ORIGINAL ARTICLE

EFFECTS OF PREOPERATIVE SUPRA-INGUINAL FASCIA ILIACA BLOCK APPLIED TO PATIENTS OVER 65 YEARS OLD WITH HIP FRACTURES

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Abstract

Introduction:A large number of patients are hospitalized each year due to hip fractures in the elderly population. Conventional pain management is difficult in this age group. Ineffective pain management and side effects of analgesics may increase morbidity and prolong the hospital stay. Ultrasound-guided Supra-inguinal fascia iliaca block(SFICB)are useful in these cases.

Materials and Method: Patients aged 65 years and older who presented to the hospital emergency department due to hip fracture, were scheduled for arthroplasty surgery, were able to answer the survey questions, and were not undergoing surgery within the first 24 hours were included in the study. Group B included patients who underwent SFICB for analgesia and Group C included patients who received conventional intravenous dexketoprofen, paracetamol, tramadol.

Results: In the block group, visual analog scale values at the 1st and 8th hours were statistically significantly lower. The values at the 16th and 24th hours were not significantly. All subscale scores of the 36-item short form quality of life scale except mental health, were found to be higher in the block group, and the differences were close to significance only for pain, role limitations due to physical health and general health. There were no differences between the groups in terms of State Trait Anxiety Inventory and 1- and 3-month mortality rates.

Conclusion: Preoperative SFICB provided effective early pain management and improved certain areas of quality of life in patients hospitalized with hip fracture. This simple, superficial block can be safely performed by the physician who first sees the patient.

Keywords: Hip Fractures; Aged; Nerve Block; Quality of Life; Test Anxiety Scales.

INTRODUCTION

In the elderly population, a large number of patients are admitted to the hospital every year due to hip fractures. Traditional pain management in this age group is difficult due to physiological changes and comorbidities. The side effects of analgesics are high. Ineffective pain management increases the risk of atelectasis, pneumonia, deep vein thrombosis, and may increase the length of hospital stay. Ultrasound (USG)-guided fascia iliaca block can be used for postoperative pain management or for analgesia while waiting for surgery in those receiving anticoagulant therapy in the preoperative period (1,2). Nerve blockade also makes it easier to position if the surgery is to be performed with regional anesthesia. Multimodal analgesia techniquessuch as systemic NSAIDs, paracetamol, opioids are applied in patients with or without regional block. It was reported that in patients with hip fractures, preoperative fascia iliac block reduces pain, morbidity and mortality. (3,4). The supra-inguinal fascia iliaca compartment block (SFICB) was described by Hebbard et al(5). SFICB has been used in hip surgery in adults (6). SFICB aims to block the femoral, lateral femoral cutaneous and obturator nerves (7).

In this study, our primary aimwas to investigate the effectiveness of SFICB in terms of pain scores in patients with hip fractures. Our secondary aim was to investigate the effects on anxiety control, quality of life, length of hospital and intensive care unit stay, and early mortality.

MATERIALS AND METHOD

After obtaining Ethics Committee approval from our hospital (24.01.2022, 129/15), a prospective randomized controlled study was conducted in accordance with the standards specified in the Declaration of Helsinki.Patients over the age of 65 who were admitted to the hospital emergency department due to hip fracture and were to undergo arthroplasty between June 2022 and May 2023 were included in the study. All patients signed and informed consent form and were able to answer the survey questions.

Patients with chronic pain problems, multiple fractures, a history of surgery for spine or extremity fractures, a history of psychiatric illness, who did not accept to participate, and who would undergo surgery in the first 24 hours were excluded.

Preoperative evaluation was done in the emergency room; patients were informed about the study those who accepted participation were randomized into two groups according to their analgesia preference to receive either SFICB(Group B)or conventional intravenous (iv) analgesics including paracetamol, tramadol and dexketoprofen with standard dose and regimen (Group C). All blocks were performed by the same experienced anesthesiologist in the emergency department without sedation.

In the block group, while the patient was in the supine position, the anterior superior iliac spine was determined, a high-frequency (12 MHz) linear USG probe (LOGIQ P9, GE Ultrasound) was moved medially and inferiorly, and the internal oblique muscle in the cranial direction, the sartorius muscle in the caudal direction, the bow tie shape formed by these muscles, the underlying iliacus muscle and the fascia iliaca surrounding it were seen lateral, 50 mm needle as in plane it was directed medially, the iliac fascia was passed and 0.5ml/kg 0.25% bupivacaine was given underneath. The control group was treated with intravenous dexketoprofen, paracetamol and tramadol. Low molecular weight heparin (LMWH) treatment was started in patients receiving anticoagulants, and surgery was commenced within three days.

Visual analogue scale (VAS: 0-10) and block complications (hematoma, hemorrhage and local anesthetic systemic toxicity-LAST) were evaluated on the 1st, 8th, 16th, and 24th hours after the block was performed. In patients receiving iv. analgesia

pain and complications(nausea, vomiting, dizziness, abdominal pain etc.) were evaluated at the same time points. If VAS ≥4 paracetamol iv 1 gram was added to the treatment as rescue analgesia.

State Trait Anxiety Inventory (STAI I-II) and 36-item short form quality of life scale questionnaires were administered to the patients at 4 hours after the procedure and the first analgesic intake. The STAI, which we used in the assessment of anxiety, was developed by Spielberger et al. in 1970. It was adapted to Turkish by Öner et al. in 1983 and its validity-reliability study was conducted (8).

STAI is a "Likert-type self-assessment" scale consisting of twenty-item state (STAI-I) and trait (STAI-II) anxiety scales. The total score ranged from 20 to 80, and a score of 52 and above was defined as "clinically significant state anxiety". If the state anxiety score is 52-56, it is classified as slightly high, if it is 57-61, it is high, and if it is 62 or above, it is classified as very high. Trait anxiety, on the other hand, is the scale that shows that there is an anxious life that does not occur according to a certain time and situation.

The SF-36 scale is aquality-of-life assessment scale designed to be used in clinical practice and research, evaluation of health policies in intensive care units and general population reviews. The validity and reliability study of the Turkish version was carried out by Koçyiğit et al. in 1999 (9). The scale, which contains thirty-six statements, is in the form of a multi-headed scale that evaluates 8 health areas. As the score increases, the quality-of-life increases. Physical function (10 items), social function (2 items), role limitations due to physical problems (4 items), role limitations due to emotional problems (3 items), mental health (5 items), energy/vitality (4 items), pain (2 items) and general perception of health (5 items). The 3 major health areas in SF-36 are "Functional status, well-being and general health understanding".

The primary outcome measure of the study was VAS pain scores,and secondary outcome measures were, anxiety and quality of life scores, length of stay in intensive care unit and hospital, and 1 and 3-month mortality results were compared.

Statistical Analysis

Continuous variables were expressed as mean ± standard deviation or median (min-max), categorical data were expressed as numbers and percentages. The conformity of the data to the normal distribution was evaluated by the Kolmogorov Smirnov goodness of fit test. Student's T Test was used to compare the data that were suitable for the normal distribution between the groups, and the Mann Whitney U Test was used for the data that were not suitable. Comparisons of categorical data were made with the Chi-Square Test or Fisher's Exact Test. The analysis was performed with IBM SPSS version 27.0 (IBM Corporation, Armonk, NY, USA). Statistical significance level was considered as $p<0.05$.

Sample size:

Before the data collection phase, the number of samples required for the study was determined using the G*Power 3.1 (10) program. According to the previous study, when the VAS score of Group 1 was taken as 3, the VAS score of Group 2 was taken as 4 and the standard deviation was taken as 1; when the effect size was taken as 1.0, the alpha level as .05 and the power as 80%, the number of samples was found to be 17 for each group and 34 in total; when the power was taken as 95%, the number of samples was found to be 27 for each group and 54 in total. (11).

RESULTS

Results were analyzed 56 patients, 34 patients in the block group and 21 patients in the iv. analgesia group. Patients who accept to participate in the study freely choose their analgesic regimen. Thus, all patients knew that they could opt for a block or intravenous analgesia. The patients were

randomly divided into study groups according to their analgesic regimen preferences. Before the procedure, some patients changed their minds and 7 patients in Group C asked for blocks. Since we had already included the patients in the study, we did not ask them to exclude them and included these patients in the block group (Group B), so the study groups do not include the same number of patients. The mean age of the patients included in the study was 78.27, 80.35% had American Society of Anesthesiologist (ASA)physical status classification III and 57.1% were female. There was no significant difference between the control and block groups in terms ofpatient characteristics, length of hospital and intensive care unit stay($p>0.05$) (Table 1).The depth of the block was similar in patients who received and did not receive anticoagulants and acetylsalicylic acid.

In the block group, 10 patients were on asetyl salicylic acid, and 11 patients were on anticoagulant drugs. There was no hematoma, bleeding and LASTin any of the cases after the procedure.

Patients were followed in the ward till the surgery. While the baseline VAS values (VAS 0) did not make

Table 1. Socio-demographic and Clinical Parameters of the Groups

	Control group (n=21)	Block group (n=35)	p
Age (years) (mean±SD)	76.66±9.95	79.88±9.32	0.228*
BMI (kg/m2) (mean±SD)	25.40±2.92	24.52±3.51	0.342*
ASA (II/III)	7/14	4/31	0.058**
Block depth (cm) [median (min-max)]	-	0.9 (0.7-1.15)	-
Length of hospital stay (day) [median (min-max)]	5 (2-29)	4 (2-69)	0.883*
ICU length of stay (day) [median (min-max)]	1 (0-7)	1 (0-17)	0.928***
Gender (n, %)			
Female	12 (%57.1)	20 (%57.1)	1.000***
Male	9 (%42.9)	15 (%42.9)	
Use of acetylsalicylic acid (n, %)			
No	17 (%81.0)	25 (%71.4)	0.532****
Yes	4 (%19.0)	10 (%28.6)	
Use of anticoagulants (n, %)			
No	14 (%66.7)	24 (%68.6)	0.883***
Yes	7 (%33.3)	11 (%31.4)	
Mortality			
1st month	1 (4.8)	1 (2.9)	0.614****
3rd month	2 (9.5)	4 (11.4)	0.599****

ASA: American Society of Anesthesiologists, ICU:Intensive Care Unit

* Student's T Test

** Mann Whitney U Test

***Chi-square Test

**** Fisher's Exact Test

a significant difference between the control and block groups (8.95±0.80 and 8.68±0.83, p=0.245, respectively), the 1st hour and 8th hour VAS values were statistically significantly lower in the block group (2.14±1.19 and 1.88±0.90, respectively) compared to the control group (3.42±0.97 and 2.85±0.85, respectively) (p<0.001 and p<0.001, respectively), It was determined that the differences at 16th and 24th hours were not significant between the groups (p=0.541 and p=0.917, respectively) (Table 2).Rescue analgesia was used in 5 patients in both groups.

There was no significant difference between the STAI-I and STAI-II scale scores between the control and block groups (p=0.286 and p=0.853, respectively).

It was found that all subscale scores in the SF-36 quality of life scale, except MH, were generally lower in the control group than in the block group, and only the differences for pain, RLP and GH were close to the significance level (p=0.070, p=0.093 and p=0.081, respectively) (Table 3). High pain scores reflect the absence of pain or pain-related limitations.

Table 2. Comparison of VAS Scores of Groups

	Control group (mean±SD) (n=21)	Block group (mean±SD)(n=35)	p
VAS 0	8.95±0.80	8.68±0.83	0.245*
VAS 1	3.42±0.97	2.14±1.19	**<0.001***
VAS 8	2.85±0.85	1.88±0.90	**<0.001***
VAS 16	2.52±0.81	2.37±0.94	0.541*
VAS 24	2.61±0.74	2.60±0.60	0.917*

* Student's T Test, VAS:Visual Analogue Scale

Table 3. STAI I-II and SF-36 Quality of Life Subscale Scores of the Groups

	Control group (mean±SD) (n=21)	Block group (mean±SD) (n=35)	p
STAI I	56.90±6.09	54.54±8.84	0.286*
STAI II	47.66±6.72	47.34±6.06	0.853*
P	29.28±19.02	40.00±23.99	0.070*
PF	28.14±29.48	35.00±35.16	0.443*
RLP	16.42±33.72	34.52±45.05	0.093*
RLE	23.80±40.88	26.98±42.97	0.784*
SF	28.92±23.24	31.54±18.79	0.664*
V	26.20±13.93	31.19±19.80	0.274*
MH	51.17±22.62	44.00±13.79	0.196*
GH	27.97±12.39	35.71±20.26	0.081*

* Student's T Test

STAI:State-trait Anxiety Inventory, pain (P), Physical function (PF), role limitations due to physical problems (RLP), role limitations due to emotional problems (RLE), social function (SF), energy/vitality (V), mental health (MH) and perception of general health (GH)

At the end of the 1st month, the mortality rates were similar to 4.8% (n=1) in the control group and 2.9% (n=1) in the block group (p=0.614), and at the end of the 3rd month, it was 9.5% (n=2) in the control group and 11.4% (n=4) in the block group and there was no significant difference (p=0.599) (Table 1).

DISCUSSION

We evaluated the effects of SFICB on pain control, anxiety level, quality of life, length of intensive care and hospital stay, and early mortality in the preoperative period of patients scheduled for surgical treatment for hip fracture. Pain scores on the 1st and 8th hours were significantly lower in the patients who underwent block. Pain, RLP, and GH were higher in the block group as measured with the SF-36 quality of life scale. There was no difference between the groups in anxiety, length of intensive care unit and hospital stay, or early mortality.

In this study, the block was administered with the SFICB approach at the dose proven to be effective and with the recommended approach (12,13). Studies on the preoperative analgesic efficacy of FIB have shown that it reduces dependence on opioids in acute pain management and is an effective and safe supplement (1). In acetabular fractures, SFICB has been shown to provide a position for more effective analgesia and spinal anesthesia than fentanyl (14).

In a study by Azizoğlu et al. comparing SFICB and patient-controlled analgesia in major hip surgery, VAS values at rest during the first 6 hours postoperatively and during movement for up to 24 hours were significantly lower in the SFICB group (15). As in our study, it has been shown that there is a significant reduction in pain levels with SFICB, especially in the first 8 hours (3,16). The decrease in the difference in pain scores between the groups at 16 and 24 hours in this study resulted from the decreasing effects of the local anesthetic, and additional analgesic treatments or catheter applications may be needed (17). However, in their study, Garlichk et al. did not find a decrease in late-stage pain levels with catheter administration but observed less opioid consumption without an increased risk of complications. Preoperative analgesia is a key factor that can improve perioperative outcomes in geriatric hip fracture patients (18).

FIB application has been found to be more effective than parenteral or oral opiates and sedative agents alone in reducing pain scores in the preoperative period (19). Studies have also reported that it provides effective analgesia but causes muscle weakness after surgery (20). USG-guided FIB application is now included in the procedure specific postoperative pain management (PROSPECT) recommendations because it reduces opioid-related side effects and sedation in hip fractures and shortens the duration of spinal anesthesia with ease of position. A catheter is also recommended in appropriate cases (21).

With the introduction of USG into clinical practice, side effects, such as adjacent organ injury and hematoma, are no longer seen. USG is recommended to be performed in the emergency room, ambulance, or even at home by the physician who sees the patient for the first time (2). In the literature, it has been shown that FIB with a continuous infusion catheter is safe in patients using anticoagulants and/or antiplatelet drugs (22). We safely applied this block, which is considered a superficial block, at an average depth of 0.9 cm. No side effects, such as hematoma, bleeding, or LAST, were observed in any of the patients' using anticoagulants and/or ASA.

It has been determined that being single, having chronic disease and advancing age influence patients' surgery-specific anxiety, perceived stress and fear of surgery. Long-term chronic diseases can negatively affect individuals' anxiety levels (23).

Jung et al. found that one-third of geriatric patients undergoing hip fracture surgery experienced clinically significant anxiety, with a mean STAI score

of 47.2.The rate of anxiety was found to be higher in these patients than in patients with chronic hip disease, and the reason for this was sudden movement restrictions, accompanying excessive pain, and the thought that the patient would undergo surgery in a short time (24).The anxiety levels we found using STAI-I and II were similar between the two groups, but we did not have information about the patients' previous anxiety statuses. In our study, it was determined that FIB did not have a significant effect on anxiety levels. However, it is also known that pain management has an indirect effect on the psychological well-being of patients. Therefore, there is a need for studies that evaluate the relationship between pain management and anxiety in more detail and include larger samples.

The SF-36 quality of life scale, which provides information about general health status, includes eight domains. Aziz et al. found a significant decrease in quality of life on the SF-36 scale 6 months after hip fracture surgery (25). In our study, the SF-36 scale results were higher in the FIB group, especially in terms of pain, PF and limitations due to FRG. This suggests that effective pain management can contribute to overall functional recovery by increasing patients'postoperative mobilization.

In the other SF-36 domains, higher scores were obtained in the FIB group in terms of RLE, social function, vitality, and GH although the results were not statistically significant. Although this suggests that FIB provides a significant improvement in quality of life, additional interventions, such as physical therapy or psychosocial support, may be necessary to make a difference in some domains. The MH scores did not differ between the two groups. In a study measuring the quality of life in hip fractures, it was shown that only one-third of patients could return to their previous physical health, and this occurred within 3–12 months, and MH did not change much (26).

Some studies have shown that facia iliaca block shortens the length of hospital stay and reduces mortality (3,4). In our study, no significant difference was found between the groups in terms of length of stay in the intensive care unit and hospital. The average number of hospitalization days in the block group was 4–5 days, like the results in the literature. David et al., on the other hand, showed that continuous FIB reduced the length of hospital stay but did not affect mortality (27).

Hip fractures are a health problem with high mortality rates, especially in the population of the elderly. During the hospitalization process, one patient in the block group died due to postoperative Covid-19 infection. In our study, there was no significant difference between the groups in the one- and three-month mortality rates, which is like what has been observed in literature. It has been suggested that FIB reduces complication rates by promoting early mobilization and, therefore, may be associated with lower mortality in the long term (28). Therefore, there is a need for studies with longer follow-up periods.

This study has some limitations. Continuous catheterization or block repetition was not applied until the surgery. The relatively small sample size and the fact that the study was conducted in a single center limit the generalizability of the results. Longer-term (6–12 months) follow-up studies are required to evaluate the long-term functional and psychosocial effects of FIB. SF-36 and STAI tests should be repeated in the future to more comprehensively evaluate the effects of FIB on patients' long-term quality of life and anxiety levels. Repeating the STAI test will allow analysis of patients' preoperative psychological status and postoperative changes.

CONCLUSION

SFICB applied in the preoperative period provided effective pain management in the early period and improved certain quality of life domains in patients admitted to the hospital due to hip fracture. SFICB, a

simple, superficial block, can be safely administered by the first physician to see the patient.

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