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AN OBSERVATIONAL STUDY ON THE EFFECTIVE ANALGESIC MODALITY OF FASCIA ILIACA COMPARTMENT BLOCK IN GERIATRIC HIP FRACTURE PATIENTS

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Abstract
One of the most frequent orthopedic ailments among the elderly is hip fractures. Although they may have adverse effects, opioids can help individuals with hip fractures with their perioperative pain. Fascia iliaca compartment block (FICB) and other peripheral nerve blocks are now standard components of the multimodal analgesic regimen given to patients with hip fractures during surgery. In older patients with hip fractures, we examine the effects of continuous infusion FICB (CFICB) on perioperative pain management, opioid use, related complications, and the patients' short- and long-term rehabilitation status. 40 elderly patients with hip fractures who had received the CFICB between November 2020 and April 2022, were matched in a 1:2 ratio with comparable patients who had not received the CFICB from our institution's hip fracture database, which included 212 individuals, for this retrospective matched case control research. Both the CFICB group (N = 95) and the control group (N = 112) included a total of 212 patients. The CFICB group used considerably less opioids overall during the first three days and had significantly lower postoperative pain ratings than the control group ($p < 0.01$, respectively). The CFICB group's systemic problems were similar to those of the control group. Although the CFICB group's recovery was delayed for up to two weeks, there was no discernible difference between the two groups' function and mobility one year after surgery. Improved pre-fracture function was linked to quicker short-term recovery outcomes for post-operative patients in both groups. For elderly patients with hip fractures, the CFICB offers safe and efficient post-operative pain management. In elderly hip fracture patients treated with CFICB, post-operative opioid use is reduced. Short-term rehabilitation milestones are delayed, but a year after surgery, there is no discernible difference.

Keywords:- Fascia iliaca compartment block, Geriatric hip fractures, Pain control, Opioid usage ·

Introduction
Hip fractures are among the most common orthopaedic injuries among the elderly, and they have a significant morbidity and mortality rate. Adequate analgesia is essential for hip fractures because pain can lead to delayed ambulation, increased mortality, and functional impairment in the elderly. In the past, the primary method of treating pain in patients with hip fractures has been systemic opioids. Conversely, negative effects might include delirium, constipation, respiratory depression, nausea, and urine retention. Due to the challenges associated with opioid usage in the elderly, modalities such as

fascia iliaca compartment block (FICB) have become a common feature of the multimodal analgesic regimen for senior hip fracture patients. The FICB is a low-concentration, high-volume local anesthetic nerve block that is injected into the fascia iliaca compartment in the inguinal region, targeting the femoral, obturator, and lateral femoral cutaneous nerves. Numerous papers claim that patients undergoing total hip replacement who received the FICB experienced increased quadriceps weakness. As a result, either post-operative treatment modifications were required or immediate post-operative rehabilitation was delayed. The function and mobility status of elderly patients who had short- and long-term FICB for hip fracture surgery have not been studied. We postulated that the FICB may worsen short-term rehabilitation and might affect long-term rehab outcomes in elderly hip fracture patients. In this study, older hip fracture patients who got continuous infusion FICB (CFICB) were compared to those who did not get any block in terms of their short- to mid-term rehabilitation outcomes, opioid use, pain management, and associated issues.

Materials and methods

The demographic data and details of each patient admitted to our facility with hip (femoral), neck, and intertrochanteric fractures up to February 2022. The project and data collection were approved by Department of Anaesthesiology, Nemcare Hospital and Research institute, Bhangagarh, Guwahati, Assam, India PIN: 781005 . Between November 2020 and April 2022, our facility implemented the CFICB delivery regimen for older patients with hip fractures. 212 people were identified using our hospital's hip fracture database. This retrospective matched case-control research assessed two patient groups: similar patients who did not get the CFICB (controls) and elderly hip fracture patients who received the CFICB (cases). Out of the 212 patients, 95 had received the CFICB. After applying the study's exclusion criteria, we recruited forty CFICB patients for our investigation. The patients were randomly assigned to similar controls for demographic characteristics. There were 117 matched controls in all. Three patients in the CFICB group could not be matched to all four demographics. A total of 95 participants participated in the study. The process for administering the CFICB was standardized. The block was given to patients in the operating room by anaesthetists who had completed a fellowship. The needle and catheter tip were hydrolocated under ultrasonography to ensure they were in the correct place within the fascia iliaca compartment. An ethyl-2-cyanoacrylate adhesive called Epiglu® was used to stop the catheter from leaking. Roprivacaine 0.2% was used, and a continuous infusion flow rate of 5–10 ml/h was used.

The Visual Analogue Scale (VAS) pain score was recorded on the day of admission and subsequently daily until the patient was discharged. Parameters such as the kind and amount of opioid required, the type of adjuvant pain treatment required, and any issues related to the CFICB were recorded daily until the catheter was withdrawn. Among the rehabilitation success indicators collected were the duration of time needed to sit up immediately following surgery, sit up to stand, move from bed to chair, and walk three to ten meters. All patients were observed in the outpatient clinics for at least a year after surgery to evaluate their walking habits, mobility, and Modified Barthel Index (MBI) scores. It specified the help that was required.

Statistical analysis

Descriptive statistics were shown for continuous variables. in terms of median [interquartile range (IQR)], mean standard deviation (SD), minimum, maximum, and frequencies. Proportions and percentages were displayed for the binary and ordinal/categorical variables. Each continuous variable's median value was compared using the nonparametric Mann-Whitney test. At the 5% level, all statistical tests were two-sided. At $p < 0.05$, the results were deemed significant.

Table- 1 Demographic profile with follow-up finding :_

Total (*N* = 212)		**CFICB** (*N* = 95)	**Controls** (*N* = 117)	***p* value**
Age				
Min–Max	64–97	66–87	62–81	0.01
Mean (SD)	79.2 (7.8)	79.4 (8.1)	76.7 (7.7)	
Gender				
Female	62.5%	65%	60.5%	0.001
AMT score				
7- AMT score	(18.7%)	(19%)	(15%)	0.01
8- AMT score	(21.2%)	(14%)	(18%)	
9- AMT score	(29.6%)	(20.5%)	(21%)	
10- AMT score	(32.6%)	(42%)	(43%)	
Pre-fracture condition				
Community ambulant	(84.1%)	(77.5%)	(86.3%)	0.02
Home ambulant	(15.9%)	(22.5%)	(13.7%)	
Procedure				
PFNA	(45.7%)	(11.5%)	(32.7%)	0.02
Bipolar hemiarthroplasty	(26.3%)	(31%)	(31.8%)	
Dynamic hip screws (DHS)	(7.9%)	(2.5%)	(5.4%)	
Total hip replacement (THR)	(8.4%)	(15%)	(9%)	
Cancellous screw fixation	(7%)	(9%)	(12%)	
Diagnosis				
Femoral neck fracture	(54.0%)	(27.5%)	(21.7%)	0.001
Intertrochanteric	(39%)	(32.5%)	(21.3%)	
Side				
Left	(36%)	(37.5%)	(32%)	0.02
Right	(24.0%)	(22.5%)	(21%)	
MBI Total score(1 year post-surgery function)				
Min–max	68–100	76–100	68–100	
Mean (SD)	91.1 (4.1)	84.3 (6.6)	74.8 (9.2)	
Median (IQR)	88 (10)	91 (10)	100 (10)	
MBI dependency status (0–100)				
Independence (100)	(49%)	(40%)	(20%)	
Slight dependence (91–99)	(30%)	(25%)	(10%)	
Mod dependence (61–90)	(35%)	(45%)	(30%)	
Severe dependence (21–60)	(0%)	(0%)	(0%)	
Total dependence (0–21)	(0%)	(0%)	(0%)	
Assisted mobility				
Independent without aid	101	32	81	
Independent with walking aids	48	18	28	
Walking with caregiver assistance	4	3	5	
Wheelchair bound/non ambulant	0	0	0	
Walking aid				
None	92	21	80	
Walking stick	35	11	20	
Quad stick	10	4	8	
Walking frame	5	4	2	
Others (umbrella/handheld)	5	3	2	
Wheelchair/bedbound	0	0	0	
Pre-operation pain score				
Min–Max	0–8	0–8	0–8	
Mean (SD)	3.3 (1.5)	3.7 (1.2)	3.4 (1.5)	

Median (IQR)	3 (0)	3 (0)	3 (0)	
POD 1 pain score				
Min–Max	0–4	0–3	0–4	
Mean (SD)	1(2.3)	2 (0.5)	2 (0.5)	
Median (IQR)	2 (2)	0 (0)	2(1)	
POD 2 pain score				
Min–Max	0–5	0–0	0–5	
Mean (SD)	2 (1)	0 (0)	2 (1)	
Median (IQR)	2 (2)	0 (0)	2 (1)	
POD 3 pain score				
Min–Max	0–3	0–3	0–3	
Mean (SD)	1.1 (1)	0.2 (0.4)	2.0 (1)	
Median (IQR)	2 (2)	0 (0)	2 (1)	
POD 1				
Min–Max	0–150	0–75	0–150	
Mean (SD)	54 (37.4)	16.4 (5.2)	60.7 (30.7)	
POD 2				
Median (IQR)	50 (50)	0 (25)	50 (50)	
POD 2				0.001
Min–Max	0–150	0–150	0–150	
Mean (SD)	55(40)	35 (15)	57 (37)	
POD 3				
Min–Max	0–150	0–150	0–150	
Mean (SD)	50 (40)	31.5 (34)	56 (35)	
Median (IQR)	50 (50)	25 (50)	50 (50)	
Rehab outcomes				
Min–max	0–4	0–4	1–3	0.01
Mean (SD)	1 (0.4)	1 (0.6)	1 (0.2)	
Median (IQR)	1 (0)	1 (0)	1 (0)	
Sit to stand				
Min–max	1–4	1–4	1–4	0.2
Mean (SD)	1 (0.8)	1(0.8)	1(0.8)	
Median (IQR)	1 (1)	2 (1)	1 (1)	

Results

Between November 2020 and April 2022,, the trial included 212 patients in total. 117 patients from the control group were matched with 95 patients in the CFICB group. The average duration of stay was 9.5 days (SD 7.2). There were no fatalities among the 117 patients examined while they were at the hospital. The demographics of the patients are shown in Table 1. The pre-hip fracture function and demographics of the patients in the CFICB and control groups were similar in all categories, and there was no appreciable difference between them. The pain scores for both groups on the day of admission and the postoperative pain scores on days 1, 2, and 3 are shown in Table 1. Five participants were excluded from the research because their pain ratings for these four days were missing. This data erasure was deemed to be insignificant. Assessments of entry pain did not differ between the CFICB and control groups ($p = 0.01$). During the first three days following surgery, the CFICB group experienced significantly less pain than the control group ($p < 0.001$ for each of the three days, respectively) (Table 1). Standard paracetamol was used as an analgesic for all but three of the participants in the control group and all but two of the patients in the CFICB group. One patient in the control group received oral morphine sulfate as their primary opioid analgesia, while four patients

in the CFICB group received oral oxycodone due to side effects from the first oral tramadol prescription. Oral tramadol was the primary opioid analgesic used by patients in both groups. Three patients in the CFICB group and eight patients in the control group got oral codeine phosphate as part of their opioid prescription in addition to oral tramadol. One patient in the control group received a fentanyl patch, one patient received intramuscular pethidine injections, and one patient received fentanyl as patient-controlled analgesia (PCA) for the first three postoperative days (POD). Additional adjuvant analgesics were used, such as oral celecoxib, oral etoricoxib, and topical ketoprofen patches. 20% patients were in the CFICB group, whereas 19.7% patients were in the control group. Only patients using tramadol as their sole opioid analgesia were included in the analysis. Subgroup analysis for other people Opioid regimens were not adopted due to their small numbers. The CFICB group took less tramadol overall and during each of the first three PODs ($p < 0.01$) than the control group (Table 1). The time it took for patients in the CFICB group and control group to meet the post-operative rehabilitation objectives is displayed in Table 1. The control group took significantly less time than the CFICB group to attain the rehab milestones in four of the five criteria.

The kind of fracture (intertrochanteric or femoral neck) did not significantly connect with the amount of time needed to complete rehabilitation goals ($p = 0.001$). When both groups were stratified based on MBI scores and time required to achieve rehab goals, independent patients (MBI = 100) had a statistically significant quicker time to ambulate 10 m compared to all other patients with lower MBI ratings ($p < 0.01$). The following systemic issues were evaluated in all of our patients: post-operative delirium, acute urine retention, hospital-acquired pneumonia, deep vein thrombosis, and urinary tract infections. There was no difference in the rate of systemic issues between the CFICB and control groups during their inpatient stay. The following variables were investigated in connection with the difficulties that specifically emerged from the CFICB: motor weakness, mobility problems, catheter site infections, and catheter dislodgement. Although one patient had mobility problems linked to the CFICB catheter and only two patients displayed motor weakness, these results were not statistically significant.

Discussion

The effectiveness of the single-shot FICB in reducing pain ratings and opioid use in patients with hip fractures has been shown in several trials. According to this study, CFICB reduces pain and opiate consumption in patients with hip fractures. Cuignet et al. compared a single injection of FICB to CFICB in patients with hip fractures, while there isn't a direct trial assessing the efficacy of the two treatments. When comparing FICB with CFICB for burn patients undergoing skin grafting procedures, it was discovered that neither approach was superior in terms of morphine and dynamic pain reduction. Nie et al. showed that a CFICB effectively sustained analgesic effects in comparison to a single-shot FICB. A CFICB could be useful in circumstances when prolonged preoperative waiting times could produce more effective, long-lasting analgesia, according to Ma et al.. This study found that for each of the first three PODs, the CFICB group had significantly decreased resting postoperative pain ratings ($p < 0.01$, respectively). Leung et al. and Vario et al. claim that postoperative pain treatment greatly contributes to the reduction of postoperative delirium.

In our study, post-operative delirium was more common in the control group than in the CFICB group, although the difference was not statistically significant. The rehabilitation of older adults after a hip fracture may be impacted by both pain and analgesic approaches. According to research, people who have more post-operative discomfort may take longer to walk about. Tuncer et al. showed that continuous femoral nerve catheter infusion blocks generated better and longer analgesia while moving compared to systemic intravenous opioid analgesia, enabling a speedier ambulation for trochanteric fractures. Similar to this, Foss et al. showed that opioids do not effectively reduce pain in individuals who are moving as opposed to those who are immobile. We expected that improved pain management would enable the CFICB group to reach rehabilitation goals more quickly.

However, we found that the CFICB group was slightly but significantly slower in most of the parameters used to evaluate the immediate post-operative rehab results in our study. In a study by Metesky et al., the authors found that FICB patients had delayed first postoperative rehabilitation after total hip replacement. This rehabilitation outcome was similar to that study. While the CFICB did not reveal any significant block-specific issues, we believe that a reduction in sensation and proprioception may have contributed to the delayed recovery.

In a randomized control trial comparing hip fracture patients who received a single shot of the medication, Yamamoto et al. found that although the FICB group's pain scores were significantly lower than those of patients who received intravenous acetaminophen, there was no difference between the groups in terms of how long it took the patients to stand up for the first time after surgery. However, the author didn't look at any long-term consequences or other rehabilitation benchmarks. According to 1-year follow-up data, there was no change in function or mobility between the two groups, despite the fact that the CFICB group in our trial performed marginally worse than the controls. There may be more prospective studies that directly compare the single-shot FICB with the CFICB in terms of opioid intake, dynamic pain ratings, and rehabilitation outcomes.

According to Morrison et al., patients with hip fractures who rated their resting pain higher had longer hospital stays, delayed ambulation, and long-term functional impairment compared to those who had better pain management. Mangram et al. showed that there was no difference in the length of hospital stay between a group of patients with CFICB and controls. In our study, there was no appreciable difference in the duration of hospitalization between the CFICB and control groups. This may be due to a shortage of community hospital beds for discharge rather than the patients' fitness for discharge. Therefore, even though we showed that the CFICB group's patients had lower levels of postoperative pain, we couldn't tell if this affected how long they stayed in the hospital. In line with other studies, our analysis demonstrated that patients with higher MBI scores and pre-fracture function progressed more quickly to walk 10 m, regardless of CFICB administration or pain treatment. Unlike Koval's study, we found no statistically significant difference in the rehabilitation features of individuals with femoral neck fractures compared to those with intertrochanteric fractures.

Furthermore, the opioid regimens given following surgery were not strictly standardized. Patient comorbidities and dynamic pain ratings during rehabilitation were not documented. Our study offers some advantages. The CFICBs on patients in this series were carried out by regional block consultants who had received fellowship training. The more efficient ultrasound-guided method and consistent block administration resulted in high-quality blocks with little variation for every patient. Using a wide range of stringent matching criteria for all four parameters (age, sex, pre-morbid ambulation status, and AMT score), patients from the control group who were as similar to those from the CFICB group as possible were selected. Although we did not include patients with concomitant injuries (distal radius fractures, osteoporotic spinal compression fractures, etc.), which could have added inconsistencies to our rehabilitation results, and the findings of this study should only be applied to older patients with hip fractures, not to the broader population with hip pathologies requiring surgical intervention.

Conclusion

The CFICB provides safe and effective postoperative pain management and decreases opioid use in elderly adults with hip fractures. The CFICB did not considerably raise the risk of complications in comparison to controls. A year's worth of data shows no variations in mobility and functional status when compared to controls.

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