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Comparison of pericapsular nerve group block alone versus combined with suprainguinal fascia ilica compartment block for postoperative analgesia and quality of recovery in older adult patients with hip fractures: A retrospective study

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Abstract

Previous studies have demonstrated the effectiveness of the pericapsular nerve group (PENG) block and suprainguinal fascia ilica compartment block (SIFCB) in providing postoperative pain relief. This retrospective study aimed to compare the analgesic contribution and quality of recovery of SIFCB added to PENG block for hip surgery in elderly patients. This retrospective study analyzed data from patients over the age of 65 who underwent hip surgery between January 2023 and September 2023. The patients included were all American Society of Anesthesiologists (ASA) 2-3, and received a standard perioperative and postoperative analgesia regime. According to the regional anesthesia method applied to the patients, they were grouped as PENG and PENG+SIFCB. The study was conducted on 38 patients. Of these, 20 were in the PENG group, while 18 were in the PENG+SIFCB group. The study evaluated the 48-hour oral opioid consumption and quality of recovery on postoperative day 1 and month 1 in both groups. The results indicated that the average oral opioid consumption was similar in both groups, with the PENG group consuming an average of 26.5 (IQR: 20-30) and the PENG+SIFCB group consuming an average of 20 (IQR: 10-28), respectively (p=0.100). Furthermore, there was no significant difference between the two groups in terms of quality of recovery on postoperative day 1 and month 1 (p=0.271, p=0.936, respectively). The study found that combining SIFCB with PENG block provides similar benefits compared to PENG block alone for postoperative opioid consumption and quality of recovery in multimodal analgesia planning.

Keywords: Pain management, lower extremity, postoperative, nerve block, pain

Introduction

As a consequence of the ageing population, a greater number of patients are experiencing hip fracture. In addition to different comorbidities in this patient population, the fragile bone structure makes it important that hip fracture operations are followed up postoperatively [1]. The provision of sufficient postoperative analgesia and an early start to rehabilitation are crucial for the patient in respect of morbidity and mortality [2]. Opioids used for postoperative pain management may cause side effects such as nausea, vomiting, respiratory depression, constipation, and delirium. If the analgesic approach is not effective, it can delay the rehabilitation period and increase the risk of complications such as atelectasis, pneumonia, pulmonary embolism, and deep vein thrombosis. Regional anaesthesia techniques are increasingly used to provide effective pain relief and to speed up patient recovery and mobility [3].

The hip joint has complex anatomy and nerve supply, making it difficult to relieve localized pain. However, the fascial iliac compartment, located between the fascia iliaca and the iliopsoas muscle, is a potential target for pain relief [4,5].

In recent years, the suprainguinal fascia iliaca compartment block (SIFCB) has been increasingly used for postoperative analgesia in hip arthroplasty. It has been shown to have high success in blocking the femoral nerve (FN), obturator nerve (ON), and lateral cutaneous nerve (LCFN), especially with administration

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at a high volume [6,7]. In total hip arthroplasty (THA), the suprainguinal approach of fascia iliaca has been determined to be a superior analgesic and reduce morphine consumption in the first 24 hours compared to the infrainguinal approach [8]. Some studies have shown that in addition to the analgesic effect, there is a high motor protective effect [9,10]. However, some studies have reported that a patient group applied with SIFCB experienced muscle weakness after 6 hours postoperatively [11].

Pericapsular nerve group (PENG) block is increasingly used due to its strong postoperative analgesic effect and motor protective effect. This block was first administered to patients with a hip fracture by Giron Arango in 2018 [12]. The anterior capsule of the hip joint has an advanced innervation system provided by the ON, accessory ON, and FN [13]. After the application of PENG block, blockage of the anterior articular branches that provide the anterior innervation of the hip joint has been shown to have been obtained. It has been emphasized that patients undergoing hip arthroplasty with PENG block have a lower postoperative requirement for opioids because of this blockage [14]. In a study by Lin-yin et al., it was determined that in addition to providing effective postoperative analgesia for total hip arthroplasty patients, this blockage also provided effective motor blockage. However, no significant effect on quality of recovery was determined in the short or long term [15]. In contrast, Kukreja et al. observed an increase in 24-48-hour quality of recovery in THA patients with PENG block [16].

The aim of this study was to compare postoperative recovery quality and opioid consumption in patients aged >65 years who underwent hip fracture surgery under spinal anesthesia. The study aimed to investigate whether combining PENG block and SIFCB would result in reduced opioid consumption and less motor weakness after surgery, providing more effective postoperative pain relief compared to PENG block alone. The study focused on elderly patients with a hip fracture and aimed to improve postoperative quality of recovery (QoR).

Material and Methods

The Ethics Committee of Karamanoğlu Mehmetbey University Medical Faculty approved the study (decision no: 10-2023/17 date: 20.11.2023). Patients aged >65 who underwent hip fracture surgery at Karaman Training and Research Hospital between January 2023 and September 2023 were included in the study.

The peripheral block techniques for perioperative and postoperative analgesia are carefully managed in our clinic. All the data up to 24-48 hours postoperative were recorded. Detailed information was collected of postoperative analgesia follow-up, pain intensity, motor follow-up, opioid consumption, and complications. The data were also regularly recorded of patient polyclinic follow-up examinations and improvements in the criteria for rehospitalisation.

The records were scanned of all the patients aged >65 years who were operated on because of hip fracture in the defined study period. The study sample consisted of patients who were applied with PENG block only and PENG block combined with SIFCB for postoperative pain relief. The study exclusion criteria were defined as age ≤65 years, American Society of Anesthesiologists (ASA) ≥IV, the presence of any cognitive or function disorder that affected pain evaluation, local anaesthetic allergy, deviation from the standard postoperative analgesia protocols, or incomplete data in the records.

The data of patients aged >65 years with ASA score of 2-3 were retrospectively scanned. All the patients undergoing hip surgery provided informed consent for the nerve blocks. The combination of SIFCB and PENG block was applied to 18 patients and PENG block alone to 20 patients. Both nerve blocks were performed with the patient positioned supine after the administration of spinal anaesthesia.

Patient demographic data of age, gender, height and weight, together with the operating time and duration of anaesthesia were obtained from the hospital records system. The postoperative pain follow-up of the patients, time to first requirement for opioids, time to mobilisation, and complications were obtained from the routine forms in the patient records. The data of quality of recovery at postoperative 24 hours and 1 month were obtained from QoR-15 questionnaires in the records.

Anaesthesia Method and Analgesia Plan

In our clinic, great care is taken in the administration of perioperative and postoperative standard anaesthesia protocols. Data obtained from patients outside these protocols were excluded from the study.

As part of the standard preoperative monitoring, all patients underwent an electrocardiogram, pulse oximetry, and non-invasive arterial blood pressure measurement. Spinal anesthesia was then administered at the L4-5 level using 12-15mg of heavy bupivacaine. Standard postoperative analgesia protocols were applied using 1gr paracetamol 3 times a day and 50mg dexketoprofen twice a day admnistered intravenously (IV). If the numeric rating scale (NRS) was ≥4, 50mg tramadol IV and 5mg oral oxycodone were administered. Pain scores were obtained at postoperative 3, 6, 8, 12, and 24 hours using NRS. The study recorded the cumulative oral morphine equivalent (OME) use during different postoperative time frames; the first 6 hours, 6-12 hours, 12-24 hours, and 24-48 hours. To evaluate the postoperative healing scores of the patients, the QoR-15 questionnaire was administered on postoperative day 1 and after 1 month. At the end of the first postoperative month, complications were evaluated using the Clavien-Dindo classification system.

PENG Block Application

Peripheral block applications were performed by an expert with advanced block application certificate and ten years of experience. The patient was positioned supine for the block procedure. The targeted area was cleaned with an antiseptic solution. Then, a low-frequency ultrasound probe (3-5 Mhz) was placed over the anterior inferior iliac spine (AIIS) in the transverse plane.

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The transducer was slowly moved downwards to visualise the pubic ramus. Imaging was performed on the femoral artery and iliopubic eminence. An 21-gauge 80-mm block needle (B.Braun®, Germany) was inserted using the in-plane technique, from lateral to medial. Then, a 20ml local anaesthetic of 0.25% bupivacaine was injected between the psoas tendon in the anterior and the pubic ramus in the posterior.

SIFCB Application

A high-frequency linear ultrasound probe (6-13 Mhz) was placed in the sagittal plane to obtain the ASIS image. Shifting the probe medially, the fascia iliaca and sartorius, iliopsoas and oblique internal muscles were identified. After confirmation of the "bow sign" formed by the muscle fascia, an 21-gauge 80-mm block needle (B.Braun®, Germany) was placed 1cm cephalic to the inguinal ligament. Using the in-plane technique, the fascia iliaca was entered, which was then separated from the iliac muscle by hydrodissection. The needle was advanced cranially and slightly dorsally in this created gap. A total volume of 20 ml 0.25% bupivacaine was injected. If the local anaesthetic was observed to have spread cranially from the point where it was distributed below the abdominal muscles of the iliac muscle and the iliopsoas muscles, the injection was accepted as successful [17].

Outcome Measurements

The primary outcome of this retrospective study was the amount of opioids used within postoperative 48 hours. Secondary outcomes were the NRS measurements at 48 hours, the time to first requirement for opioids, the incidence of nausea-vomiting, and Clavien-Dindo complication scores. Dynamic NRS is pain experienced during passive lower limb elevation of 15 degrees. Static NRS is defined as the pain experienced in the position that provides the patient with the best comfort. QoR-15 questionnaires were performed and recorded by the M.K. on postoperative day 1 and month 1.

Statistical Analysis

The number of people to be included was calculated on the basis of data obtained from the cohort in our centre on postoperative morphine consumption of patients operated for femur fracture. These data showed that the 48-hour mean morphine consumption was 20 milligrams (±8 mg standard deviation). We expected a 30% reduction in morphine consumption at 48 h by performing a PENG+SIFCB block compared to PENG for postoperative analgesia for hip fracture. The inclusion of 21 patients (42 patients in total) in each group with an alpha risk of 0.05 and a power of 80% was considered sufficient to observe a significant difference between both groups. However, we were able to include 20 patients in the PENG group and 18 patients in the PENG+SIFCB group.

The data collected in the study were statistically analyzed using IBM SPSS version 26 software. The Kolmogorov-Smirnov test was used to determine if the data were normally distributed. Normally distributed data were compared between groups using the Student's t-test, and the Mann-Whitney U-test was applied to data not showing normal distribution. Descriptive data were presented as mean±standard deviation and interquartile range (25th and 75th percentiles) values. Ratios were compared using the Chi-square test, while the Fisher Exact test was utilized for categorical variables. The level of statistical significance was set at $p<0.05$.

Results

The records were scanned of patients aged >65 years who underwent surgery for a hip fracture. The study sample included a total of 38 patients, comprising 20 patients who were administered PENG block alone and 18 patients administered PENG+SIFCB. No statistically significant difference was observed between the groups in respect of the preoperative demographic data of age, gender, height, weight, and body mass index. The two groups were similar in respect of the type of surgery (p=0.417), anaesthesia duration (p=0.101), operating time (p=0.137) and preoperative NRS (p=0.124) (Table 1).

In the postoperative 48-hour NRS evaluations, the 8 and 12-hour static NRS values were found to be significantly lower in the PENG+SIFCB group (1.94±0.12 and 2.38±0.53) compared to the PENG group (2.55±0.13 and 3.20±0.60)(p=0.011, p=0.028, respectively) (Table 2). In the 8-hour dynamic NRS evaluation the values were determined to be significantly lower in the PENG+SIFCB group (3.38±1.14) than in the PENG group (4.15±1.26) (p=0.031) (Table 2).

No significant difference was found between the groups in postoperative OME use over 0-48 hours: 0-6 hours (p=0.277), 6-12 hours (p=0.250), 12-24 hours (p=0.365), and 24-48 hours (p=0.322). The amount of oral opioid consumption over a 48-hour period was found to be similar in both groups (p=0.100) (Table 3).

There was no statistically significant difference between the two groups regarding the QoR-15 scores on the first postoperative day. The PENG group had a score of 117.45±8.3, and the PENG+SIFCB group had a score of 114.05±10.38 (p=0.271). In the 1-month postoperative QoR score evaluation, the values of 138.55±6.2 in the PENG group and 138.72±6.92 in the PENG+SIFCB group were not significantly different (p=0.936) (Table 4).

A statistically significantly shorter time to first opioid requirement was determined in the PENG group (9.35±3.29 hours) compared to the PENG+SIFCB group (11.66±3.3 hours) (p=0.038). No significant difference was determined between the groups in respect of time to mobilisation (p=0.417) and patient satisfaction (p=0.299). The results of the evaluation of postoperative complications were similar in both groups (p=0.840), with no significant difference determined between the groups in respect of postoperative nausea (p=0.095), vomiting (p=0.554), itching (p=1.000), respiratory depression (p=1.000), and urine retention (p=1.000) (Table 5).

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Table 1. Comparison of patient characteristics and intraoperative data between research groups

Variable		PENG (n=20)	PENG+SIFCB (n=18)	P values
Sex	**Female**	11 (55%)	12 (66.7%)	0.463[a]
	Male	9 (45%)	6 (33.3%)	
Age (years)		76.35 (4.42)	76.38 (7.91)	0.985[b]
ASA		3 (2-3)	3 (2-3)	0.691[c]
Weight (kg)		73.90 (10.41)	70.66 (8.10)	0.290[b]
Height (cm)		160.55 (8.61)	161.83 (8.06)	0.064[b]
BMI (kg/m²)		27.81 (3.96)	26.51 (2.47)	0.239[b]
Surgical side	**Right**	10 (50%)	11 (61.1%)	0.492
	Left	10 (50%)	7 (38.9%)	
Surgery type (THA/gamma nail/screws)		7/6/7	9/6/3	0.417[a]
Duration of anesthesia, min		111.90 (10.51)	117.27 (8.98)	0.101[b]
Surgical time, min		88.35 (11.26)	93.77 (10.68)	0.137[b]
Preoperative NRS		6.7 (1.12)	7.2 (1.12)	0.124[b]

PENG: pericapsular nerve group, SIFCB: suprainguinal facial ilica compartman block, ASA: American Society of Anesthesiologists, NRS: numeric rating scale, BMI: body mass index, THA: total hip arthroplasty. a: Chi-Square test with n (%), b: Student's t-test with mean (SD), c: Mann-Whitney U test with median (interquartile range: Q1, Q3)

Table 2. Comparison of NRS scores measured static and dynamic in study groups

Time	3 h	6 h	8 h	12 h	24 h	48 h
Static						
PENG (n=20)	0.20±0.41	1.25±0.85	2.55±0.13	3.20±0.60	1.90±0.78	0.95±0.68
PENG+SIFCB (n=18)	0.05±0.23	1.16±0.78	1.94±0.12	2.38±0.53	1.60±0.59	1.11±0.75
P value	0.198	0.515	**0.011***	**0.028***	0.426	0.534
Dynamic						
PENG (n=20)	0.55±0.94	2.70±1.41	4.15±1.26	4.90±1.68	3.00±1.68	1.30±0.64
PENG+SIFCB (n=18)	0.38±0.60	2.38±1.24	3.38±1.14	4.16±1.15	2.77±0.64	2.22±0.54
P value	0.901	0.272	**0.031***	0.105	0.334	0.109

PENG: pericapsular nerve group, SIFCB: suprainguinal facial ilica compartman block, Student t test with mean±SD, *Statistically significant. P<0.05

Table 3. Comparison of required oral morphine equivalents (OMEs) amounts in study groups

	PENG (n=20)	PENG+SIFCB (n=18)	P values
0-6 hours (mg)	0 (0–7.5)	0 (0–0)	0.277
6-12 hours (mg)	10 (0–15)	10 (0–10)	0.250
12-24 hours (mg)	10 (10–10)	10 (10–10)	0.365
24-48 hours (mg)	0 (0–10)	0 (0–10)	0.322
Total (0-48 h) (mg)	26.5 (20–30)	20 (10–28)	0.100

PENG: pericapsular nerve group, SIFCB: suprainguinal facial ilica compartman block, Mann Withney test with median (quartiles: Q1-Q3)

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Table 4. Comparison of postoperative 1 day and 1 month quality of recovery (QoR)-15 scores between research groups

Variable	Postoperative 1 day			Postoperative 1 month		
QoR-15	**PENG**	**PENG+SIFCB**	**P values**	**PENG**	**PENG+SIFCB**	**P values**
Able to breathe easy	10 (10-10)	10 (10-10)	0.600	10 (10-10)	10 (10-10)	1.00
Been able to enjoy food	8 (8-8)	8 (8-9)	0.680	10 (10-10)	10 (10-10)	0.746
Feeling rested	8 (7-8)	8 (7-9)	0.389	9 (9-10)	10 (9-10)	0.726
Have had a good sleep	7.5 (6-8)	8 (7-9)	0.087	9 (9-10)	10 (10-10)	0.143
Able to look after personal toilet and hygiene unaided	3 (2-3.5)	2 (1-4)	0.339	7 (6-8)	7 (6-8)	0.831
Able to communicate with family or friends	10 (10-10)	10 (10-10)	0.239	10 (10-10)	10 (10-10)	0.131
Getting support from hospital doctors and nurses	10 (10-10)	10 (10-10)	1.00	10 (10-10)	10 (10-10)	0.343
Able to return to work or usual home activities	2 (1-3)	2 (1-3)	0.507	7 (5-8)	7 (5-7)	0.706
Feeling comfortable and in control	9 (8-9)	8.5 (8-10)	0.493	10 (9.5-10)	10 (9-10)	0.623
Having a feeling of general well-being	9 (8-9.5)	8 (8-10)	0.563	10 (9-10)	10 (9-10)	0.491
Moderate pain	5 (4-6)	5 (5-5)	0.950	8 (7-8)	8 (8-9)	0.006*
Severe pain	8 (7-8)	8 (8-8)	0.455	10 (10-10)	10 (10-10)	0.227
Nausea or vomiting	9 (8-10)	9 (6-10)	0.491	10 (10-10)	10 (10-10)	1.00
Feeling worried or anxious	10 (9-10)	10 (8-10)	0.688	10 (10-10)	10 (10-10)	1.00
Feeling sad or depressed	10 (7.75-10)	10 (8.75-10)	0.507	10 (10-10)	10 (10-10)	1.00
Total score	119 (11.5-122)	115 (107-123)	0.271	140.5 (142-146)	142 (144-147)	0.936

PENG: pericapsular nerve group, SIFCB: suprainguinal facial ilica compartman block, QoR: quality of recovery. Mann-Whitney U test with median (interquartile range: Q1-Q3) *Statistically significant P<0.05

Table 5. Comparison of postoperative clavin-dindo, patient satisfaction, mobilization time and complications

		PENG (n=20)	PENG+SIFCB (n=18)	P values
Time to first opioid requirement (hour)		9.35±3.29	11.66±3.30	**0.038***
Mobilization time		13.35±4.17	15.00±7.85	0.417
Patient satisfaction		6.60±1.65	7.05±130	0.299
Clavin-dindo	**1**	16 (80%)	13 (76.3%)	0.840
	2	3 (15%)	4 (18.4%)	
	3a	1 (5%)	1 (5.3%)	
	3b	0 (0%)	0 (0%)	
	4	0 (0%)	0 (0%)	
Nausea	**No**	17 (85%)	11 (61.1%)	0.095†
	Yes	3 (15%)	7 (38.9%)	
Vomiting	**No**	18 (90%)	15 (83.3%)	0.554‡
	Yes	2 (10%)	3 (16.7%)	
Pruritus	**No**	20 (100%)	18 (100%)	1.000‡
	Yes	0 (0%)	0 (0%)	
Urinary retention	**No**	20 (100%)	18 (100%)	1.000‡
	Yes	0 (0%)	0 (0%)	
Respiratory depression	**No**	20 (100%)	18 (100%)	1.000‡
	Yes	0 (0%)	0 (0%)	

PENG: pericapsular nerve group, SIFCB: suprainguinal facial ilica compartman block, †: Chi-Square test with n (%), ‡: Fisher exact test with n (%), studen t-test mean±standard deviation, *Statistically significant P<0.05

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Discussion

The results of this retrospective study of patients aged >65 years applied with PENG block only or PENG+SIFCB in surgery for a hip fracture, showed that the combination of PENG+SIFCB provided more effective analgesia than PENG block alone at static postoperative 8 and 12 hours and at dynamic 8 hours. Patients in the PENG+SIFCB group had a longer time to first requirement for opioids than those in the PENG group. However, the total postoperative opioid consumption and recovery scores were similar in both groups.

Hip fracture is a significant cause of morbidity and mortality in elderly people. Adequate postoperative pain relief is crucial, particularly for minimizing complications in older patients. [12]. If adequate pain control is not achieved, it can prolong the rehabilitation period and impair functional recovery. This increases the probability of the development of postoperative complications [18]. It has been previously proven that various blocks such as PENG block, fascia iliac block, and femoral nerve block provide effective postoperative analgesia in hip surgery [14,16,17,19]. However, despite the increasingly widespread use of these applications, the evidence of their effectiveness is limited [20].

The use of PENG block as an analgesic, which also protects motor function after surgery, has increased in THA. However, there is still a debate on whether it provides effective pain relief due to the complex innervation of the hip joint. In a study by Pasceralla et al., patients who received PENG block during THA surgery reported lower pain scores and consumed less opioids 48 hours post-surgery [14]. In another study that compared PENG block and femoral nerve block for postoperative analgesia during hip fracture surgery, no difference was found in respect of the pain scores on postoperative day 1. In addition, quadriceps strength was found to be better protected in the PENG block group [21]. The authors of a study comparing PENG and femoral blocks in femur fracture surgery concluded that PENG block provided no analgesic advantage [22].

Vermeylen et al. reported that a triple block of FN, LCFN, and ON occurred following high volume injection of suprainguinal injected solution due to the effect of the injectate spreading below the fascia iliaca [7]. Shariat et al. compared fascia ilica compartment block and sham block in THA and did not determine any significant decrease in the 24-hour pain level [23]. There are also studies in the literature showing that the SIFCB technique encompasses the nerves more consistently compared to the infrainguinal technique [6,8]. It has been shown that the suprainguinal approach is superior to the infrainguinal approach in the provision of postoperative analgesia, resulting in less morphine consumption [8]. The difference seen in nerve involvement in the application of local anaesthesia, especially at high volume, has led to debate about the efficacy of this block [7].

In the current study, PENG block combined with SIFCB resulted in decreased pain scores at postoperative 6 and 8 hours and this extended the time to the first requirement for opioids. However, similar results were seen in both groups in respect of total opioid consumption. The limited analgesia provided by the addition of SIFCB to PENG block suggested that it could be due to the different stimulation of the nerve branches at the point of application and the cumulative effect of local anaesthesia. The blockade of the extra-articular branches of the femoral nerve and the LCFN can be viewed as the greatest factor in this. In addition to the blockage of the nerve innervating the anterior capsule, there is also an effect of blocking the sensory innervation of the outer side of the hip. In the posterolateral performance of the surgical approach, the skin incision and subcutaneous dissection seem to have a great effect in blocking the LCFN which innervates this area.

Cartilage, joints, and bones are exposed to advanced wear and tear together with ageing, and osteoarthritis affects the hip joint most as the primary cause of functional disability. In patients older than 60 years, especially between 70 and 79 years of age, there is a predisposition to falls and fractures because of the loss of bone and muscle mass. The most frequently seen fractures are in the upper section of the femur, especially in the neck and trochanteric regions [24]. In the evaluation of recovery quality, no significant difference in QoR-15 scores was found between the groups on postoperative day 1 or after the first month. The similar opioid consumption was thought to be related to the similar pain scores at 24 hours and there was no difference between the groups in the time to mobilisation. High levels of opioid consumption cause an increased risk of complications [24]. The low pain scores in both groups in the current study reduced the opioid consumption. This supports the target strategies of reducing perioperative and postoperative opioid consumption as in The Concept of Enhanced Recovery after surgery (ERAS) [25]. According to the ERAS protocol, preventive analgesia, peripheral nerve block, local infiltration anesthesia, postoperative multimodal analgesia; sleep management, prevention of nausea and vomiting; functional recovery exercise; and post-discharge follow-up is of great importance in terms of management.

There were some limitations to this study, primarily the retrospective design and relatively small sample. The fact that the cases could not be blinded was also a limitation. Third was that the sensory dermatome levels affected by the SIFCB and PENG blocks could not be checked. The addition of SIFCB to the PENG block in particular constituted a limitation in the full evaluation of the motor protective property. Finally, a control group was not included in this study because previous studies have reported reduced opioid consumption and low pain scores in PENG block and SIFCB block groups compared to control groups.

Conclusion

In conclusion, the duration of the postoperative analgesic effect of the addition of SIFCB to PENG block is limited in hip surgery in elderly patients. The postoperative opioid consumption and

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quality of recovery were seen to be similar in both groups of this study. Further studies are needed to comprehensively investigate the efficacy of PENG block in hip surgery, both alone and in combination with other blocks, on postoperative analgesia and recovery quality.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
The Ethics Committee of Karamanoğlu Mehmetbey University Medical Faculty approved the study (decision no:10-2023/17 date: 20.11.2023).

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