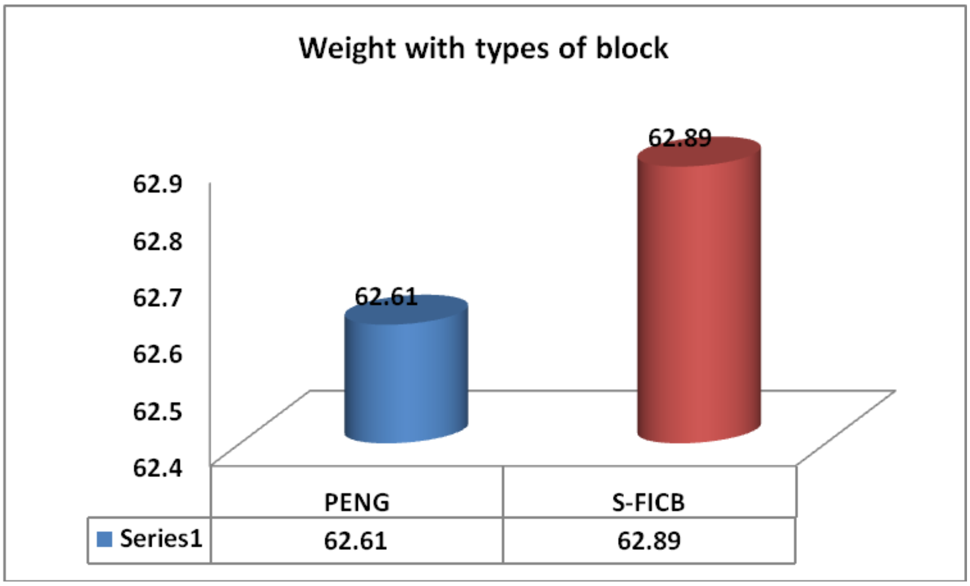


Table 5: Association of heart rate with types of block among the study participants

Heart rate	Block types	N	Mean	SD	p value
Baseline	PENG	36	95.50	6.566	.004*
	S-FICB	36	91.81	4.609	
T0	PENG	36	96.92	5.437	.005*
	S-FICB	36	93.81	4.609	
T5	PENG	36	92.67	5.110	.007*
	S-FICB	36	89.81	4.609	
T15	PENG	36	76.83	4.663	.101
	S-FICB	36	75.50	4.081	
S0	PENG	36	93.50	5.359	.077
	S-FICB	36	91.81	4.609	

Baseline and post-block heart rates (T0, T5) were significantly lower in the S-FICB group than the PENG group ($p < 0.05$), suggesting earlier cardiovascular stabilization in the S-FICB group. HR at T15 and S0 were comparable between groups.

VAS score measured at T0 (Pre-block), T5 (5 minutes post-block), T15 (15 minutes post-block), and S0 (Time of spinal anaesthesia positioning) to assess analgesic efficacy at rest.

Figure 5: Changes in Heart Rate Over Time Across Block Groups

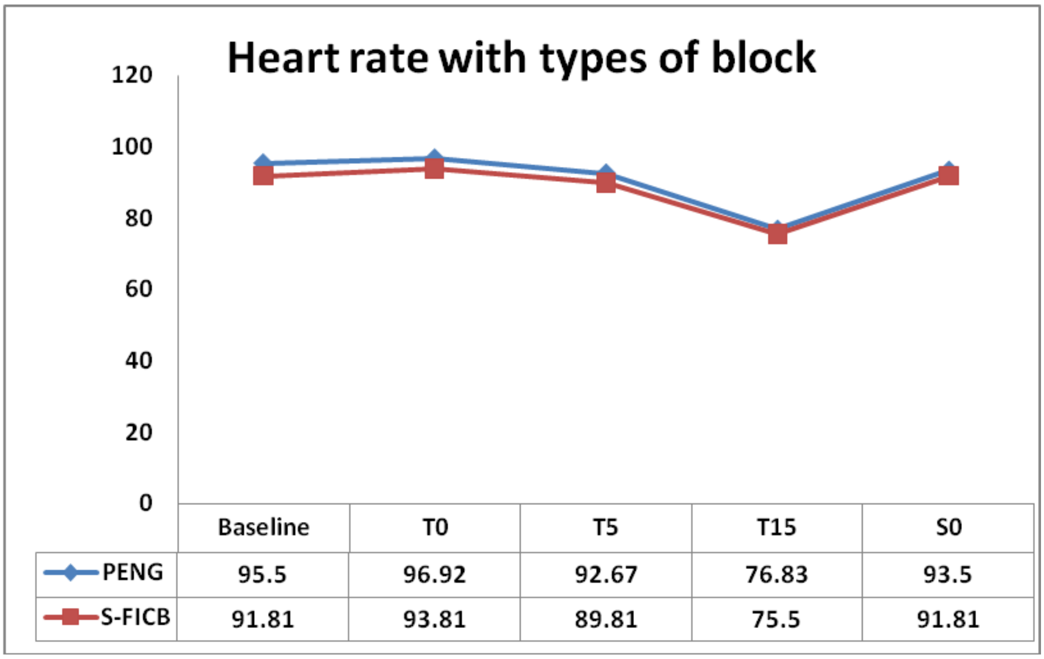


Table 6: Association of MAP with types of block among the study participants

MAP	Block types	N	Mean	SD	p value
Baseline	**PENG**	36	92.83	2.223	.218
	S-FICB	36	93.53	2.513	
T0	**PENG**	36	92.83	2.223	.218
	S-FICB	36	93.53	2.513	
T5	**PENG**	36	88.92	4.371	.168
	S-FICB	36	90.08	2.489	
T15	**PENG**	36	81.83	2.678	.065
	S-FICB	36	80.83	1.732	
S0	**PENG**	36	90.08	1.873	1.000
	S-FICB	36	90.08	2.489	

MAP remained comparable between both groups at all time intervals ($p > 0.05$), showing hemodynamic stability with both blocks. (*VAS score measured at T0 (Pre-block), T5 (5 minutes post-block), T15 (15 minutes post-block), and S0 (Time of spinal anaesthesia positioning) to assess analgesic efficacy at rest.)*

Figure 6: Mean Arterial Pressure (MAP) Trend at Different Intervals for PENG and S-FICB

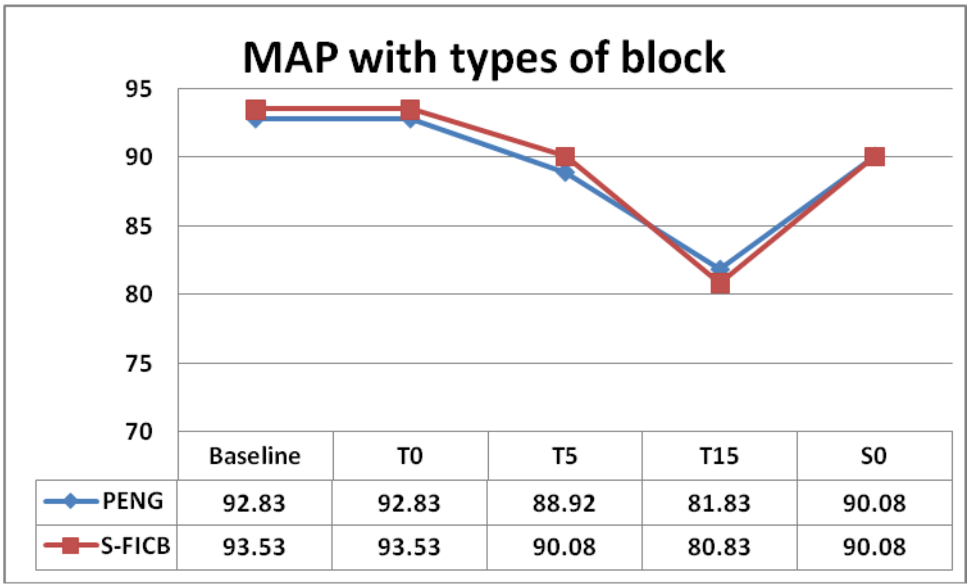


Table 7: Association of VAS-R with types of block among the study participants

VAS-R	Block types	N	Mean	SD	p value
Baseline	PENG	36	5.17	1.363	.255
	S-FICB	36	5.44	.504	
T0	PENG	36	5.17	1.363	.257
	S-FICB	36	5.44	.504	
T5	PENG	36	1.06	.826	.578
	S-FICB	36	.94	.860	
T15	PENG	36	.33	.478	.472
	S-FICB	36	.42	.500	
S0	PENG	36	.44	.504	.638
	S-FICB	36	.39	.494	

VAS-R decreased significantly post-block in both groups. Though baseline VAS-R was slightly higher in S-FICB, subsequent pain scores at T5, T15, and S0 were comparable ($p > 0.05$).

(VAS score measured at T0 (Pre-block), T5 (5 minutes post-block), T15 (15 minutes post-block), and S0 (Time of spinal anaesthesia positioning) to assess analgesic efficacy at rest.)

Figure 7: VAS Scores at Rest (VAS-R) Over Time in Both Groups

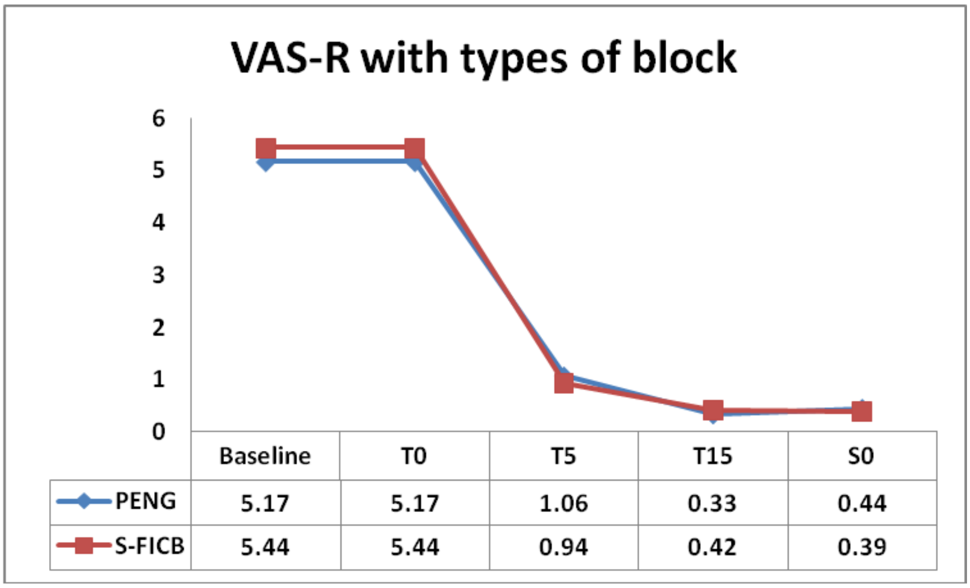


Table 8: Association of VAS-M with types of block among the study participants

VAS-M	Block types	N	Mean	SD	p value
Baseline	PENG	36	8.42	1.052	.321
	S-FICB	36	8.19	.822	
T0	PENG	36	8.42	1.052	.322
	S-FICB	36	8.19	.822	
T5	PENG	36	3.81	1.431	.749
	S-FICB	36	3.92	1.500	
T15	PENG	36	.89	.785	.766
	S-FICB	36	.94	.791	
S0	PENG	36	1.00	.586	.300
	S-FICB	36	1.14	.543	

VAS-M followed a similar trend, showing steep reduction post-block with no statistically significant differences between groups at any measured interval.(*VAS score measured at T0 (Pre-block), T5 (5 minutes post-block), T15 (15 minutes post-block), and S0 (Time of spinal anaesthesia positioning) to assess analgesic efficacy at rest.)*

Figure 8: VAS Scores During Movement (VAS-M) Over Time in PENG and S-FICB Groups

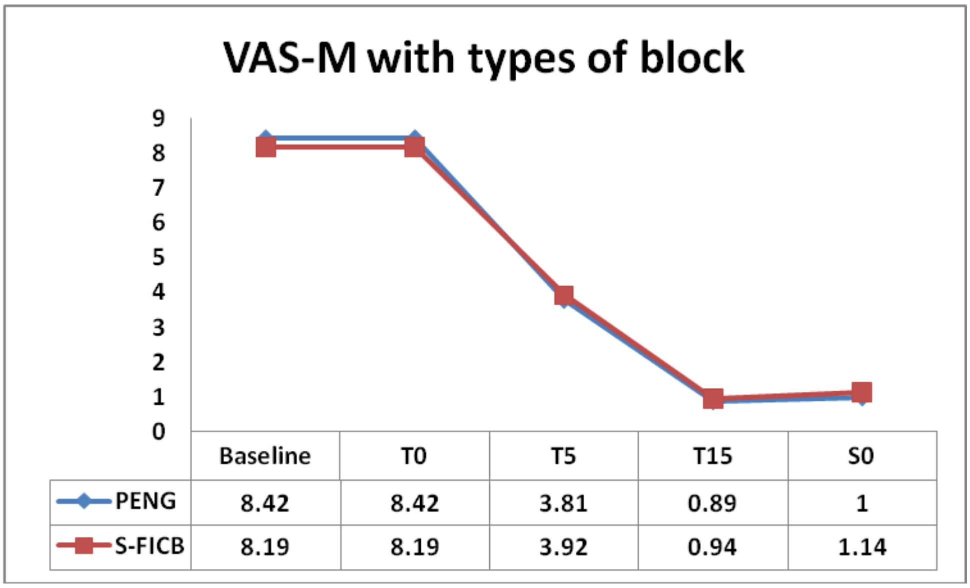


Table 9: Association of VAS-R with types of block among the study participants

VAS-R	Block types	N	Mean	SD	p value
At 6 hours	PENG	36	.33	.478	.629
	S-FICB	36	.39	.494	
At 12 hours	PENG	36	.39	.494	.813
	S-FICB	36	.42	.500	
At 24 hours	PENG	36	.39	.494	.813
	S-FICB	36	.42	.500	

Postoperative resting pain scores remained low and similar between groups, with no significant differences across all time points. (*Assessment of pain during movement at 6, 12, and 24 hours postoperatively in both block groups.)*

Figure 9: Postoperative VAS-R at 6, 12, and 24 Hours in PENG and S-FICB Groups

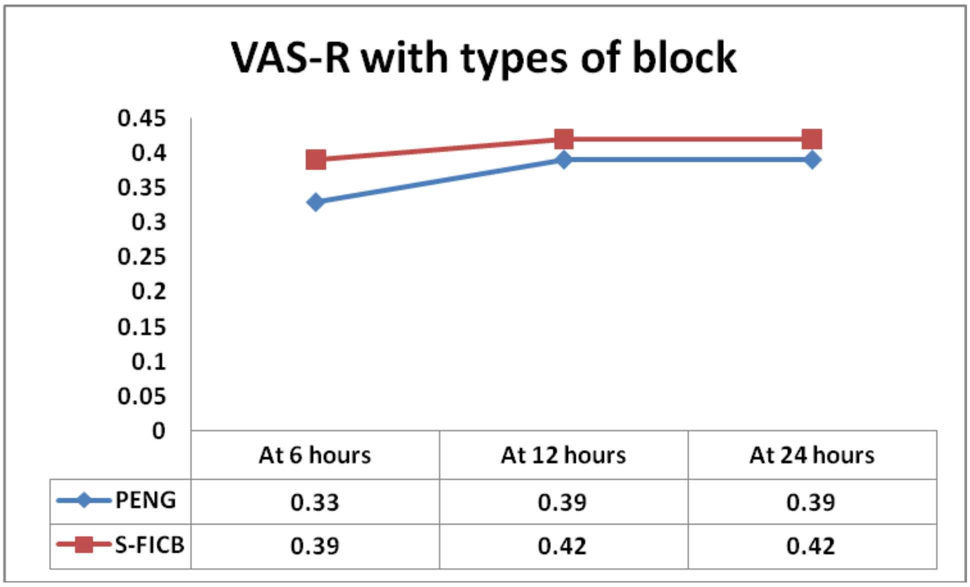


Table 10: Association of VAS-M with types of block among the study participants

VAS-M	Block types	N	Mean	SD	p value
At 6 hours	PENG	36	.86	.798	.658
	S-FICB	36	.94	.791	
At 12 hours	PENG	36	1.00	.793	.660
	S-FICB	36	.92	.806	
At 24 hours	PENG	36	1.00	.793	.767
	S-FICB	36	.94	.791	

Pain on movement remained controlled throughout the first 24 hours, with no significant group differences ($p > 0.05$).

Figure 10: Postoperative VAS-M at 6, 12, and 24 Hours for Each Block Group

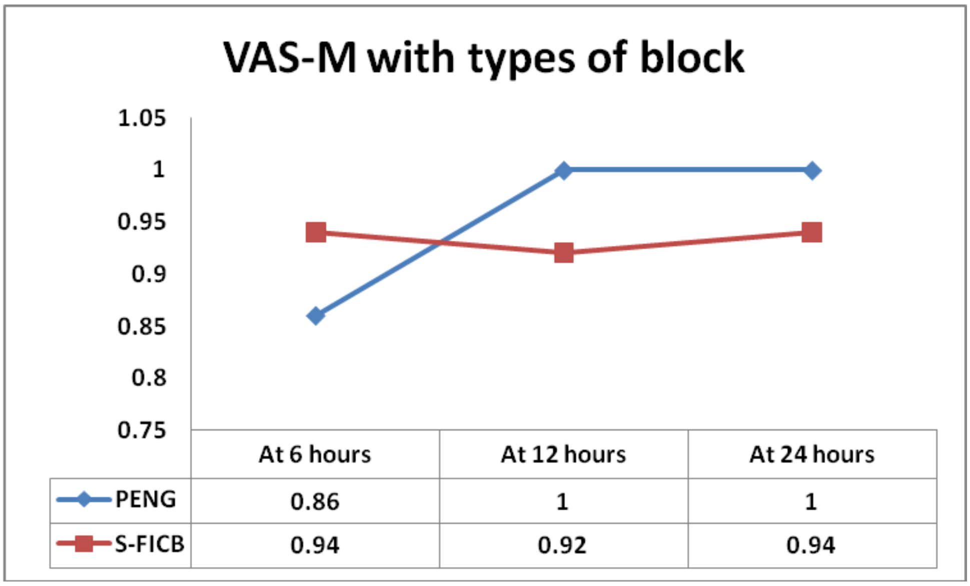


Table 11: Association of T-RA (minutes) with types of block among the study participants

	Block types	N	Mean	SD	p value
T-RA (minutes)	PENG	36	413.33	41.266	.831
	S-FICB	36	415.00	21.974	

Mean time to first rescue analgesia was statistically similar between the two blocks—PENG (413.33 ± 41.27 min) and S-FICB (415.00 ± 21.97 min) (p = 0.831).

Figure 11: Mean Duration to First Rescue Analgesia (T-RA) in Minutes by Group

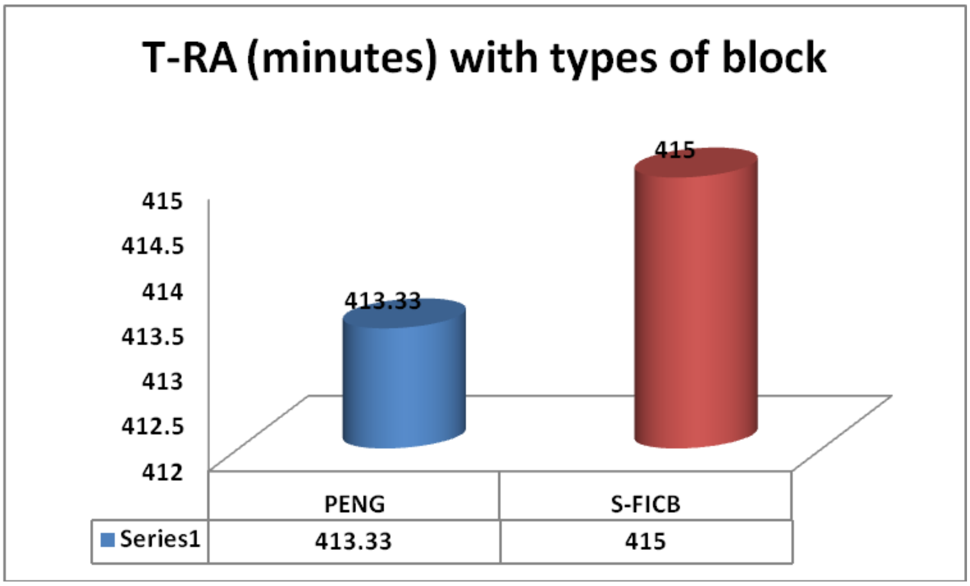


Table 12: Association of Tramadol dose with types of block among the study participants

	Block types	N	Mean	SD	p value
Tramadol	PENG	36	200.00	77.460	.849
	S-FICB	36	202.78	39.541	

Total tramadol dose required was marginally lower in the PENG group (200 ± 77.46 mg) versus S-FICB (202.78 ± 39.54 mg), but this difference was not statistically significant.

Figure 12: Total Tramadol Consumption (mg) Within 24 Hours Between Groups

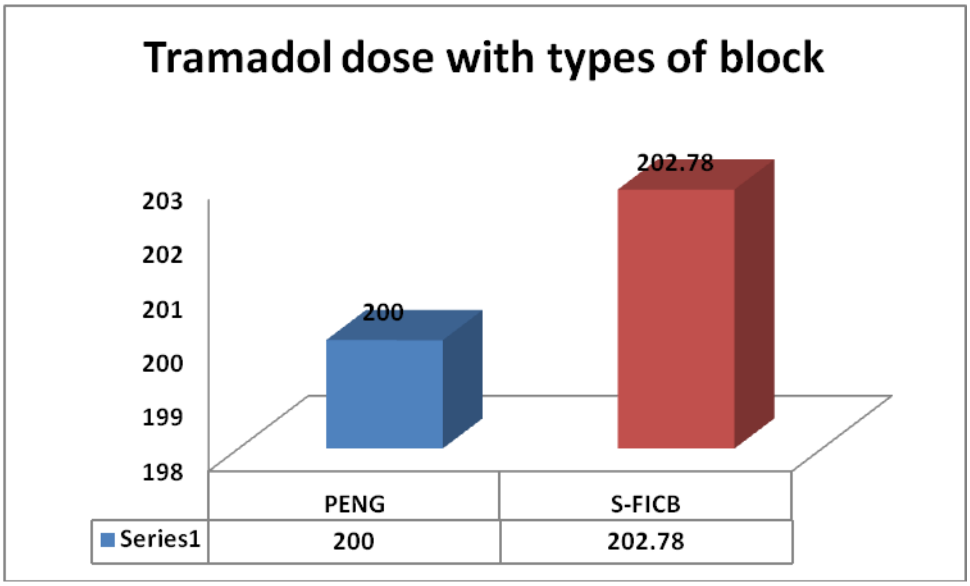
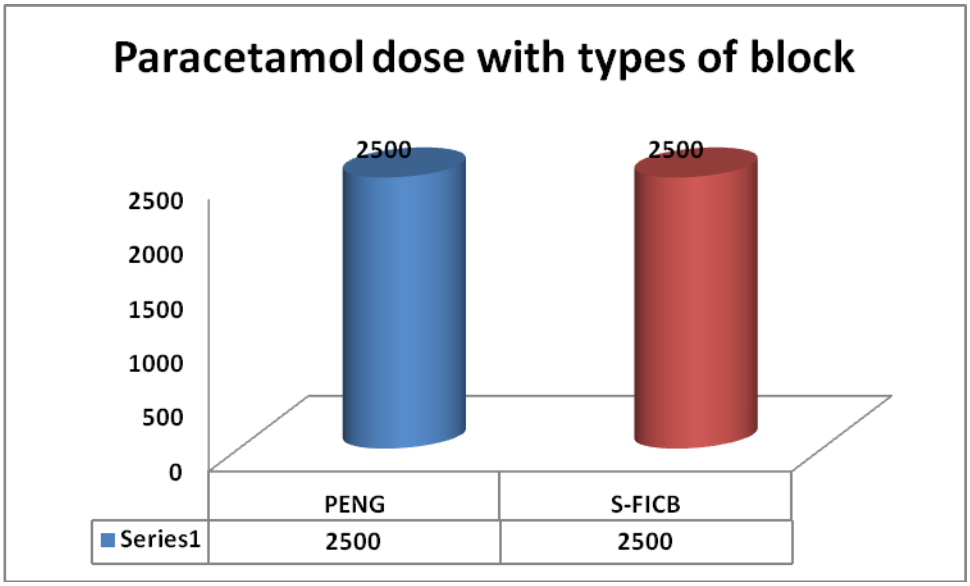


Table 13: Association of paracetamol dose with types of block among the study participants

	Block types	N	Mean	SD	p value
Paracetamol	PENG	36	2500.00	971.008	1.000
	S-FICB	36	2500.00	1183.216	

Mean paracetamol dose was equal in both groups (2500 mg), with no difference in usage patterns

Figure 13: Total Paracetamol Consumption (mg) Within 24 Hours by Block Type



DISCUSSION

DISCUSSION

Optimizing pre-procedural analgesia in patients presenting with hip fractures is a cornerstone of effective perioperative care. Ensuring sufficient pain relief prior to neuraxial anaesthesia significantly enhances patient comfort, enables optimal positioning, and facilitates procedural success, particularly in an elderly population characterized by increased pain sensitivity and frailty. This randomized controlled trial sought to evaluate the comparative efficacy of two advanced ultrasound-guided regional anaesthetic techniques—Pericapsular Nerve Group (PENG) block and Suprainguinal Fascia Iliaca Compartment Block (S-FICB). The primary objectives included assessment of procedural pain relief, ease of positioning for spinal anaesthesia, and quality of early postoperative analgesia.

Patient Demographics and Baseline Parameters

The study achieved well-balanced demographic profiles across both groups. No statistically significant differences were observed in age, sex distribution, body mass, or baseline cardiovascular parameters. Such demographic parity validates the effectiveness of randomization and minimizes confounding variables. This uniformity enhances the internal validity of outcome assessments, ensuring that any treatment effects observed may be attributed to the intervention itself rather than to baseline disparities.

Hemodynamic Tolerability and Safety

Both PENG and S-FICB blocks demonstrated robust hemodynamic stability throughout the perioperative period. While heart rate reduction in the S-FICB cohort reached statistical significance at T0 and T5, this effect remained clinically negligible. No significant variation in mean arterial pressure was observed, reinforcing the cardiovascular tolerability of both blocks. These outcomes are consistent with findings reported by **Kalashetty et al. (2022)**[19] and **Bauiomy et al. (2022)**[16], who documented comparable hemodynamic safety profiles in similar regional anaesthetic comparisons. In populations with high comorbidity burdens, such safety is not merely preferable but imperative.

Analgesic Effectiveness and Facilitation of Positioning

The impact of both blocks on procedural analgesia was evident through significant reductions in pain scores at rest and during movement, as measured by the Visual Analog Scale (VAS). Though the PENG group exhibited slightly lower pain scores across early time intervals, the differences did not achieve statistical significance. This finding echoes the conclusions of **Kulkarni et al.**[15], who found equivalent efficacy in pain reduction for spinal positioning in both groups.

Nonetheless, nuanced advantages were noted in favor of the PENG block. **Jadon et al. (2021)**[5]and **Keskes et al. (2023)**[17] observed superior analgesia during patient positioning with the PENG block, particularly in patients with intracapsular femoral neck fractures. These advantages are grounded in the PENG block's anatomical precision. As originally described by **Girón-Arango et al. (2018)**[2], the PENG block targets the articular branches of the femoral, obturator, and accessory obturator nerves near the iliopubic eminence. This localization corresponds with the dense sensory innervation of the anterior hip capsule, a primary pain generator in hip fractures.

Further anatomical validation was provided by **Gerhardt et al. (2012)**[18], whose cadaveric dissections confirmed the convergence of nociceptive fibers in the anterior hip region. The block’s ability to achieve targeted sensory blockade without motor impairment makes it especially valuable for frail patients, enabling procedural cooperation while preserving muscle function.

Consistent with this theory, **Bauiomy et al.**[16] and **Morrison et al.**[7] documented a faster onset of analgesia and higher patient satisfaction in those receiving the PENG block. These studies noted that improved comfort translated to reduced anxiety, better cooperation during spinal positioning, and enhanced procedural success.

Postoperative Analgesia Duration and Analgesic Consumption

In terms of postoperative outcomes, the time to first rescue analgesia (T-RA) and cumulative 24-hour analgesic consumption—both opioid and non-opioid—were similar across groups. These findings align with the results of **Aliste et al.**[3] and **Desmet et al. (2017)**[4]. The latter demonstrated that while suprainguinal FICB was effective in reducing opioid consumption following hip surgery, it may not reliably block the obturator nerve, thereby offering less specific relief in patients with anterior hip pathology.

Despite this parity in postoperative consumption, the PENG block's more immediate onset and effectiveness in the preoperative phase suggest an important logistical advantage in operating room settings. For instance, **Kalashetty et al. (2022)**[19] found significantly lower VAS scores in PENG recipients at 30 minutes post-block during passive limb movement, an outcome reflected in our findings at T5 and T15.

Clinical Implications and Contextual Application

Although statistical equivalence was observed in several measures, clinical judgment suggests that block selection should be tailored to the patient's anatomical and procedural context. For isolated femoral neck fractures with anterior capsule involvement, the PENG block may offer superior benefit due to its precise innervation coverage. Conversely, S-FICB may be preferable in patients requiring broader sensory blockade due to complex or high-energy trauma.

The PENG block's sparing of quadriceps motor function facilitates earlier mobilisation, a critical goal in ortho-geriatric care. **Morrison et al.**[7] emphasized this in their evaluation, highlighting that maintained motor strength translates to fewer postoperative complications, improved functional recovery, and shorter hospital stays. These outcomes align with enhanced recovery after surgery (ERAS) principles.

Future Directions for Clinical Research

Future investigations should extend beyond analgesic duration to examine the broader functional and health-economic impact of these blocks. Multicentric trials with large, diverse populations can enhance generalizability. Comparative studies incorporating adjuncts—e.g., dexmedetomidine or dexamethasone—could determine strategies to prolong block duration while minimizing systemic exposure.

Educational initiatives targeting ultrasound proficiency for anaesthesiologists should emphasize the anatomic nuances of the PENG block. Moreover, the development of consensus-based clinical pathways, including recommendations on local anaesthetic volume, needle orientation, and safety precautions, will be critical to standardizing practice.

CONCLUSION

CONCLUSION

This study provides valuable reinforcement to the expanding body of literature underscoring the pivotal role of regional anaesthesia in the multimodal management of hip fractures, particularly within the framework of modern orthopaedic and geriatric anaesthetic care. The findings affirm that both the Pericapsular Nerve Group (PENG) block and the Suprainguinal Fascia Iliaca Compartment Block (S-FICB) are capable of delivering reliable analgesia to facilitate patient positioning for spinal anaesthesia and to maintain effective pain control during the early postoperative period.

However, the PENG block distinguishes itself through its highly selective anatomical targeting of articular branches that innervate the anterior hip capsule. This precision not only contributes to a faster onset of analgesia but also preserves motor function in adjacent structures, particularly the quadriceps, thereby minimizing the risk of functional impairment post-block. This motor-sparing characteristic is particularly advantageous in elderly patients, who are at higher risk of falls, prolonged immobilization, and delayed rehabilitation. The rapid analgesic onset further enhances operating room logistics by reducing anaesthetic preparation time and improving patient cooperation during neuraxial procedures.

Given these clinical benefits, the PENG block aligns well with the principles of Enhanced Recovery After Surgery (ERAS) pathways, which emphasize reduced opioid consumption, earlier mobilization, and improved perioperative functional outcomes. As patient-centered care models evolve to prioritize functional recovery and quality of life, the PENG block emerges as an essential tool in the anaesthesiologist’s arsenal for ortho-geriatric trauma care.

Nevertheless, to fully harness the potential of the PENG block, ongoing research is imperative. Comparative effectiveness studies involving diverse patient populations, fracture types, and procedural contexts are needed to refine block indications and optimize outcomes. Furthermore, there is a clear need to establish standardized protocols regarding volume, concentration, and technique of local anaesthetic delivery to ensure reproducibility across institutions.

Clinician education also plays a critical role. Training programs must emphasize anatomical landmarks, sonoanatomy, and block mechanics to ensure proficiency in ultrasound-guided administration. Finally, interdisciplinary collaboration among anaesthesiologists, surgeons, physiotherapists, and geriatricians is essential to integrate PENG block application seamlessly into perioperative workflows and ERAS-aligned care plans.

STRENGTHS OF THE STUDY

This study was designed with several methodological strengths that enhance the validity and applicability of its findings. Foremost is its prospective, randomized controlled design, which provides a high level of evidence by minimizing selection bias and ensuring an equitable distribution of participants into the two intervention arms—Pericapsular Nerve Group (PENG) block and Suprainguinal Fascia Iliaca Compartment Block (S-FICB). Randomization was successful in producing comparable groups with respect to age, sex, and body weight, thus strengthening the attribution of observed outcomes to the intervention type rather than to confounding demographic variables.

Another notable strength was the use of ultrasound guidance for all block procedures. This allowed precise localization of anatomical structures, ensured accurate deposition of local anaesthetic, and reduced the risk of complications. The study adhered to a well-defined and standardized protocol, employing consistent drug volumes, block techniques, and evaluation intervals (T0, T5, T15, and S0). These methodological consistencies minimized procedural variability and ensured uniform data collection. Outcome assessment was comprehensive, incorporating both subjective pain evaluations using Visual Analog Scores (VAS-R and VAS-M) and objective physiological parameters such as heart rate and mean arterial pressure. Blinded outcome assessment further strengthened the study by reducing observer bias. Collectively, these methodological features contribute to the study's high internal validity and provide a reliable foundation for interpreting the comparative analgesic efficacy of the two regional techniques.

LIMITATIONS

LIMITATIONS OF THE STUDY

Despite its strengths, the study also has certain limitations that merit consideration. The sample size, although statistically adequate for primary outcome evaluation, was relatively modest, thereby limiting the power to detect smaller intergroup differences and restricting the possibility of detailed subgroup analyses. Furthermore, a significant limitation was the absence of motor function assessment following block administration. One of the key theoretical advantages of the PENG block is its motor-sparing property, yet this aspect was not formally evaluated, precluding objective confirmation of this functional benefit.

Another limitation stems from the use of the Visual Analog Scale (VAS), a subjective tool for pain measurement. While widely accepted, VAS scores are susceptible to individual variability influenced by psychological, emotional, and cognitive factors, particularly in elderly populations. Moreover, the postoperative follow-up period was limited to 24 hours, which may not fully capture the duration of analgesia, total analgesic requirements, or the time to meaningful functional recovery such as ambulation or discharge readiness. As such, the long-term clinical implications of each block remain inadequately explored.

The study was conducted in a single tertiary care institution, which may affect the generalizability of findings to other settings with different patient populations, clinical workflows, or levels of practitioner expertise. Institutional factors and practitioner skill can influence both block efficacy and patient outcomes. Additionally, the absence of functional recovery metrics, patient satisfaction scores, or quality-of-life assessments represents a gap in the evaluation of broader patient-centered outcomes, which are increasingly emphasized in modern anaesthesia and ortho-geriatric practice.

SUMMARY

SUMMARY:

This prospective, randomized controlled study was conducted to evaluate and compare the analgesic efficacy and procedural utility of two ultrasound-guided regional anaesthesia techniques—Pericapsular Nerve Group (PENG) block and Suprainguinal Fascia Iliaca Compartment Block (S-FICB)—in patients undergoing surgery for hip fractures. The primary objective was to assess pain relief and ease of patient positioning for subarachnoid block, with secondary objectives including hemodynamic stability and postoperative analgesic consumption.

A total of 72 patients were equally randomized into two groups. Both blocks were administered under ultrasound guidance following a standardized protocol, and pain scores were evaluated at rest and during movement using the Visual Analog Scale at predefined intervals: before the block (T0), 5 minutes after (T5), 15 minutes after (T15), and at the time of spinal positioning (S0). Postoperative analgesia was assessed over 24 hours through pain scores and total consumption of tramadol and paracetamol.

The study found that both PENG and S-FICB blocks provided effective analgesia, facilitating patient positioning for spinal anaesthesia with comparable reductions in pain scores at key intervals. Though not statistically significant, the PENG block demonstrated a trend toward faster onset and greater reduction in pain scores, particularly at early time points, consistent with its anatomical precision in targeting articular branches of the femoral and obturator nerves. Hemodynamic parameters remained stable in both groups, and postoperative analgesic consumption did not differ significantly. The findings suggest that while both blocks are effective, the PENG block offers certain clinical advantages, including potential motor-sparing benefits and faster analgesic onset, which are particularly beneficial in elderly and frail patients. These attributes position the PENG block as a

promising regional technique in modern orthopaedic and perioperative care, particularly within the framework of Enhanced Recovery After Surgery (ERAS) protocols.

In conclusion, the study contributes meaningful data supporting the use of PENG and S-FICB blocks as viable options for preoperative analgesia in hip fracture surgeries. While further research with larger cohorts and long-term follow-up is warranted, this study underscores the role of targeted regional techniques in enhancing perioperative outcomes in ortho-geriatric populations.

BIBLIOGRAPHY

REFERENCES

1. Hebbard P, Ivanusic J, Sha S. Ultrasound-guided supra-inguinal fascia iliaca block: A cadaveric evaluation of a novel approach. Anaesthesia. 2011;66(4).

2. Girón-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).

3. Aliste J, Layera S, Bravo D, Jara Á, Muñoz G, Barrientos C, Wulf R, Brañez J, Finlayson RJ, Tran Q. Randomized comparison between pericapsular nerve group (PENG) block and suprainguinal fascia iliaca block for total hip arthroplasty. Reg Anesth Pain Med. 2021 Oct;46(10):874-878. doi: 10.1136/rapm-2021-102997. Epub 2021 Jul 20. PMID: 34290085.).

4. Desmet M, Vermeylen K, Herreweghe I Van, Carlier L, Soetens F, Lambrecht S, et al. A longitudinal supra-inguinal fascia iliaca compartment block reduces morphine consumption after total hip arthroplasty. In: Regional Anesthesia and Pain Medicine. 2017.

5. Jadon A, Mohsin K, Sahoo RK, Chakraborty S, Sinha N, Bakshi A. Comparison of supra-inguinal fascia iliaca versus pericapsular nerve block for ease of positioningduring spinal anaesthesia: A randomised double-blinded trial. Indian J Anaesth. 2021;65(8).

6. Morrison RS, Meier DE, Arnold RM. What's Wrong with Advance Care Planning? Vol. 326, JAMA - Journal of the American Medical Association. 2021.

7. Morrison RS, Magaziner J, McLaughlin MA, Orosz G, Silberzweig SB, Koval KJ, et al. The impact of post-operative pain on outcomes following hip fracture. Pain. 2003;103(3).

8. Kukreja P, Avila A, Northern T, Dangle J, Kolli S, Kalagara H. A Retrospective Case Series of Pericapsular Nerve Group (PENG) Block for Primary Versus Revision Total Hip Arthroplasty Analgesia. Cureus. 2020;

9. Das S, Mitra K, Mandal M. Sample size calculation: Basic principles. Vol. 60, Indian Journal of Anaesthesia. 2016.

10. Lu Y, Uppal HS. Hip Fractures: Relevant Anatomy, Classification, and Biomechanics of Fracture and Fixation. Geriatr Orthop Surg Rehabil. 2019 Jun 28;10.

11. Hip Fractures [Internet]. Available from: https://orthoinfo.aaos.org/en/diseases--conditions/hip-fractures

12. Functional Anatomy of the Hip-Neural and Vascular.

13. Marino M, Hagh R, Hamrin Senorski E, Longo UG, Oeding JF, Nellgard B, et al. Artificial intelligence-assisted ultrasound-guided regional anaesthesia: An explorative scoping review. Vol. 11, Journal of Experimental Orthopaedics. John Wiley and Sons Inc; 2024.

14.Sites B. Ultrasound guidance in regional anesthesia: state of the art review through challenging clinical scenarios. Local Reg Anesth. 2009;

15. Bipin Kulkarni P, Sachin Ghodki P, Vinod Prabhu A. Pericapsular Nerve Group Block (PENG) and Fascia Iliaca Compartment Block (FICB) for Positioning Patients with Hip Fractures for Spinal Anaesthesia: A Comparative Study between The Two Blocks [Internet]. Vol. 8, Archives of Anesthesiology and Critical Care. 2022. Available from: http://aacc.tums.ac.ir

16. Bauiomy H, Kohaf NA, Saad M, Abosakaya AM. Comparison between peri-capsular nerve group and supra inguinal fascia iliaca block for analgesia and ease of positioning during neuraxial anesthesia in hip fracture patients: A randomized double-blind trial. Egypt J Anaesth. 2024;40(1):193–200.

17. Keskes M, Mtibaa MA, Abid A, Sahnoun N, Ketata S, Derbel R, et al. Pericapsular nerve group block versus fascia iliaca block for perioperative analgesia in hip fracture surgery: a prospective randomized trial. Pan African Medical Journal. 2023;46.

18. Gerhardt M, Johnson K, Atkinson R, Snow B, Shaw C, Brown A, et al. Characterisation and classification of the neural anatomy in the human hip joint. HIP International. 2012;22(1).

19. Kalashetty MB, Channappagoudar R, Alwandikar V, Naik DL, Hulakund SY, Guddad A. Comparison of Pericapsular Nerve Group Block with Fascia Iliaca Compartment Block in Adult Patients Undergoing Hip Surgeries. Anesth Essays Res. 2022;16(3).

20. Kumar K, Pandey RK umar, Bhalla AP al, Kashyap L, Garg R, Darlong V, et al. Comparison of conventional infrainguinal versus modified proximal suprainguinal approach of Fascia Iliaca Compartment Block for postoperative analgesia in Total Hip Arthroplasty. A prospective randomized study. Acta Anaesthesiol Belg. 2015;66(3).

21. Wallace JB, Andrade JA, Christensen JP, Osborne LA, Pellegrini JE. Comparison of fascia iliaca compartment block and 3-in-1 block in adults undergoing knee arthroscopy and meniscal repair. AANA J. 2012;80(SUPPL.4).

22. Gao Y, Tan H, Sun R, Zhu J. Fascia iliaca compartment block reduces pain and opioid consumption after total hip arthroplasty: A systematic review and meta-analysis. Vol. 65, International Journal of Surgery. 2019.

23. Bansal K, Sharma N, Singh MR, Sharma A, Roy R, Sethi S. Comparison of suprainguinal approach with infrainguinal approach of fascia iliaca compartment block for postoperative analgesia. Indian J Anaesth. 2022;66.

24. Choi YS, Park KK, Lee B, Nam WS, Kim DH. Pericapsular Nerve Group (PENG) Block versus Supra-Inguinal Fascia Iliaca Compartment Block for Total Hip Arthroplasty: A Randomized Clinical Trial. J Pers Med. 2022;12(3).

25. Kaur, G., Saikia, P., Dey, S. *et al.* Pericapsular nervegroup (PENG) block—a scoping review. *Ain-Shams J Anesthesiol* **14**, 29 (2022).

26. Eshag MME, Hasan LOM, Elshenawy S, Ahmed MS, Emad Mostafa AE, Abdelghafar YA, Althawadi YJ, Ibraheem NM, Badr H, AbdelQadir YH. Fascia iliaca compartment block for postoperative pain after total hip arthroplasty: a systematic review and meta-analysis of randomized controlled trials. BMC Anesthesiol. 2024 Mar 9;24(1):95.

27. Parker M, Johansen A. Hip fracture. BMJ. 2006 Jul 1;333(7557):27-30.

28. Kowark A, Rossaint R, Coburn M. General versus spinal anesthesia for the elderly hip fractured patient. Curr Opin Anaesthesiol. 2019 Feb;32(1):116-119.

29. Neuman MD, Silber JH, Elkassabany NM, Ludwig JM, Fleisher LA. Comparative effectiveness of regional versus general anesthesia for hip fracture surgery in adults. Anesthesiology. 2012 Jul;117(1):72-92.

30. Yun MJ, Kim YH, Han MK, Kim JH, Hwang JW, Do SH. Analgesia before a spinal block for femoral neck fracture: fascia iliaca compartment block. Acta Anaesthesiol Scand. 2009 Nov;53(10):1282-7.

31. Kacha NJ, Jadeja CA, Patel PJ, Chaudhari HB, Jivani JR, Pithadia VS. Comparative Study for Evaluating Efficacy of Fascia Iliaca Compartment Block for Alleviating Pain of Positioning for Spinal Anesthesia in Patients with Hip and Proximal Femur Fractures. Indian J Orthop. 2018 Mar-Apr;52(2):147-153.

32. Sahoo RK, Jadon A, Sharma SK, Nair AS. Pericapsular nerve group (PENG) block for hip fractures: Another weapon in the armamentarium of anesthesiologists. J Anaesthesiol Clin Pharmacol. 2021 Apr-Jun;37(2):295-296.

33. Senthil KS, Kumar P, Ramakrishnan L. Comparison of Pericapsular Nerve Group Block versus Fascia Iliaca Compartment Block as Postoperative Pain Management in Hip Fracture Surgeries. Anesth Essays Res. 2021 Oct-Dec;15(4):352-356.

34. Bhattacharya, A & Bhatti, T & Haldar, M. (2019). ESRA19-0539 Pericapsular nerve group block – is it better than the rest for pain relief in fracture neck of femur?. Regional Anesthesia & Pain Medicine. 44. A116.1-A116. 10.1136/rapm-2019-ESRAABS2019.139.

35. Duan L, Zhang L, Shi CG, Huang LG, Ao H, Wang ZP, Deng Y, Sun ML. Comparison of continuous pericapsular nerve group (PENG) block versus continuous fascia iliaca compartment block on pain management and quadriceps muscle strength after total hip arthroplasty: a prospective, randomized controlled study. BMC Anesthesiol. 2023 Jul 11;23(1):233.

36. Nuthep L, Klanarong S, Tangwiwat S. The Analgesic effect of adding ultrasound-guided pericapsular nerve group block to suprainguinal fascia iliaca compartment block for hip fracture surgery: A prospective randomized controlled trial. Medicine (Baltimore). 2023 Nov 3;102(44):e35649.

37. Liang Y, Lv L, He L, Deng W, Chen C, Li J. A Randomized Controlled Trial of FNB versus FICB for Patients with Femoral Neck Fractures Before Spinal Anesthesia. Clin Interv Aging. 2020 Jul 10;15:1113-1119.

38. Wan HY, Li SY, Ji W, Yu B, Jiang N. Fascia Iliaca Compartment Block for Perioperative Pain Management of Geriatric Patients with Hip Fractures: A Systematic Review of Randomized Controlled Trials. Pain Res Manag. 2020 Nov 25;2020:8503963.

39. Morrison RS, Dickman E, Hwang U, Akhtar S, Ferguson T, Huang J, Jeng CL, Nelson BP, Rosenblatt MA, Silverstein JH, Strayer RJ, Torrillo TM, Todd KH. Regional Nerve Blocks Improve Pain and Functional Outcomes in Hip Fracture: A Randomized Controlled Trial. J Am Geriatr Soc. 2016 Dec;64(12):2433-2439.

40. Guay J, Parker MJ, Gajendragadkar PR, Kopp S. Anaesthesia for hip fracture surgery in adults. Cochrane Database Syst Rev. 2016 Feb 22;2(2):CD000521.

41. Andrade PP, Lombardi RA, Marques IR, Braga ACDNAE, Isaias BRS, Heiser NE. Pericapsular Nerve Group (PENG) block versus fascia iliaca compartment (FI) block for hip surgery: a systematic review and meta-analysis of randomized controlled trials. Braz J Anesthesiol. 2023 Nov-Dec;73(6):794-809.

42. Baheti S, Yerramshetty M. Ultrasound-Guided Fascia Iliaca Block Versus Pericapsular Nerve Group Block Before Positioning for Spinal Anesthesia in Patients Undergoing Surgery for Neck of Femur Fracture: A Comparative Study. Cureus. 2024 Aug 30;16(8):e68173.

43. Jadon A, Sinha N, Chakraborty S, Singh B, Agrawal A. Pericapsular nerve group (PENG) block: A feasibility study of landmark based technique. Indian J Anaesth. 2020 Aug;64(8):710-713.

44. Ben Aziz M, Mukhdomi J. Pericapsular Nerve Group Block. [Updated 2024 Oct 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan.

45. Abelleyra Lastoria D A, Halicka Z, Liu K C, et al. (April 28, 2023) Fascia Iliaca Blocks: A Cadaveric Study Comparing the Suprainguinal Approach to the Loss of Resistance Technique. Cureus 15(4): e38243.

ANNEXURES

ANNEXURE 1

INFORMATION SHEET

TITLE: ULTRASOUND GUIDED PERICAPSULAR NERVE GROUP BLOCK VERSUS SUPRAINGUINAL FASCIA ILIACA COMPARTMENT BLOCK FOR EASE OF POSITIONING DURING SPINAL ANAESTHESIA FOR HIP FRACTURE SURGERIES: A RANDOMIZED CONTROLLED STUDY.

I, **DR. NAMRATHA K R** Postgraduate in the department of Anesthesiology, Sri Devaraj Urs Medical College, Kolar, under the guidance of Dr. Suresh Kumar N, Professor and HOD, department of anesthesiology, are carrying out above mentioned study at RLJH, Tamaka, Kolar. The study has been reviewed and approved by the institutional ethical review board. We will be determining the effectiveness of ultrasound guided PENG block and S-FICB with the help of pain score for ease of positioning during subarachnoid block and also be comparing the duration of postoperative analgesia.

Participation in this study doesn't involve any added cost for the patient. There is no compulsion to participate in this study and there will be no effect on quality patient care, if they do not wish to be part of this study.

All the information collected from the patient will be kept confidential and will not be disclosed to any outsider, unless compelled by the law. The information collected will be used only for this study. I request your kind self to give consent for the above-mentioned research project.

For any further clarification you are free to contact,

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<u>ಮಾಹಿತಿ ಪತ್ರ</u>

<u>ಶೀರ್ಷಿಕೆ:</u> ಸೊಂಟದ ಮೂಳೆ ಮುರಿತ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಗಳಿಗೆ ಬೆನ್ನುಮೂಳೆಯ ಅರಿವಳಿಕೆಯ ಸಮಯದಲ್ಲಿ ಸ್ಥಾನವನ್ನು ಸುಲಭಗೊಳಿಸಲು ಅಲ್ಟ್ರಾಸೌಂಡ್ ಮಾರ್ಗದರ್ಶಿ ಪೆರಿಕಾಪ್ಸುಲರ್ ನರ ಗುಂಪು ಬ್ಲಾಕ್ ವರ್ಸಸ್ ಸುಪ್ರೈಂಗುನಲ್ ಫ್ಯಾಸಿಯಾ ಇಲಿಯಾಕಾ ಕಂಪಾರ್ಟ್ಮೆಂಟ್ ಬ್ಲಾಕ್: ಯಾದೃಚ್ಛಿಕ ನಿಯಂತ್ರಿತ ಅಧ್ಯಯನ.

ನಾನು, **ಡಾ. ನಮ್ರತಾ ಕೆ.ಆರ್.** ಕೋಲಾರದ ಶ್ರೀ ದೇವರಾಜ ಅರಸು ವೈದ್ಯಕೀಯ ಕಾಲೇಜಿನ ಅರಿವಳಿಕೆ ವಿಭಾಗದಲ್ಲಿ ಸ್ನಾತಕೋತ್ತರ ಪದವೀಧರರಾಗಿದ್ದು, ಅರಿವಳಿಕೆ ವಿಭಾಗದ ಪ್ರೊಫೆಸರ್ ಮತ್ತು ಎಚ್‌ಒಡಿ ಡಾ.ಸುರೇಶ್ ಕುಮಾರ್ ಎನ್ ಅವರ ಮಾರ್ಗದರ್ಶನದಲ್ಲಿ ಕೋಲಾರದ ತಮಕದ RLJH ನಲ್ಲಿ ಮೇಲೆ ತಿಳಿಸಿದ ಅಧ್ಯಯನವನ್ನು ನಡೆಸುತ್ತಿದ್ದೇವೆ. ಅಧ್ಯಯನವನ್ನು ಸಾಂಸ್ಥಿಕ ನೈತಿಕ ಪರಿಶೀಲನಾ ಮಂಡಳಿ ಪರಿಶೀಲಿಸಿದೆ ಮತ್ತು ಅನುಮೋದಿಸಿದೆ. ಅಲ್ಟ್ರಾಸೌಂಡ್ ಮಾರ್ಗದರ್ಶಿತ ಪೆರಿಕ್ಯಾಪ್ಸುಲರ್ ನರ ಗುಂಪು ಬ್ಲಾಕ್ ಮತ್ತು ಸುಪ್ರಾ ಇಂಗ್ವಿನಲ್ ಫ್ಯಾಸಿಯಾ ಇಲಿಯಾಕಾ ಬ್ಲಾಕ್ನ ಪರಿಣಾಮಕಾರಿತ್ವವನ್ನು ನಾವು ಸುಬಾರಾಕ್ನಾಯ್ಡ್ ಬ್ಲಾಕ್ ಸಮಯದಲ್ಲಿ ಸ್ಥಾನೀಕರಣವನ್ನು ಸುಲಭಗೊಳಿಸಲು ನೋವು ಸ್ಕೋರ್ ಸಹಾಯದಿಂದ ನಿರ್ಧರಿಸುತ್ತೇವೆ ಮತ್ತು ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರದ ನೋವು ನಿವಾರಕದ ಅವಧಿಯನ್ನು ಸಹ ಹೋಲಿಸುತ್ತೇವೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದರಿಂದ ರೋಗಿಗೆ ಯಾವುದೇ ಹೆಚ್ಚುವರಿ ವೆಚ್ಚವಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಯಾವುದೇ ಬಲವಂತವಿಲ್ಲ ಮತ್ತು ಅವರು ಈ ಅಧ್ಯಯನದ ಭಾಗವಾಗಲು ಬಯಸದಿದ್ದರೆ, ಗುಣಮಟ್ಟದ ರೋಗಿಯ ಆರೈಕೆಯ ಮೇಲೆ ಯಾವುದೇ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ರೋಗಿಯಿಂದ ಸಂಗ್ರಹಿಸಿದ ಎಲ್ಲಾ ಮಾಹಿತಿಯನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗುತ್ತದೆ ಮತ್ತು ಕಾನೂನಿನಿಂದ ಒತ್ತಾಯಿಸದ ಹೊರತು ಯಾವುದೇ ಹೊರಗಿನವರಿಗೆ ಬಹಿರಂಗಪಡಿಸಲಾಗುವುದಿಲ್ಲ. ಸಂಗ್ರಹಿಸಿದ ಮಾಹಿತಿಯನ್ನು ಈ ಅಧ್ಯಯನಕ್ಕಾಗಿ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ. ಮೇಲೆ ತಿಳಿಸಿದ ಸಂಶೋಧನಾ ಯೋಜನೆಗೆ ಸಮ್ಮತಿ ನೀಡುವಂತೆ ನಾನು ನಿಮ್ಮನ್ನು ವಿನಂತಿಸುತ್ತೇನೆ.

ಯಾವುದೇ ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ದಯವಿಟ್ಟು ಸಂಪರ್ಕಿಸಿ,

ಡಾ.ನಮ್ರತಾ ಕೆ.ಆರ್.
(ಅರಿವಳಿಕೆ ಶಾಸ್ತ್ರದಲ್ಲಿ ಸ್ನಾತಕೋತ್ತರ ಪದವಿ)
ಮೊಬೈಲ್ ಸಂಖ್ಯೆ: **8971859206**
ಸುರೇಶ್ ಕುಮಾರ್.ಎನ್.
(ಅರಿವಳಿಕೆ ವಿಭಾಗದ ಪ್ರೊಫೆಸರ್ ಮತ್ತು ಎಚ್‌ಒಡಿ)
ಮೊಬೈಲ್ ಸಂಖ್ಯೆ: **9008222550**

ANNEXURE 2

INFORMED CONSENT FORM

ULTRASOUND GUIDED PERICAPSULAR NERVE GROUP BLOCK VERSUS SUPRAINGUINAL FASCIA ILIACA COMPARTMENT BLOCK FOR EASE OF POSITIONING DURING SPINAL ANAESTHESIA FOR HIP FRACTURE SURGERIES: A RANDOMIZED CONTROLLED STUDY.

Date:

I, ____ aged _____________ ,after being explained in my own vernacular language about the purpose of the study and the risks and complications of the procedure, hereby give my valid written informed consent without any force or prejudice for performing **PENG Block/ S-FICB**. The nature and risks involved have been explained to me to my satisfaction. I have been explained in detail about the study being conducted. I have read the patient information sheet and I have had the opportunity to ask any question. Any question that I have asked, have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research. I hereby give consent to provide my history, undergo physical examination, undergo the procedure, undergo investigations and provide its results and documents etc., to the doctor / institute etc. For academic and scientific purpose, the operation / procedure etc., may be video graphed or photographed. All the data may be published or used for any academic purpose. I will not hold the doctors / institute etc., responsible for any untoward consequences during the procedure / study.

_______________ ___________________

Signature &
Name of Patient Attendant
relation with patient

Signature/Thumb impression
& Name of patient

Witness 1:

Witness 2:

____

(Signature & Name of Research person /doctor)

[A copy of this Informed Consent Form and Patient Information Sheet has been provided to the participant.]

ಮಾಹಿತಿ ಕನ್ಸೆಂಟ್ ಫಾರ್ಮ್

ಸೊಂಟದ ಮೂಳೆ ಮುರಿತ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಗಳಿಗೆ ಬೆನ್ನುಮೂಳೆಯ ಅರಿವಳಿಕೆಯ ಸಮಯದಲ್ಲಿ ಸ್ಥಾನವನ್ನು ಸುಲಭಗೊಳಿಸಲು ಅಲ್ಟ್ರಾಸೌಂಡ್ ಮಾರ್ಗದರ್ಶಿ ಪೆರಿಕಾಪ್ಸುಲರ್ ನರ ಗುಂಪು ಬ್ಲಾಕ್ ವರ್ಸಸ್ ಸುಪ್ರೈಂಗುನಲ್ ಫ್ಯಾಸಿಯಾ ಇಲಿಯಾಕಾ ಕಂಪಾರ್ಟ್ಮೆಂಟ್ ಬ್ಲಾಕ್: ಯಾದೃಚ್ಛಿಕ ನಿಯಂತ್ರಿತ ಅಧ್ಯಯನ.

ದಿನಾಂಕ:

ನಾನು, ____ ವಯಸ್ಸು ______, ಅಧ್ಯಯನದ ಉದ್ದೇಶ ಮತ್ತು ಕಾರ್ಯವಿಧಾನದ ಅಪಾಯಗಳು ಮತ್ತು ತೊಡಕುಗಳ ಬಗ್ಗೆ ನನ್ನ ಸ್ವಂತ ಭಾಷೆಯಲ್ಲಿ ವಿವರಿಸಿದ ನಂತರ, **ಪೆರಿಕಾಪ್ಸುಲರ್ ನರ ಗುಂಪು ಬ್ಲಾಕ್** / **ಸುಪ್ರೈಂಗುವಿನಲ್ ಫ್ಯಾಸಿಯಾ ಇಲಿಯಾಕಾ ಕಂಪಾರ್ಟ್ಮೆಂಟ್ ಬ್ಲಾಕ್** ಅನ್ನು ನಿರ್ವಹಿಸಲು ಯಾವುದೇ ಬಲ ಅಥವಾ ಪೂರ್ವಾಗ್ರಹವಿಲ್ಲದೆ ನನ್ನ ಮಾನ್ಯ ಲಿಖಿತ ತಿಳುವಳಿಕೆಯ ಒಪ್ಪಿಗೆಯನ್ನು ಈ ಮೂಲಕ ನೀಡುತ್ತೇನೆ. ಒಳಗೊಂಡಿರುವ ಸ್ವರೂಪ ಮತ್ತು ಅಪಾಯಗಳನ್ನು ನನ್ನ ತೃಪ್ತಿಗೆ ವಿವರಿಸಲಾಗಿದೆ. ನಡೆಸುತ್ತಿರುವ ಅಧ್ಯಯನದ ಬಗ್ಗೆ ನನಗೆ ವಿವರವಾಗಿ ತಿಳಿಸಲಾಗಿದೆ. ನಾನು ರೋಗಿಯ ಮಾಹಿತಿ ಹಾಳೆಯನ್ನು ಓದಿದ್ದೇನೆ ಮತ್ತು ಯಾವುದೇ ಪ್ರಶ್ನೆ ಕೇಳುವ ಅವಕಾಶ ನನಗೆ ಸಿಕ್ಕಿದೆ. ನಾನು ಕೇಳಿದ ಯಾವುದೇ ಪ್ರಶ್ನೆಗೆ ನನ್ನ ತೃಪ್ತಿಗೆ ಉತ್ತರಿಸಲಾಗಿದೆ. ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನಾನು ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ಒಪ್ಪುತ್ತೇನೆ. ನನ್ನ ಇತಿಹಾಸವನ್ನು ಒದಗಿಸಲು, ದೈಹಿಕ ಪರೀಕ್ಷೆಗೆ ಒಳಗಾಗಲು, ಕಾರ್ಯವಿಧಾನಕ್ಕೆ ಒಳಗಾಗಲು, ತನಿಖೆಗೆ ಒಳಗಾಗಲು ಮತ್ತು ಅದರ ಫಲಿತಾಂಶಗಳು ಮತ್ತು ದಾಖಲೆ ಇತ್ಯಾದಿಗಳನ್ನು ವೈದ್ಯರಿಗೆ / ಸಂಸ್ಥೆಗೆ ನೀಡಲು ನಾನು ಈ ಮೂಲಕ ಒಪ್ಪಿಗೆ ನೀಡುತ್ತೇನೆ. ಶೈಕ್ಷಣಿಕ ಮತ್ತು ವೈಜ್ಞಾನಿಕ ಉದ್ದೇಶಕ್ಕಾಗಿ ಕಾರ್ಯಾಚರಣೆ / ಕಾರ್ಯವಿಧಾನ ಇತ್ಯಾದಿ ವೀಡಿಯೊ ಆಗಿರಬಹುದು ಗ್ರಾಫ್ ಅಥವಾ ಛಾಯಾಚಿತ್ರ, ಎಲ್ಲಾ ಡೇಟಾವನ್ನು ಯಾವುದೇ ಶೈಕ್ಷಣಿಕ ಉದ್ದೇಶಕ್ಕಾಗಿ ಪ್ರಕಟಿಸಬಹುದು ಅಥವಾ ಬಳಸಬಹುದು. ಕಾರ್ಯವಿಧಾನ / ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ಯಾವುದೇ ಅಹಿತಕರ ಪರಿಣಾಮಗಳಿಗೆ ನಾನು ವೈದ್ಯರು / ಸಂಸ್ಥೆ ಇತ್ಯಾದಿಗಳನ್ನು ಜವಾಬ್ದಾರರನ್ನಾಗಿಮಾಡುವುದಿಲ್ಲ.

________________ ______________

(ಸಹಿ ಮತ್ತು ಪಂ. ಅಟೆಂಡೆಂಟ್) (ಸಹಿ / ಹೆಬ್ಬೆರಳು ಅನಿಸಿಕೆ

(ರೋಗಿಯೊಂದಿಗಿನ ಸಂಬಂಧ) ಮತ್ತು ರೋಗಿಯ ಹೆಸರು)

ಸಾಕ್ಷಿ 1:

ಸಾಕ್ಷಿ 2:

(ಸಹಿ ಮತ್ತು ಸಂಶೋಧನಾ ವ್ಯಕ್ತಿ / ವೈದ್ಯರ ಹೆಸರು)

[ಭಾಗವಹಿಸುವವರಿಗೆ ಈ ತಿಳುವಳಿಕೆಯುಳ್ಳ ಒಪ್ಪಿಗೆ ನಮೂನೆ ಮತ್ತು ರೋಗಿಯ ಮಾಹಿತಿ ಹಾಳೆಯ ನಕಲನ್ನು ಒದಗಿಸಲಾಗಿದೆ]

ANNEXURE 3

PROFORMA

Sl no.

Title of the study: ULTRASOUND GUIDED PERICAPSULAR NERVE GROUP BLOCK VERSUS SUPRAINGUINAL FASCIA ILIACA COMPARTMENT BLOCK FOR EASE OF POSITIONING DURING SPINAL ANAESTHESIA FOR HIP FRACTURE SURGERIES: A RANDOMIZED CONTROLLED STUDY.

UHID No. Age (years):

Gender: Weight (Kg):

Height (Cm): IBW (Kg/m^2):

ASA Grading:

Surgical Details:

Time of Block:

Surgery Start time: End time: Duration (min):

Hemodynamic Variables:

Time Frame	Heart Rate (bpm)	Mean Arterial Pressure (mmHg)
Base line		
At the time of block (T0)		
5 min after block (T5)		
10 min after block (T10)		
15 min after block (T15)		
At the time of SAB (S0)		

Time Frame	VAS score at REST	VAS Score with movement
Base line		
At the time of block (T0)		
5 min after block (T5)		
10 min after block (T10)		
15 min after block (T15)		
20 min after block (T20)		
25 min after block (T25)		
30 min after block (T30)		
At the time of Positioning (TP)		

Postoperative Period:

Time frame	VAS score at REST	VAS score with movement
6 hrs after block		
12 hrs after block		
18 hrs after block		
24 hrs after block		

Time of First Rescue Analgesic (minutes):

Total Dose of TRAMADOL in the first 24 hours:

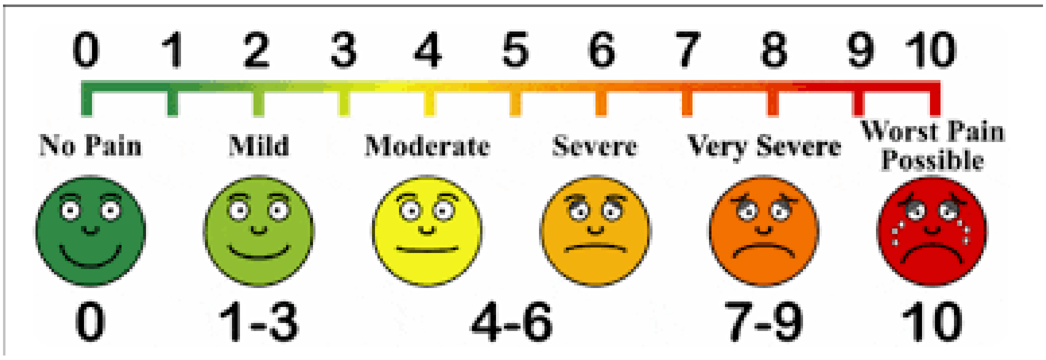
Total Dose of DICLOFENAC in the first 24 hours:

Total Dose of PARACETAMOL in the first 24 hours:

Complications of Block:

Adverse effects of Study drug

Pain Score on Visual Analog Scale (VAS)



MASTER CHART

ANNEXURE 5

Sl No	Age	Sex	Weight (kg)	ASA Physical Status	Base Line				T0				T5				T15				30				At 6hrs		At 12hrs		At 24hrs		T-RA (mins)	Total Dose (mg) in 24hrs		Type of Block
					HR	MAP	VAS-R	VAS-M	HR	MAP	VAS-R	VAS-M	HR	MAP	VAS-R	VAS-M	HR	MAP	VAS-R	VAS-M	HR	MAP	VAS-R	VAS-M	VAS-R	VAS-M	VAS-R	VAS-M	VAS-R	VAS-M		Tramadol	Paracetamol	
1	65	F	70	II	85	94	5	8	87	94	5	8	83	90	0	3	70	79	0	1	85	90	1	2	0	1	0	1	0	1	410	200	2000	S-FICB
0	61	F	53	I	96	96	6	9	98	96	6	9	94	93	2	4	80	82	1	2	96	93	0	1	1	2	1	2	1	2	400	150	4000	S-FICB
2	56	M	67	I	110	89	1	7	105	89	1	7	98	76	2	5	70	87	0	1	86	90	0	0	0	1	0	1	0	1	520	0	2000	PENG
1	62	F	61	II	99	95	6	9	101	95	6	9	97	92	1	3	82	84	1	1	99	92	1	2	1	1	1	1	1	1	390	250	3000	PENG
5	54	M	58	I	88	91	5	7	90	91	5	7	86	88	1	3	72	80	0	1	88	88	0	1	0	1	0	1	0	1	420	200	1000	S-FICB
6	65	F	54	II	95	97	6	9	97	97	6	9	93	93	2	4	79	82	1	1	95	93	1	1	1	1	1	1	1	1	400	250	4000	S-FICB
7	60	F	66	II	96	93	6	9	98	93	6	9	94	90	1	4	80	82	1	2	96	90	1	1	1	2	1	2	1	2	380	250	4000	PENG
8	58	F	59	II	99	95	6	9	101	95	6	9	97	92	1	4	82	84	1	1	99	92	1	2	1	1	1	1	1	1	390	250	3000	PENG
9	60	F	65	II	97	95	6	9	99	95	6	9	95	92	2	5	80	84	1	2	97	92	1	1	1	2	1	2	1	2	400	300	4000	S-FICB
10	65	F	50	I	92	90	5	8	94	90	5	8	90	88	0	4	76	80	0	1	92	88	0	1	0	1	0	1	0	1	400	200	2000	PENG
11	45	M	62	I	99	94	6	9	101	94	6	9	97	91	2	5	81	83	1	1	99	91	1	2	1	1	1	1	1	1	380	200	3000	S-FICB
12	62	F	68	I	100	94	6	10	102	94	6	10	98	91	1	4	81	83	1	2	100	91	1	1	1	2	1	2	1	2	380	250	3000	PENG
13	60	F	57	II	98	95	6	9	100	95	6	9	96	92	1	4	82	84	0	1	98	92	1	0	0	1	0	1	0	1	380	250	3000	PENG
14	50	M	60	I	87	92	5	8	89	92	5	8	85	88	0	4	71	78	0	1	87	88	0	1	0	1	0	1	0	1	420	200	1000	PENG
15	61	M	64	II	89	91	5	8	91	91	5	8	87	88	0	5	73	80	0	1	89	88	0	1	0	1	0	1	0	1	420	200	1000	S-FICB
16	57	F	55	II	95	97	6	9	97	97	6	9	93	93	2	4	79	82	1	1	95	93	1	1	1	1	1	1	1	1	400	250	4000	S-FICB
17	64	F	63	II	90	92	5	7	92	92	5	7	88	88	1	1	74	80	0	1	90	88	0	1	0	1	0	0	0	1	420	150	1000	S-FICB
18	48	M	69	I	90	91	5	7	92	91	5	7	88	87	0	5	74	80	0	1	90	87	1	0	0	1	0	1	0	1	400	200	2000	S-FICB
19	64	F	52	II	90	92	5	7	92	92	5	7	88	88	1	1	74	80	0	1	90	88	0	1	0	1	0	1	0	1	420	150	1000	S-FICB
20	65	F	70	II	90	93	5	8	92	93	5	8	88	89	0	5	74	81	0	1	90	89	0	1	0	0	0	1	0	1	450	150	2000	PENG
21	57	F	56	II	92	90	5	8	94	90	5	8	90	88	0	5	76	80	0	1	92	88	0	1	0	1	0	1	0	1	400	200	2000	PENG
22	57	M	58	I	95	97	6	9	97	97	6	9	93	93	1	3	79	82	1	1	95	93	0	1	0	1	1	1	1	1	400	250	4000	S-FICB
23	35	F	61	I	88	90	5	7	90	90	5	7	86	87	1	1	72	79	0	1	88	87	0	1	0	1	0	1	0	1	450	150	2000	PENG
24	58	M	67	II	90	91	5	7	92	91	5	7	88	87	0	5	74	80	0	1	90	87	1	0	0	1	0	1	0	1	400	200	2000	S-FICB
25	22	M	53	I	90	93	5	8	92	93	5	8	88	89	0	3	74	81	0	0	90	89	0	1	0	0	0	0	0	0	450	150	2000	PENG
26	24	M	65	I	98	95	6	9	100	95	6	9	96	92	2	5	82	84	0	0	98	92	1	2	0	0	0	0	0	0	380	250	3000	PENG
27	60	M	59	II	92	90	5	8	94	90	5	8	90	88	0	3	76	80	0	0	92	88	0	1	0	0	0	0	0	0	400	200	2000	PENG
28	60	F	64	I	100	96	6	10	102	96	6	10	98	93	2	4	80	82	1	1	100	93	1	1	1	1	1	1	1	1	390	300	4000	PENG
29	56	F	66	II	87	90	5	8	89	90	5	8	85	87	0	5	71	79	0	1	87	87	0	1	0	1	0	1	0	1	450	200	2000	S-FICB
30	67	M	50	III	85	94	5	8	87	94	5	8	83	90	0	5	70	79	1	0	85	90	1	2	1	0	1	0	1	0	410	200	2000	S-FICB
38	65	F	55	II	96	96	6	9	98	96	6	9	94	93	2	5	80	82	1	2	96	93	0	1	1	2	1	2	1	2	400	150	4000	S-FICB
39	65	M	61	II	87	90	5	8	89	90	5	8	85	87	0	5	71	79	0	0	87	87	0	1	0	0	0	0	0	0	450	200	2000	S-FICB
40	57	F	69	I	96	93	6	9	98	93	6	9	94	90	1	4	80	82	1	2	96	90	1	1	1	2	1	2	1	2	380	250	4000	PENG
41	45	M	52	I	87	92	5	8	89	92	5	8	85	88	0	5	71	78	0	0	87	88	0	1	0	0	0	0	0	0	420	200	1000	PENG
42	60	M	68	II	88	92	5	7	90	92	5	7	86	89	1	1	72	78	0	0	88	89	0	1	0	0	0	0	0	0	420	150	1000	PENG
43	30	F	62	I	89	91	5	8	91	91	5	8	87	88	0	5	73	80	0	0	89	88	0	1	0	0	0	0	0	0	420	200	1000	S-FICB
44	56	M	66	II	86	93	5	8	88	93	5	8	84	89	0	5	70	78	0	0	86	89	0	1	0	0	0	0	0	0	450	200	2000	S-FICB
45	65	M	59	II	98	95	6	9	100	95	6	9	96	92	1	4	82	84	0	1	98	92	1	0	0	1	0	1	0	1	380	250	3000	PENG
46	54	F	54	I	88	90	5	7	90	90	5	7	86	87	1	1	72	79	0	0	88	87	0	1	0	0	0	0	0	0	450	150	2000	PENG
47	65	M	65	II	89	91	5	8	91	91	5	8	87	88	0	4	73	80	0	0	89	88	0	1	0	0	0	0	0	0	420	200	1000	S-FICB
48	60	F	58	II	98	95	6	9	100	95	6	9	96	92	2	5	82	84	1	0	98	92	1	2	1	0	1	0	1	0	380	250	3000	PENG
49	26	M	70	I	110	89	1	7	105	89	1	7	98	76	2	5	70	87	0	0	86	90	0	0	0	0	0	0	0	0	520	0	2000	PENG
50	31	M	68	I	100	94	6	10	102	94	6	10	98	91	2	4	81	83	1	2	100	91	1	1	1	2	1	2	1	2	380	250	3000	PENG
51	42	M	71	I	100	96	6	10	102	96	6	10	98	93	2	4	80	82	1	2	100	93	0	1	1	2	1	2	1	2	390	300	4000	PENG
52	30	M	60	I	110	89	1	7	105	89	1	7	98	76	2	5	70	87	0	1	86	90	0	0	0	1	0	1	0	1	520	0	2000	PENG
53	44	M	65	I	88	91	5	7	90	91	5	7	86	88	1	1	72	80	0	0	88	88	0	1	0	0	0	0	0	0	420	200	1000	S-FICB
54	54	M	68	II	99	94	6	9	101	94	6	9	97	91	2	5	81	83	1	2	99	91	1	2	1	2	1	2	1	2	380	200	3000	S-FICB
55	28	M	68	I	95	98	6	9	97	98	6	9	93	94	1	1	78	83	0	0	95	94	0	1	0	0	0	0	0	0	450	150	3000	S-FICB
56	64	M	70	II	99	95	6	9	101	95	6	9	97	92	2	4	82	84	0	2	99	92	1	2	0	2	1	2	1	2	390	250	3000	PENG
57	56	F	62	I	88	90	5	7	90	90	5	7	86	87	1	1	72	79	0	0	88	87	0	1	0	0	0	0	0	0	450	150	2000	PENG
58	65	F	54	II	98	95	6	9	100	95	6	9	96	92	2	4	82	84	0	1	98	92	1	0	0	1	0	1	0	1	380	250	3000	PENG
59	56	M	69	I	96	93	6	9	98	93	6	9	94	90	2	4	80	82	1	2	96	90	1	1	1	2	1	2	1	2	380	250	4000	PENG
60	52	M	75	I	86	93	5	8	88	93	5	8	84	89	0	5	70	78	0	2	86	89	0	1	0	2	0	2	0	2	450	200	2000	S-FICB
61	61	F	60	II	90	91	5	7	92	91	5	7	88	87	1	4	74	80	0	1	90	87	1	0	0	1	0	1	0	1	400	200	2000	S-FICB
62	57	M	70	I	100	96	6	10	102	96	6	10	98	93	2	5	80	82	0	1	100	93	0	1	0	1	1	1	1	1	390	300	4000	PENG
63	63	F	64	II	97	96	6	9	99	96	6	9	95	93	2	5	80	82	1	2	97	93	1	2	1	2	1	2	1	2	400	250	4000	S-FICB
64	50	M	73	I	86	93	5	8	88	93	5	8	84	89	0	3	70	78	0	0	86	89	0	1	0	0	0	0	0	0	450	200	2000	S-FICB
65	64	M	67	III	96	96	6	9	98	96	6	9	94	93	0	4	80	82	1	2	96	93	1	1	1	2	1	2	1	2	400	150	4000	S-FICB
66	30	M	66	I	88	92	5	7	90	92	5	7	86	89	0	1	72	78	0	0	88	89	0	1	0	0	0	2	0	2	420	150	1000	PENG
67	42	F	74	I	87	90	5	8	89	90	5	8	85	87	0	4	71	79	0	0	87	87	0	1	0	0	0	0	0	0	450	200	2000	S-FICB
68	55	M	75	II	90	92	5	7	92	92	5	7	88	88	1	1	74	80	0	0	90	88	0	1	0	0	0	0	0	0	420	150	1000	S-FICB
69	31	M	69	I	99	94	6	9	101	94	6	9	97	91	2	5	81	83	1	1	99	91	1	2	1	1	1	1	1	1	380	200	3000	S-FICB
70	65	F	56	II	95	98	6	9	97	98	6	9	93	94	1	1	78	83	0	0	95	94	0	1	0	0	0	0	0	0	450	150	3000	S-FICB
71	50	F	60	I	88	92	5	7	90	92	5	7	86	89	0	1	72	78	0	0	88	89	0	1	0	0	0	2	0	2	420	150	1000	PENG
72	45	F	59	I	88	91	5	7	90	91	5	7	86	88	1	4	72	80	0	2	88	88	0	1	0	2	0	2	0	2	420	200	1000	S-FICB