Role of Peripheral Nerve Blocks in the Preoperative Pain Management of Hip Fractures in the Elderly: a narrative review

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Abstract

Introduction: **Hip fractures among geriatric patients present significant challenges for effective pain management and overall patient care. This review explores the role of peripheral nerve blocks in addressing preoperative pain in elderly hip fracture patients, considering the limitations of conventional analgesic approaches.**
Methods: **A literature search with Pubmed and Google Scholar was conducted, identifying 26 relevant studies encompassing randomized controlled trials and observational cohort studies. The efficacy of various nerve block techniques, including femoral nerve, fascia iliaca compartment, and pericapsular nerve group blocks, were analyzed.**
Results: **Peripheral nerve blocks demonstrated consistent benefits in pain relief, potentially minimizing the need for systemic opioids and their associated adverse effects. Several challenges and nuances remain, including the role of regional anesthesia in preventing delirium and the need for comparative studies between different types of nerve blocks. Furthermore, the potential role of nerve catheters in addressing prolonged waiting times until surgery warrants further investigation.**
Conclusion: **Peripheral nerve blocks are an important asset in the preoperative pain management of hip fractures in geriatric patients, necessitating their further integration into early trauma patient care, especially in the emergency department setting.**

Keywords: **Regional anesthesia, hip fracture.**

Introduction

As the global population continues to age, the prevalence of various health issues rises correspondingly. Hip fractures predominantly afflict geriatric patients following minor trauma[1,2]. This demographic often presents with multiple comorbidities, contributing to a significant mortality rate due to various complications[3,4].

Severe pain affects a majority of hip fracture patients[5], posing a challenge for effective pain management, particularly in the elderly population[6]. Acetaminophen alone frequently proves insufficient, while non-steroidal anti-inflammatory drugs are discouraged due to their potential adverse effects, including an increased risk of gastrointestinal bleeding, impaired kidney function, and platelet aggregation[7]. The cornerstones of pain management in this frail population include enteral or parenteral opioids, yet caution is warranted given the impaired pharmacodynamics and reduced physical reserve of elderly patients. Opioids may also induce adverse effects such as sedation, respiratory depression, urinary retention, and gastrointestinal disturbances like nausea, vomiting or constipation[8].

Pain assessment is often complicated in the geriatric population due to cognitive impairment, resulting in underdetection and undertreatment[9]. Studies suggest that up to 40% of patients may receive inadequate pain management, potentially contributing to delirium[10,11]. Postoperatively, delirium may present in up to 60% of hip fracture patients, which is not only attributed to inadequate pain control, but also opioid-related side effects[12,13].

Optimizing pain management in this vulnerable population holds promise. Preoperative placement of peripheral nerve blocks (PNBs) emerges as a potentially beneficial intervention, providing not only pain relief but also potentially reducing the need for systemic analgesics like opioids and mitigating their adverse effects[14].

The objective of this narrative review was to evaluate three common nerve blocks, the femoral nerve block (FNB), fascia iliaca compartment block (FICB) and pericapsular nerve group (PENG) block, currently used in the preoperative pain management of hip fractures and to identify potential areas requiring additional research.

Methods

A comprehensive literature search was conducted by reviewing PubMed and Google Scholar in February 2024 to identify randomized controlled clinical trials and prospective, observational cohort studies that were published up to that time. Following key search terms were employed: 'hip fracture', 'preoperative', 'pain', 'nerve block', 'fascia iliaca block', 'femoral nerve block', 'PENG', and 'pericapsular nerve group'.

Articles were included if they were published in English. The abstracts of retrieved results were assessed to determine their relevance for full review.

The quality of randomized controlled trials was evaluated using the Jadad scale, which assesses the internal validity of trials based on three key methodological features: randomization, masking, and accountability of all patients, including withdrawals. Higher Jadad scores indicate superior study quality, with scores of 3, 4, and 5 typically indicative of high-quality trials[15].

Observational studies were assessed for quality using the Newcastle-Ottawa scale, a tool designed for evaluating the quality of non-randomized studies. Each study was assessed based on eight items, categorized into three groups: selection of study groups, comparability of groups, and ascertainment of exposure or outcome for case-control or cohort studies, respectively. Studies were rated on a scale ranging from 0 (poor quality) to 9 (good quality)[16].

Results

The outcomes of the literature search are summarized in a flow diagram in Figure 1. The investigation yielded a total of 244 results. Following the removal of duplicate results and the exclusion of irrelevant records for this review, this number was scaled down to 62. After excluding 22 review articles, a total of 40 articles were selected for full-text analysis. Eventually, 26 studies were deemed suitable for inclusion. Among the included articles, there were 18 randomized controlled trials and 8 observational cohort studies.

The FNB was examined in 16 papers, the FICB in 10 and the PENG block in 3. A summary of the investigated articles and their quality assessment is available in Table I.

Block techniques

Ultrasound guidance was used for nerve block placement in 16 studies[18-20,22,24,25,27-31,33,38,40-42].

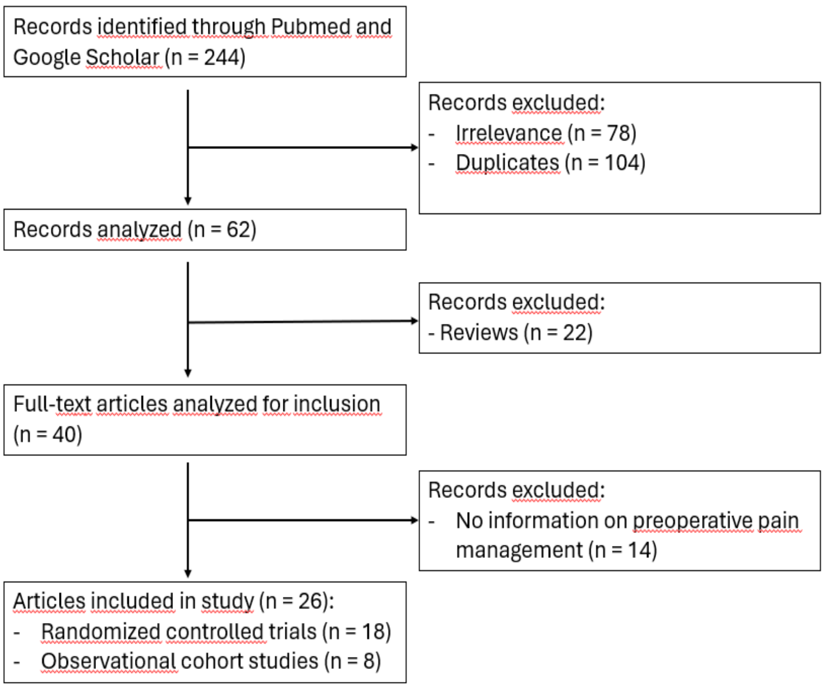

Fig. 3 — Schematic presentation of literature search and review.

Table I. — Summary of randomized controlled trials and observational cohort studies.

Study	Study type	Type of block	Study population	Sample size	Intervention	Key results	Jadad scale score or NOS
Garlich et al (2017)	Prospective observational cohort study	FICB, US-guided	FICB vs No block	725	Single shot: 30-40mL bolus of 0,25% bupivacaine with 1-200.000 epinephrine Continuous: bolus of 10-20mL of 0,2% bupivacaine and continuous infusion of 0,2% bupivacaine at 6mL/h	FICB group demonstrated less opioid consumption preoperatively, with no change in pain scores. Subgroup analysis demonstrated significant decrease in preoperative opioid requirements in femoral neck fractures only. No significant differences regarding delirium, length of stay or opioid-related adverse effects.	3/9
Kolodychuk et al (2022)	Prospective, observational cohort study	FICB, US-guided	FICB vs No block	98	40mL of 0,25% bupivacaine	FICB group demonstrated significantly lower opioid consumption preoperatively. FICB group demonstrated shorter length of stay and was less likely to be readmitted to hospital.	8/9
Gerlier et al (2024)	Randomized, controlled trial	FNB, US-guided	FNB vs No block	30	20mL of ropivacaine 0,375%	FNB group demonstrated reduced preoperative opioid consumption and reduced opioid consumption during hospital stay. FNB group demonstrated reduced opioid adverse effects occurrence. No FNB-related adverse effects were detected.	3/5

Table I (Continued). — Summary of randomized controlled trials and observational cohort studies.

Chaudet et al (2016)	Randomized, controlled trial	FNB, US-guided and/or nerve stimulation	FNB catheter with continuous ropivacaine infusion vs FNB catheter with continuous saline infusion	55	Continuous infusion of ropivacaine 0,2% at 8mL/h	FNB group demonstrated lower total opioid consumption, but was not statistically significant. FNB group demonstrated significant reduction in preoperative opioid consumption in extracapsular fractures. FNB group demonstrated significant decrease in morphine side effects (nausea).	5/5
Hao et al (2019)	Randomized, controlled trial	FICB, US-guided	FICB with single shot and continuous ropivacaine infusion vs FICB with saline infusion	85	30mL of ropivacaine 0,45% followed by infusion of ropivacaine 0,25% at 6mL/h	FICB group demonstrated significantly lower VAS scores and lower opioid consumption. FICB group demonstrated lower incidence of postoperative delirium and fewer opioid-related symptoms.	2/5
Wennberg et al (2019)	Randomized, controlled trial	FICB, landmark technique	FICB vs No block	127	30mL of ropivacaine 0,2%	FICB group showed significant reduction of VAS scores for pain on movement.	5/5
Salottolo et al (2022)	Multicenter, prospective, observational cohort study	FICB, US-guided	FICB vs No block	517	No details	No reduction in delirium incidence. Opioid requirements were similar for both groups. FICB group demonstrated significantly lower pain scores.	8/9
Fahey et al (2022)	Prospective, observational cohort study	FNB, FICB, PENG, US-guided	FNB or FICB vs PENG	52	FICB: 20-40mL ropivacaine (concentration unknown) FNB: 20-30mL ropivacaine (concentration unknown) PENG: 15-40mL ropivacaine (concentration unknown)	Opioid use was similar between both groups. More patients were opioid-free for 6h after PENG block.	8/9

Table I (Continued). — Summary of randomized controlled trials and observational cohort studies.

Newman et al (2013)	Randomised, controlled trial	FNB, FICB, landmark and nerve stimulation	FNB vs FICB	107	Levobupivacaine 0,5%, volume 20-30mL (depending on weight)	FNB group demonstrated greater reduction in VAS scores and required less opioids after block.	2/5
Mayel et al (2022)	Randomized, controlled trial	FNB, US-guided	FNB vs No block	40	20mL lidocaine 2%	FNB grouped demonstrated higher reduction in pain scores.	2/5
Marrone et al (2023)	Randomized, controlled trial	PENG, infra-inguinal FICB, US-guided	PENG vs Infra-inguinal FICB	60	PENG: 20mL ropivacaine 0,375% FICB: 40mL ropivacaine 0,2%	PENG block was not superior over FICB in pain management.	
Pasquier et al (2019)	Randomized, controlled trial	FICB, landmark technique	FICB vs Sham injection	30	30mL bupivacaine 0,5% with epinephrine 1:200.000	FICB group demonstrated no supplementary analgesic benefit. No difference in total opioid consumption at 24h. No differences in length of stay.	3/5
Güllüpinar et al (2022)	Randomized, controlled trial	PENG, US-guided	PENG vs No block	39	20mL bupivacaine 0,25%	PENG block demonstrated significant decreases in pain scores at both rest and during mobilization.	2/5
Dickman et al (2016)	Multicenter, randomized controlled trial	FNB, US-guided	FNB vs No block	68	20mL bupivacaine 0,5%	FNB provided equivalent pain relief in both extracapsular and intracapsular hip fractures.	1/5
Morrison et al (2016)	Multicenter, randomized controlled trial	FNB, US-guided	FNB vs No block	153	20mL bupivacaine 0,5%	FNB group demonstrated significantly less pain up to 2 hours after admission.	2/5
Uysal et al (2019)	Randomized, controlled trial	FNB, US-guided and nerve stimulation	FNB vs No block	114	0,5mL/kg bupivacaine 0,25% (repeated 8 hourly through catheter)	FNB group demonstrated significantly lower VAS scores and experienced less pain during positioning for spinal anesthesia. FNB group demonstrated lower incidence of delirium, but difference was not statistically significant.	3/5

Table I (Continued). — Summary of randomized controlled trials and observational cohort studies.

Stephan et al (2020)	Prospective, observational cohort study	FNB, US-guided	Single-shot FICB vs Continuous catheter FICB	107	Single shot: 30-40mL bupivacaine 0,25% with 1:200.000 epinephrine Catheter: bolus 10-20mL bupivacaine 0,2% + infusion of bupivacaine 0,2% 6mL/h	No significant differences between both groups regarding opioid consumption and pain scores. Preoperative opioid consumption significantly decreased in both groups.	6/9
Unneby et al (2017)	Randomized controlled trial	FNB, landmark + nerve stimulation	FNB vs No block	266	40mL levobupivacaine 0,25%	FNB group demonstrated significantly lower pain scores up to 12h after admission and required less opioids.	2/5
Reavley et al (2015)	Multicentre, randomized, controlled trial	FNB, US-guided or nerve stimulation FICB; landmark technique	FNB vs FICB	162	30mL bupivacaine 0,5%	Both groups were equivalent in pain relief. No difference in analgesic effect for subgroup analysis according to fracture type.	2/5
Fletcher et al (2003)	Randomized, controlled trial	FNB, landmark technique	FNB vs No block	50	20mL bupivacaine 0,5%	FNB group demonstrated faster time to lowest pain score and required significantly less opioids.	2/5
Foss et al (2007)	Randomized, controlled trial	FICB, land-mark tech-nique	FICB with mepiva-caine + IM injection of saline vs FICB with saline + IM injection of morphine	48	40mL mepivacaine 1% with 1:200.000 epinephrine	FICB group experienced better pain relief at rest and on movement. FICB group demonstrated lower opioid consumption.	2/5
Cooper et al (2019)	Randomized, controlled trial	FNB; FICB; US-guided	FNB vs FICB	100	20mL levobupivacaine 0,5%	Both groups demonstrated significant reductions in pain scores, with no significant differences between both groups.	5/5
Groot et al (2015)	Prospective, observational, cohort study	FICB; landmark technique	FICB performed on all patients	43	30mL levobupiva-caine	FICB demonstrated a meaningful decrease in pain in 64% of patients after 240 minutes without additional opioids.	5/9

Table I (Continued). — Summary of randomized controlled trials and observational cohort studies.

Beaudoin et al (2013)	Randomized controlled trial	FNB; US-guided	FNB with bupivacaine vs FNB with sham injection (placebo)	36	25mL bupivacaine 0,5%	FNB group demonstrated significantly lower pain scores at 4 hours and experienced significantly greater overall pain relief. FNB group received significantly less opioids. No difference in opioid related adverse effected between both groups.	4/5
Dayan et al (2021)	Prospective, observational, cohort study	FNB; US-guided	FNB vs No block	69	Not mentioned	FNB group demonstrated lower pain scores at 3 and 12 hours after presentation. FNB group demonstrated lower opioid consumption.	6/9
Ketelaars et al (2018)	Prospective, observational cohort study	FNB; US-guided	FNB vs No block	64	40mL ropivacaine 0,375%	FNB significantly reduced pain scores after 30 and 60 min. Patient satisfaction was high. FNB was easy to learn (single-day course). No adverse events occurred.	8/9

NOS, Newcastle-Ottawa Scale; FNB, femoral nerve block; FIB, fascia iliaca block; PENG, pericapsular nerve group; IM, intramuscular.

Furthermore, three additional studies[21,32,35] utilized ultrasound alongside nerve stimulation for blocks when feasible. Only six studies[17,23,35-37,39] adopted a landmark technique exclusively, with two others[26,34] integrating it alongside nerve stimulation.

Bupivacaine emerged as the preferred local anesthetic in 11 articles[17-19,29-33,35,36,40], while the preference was for ropivacaine[20,25,28,42] and levobupivacaine[26,34,38,39] in four studies, respectively. Lidocaine[27] and mepivacaine[37] were each employed only once. One article did not specify the local anesthetic utilized[41].

Time to block

Only four articles provided information regarding the duration between arrival to hospital and nerve block placement. While in other studies nerve blocks were predominantly administered in emergency departments, the specific timeframe after presentation was not explicitly stated. Unneby et al[34]. reported a mean duration of 1.4 hours, but the patients in their study were only enrolled after being admitted to the orthopedic ward, making it unclear when the procedure was precisely performed. Salottolo et al[24]. reported a mean duration of 3.7 hours, with blocks being performed by anesthesiologists either in the emergency department or preoperatively. Fahey et al[25]. reported a mean duration of 4 hours; however, in their study the PENG blocks were performed by emergency physicians. Finally, Stephan et al[33]. reported a mean duration of 8.6 hours. In this study the timing of block placement relied on the availability of the regional anesthesia team, perhaps explaining the longer time gap.

Placement and operators of blocks

In 20 studies the blocks were conducted in the emergency departmen[t17-22,24,25,27-29,31,32,35-42], while in three[18,23,34], they were done at the ward. Three studies[26,30,33] did not specify the location of their intervention. Emergency physicians performed the nerve blocks in 11 studies[17,20,25,27,29,31,36,38,39,41,42,] whereas anesthesiologists did so in seven articles[18,22,24,28,33,34,37]. Orthopedic surgeons[23] and acute pain therapy nurses[26] were the practitioners in one study each. Six studies did not specify which healthcare professional performed the block[19,21,30,32,35,40].

Pain management

The majority of included studies demonstrated that PNBs offer advantages in preoperative pain management, evidenced by a decrease in pain scores after block placement (measured using VAS (Visual Analog Scale) or NRS (Numeric Rating Scale))[22-24,26,27,29,31,32,34,36-42].

Pasquier et al.'s study stands as an exception, as it did not clearly exhibit the analgesic benefits of PNBs[17]. In their randomized controlled trial, patients underwent either a FICB with a long-lasting local anesthetic or a sham injection with normal saline[17]. However, Pasquier et al. utilized a landmark-based technique and did not verify the sensory onset, which could raise uncertainties about the success rate of their block placement.

Opoid consumption

Eight studies reported a significant reduction in the need for opioid rescue analgesia[18-22,33,36,40]. Gerlier et al. showed a 60% reduction in preoperative opioid consumption (P < .001) for patients receiving a FNB[20]. However, in the study by Chaudet et al. this significance was only in cases of extracapsular hip fractures (P = .03) when employing FNB[21].

Two studies failed to observe any difference in opioid requirements among patients receiving nerve blocks. One of these studies was conducted by Pasquier et al.[17], and the other by Salottolo et al.[24]. The latter investigated the efficacy of FICB versus systemic analgesia in a multicenter, prospective observational study. Despite participants experiencing significantly lower pain scores (P = .002) following the administration of FICB, this did not translate into decreased opioid requirements. Nevertheless, this outcome could be attributed to the absence of a standardized approach to pain management within the study population.

Opoid-related adverse effects

Five studies in total investigated the influence on potential side effects associated with opioids[18,20-22,40]. Among them, only three reported a decrease in adverse effects. Gerlier et al. demonstrated a 40% reduction in the incidence of opioid-related adverse events in the intervention group compared to the standard group[20]. However, the specific side effects that were reduced were not explicitly mentioned. Meanwhile, the studies by Hao et al. (P = .025) and Chaudet et al. primarily reported a reduction in pre-operative nausea (P = .003) and vomiting (P = .046)[21,22].

Delirium

Among the articles included in our analysis, four investigated delirium incidence after block placement[18,22,24,32]. Only two of these studies reported a decreased incidence. Hao et al. documented a reduction of over 20% (p = 0.018)[22]. However, their study excluded patients with an Mini-Mental State Examination scores below 27, which might not adequately represent the geriatric population, given the higher prevalence of cognitive impairment among the elderly. Similar considerations apply to the study by Uysal et al., although in their case, the observed difference was also not statistically significant[32].

Type of hip fracture

Three studies conducted subgroup analyses based on fracture type. Garlich et al. analyzed the FICB among intertrochanteric and femoral neck fractures. Patients with femoral neck fractures treated with FIBs consumed fewer opioids preoperatively (P < .001), while no differences were found for intertrochanteric hip fractures18. Chaudet et al.[21] performed FNBs and compared catheters with continuous ropivacaine infusion to those with saline infusion[21]. They found a notable decrease in preoperative opioid consumption exclusively in extracapsular fractures (P = .03). Dickman et al. previously compared FNBs in intracapsular versus extracapsular hip fractures and concluded that there was similar pain relief in both types of fractures[30].

Comparison of nerve blocks

A total of five studies compared different nerve blocks based on their analgesic effects[25,26,28,35,38].

Among these, three randomized controlled trials examined the FNB versus the FICB. While two of these trials found no apparent differences in pain scores between both groups[35,38], Newman et al. favored the FNB as they observed a greater reduction in pain scores (P = .047) and lower opioid requirements (P = .041) with this approach[26]. However, it's important to note some limitations in this study. The techniques employed for both blocks were different (landmark + nerve stimulator for FNB; landmark only for FICB). Additionally, the same volume of local anesthetic was used for both blocks. This could be critical as the efficacy of a FICB relies on the distribution of a high volume, whereas lower volumes are typically sufficient for a FNB[59].

Comparative studies regarding PENG are limited. One randomized, controlled trial examined PENG versus FIB and did not find any superiority[28]. Another observational study compared PENG with FNB and FIB, revealing no definitive distinction in terms of pain relief and total opioid consumption. However, more patients were opioid-free for 6h after PENG block (53% versus 33%)[25].

Discussion

There is compelling evidence for the use of PNBs in pain management of hip fractures. The majority of studies conclude for nerve blocks to be a viable alternative analgesic option, consistently demonstrating reductions in pain scores and opioid consumption. Presently the Association of Anesthetics recommends PNBs as a first line treatment in preoperative pain management for hip fractures[47]. However, regional anesthetic techniques are still underutilized in trauma patients, despite their recognized advantages, particularly during the acute phase of injury[56,57].

It has been proposed that anesthesiologists with extensive regional anesthesia experience should introduce these techniques into non-operating room settings and early phases of trauma patient care to reap the benefits of regional anesthesia[58]. However, as we have seen in the study by Stephan et al[33]. the timeframe to block placement may be prolonged due to unavailability of the regional anesthesia team. Fortunately, nerve blocks may also be safely administered by emergency physicians[25], as competence in simple techniques can be achieved with brief training sessions. This is further emphasized in our review, as emergency physicians more often than anesthesiologists were the ones performing the nerve blocks.

Ultrasound guidance was predominantly employed across the studies. This technique offers significant advantages over landmark techniques or nerve stimulation by providing clear visualization of anatomical structures, continuous monitoring of the needle tip, and real-time observation of local anesthetic spread[46]. The integration of ultrasonography has enhanced the success rates and reduced complications associated with PNBs.

Given the link between inadequate pain management, opioid use, and delirium incidence, investigating the cognitive impacts of PNBs is crucial. Current research on pain reduction and reduced opioid requirements through nerve blocks remains inconclusive regarding its effect on delirium48. For instance, a systematic review by Kim et al. found a significant reduction in delirium only in patients without cognitive impairment, highlighting the need for more targeted studies[44].

The type of hip fracture (extracapsular or intracapsular) could influence the choice of nerve block. The hip, receives innervation anteriorly from branches of the femoral and obturator nerves, and posteriorly from branches of the sciatic and superior gluteal nerves. Depending on type of fracture, various branches of these nerves providing sensory innervation to the hip may be affected. Neither FICB nor FNB provide complete pain relief, as they primarily target the femoral and lateral cutaneous femoral nerves. Previous studies have also indicated that FICB and FNB are not consistently effective in blocking the obturator nerve[49].

PENG block is a relatively novel anesthetic technique that has garnered attention for its motor-sparing effects on the quadriceps muscle. It targets the anterior capsule branches of the femoral nerve, obturator nerve and accessory obturator nerve[50,51]. The latter two are not consistently blocked by FNB and FICB[52], making PENG a potentially more favorable option for achieving optimal analgesia in hip fractures. A perioperative study demonstrated the superiority of the PENG block over suprainguinal FICB prior to patient positioning for spinal anesthesia[53]. However, the existing literature on preoperative pain management is limited, necessitating further comparative studies to evaluate different nerve block techniques for efficacy in pain management and functional outcomes in hip fractures..

Comorbidities and current drug therapy may also be crucial when determining the appropriate type of nerve block. Elderly patients often require anticoagulation therapy, but the most common indication being atrial fibrillation[54]. Recently joint ESAIC/ESRA guidelines[55] have been published concerning the use of regional anesthesia in patients on antithrombotic drugs. Withdrawal of antithrombotic drugs is recommended (GRADE 1C recommendation) for deep blocks, including PENG. However, regarding superficial blocks as FNB and FICB, the consensus is that procedures may be performed in the presence of direct oral anticoagulants (DOACs) at either high or low doses, vitamin K antagonists irrespective of target INR, low-molecular weight heparins at either high or low doses and antiplatelet agents irrespective of dose (GRADE 2C recommendation).

There seems to be significant variability in the time from hospital admission to surgical admission for hip fractures. Hao et al. reported an interval that approached nearly 30 hours. This does not seem be an exception as several other studies reporting waiting periods exceeding 25 hours[43-45]. This highlights the need for strategies to manage pain effectively during extended waiting periods. A preference for the use of long-lasting local anesthetics, such as bupivacaine and ropivacaine, is favorable. However, a single injection typically provides pain relief for only 8 to 12 hours, leaving a considerable gap during which patients may experience rebound pain while awaiting surgery. There could be several options to tackle this issue. Liposomal bupivacaine has been proposed to provide analgesia up to 72 hours[61]. Nonetheless, there is a lack of high-quality evidence supporting its use over nonliposomal bupivacaine[62]. Other options are to repeat the nerve block or place a nerve catheter with a continuous infusion of local anesthetic. Stephan et al. compared single shot FICB versus FIB with continuous infusion through a catheter and demonstrated no differences regarding pain scores and opioid consumption[33]. In three other studies nerve catheters were used as well, however they did not provide a detailed assessment of the efficacy of their catheters on pain management during an extended preoperative period[18,21,22]. As such, there is need for further research to evaluate the effectiveness of continuous nerve block catheters in managing pain during prolonged preoperative waiting periods for hip fractures.

Conclusion

The management of hip fractures in elderly patients presents a multifaceted challenge, underscored by the need for effective pain control while minimizing the risks associated with opioid use. PNBs have emerged as a promising intervention tackle these issues. Efforts to develop and assess protocols for implementing nerve block programs into the early phases of trauma patient care, hold promise for improving outcomes. Logistical challenges however may be an issue, as anesthesiologists might not always be available around the clock. Hence, PNB techniques should be within the scope of emergency room staff.

The emergence of the PENG block warrants comparative studies to guide our strategy of preoperative pain management. Additionally, the prolonged waiting periods until surgery highlight the need for further research into alternative solutions, such as nerve catheters.

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