Randomized Control Trial

The Efficacy of Pericapsular Nerve Group Block Versus Facia Iliaca Block on Immediate Postoperative Pain and Opioid Consumption After Hip Arthroscopy Randomized Trial

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Background: Postoperative pain after hip arthroscopy remains a major cause of patient dissatisfaction in the immediate postoperative period. Adequate postoperative analgesia is associated with increased patient satisfaction, earlier mobilization, and decreased opioid consumption.

Objectives: Therefore, there is a need for safe, reliable, and opioid- and motor-sparing methods of achieving postoperative analgesia following hip arthroscopy. We evaluated the efficacy of pericapsular nerve group (PENG) block vs fascia iliaca block (FIB) in reducing postoperative pain and analgesic consumption in the first 24 hours following hip arthroscopy.

Study Design: A prospective randomized double-blinded control clinical trial.

Setting: At the arthroscopy unit of the orthopedic department of Assiut University Hospitals, Assiut, Egypt from 2019 to 2022.

Methods: Forty-three patients comprising 18 women and 25 men scheduled for hip arthroscopy were randomized to receive a preoperative block with PENG or FIB from March 2019 to March 2022. The mean age was 27.9 years (standard deviation [SD], 6.2 years; range, 18-42 years) and the mean body mass index was 25.13 kg/m^2 (SD, 5.08 kg/m^2). Patients were randomized into 2 groups: group A comprising 20 patients that received FIB; and group B comprising 23 patients that received PENG block. The efficacies of FIB and PENG block were evaluated using Visual Analog Scale scores.

Results: Statistically significant differences in median pain scores and mean at rest pain scores were observed between the 2 groups at all measured time points following surgery (i.e., 6, 12, 18, and 24 hours). Further, dynamic pain scores (with hip flexion) scores significantly differed between the 2 groups at 24 hours postoperatively ($P = 0.001$). PENG block significantly decreased postoperative opioid use compared to FIB. Total opioid use in the 24-hour postoperative period was lower in the PENG group compared to the FIB group (16.5 ± 9.9 vs 27.5 ± 9.6; $P < 005$).

Limitations: Different hip pathologies and different interventions lead to different outcomes. Also, a larger sample size and longer follow-up duration are required.

Conclusions: PENG block may represent the ideal regional anesthesia modality for hip arthroscopy as an alternative to more conventional regional nerve blocks, such as FIB, femoral nerve block, and lumbar plexus block. PENG block is reproducible, easily performed in the preoperative setting, and appears to spare motor function while providing prolonged sensory analgesia.

Key words: Pericapsular, nerve group block, fascia iliaca block, peripheral nerve blocks, hip arthroscopy

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In recent decades, hip arthroscopy has gained popularity with the number of procedures performed increasing by as much as 233% each year between 2007 and 2011. This increase is largely due to improved surgical techniques and a widening range of indications, including femoroacetabular impingement, labral tears, chondral injuries, loose bodies, osteonecrosis, and septic arthritis (1).

Despite less soft tissue dissection and morbidity compared to open surgery, postoperative pain remains a major cause of patient dissatisfaction in the immediate postoperative period after hip arthroscopy (2).

The sources of pain following hip arthroscopy can be divided into 2 anatomical regions: the intraarticular compartment and the extraarticular compartment. Pain related to the intraarticular compartment may originate from the joint capsule (capsulotomy), a repaired labrum, or bony resection. Pain in this compartment may be caused by traction, formation of arthroscopic portals, or from extravasation of irrigation fluids through the capsulotomy leading to soft tissue swelling (3). Pain related to the extraarticular compartment may be prevented by lowering the pump pressure as higher fluid infusion pressures are strongly correlated with postoperative pain after hip arthroscopy. Furthermore, decreasing upper leg edema and minimizing traction time have been shown to reduce postoperative pain. Anesthesiologists can facilitate these pain prevention techniques by providing adequate muscle relaxation and maintaining systemic blood pressure as low as possible. Pain related to the intraarticular structures is typically more difficult to control as the causes are related to the necessary surgical procedures (3). Adequate postoperative analgesia is important as improved patient comfort has been shown to be associated with increased patient satisfaction, earlier mobilization, and decreased consumption of opioids (4). The problematic side effects of opioids may contribute to patient dissatisfaction, such as nausea, vomiting, constipation, urinary retention, and altered sensorium (5). Opioid use has been associated with worse clinical outcomes following multiple procedures in orthopedic surgery, with increased early postoperative opioid use associated with increased duration of postoperative opioid use (6). Furthermore, patients undergoing hip surgery can be exposed to opioids for long periods and may be at increased risk of opioid-related harm (6), particularly as up to 61% of patients who are chronic opioid users preoperatively continue to use opioids postoperatively (7). The use of regional anesthesia techniques, such as femoral nerve block (FNB), fascia iliaca block (FIB), lumbar plexus block, and lumbar paravertebral block has been posited as a solution for post-hip arthroscopy pain. However, a recent randomized controlled trial reported patients with FNB had an increased incidence of falls. Accordingly, Parras et al (8) discontinued the use of FNB for hip arthroscopy at their institution. Given these results, there is a need for safe, reliable, and opioid- and motor-sparing methods of achieving postoperative analgesia following hip arthroscopy, such as an FIB (9) and pericapsular nerve group (PENG) block (an ultrasound-guided technique for blockade of the articular branches to the hip) (2).

Methods

A prospective randomized double-blinded control clinical trial was conducted at the arthroscopy unit of the orthopedic department of Assiut University Hospitals, Assiut, Egypt from 2019 to 2022. The present study was enrolled at www.clinicaltrials.gov under the study identifier number NCT0443419.

Patient Selection and Preintervention Assessment

Forty-three patients comprising 18 women and 25 men (Fig. 1) scheduled for hip arthroscopy, between March 2019 and March 2022, were included in the present study. The mean age was 27.9 ± 6.2 years, and the mean body mass index (BMI) was 25.13 ± 5.08 kg/m2. Informed written consent was obtained from all patients. Inclusion criteria were: American Society of Anesthesiologists (ASA) physical status I or II and scheduled for hip arthroscopy. Exclusion criteria for enrollment included age younger than 18 years, contraindications to regional anesthesia, history of opioid abuse, currently receiving opioid medications, preexisting neurological deficits, and neuropathy.

Prior to surgery, the following variables were recorded by the attending anesthetist: gender, age, BMI, and ASA status. The primary outcome measures were the Visual Analog Scale (VAS) at the time of postanesthesia care unit (PACU) admission and 6, 12, 18, and 24 hours postoperatively. The total dosage of opioids administered over the first 24 hours postoperatively was recorded. Secondary outcome measures were side effects of FIB and PENG block, quadriceps muscle weakness, and analgesic duration (Table 1).

Randomization Plan

Patients were randomized into 2 groups using the

sealed envelope system. Group A underwent preoperative FIB, while group B underwent PENG block. The effect of preoperative block was evaluated using the VAS scores and total dose of opioids administered. Once the study research coordinator had evaluated eligibility, obtained informed consent, and enrolled patients into the study, a sequentially numbered opaque envelope was opened by a separate unblinded study investigator to reveal the group designation of the patient. On the day of surgery, an anesthesia block nurse not involved in patient care was provided to perform the regional block. For patient safety, preoperative anesthesia providers administering the block and the providers of anesthesia during surgery were aware of which study medication had been administered. The patient, surgeon, intraoperative and postoperative nurses, and the individual responsible for the collection of the postoperative outcome measures were all blinded to the type of block. Subsequent data collection was performed by the blinded study research coordinator or an additional blinded study investigator.

Intervention and Interoperative Assessment

For patient comfort, patients were sedated with intravenous midazolam (0-4 mg) and local anesthesia with lidocaine 2% prior to block induction. An ultrasound scanner was used in all cases (GE Logiq F6, GE Healthcare, Chicago, IL) for PENG and FIB blocks. Both blocks were performed in the supine position by an anesthetist with extensive experience in regional blockade using a needle-in-plane technique. FIB (Fig. 2) was performed according to the method of Hebbard et al (10) under ultrasound guidance with 20 mL of 0.5% bupivacaine injected into the suprainguinal fascia iliaca compartment. Ultrasound-guided PENG block (Fig. 3) was performed according to the original description by Girón-Arango et al (11) with 20 mL of 0.5% bupivacaine injected between the psoas tendon anteriorly and pubic ramus posteriorly. Block success and coverage were assessed 30 minutes after block completion.

All surgical procedures were performed under general anesthesia. After induction with intravenous (IV) (100 mcg) fentanyl and propofol (2-2.5 mg/kg) and placement of the endotracheal tube, balanced anesthesia was maintained with sevoflurane. IV fentanyl was administered as required at the discretion of the anesthesiologist who was blinded to the group designation of the patient. All patients received 4 mg of IV dexamethasone before incision and 4 mg of IV ondansetron at the end of the procedure for postoperative nausea and vomiting prophylaxis. Most patients underwent standard surgical treatments for femoroacetabular impingement. Postsurgical pain was assessed repeatedly by an investigator blinded to the group designation of the patients and was treated with IV nalbuphine as required to achieve a VAS score of 4 or less. Measurements of quadriceps strength were assessed by an investigator blinded to the group designation of the patient on both the surgical and nonsurgical leg to

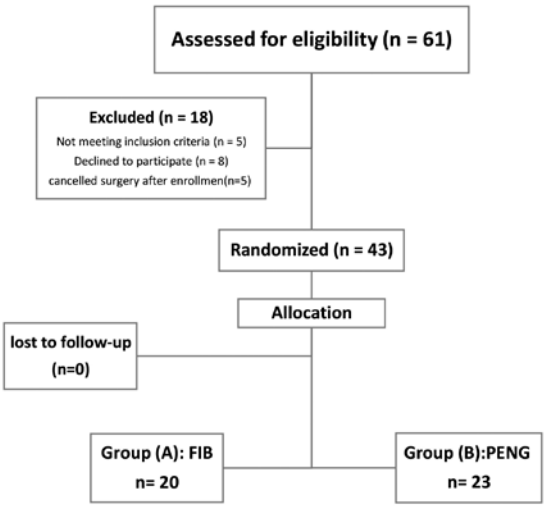

Fig. 1. *Flow diagram demonstrating the selection and analysis of patients.*

Table 1. *VAS score at different time points.*

	VAS_PRE	VAS_PACU	VAS_6H	VAS_12H	VAS_18H	VAS_24H	Dynamic VAS
Mann-Whitney U	219.000	36.000	58.500	81.500	39.500	62.500	37.500
Wilcoxon W	495.000	312.000	334.500	357.500	315.500	338.500	313.500
Z	-.277-	-4.783-	-4.238-	-3.698-	-4.790-	-4.169-	-4.765-
Asymptotic Significance (2-tailed)	.782	.0001	.0001	.0001	.0001	.0001	.0001

a. Grouping Variable: BLOCK

Abbreviations: VAS, visual analog scale; PRE, preoperative; PACU, post anesthesia intensive care unit; H, hours.

evaluate the effects of the regional technique on leg strength using the straight leg raising test a > 15° hip flexion (Table 2).

Statistics

SPSS version 23.0 software (IBM Corporation, Armonk, NY) was used for data management and data analysis. The mean ± standard deviation with the median and range when appropriate were used to describe quantitative data. The sample size was determined through a power analysis (considering an alpha error of 0.05 and power of 90%, a minimum sample size of 28 was needed to observe a moderately strong correlation with 14 patients in each group). Accordingly, the sample size was increased to 45 cases. Numbers with percentages were used to describe qualitative data. The chi-square test and Fisher's exact test were used to compare independent categorical variables (Table 3). Where continuous data were normally distributed, Student's t test was used for comparisons between the 2 groups. For nonnormally distributed data, the Mann-Whitney U and Kruskal-Wallis tests were used. A significance level was set at $\alpha = 0.05$. *P* values < 0.05 were considered statistically significant (Table 1).

Results

From March 2019 to March 2022, a total of 61 patients met the inclusion criteria and were assessed for eligibility. Of these, 18 patients were excluded, and 43 patients completed the study and were included in the final data analysis (Fig. 1). Group A comprised 20 patients that underwent FIB according to the method described by Hebbard et al (10) and group B comprised 23 patients that underwent PENG block according to the original description by Girón-Arango et al (11).

No differences in baseline parameters (e.g., age, side, gender, and ASA classification) were observed between the 2 groups (Table 4). No significant differences in total surgical time, traction time, procedures performed, or duration of hospital admission were observed between the 2 groups (Table 5).

Pain Scores

Preblock pain scores were similar between the groups (*P* = 0.782). Significant differences in median pain scores

Fig. 2. *Fascia iliaca injection point.*

Fig. 3. *PENG block injection point.*

and the mean at rest pain scores were observed between the 2 groups at all measured time points following surgery (i.e., 6, 12, 18, and 24 hours; $P = 0.001$). A significant difference in dynamic pain scores (active hip flexion up to 90°) was observed between the 2 groups at 24 hours postoperatively ($P < 0.001$). At the time of admission to the pediatric intensive care unit and at 6, 12, 18, and 24 hours postoperatively, median pain scores in group A were 6, 5, 4, 4, and 3, respectively, and in group B were 3, 2, 2, 2, and 2, respectively, while peak VAS scores at rest were 8, 7, 6, 5, and 5, respectively, in group A and 6, 5, 4, 3, and 4, respectively, in group B ($P < 0.001$). During movement (active hip flexion up to 90°), median pain scores at 24 hours postoperatively were 5.5 in group A and 3 in group B, with a maximum score of 9 in group A and 5 in group B ($P < 0.001$).

Postoperative Opioid Consumption

No significant difference in intraoperative opioid administration was observed between the 2 groups, with all patients receiving 100 mcg of fentanyl during anesthesia induction. PENG block significantly decreased postoperative opioid use compared to FIB. Total opioid use in the 24 hours postoperative period was lower in the PENG group compared to the FIB group (mean, 16.5 ± 9.9 vs 27.5 ± 9.6; $P < 0.05$).

Discussion

The main finding of the present study is the superior analgesic effect of PENG block compared to FIB in all measured parameters as a peripheral neuropathic pain treatment in hip arthroscopy surgery. PENG block dramatically decreased median pain scores at rest and on movement at all measured time points during the postoperative period. Furthermore, the PENG group had lower total postoperative opioid consumption. First analgesic demand (i.e., time before requiring first opioid dose) was significantly increased in the PENG group compared to the FIB group (500 vs 165 minutes; $P = 0.002$) (Table 6). Interestingly, some patients in the PENG group did not require any opioids during the first 24 hours postoperatively, indicating a long duration of analgesia was provided by PENG block. No patient in the PENG group had clinically significant quadriceps weakness, complications, or postoperative falls. All patients were able to perform straight leg raise with

Table 2. *Quadriceps muscle power (straight leg raising).*

			Leg Raising		Total	Pearson Chi-Square
			Y	N		Exact Significance (2-sided)
Type of Block	FIB	Count	12	8	20	
		% Within Type of Block	60.0%	40.0%	100.0%	
		% of Total	27.9%	18.6%	46.5%	
	PENG	Count	23	0	23	
		% Within Type of Block	100.0%	0.0%	100.0%	.001
		% of Total	53.5%	0.0%	53.5%	
Total		Count	35	8	43	
		% Within Type of Block	81.4%	18.6%	100.0%	
		% of Total	81.4%	18.6%	100.0%	

FIB, fascia iliaca block; PENG, pericapsular nerve group; Y, yes; N, no.

Table 3. *Percent of patients who took analgesia.*

			Analgesia or Not		Total	Pearson Chi-Square
			Y	N		Exact Significance (2-sided)
Type of Block	FIB	Count	20	0	20	
		% Within type of block	100.0%	0.0%	100.0%	
		% Of Total	46.5%	0.0%	46.5%	
	PENG	Count	17	6	23	
		% Within Type of B Block	73.9%	26.1%	100.0%	.023
		% of Total	39.5%	14.0%	53.5%	
Total		Count	37	6	43	
		% Within Type of Block	86.0%	14.0%	100.0%	
		% of Total	86.0%	14.0%	100.0%	

Abbreviations: FIB, fascia iliaca block; PENG, pericapsular nerve group; Y, yes; N, no.

hip flexion > 15°. In contrast, 3 patients in the FIB group had postoperative falls and 8 patients were unable to perform a straight leg raise. All patients in the present study were discharged without complications and with good patient satisfaction.

Table 4. *Patient demographics*.

		Gender		Total	
		Women	Men		
Type of Block	FIB	6	14	20	
	PENG	12	11	23	
Total		18	25	43	
P value		.216			
		Side		Total	
		Left	Right		
Type of Block	FIB	7	13	20	
	PENG	12	11	23	
Total		19	24	43	
P value		.359			
Age		n	Mean	SD	Standard Error Mean
FIB		20	28.9500	6.03041	1.34844
PENG		23	27.1304	6.41238	1.33707
P value		.346			
Surgery Duration		n	Mean	SD	Standard Error Mean
FIB		20	131.350	29.7025	6.6417
PENG		23	124.696	33.3145	6.9466
P value		.490			
Traction Time		n	Mean	SD	Standard Error Mean
FIB		20	50.7500	10.75994	2.40600
PENG		23	45.6522	13.91732	2.90196
P value		.184			

Table Legends Abbreviations: FIB, fascia iliaca block; PENG, pericapsular nerve group; SD, standard deviation; n, number.

Patients may experience greater levels of pain after hip arthroscopy compared to other arthroscopic procedures (12,13). Patients expect to receive optimal pain management with fewer side effects. Accordingly, insufficient knowledge of pain management techniques may lead to improper pain evaluation, thereby negatively affecting patient quality of life and physical and psychological wellbeing (14). After hip arthroscopy, achieving optimal postoperative pain control remains a significant challenge, likely due to the complicated innervation of the hip, massive amount of soft tissue around the hip, and the ball-and-socket configuration of the constrained hip joint. Therefore, a substantial amount of axial traction is required to allow instrumentation access to the hip joint leading to increased pain compared to knee and shoulder arthroscopy, which do not require traction for access (15-17).

Due to the increasing number of hip arthroscopy procedures being performed, there is an increasing need for the standardization of pain management approaches for patients undergoing hip arthroscopy (18). Multiple authors (3,19) have reviewed several approaches for anesthesia and analgesia during hip arthroscopy with no clear consensus regarding the optimal method of anesthesia (18,20). Nerve blocks, intraoperative intraarticular or extracapsular anesthetic injections, opioids, and nonsteroidal anti-inflammatory drugs are some examples of currently used analgesia modalities (3,19,21). The use of postoperative opioids is known to increase the incidence of opioid-related side effects and delayed hospital discharge. In contrast, regional anesthesia has been proven to decrease recovery times in a wide range of orthopedic surgeries (22,23), and significantly reduce nausea, vomiting, and other opioid-related complications. Studies (2,18,24) have revealed that nerve blocks can provide sufficient analgesic effects while reducing reliance on postoperative opioid consumption. Peripheral nerve block has

Table 5. *Surgery type*.

Surgery Type		**Diagnosis**					**Total**
		Cam Repair	**Debridement**	**Labral Repair**	**Loose Body Removal**	**Pincer Repair**	
FIB	Count	8	1	6	1	4	20
	%	40.0%	5.0%	30.0%	5.0%	20.0%	100.0%
PENG	Count	7	0	8	2	6	23
	%	30.4%	0.0%	34.8%	8.7%	26.1%	100.0%
Total	Count	15	1	14	3	10	43
	%	34.9%	2.3%	32.6%	7.0%	23.3%	100.0%
Pearson Chi-Square		.757					

Abbreviations: FIB, fascia iliaca block; PENG, pericapsular nerve group, DF, degrees of freedom; n, number.

Table 6. *Total dose of analgesia in 24 hours postoperative and first analgesia demand.*

	BLOCK	n	Mean	SD	Standard Error Mean	Significance (2-tailed)
Total Dose of Analgesia in mg	FIB	20	21.5000	11.70920	2.61826	
	PENG	23	9.7826	8.72278	1.81883	0.001
First Analgesia Demand Duration of Analgesia in Hours	FIB	20	2.5630	1.63335	0.36523	
	PENG	23	11.3157	7.92942	1.65340	0.001

Abbreviations: FIB, fascia iliaca block; PENG, pericapsular nerve group; SD, standard deviation; n, number.

been proven successful in all parameters in other arthroscopic surgeries, including shoulder and knee surgeries, allowing faster recovery and reduction of opioid consumption (21,24,25). As the use of peripheral nerve block in hip arthroscopy is relatively new, there is a lack of knowledge and experience, and further studies of multiple alternative regional anesthetic procedures, such as lumbar plexus blocks, FNBs, lumbar paravertebral blocks, and FIBs, are required (11,23,26-28,30). Regional anesthesia plays a significant role in postoperative pain management although some of these common techniques have limitations and complications. FNB has been shown to significantly reduce pain, but has also been associated with an increased incidence of postoperative falls (27,31,32). Lumbar plexus block has been linked to a significant risk of complications despite reducing postoperative pain due to the need for technical skill (33-35). In comparison to other lower extremity blocks, fascia iliaca compartment block has a number of significant advantages, including being easy to learn, technically straightforward, and providing effective coverage of most of the nerves that innervate the hip (29,36,37). Further, FIB has demonstrated efficacy in pain management for hip fractures (66) and total hip arthroplasty (67). Additionally, Mudumbai et al (38) have posited that injecting local anesthetic at a distance from the femoral nerve reduces quadriceps weakness. FIB of the femoral nerve at a substantial distance from major neurovascular structures reduces the risk of neurologic damage (39,40). As FIB is produced by blocking the femoral nerve, lateral femoral cutaneous nerve, and obturator nerve, FIB is believed to affect the anterior, lateral, and medial aspects of the thigh (41,42). According to several publications (43,44), FIB effectively manages pain in patients after hip arthroscopy and decreases the requirement for postoperative opiates (41). One of the first studies to evaluate the effectiveness of FIB for pain management following hip arthroscopy was conducted by Krych et al (44), which showed a significant decrease in postoperative pain and good patient satisfaction rates (44). However, this study was unable to compare FIB to other pain management techniques due to the lack of a control group. On the other hand, Smith et al (41) conducted a systematic review of 5 studies comparing FIB to other pain control modalities (i.e., lumbar plexus block, intraarticular ropivacaine, local anesthetic infiltration, saline placebo, and a no-block control group) and reported that FIB appears not to outperform other types of analgesics in the immediate postoperative period. In a study comparing the quadratus lumborum block to the femoral nerve and FIBs during hip arthroscopy, Blackwell et al (45) reported patients receiving a preoperative quadratus lumborum block had lower total opioid consumption and lower pain scores at discharge. Moreover, a recent randomized, double-blind trial by Behrends et al (46) demonstrated that routine use of the FIB in this patient population is not recommended as it weakens the quadriceps muscles rather than improving analgesia after an arthroscopic hip surgery.

A review article by Li et al (47) covered 14 randomized, controlled trials, including 1,179 patients that compared FIB to FNB. No significant differences in postoperative VAS scores were observed at any time point between the 2 groups. Additionally, narcotic demands were comparable between the 2 groups. A separate recently published randomized trial by Purcell et al (48) reported preoperative fascia iliaca compartment block does not provide significant pain control after hip arthroscopy. Furthermore, Glomset et al (13) suggested that patients receiving FIB and intraarticular ropivacaine had comparable pain scores and opioid consumption. Garner et al (49) demonstrated that patients with FIB had significantly higher pain scores and higher opioid consumption compared to local anesthesia.

In contrast to the studies mentioned above, a prospective, single-blinded, randomized study by Badiola et al (50) performed blocks in the PACU only if patients had moderate-to-severe pain. This study demonstrated both FIB and lumbar plexus block provided good postblock analgesia and patient satisfaction. Contrary to

the previous research, this one found that an FIB was superior to a lumbar plexus block in delivering postoperative analgesia following hip arthroscopic surgery. However, the methodology of these studies differed substantially. Other studies (46,51) have used the FIB preoperatively, which may have resulted in the washing out of local anesthetic leading to a decreased effect compared to the lumbar plexus block.

In summary, there is no scientific proof that the preoperative FIB improves pain control after hip arthroscopy due to incomplete coverage of the surgical area or washing out of local anesthetic. Previous authors have posited that FIB is less effective at managing pain in the posterior aspect of the hip capsule, which is innervated by the sacral plexus but not contained within the fascia iliaca compartment (13,37,41,50,51). The anterior hip capsule is the part of the hip capsule that has the highest innervation according to a recent morphological and histological study (52). A recent anatomic analysis of hip capsule innervation revealed that the accessory femoral nerve and obturator nerve may have an even greater role in innervating the anterior hip (53). They further discussed the corresponding anatomical landmarks for those articular branches. The femoral nerve, accessory obturator nerve, and iliopubic eminence are all frequently found between the anterior inferior iliac spine and the inferior medial acetabulum (53). Following on from this anatomical study, Girón-Arango et al (11) described a unique PENG block in 5 patients with intracapsular hip fractures administered before surgery. They reported that all patients had lower pain levels and no patients developed clinically obvious quadriceps weakness. Further, all patients were able to perform the straight leg test up to a 15° angle. PENG block differs from other techniques in that it specifically targets the articular branches innervating the anterior hip joint and avoids quadriceps motor weakness; a known complication of fascia iliaca and femoral blocks (54-56).

PENG block, which blocks the sensory branches of the obturator, accessory obturator, and femoral nerves in the anterior capsule of the hip, has been proposed as an effective method of managing pain induced by hip fractures and total hip replacement (57). The use of PENG block in hip fracture and total hip arthroplasty has been supported by a number of recently published studies (11,58-63) reporting excellent analgesia, improved pain scores, decreased opioid consumption, reduced time to hospital discharge, and a longer duration for PENG block compared to the regional anesthetic. On the other hand, there is a lack of studies evaluating the use of preoperative PENG block in hip arthroscopy (64-67). Accordingly, PENG block may represent the ideal peripheral nerve block technique for hip arthroscopy as it is reliable, easy to perform, and spares motor function while providing significant pain control (66).

PENG block may be a better option than other peripheral nerve blocks, such as FIB, femoral block, or lumbar plexus block for postoperative analgesia in hip arthroscopy (65,68). However, PENG block has limitations, including the need for deep instillation and poor vision of the needle tip (54,63). To avoid complications, such as quadriceps weakness, the medication must be instilled deeply into the psoas tendon (69).

The aim of the present study was to compare the efficacy of FIB and PENG blocks in reducing postoperative pain and analgesic consumption in the first 24 hours after hip arthroscopy. It is hoped the results of the present study will contribute to the establishment and standardization of regional anesthesia for hip arthroscopy with minimal side effects. The findings of the present study demonstrate PENG block may be used in place of other, more traditional regional nerve blocks, such as lumbar plexus, femoral nerve, or FIBs. To our knowledge, the present study is the first to prospectively compare FIB and PENG block for hip arthroscopy analgesia. The findings of the present study warrant further studies to evaluate the use of PENG block in routine clinical practice.

Limitations

The present study had several limitations. First, several factors need to be considered in order to ensure effective postoperative pain relief after hip arthroscopy, including joint pathology, type of procedure performed, post-procedure complications, patient characteristics, and tolerance to pain. Second, hip arthroscopy is used to treat a range of different hip pathologies and the degree to which acetabuloplasties, labral repairs, and femoral osteochondroplasties are performed varies significantly. Theoretically, these variations may lead to varying degrees of postoperative pain and bias the results of the present study. Third, a larger sample size and longer follow-up duration are required to validate the efficacy of PENG block following hip arthroscopy. Finally, further studies are required to establish ideal clinical outcomes and determine the applicability of PENG block to a larger range of indications.

Conclusions

PENG block represents a promising regional analgesic technique that may have greater utility than fascia iliaca, femoral, or lumbar plexus blocks for postoperative analgesia following hip arthroscopy. PENG block had several advantages over FIB, including longer duration, reduction in analgesic demand, and lower risk of muscle weakness.

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