Should Preoperative Fascia Iliaca Block Be Used for Hip Arthroscopic Labral Repair and Femoroacetabular Impingement Treatment? A Prospective Single Blinded Randomized Study

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Purpose: To evaluate the analgesic effect of preoperative fascia iliaca block on postoperative morphine equivalent dose, pain level, and patient satisfaction for patients electing to undergo primary hip arthroscopic labral repair with osteochondroplasty. **Methods:** This prospective study included 60 patients (fascia iliaca block group: n = 27; control group: n = 33) undergoing elective arthroscopic hip surgery by a single board-certified orthopedic surgeon, fellowship trained in hip arthroscopy. Participants for the study included patients older than 10 years of age and younger than 85 years of age, American Society of Anesthesiologists classifications I to III, diagnosed with symptomatic femoroacetabular impingement, and/or hip labral tear, and/or cartilage damage, and electing to undergo arthroscopic hip surgery. Patients were randomized by surgical date to receive preoperative fascia iliaca block or control (no fascia iliaca block). Preoperative fascia iliaca block was administered by 1 of 4 board certified anesthesiologists using identical anesthetic (35-40 mL ropivacaine 0.35%). Postoperative morphine equivalent dose, self-reported pain level (visual analog scale) and patient satisfaction were measure postoperatively. **Results:** There were no significant differences between the control group and the fascia iliaca block group in sex, age, height, weight, or body mass index. There was a significant difference between the 2 groups in distribution of American Society of Anesthesiologists classification (p = .031). There were no significant differences in postoperative morphine equivalent dose for patients receiving fascia iliaca block compared with the control group. There were no significant differences in self-reported visual analog scale pain and patient satisfaction between the 2 groups at any of the measured time points following surgery. **Conclusions:** Based on the results of this study, routine preoperative fascia iliaca block for elective hip arthroscopic labral repair and treatment of femoroacetabular impingement is not recommended. **Level of Evidence:** Level II, prospective single blinded randomized study.

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Orthopaedic surgery is known to cause significant postoperative pain. Orthopaedic surgical patients have the highest rate of severe pain in the postanesthesia care unit (PACU).[1] Postoperative pain can impede patients' ability to regain function after surgery if not managed properly.[2] Early range of motion, strengthening, and ambulation are critical to healing and to reduce the risk of postoperative complications.[3] Failure to achieve early postoperative goals because of postoperative pain delays rehabilitation progression and return to normal activity.

The harm of prescribing large amounts of opioid medication postoperatively has been widely reported.[4] There is no standard analgesic protocol to manage postoperative pain following hip arthroscopy. Various analgesic methods have been proposed in an attempt to diminish the use of opioids following hip arthroscopy including preoperative patient education,[5] preoperative opioid discontinuation,[6] local anesthetic infiltration,[7] intraoperative intravenous (IV) opiates,[7]

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postoperative anticonvulsants,[2] and perioperative nerve blocks.[8-12]

Perioperative lumbar plexus blocks,[8] L1 and L2 paravertebral blocks,[9,10] and femoral nerve blocks (FNB)[11,12] have been reported for analgesic use with hip arthroscopy. Although the FNB has been used for postoperative analgesia, it primarily reduces anterolateral hip pain.[13] Originally described by Delans et al.,[14] preoperative fascia iliaca block (FIB) has recently been used for postoperative analgesia following hip arthroscopy.[15,16] Infiltrating below the iliacus fascia to the lateral femoral cutaneous, femoral, and obturator nerves, the FIB provides analgesia to the distribution innervating the capsulotomy along with the anterior and anterolateral portals involved in hip arthroscopy.[15] The use of ultrasound guidance has been found to improve the efficacy of FIB by 35%.[17] There is conflicting evidence in recent reports regarding efficacy of FIB in hip arthroscopy.[15,16] Krych et al.[15] reported low opioid usage and high satisfaction following hip arthroscopy with use of a preoperative FIB, but lacked a control group for comparison. Another study was terminated early because of significantly higher pain and opioid consumption in patients given FIB compared with patients given local anesthetic infiltration only.[16]

Therefore, the purpose of this investigation was to evaluate the analgesic effect of preoperative FIB on postoperative morphine equivalent dose (MED), pain level, and patient satisfaction for patients electing to undergo primary hip arthroscopic labral repair with osteochondroplasty. We hypothesized there would be no significant differences between the FIB and control groups in postoperative MED, pain level, and patient satisfaction.

Methods

Study Design

This was a prospective, randomized single blinded study conducted to determine the efficacy of preoperative FIB for analgesia following hip arthroscopy with labral repair and treatment of femoroacetabular impingement. Randomization of patients occurred by the process of scheduling their respective elective surgery. Before the start of the study, we randomly assigned surgical dates by flip of a coin on which patients would either receive the FIB or no block. All patients on a particular surgical date either received the FIB or no block. Patients were scheduled independently of the FIB or no block assignment. The surgical scheduler, surgeon, anesthesiologist, nurses, and patient were blinded to which dates were assigned as FIB or no block. On any surgical day, the surgeon was completely blinded to which patients received the FIB or no block. Further randomization occurred because patients were allowed to select a surgical date at their discretion. We conducted a repeated-measures design consisting of 9 time periods at which postoperative MED was recorded including (1) in PACU, (2) during the remainder of the day following discharge from PACU, (3) postoperative day 1, (4) postoperative day 2, (5) postoperative day 3, (6) postoperative day 4, (7) postoperative day 5, (8) postoperative day 6, and (9) postoperative day 7. Patient-reported pain and satisfaction levels were recorded on postoperative days 1, 2, 4, and 7.

Participants

This study included 60 patients (FIB group: n = 27 [age range = 15-58 years]; control group: n = 33 [15-63 years]; Table 1) electing to undergo arthroscopic hip surgery by a single board-certified orthopaedic surgeon, fellowship trained in hip arthroscopy. Hip arthroscopic procedures included labral repair, acetabuloplasty, femoroplasty, chondroplasty, and synovectomy (Table 1).

Participants were screened and cleared for study participation during their routine preoperative visits. Screening and clearance for study participation was based on the physical examination, imaging studies, and results of diagnostic injection tests. All participants signed informed consent forms before study participation. This study is approved by the Institutional Review Board's Committee for Human Studies.

Participants for the study included patients older than 10 years of age and younger than 85 years of age, American Society of Anesthesiologists (ASA) classifications I to III, diagnosed with symptomatic femoroacetabular impingement, and/or hip labral tear, and/

Table 1. Participant Demographics

	Control Group	FIB Group	p Value
Patients (n)	33	27	
Sex			
Male (n)	7	12	.054
Female (n)	26	15	
Age (y)	41.4 ± 14.8	42.4 ± 11.7	.983
Height (cm)	168 ± 9.8	171 ± 10.5	.927
Weight (kg)	73.3 ± 15.0	80.2 ± 17.1	.861
BMI (kg/m^2)	25.9 ± 5.5	27.4 ± 5.1	.964
ASA classification			
I	18	6	
II	14	18	
III	1	3	
Procedures			
Labral repair	33	27	
Femoroplasty	33	27	
Acetabuloplasty	33	27	
Traction time (min)	59.2 ± 9.3	58.3 ± 8.8	.550
Preoperative alpha angle (°)	62.6 ± 3.8	61.0 ± 4.2	.905

Note: Data are presented as mean ± standard deviation.

ASA, American Society of Anesthesiologists Classification System; BMI, body mass index; FIB, fascia iliaca block.

*p < .05.

or cartilage damage, and electing to undergo arthroscopic hip labral repair surgery.

Participants were excluded from study participation with a history of preexisting neuropathy, chronic opioid use, obstructive sleep apnea, previous hip replacement, or hip resurfacing surgery on the affected side. Other exclusion criteria included a previous diagnosis of avascular necrosis.

Outcome Measures

Primary Outcome Measure

Postoperative MED was measured at the following time points: in the PACU, postdischarge day 0 and postoperative days 1 through 7. In the PACU, postoperative MED was recorded by nurses as dosages and frequencies of narcotic medication administered. Following discharge from the PACU, patients recorded dosages and frequencies of narcotic medication in a daily log.

Secondary Outcome Measure

Patients were asked to rate their level of postoperative pain at the following time points: 1 hour after arrival to the PACU and on postoperative days 1, 2, 4, and 7. The severity of pain was assessed using a visual analog scale (VAS), with 0 representing no pain and 10 the worst pain.

Tertiary Outcome Measure

Participants were asked to rate their level of satisfaction using a VAS with the question, "How satisfied are you with your pain control?" (1 = very unsatisfied, 10 = very satisfied) at the following time points: postoperative days 1, 2, 4, and 7.

Procedures

All patients received 150 mg of Lyrica and 200 mg Celebrex as preoperative analgesic regimen before surgery. Patients at high risk for postoperative nausea and vomiting received 1.5 mg scopolamine prophylactically before surgery.

The FIB was administered under ultrasound guidance by 1 of 4 board-certified anesthesiologists. The patient was placed in the supine position, sedation was given (2-4 mg IV midazolam and 50-100 mcg IV fentanyl) and the area for the block was prepared with chlorhexidine. The block was performed with ultrasound guidance (GE Logiq E) with a high-frequency ultrasound probe. The ultrasound probe was placed in a perpendicular orientation to the inguinal ligament. The anterior superior iliac spine was visualized and the probe was moved medially to identify the iliacus muscle and the iliacus fascia. A skin wheal was made at the inferior edge of the ultrasound probe with 1% lidocaine. A 20-g, 4-inch echogenic block needle was advanced in an in-plane approach through the sartorius muscle to puncture the iliacus fascia. A total of 35 to 40 mL of ropivacaine 0.35% was injected into the space below the iliacus fascia and above the iliacus muscle. Local anesthetic spread was visualized separating the iliacus muscle from the iliacus fascia in both the superior and inferior/medial directions.

All patients received general anesthesia with muscle relaxation/paralysis intraoperatively. All patients received 4 mg dexamethasone after induction and 4 mg Zofran intravenously before the end of the procedure for postoperative nausea and vomiting prophylaxis. Narcotic medication was provided IV as needed throughout the procedure. Upon release of traction, 1,000 mg of IV Tylenol was administered. Local anesthetic of 10 mL 0.50% Marcaine plain with 10 mg morphine was administered at the termination of the surgical procedure around the arthroscopic portals.

All patients received IV Fentanyl/Dilaudid as needed for pain in the PACU. Patients were also provided oxycodone as needed for pain and Valium 5 to 10 mg orally for muscle spasm.

Statistical Analyses

An a priori power analysis was conducted using G*Power based on postoperative MED data reported by Xing et al.[11] An effect size of 0.78 was calculated based on the means ± standard deviation for postoperative MED of 26.6 ± 24.6 for the control group and 10.9 ± 12.5 for the FNB group. With an effect size of 0.78, a minimum sample size of 25 participants per group was determined for an independent *t*-test with an alpha = .05 to yield a statistical power of at least 0.80.

Descriptive statistics including means, standard deviations, and 95% confidence intervals were generated for all demographic characteristics and variables of interest. Independent *t*-tests were used to compare descriptive continuous variables including age, weight, height, body mass index, traction time, and preoperative alpha angle. We used a 2 (FIB, control) × 9 (period) analysis of variance (ANOVA) with repeated measures to analyze the dependent measure (postoperative MED) over time. Post hoc testing with Bonferroni corrections was conducted to determine where differences in MED occurred among time periods. Comparisons of postoperative VAS patient satisfaction and pain scores were conducted using the Kruskal-Wallis H test. χ-square analyses were used to compare categorical variables including sex and ASA classification between the FIB and control groups. All statistical analyses were conducted using SPSS (version 22.0, IBM Corp., Armonk, NY) and Microsoft Excel 2017 (Microsoft, Redmond, WA) with an alpha level $< .05$.

Table 2. Postoperative MED

Postoperative Time Point	FIB Group	Control Group	p Value
PACU	31.0 ± 25.7	23.9 ± 14.5	.958
Postdischarge (day 0)	13.8 ± 16.0	13.3 ± 13.0	.992
PO day 1	21.1 ± 18.7	33.0 ± 23.1	.918
PO day 2	23.1 ± 20.9	26.0 ± 26.3	.984
PO day 3	22.1 ± 27.1	19.9 ± 22.5	.989
PO day 4	14.7 ± 23.4	15.5 ± 22.2	.996
PO day 5	11.3 ± 21.8	10.1 ± 16.5	.991
PO day 6	9.6 ± 21.0	8.6 ± 14.8	.992
PO day 7	10.2 ± 21.4	4.0 ± 7.0	.945
Total	162.7 ± 144.4	154.2 ± 115.1	.999

Note: Data are presented as mean ± standard deviation.
FIB, fascia iliaca block; MED, morphine equivalent dose; PACU, postanesthesia care unit; PO, postoperative.

Results

Descriptive data for all participants are presented in Table 1. The mean age of patients treated with a FIB was 42.4 ± 11.7 years, whereas the mean age of patients in the control group was 41.4 ± 14.8 years. Fifty-six percent of the FIB group was female, and 79% of the control group was female (p = .054). There were no significant differences between the control group and the FIB group in sex, age, height, weight, or body mass index. There was a significant difference between the 2 groups in distribution of ASA classification (p = .031).

The repeated measures ANOVA revealed no significant differences between groups for postoperative MED upon discharge from the PACU through the remaining postoperative time points. There were no significant differences in self-reported VAS pain between the 2 groups at any of the measured time points following surgery. Postoperative VAS pain levels are reported in Table 3. There were no significant differences in self-reported patient satisfaction between the 2 groups at any of the measured time points following surgery. Postoperative patient satisfaction is reported in Table 4.

The 2-way, repeated-measures ANOVA with Greenhouse-Geisser correction of the MED data revealed an interaction between group and time ($F_{4.38,464} = 3.064$, p = .014; Fig 1). The postoperative MED is reported in Table 2. In the FIB group, post hoc testing with Bonferroni corrections revealed significantly decreased postoperative MED upon discharge from the PACU to postoperative day 5 (p = .016), day 6 (p = .007), and day 7 (p = .009). In the same group, MED continued to significantly decrease between postoperative days 5 and 7 (p = .016). In the control group, post hoc testing revealed a significant decrease in MED upon discharge from PACU to postoperative day 8 (p = .011).

Table 3. VAS Pain Levels

Time Point	Control Group	FIB Group	p Value
Preoperative	2.8 ± 2.4	2.7 ± 2.3	.940
PACU hour 1	3.8 ± 2.0	4.1 ± 2.2	.764
Discharge	3.3 ± 1.4	3.0 ± 1.8	.651
Day 1	4.7 ± 2.5	3.9 ± 2.0	.569
Day 2	4.5 ± 1.9	4.0 ± 2.3	.719
Day 4	3.6 ± 1.7	3.9 ± 2.5	.811
Day 7	2.3 ± 1.5	3.2 ± 2.3	.419

Note: Data are presented as mean ± standard deviation.
FIB, fascia iliaca block; PACU, postanesthesia care unit; VAS, visual analog scale.

Table 4. Postoperative VAS Satisfaction Ratings

Postoperative Day	Control	FIB	p Value
1	8.5 ± 2.2	8.8 ± 1.5	.733
2	8.4 ± 2.2	8.7 ± 1.8	.744
4	8.6 ± 2.1	8.1 ± 2.5	.692
7	9.2 ± 1.6	8.6 ± 1.8	.439

Note: Data are presented as mean ± standard deviation.
FIB, fascia iliaca block; VAS, visual analog scale.

Discussion

The most important finding of the present study was that there were no significant differences in postoperative MED between the control group and the FIB group following hip arthroscopy. The efficacy of the preoperative FIB was measured by postoperative MED as well as patient-reported pain and satisfaction levels. There were no significant differences between the FIB group and control group for any of these measures at any time point, including on the day of surgery, which contradicts prior investigations. The use of perioperative nerve blocks in hip arthroscopy has been supported to reduce opioid consumption for postoperative analgesia, avoid side effects with opioid use, reduce postoperative pain, and improve satisfaction with pain control.[10-12,15,18-21]

Postoperative analgesia with preoperative nerve blocks in hip arthroscopy has previously been investigated with the use of lumbar plexus,[8] paravertebral,[9,10] and femoral nerve blockades.[11,12] Although lower mean postoperative pain scores and higher satisfaction have been reported in these investigations, these studies consist of small case series or single case reports with limited value. Fascia iliaca block usage in hip arthroscopy has been studied more extensively. To our knowledge, 3 investigations have been reported documenting the use of FIB in hip arthroscopy. Krych et al.[15] investigated the efficacy of preoperative FIB in a cohort of 30 patients undergoing hip arthroscopy with labral repair and osteochondroplasty. There were no significant changes in postoperative pain ratings or opioid consumption over the first 5 days following surgery. A total of 1,000 mg acetaminophen, 400 mg celecoxib, 300 mg gabapentin, and 10 mg oxycodone were administered preoperatively and 15 mg ketorolac was administered intraoperatively as part of their multimodal analgesic regiment. Patients were also given 75 mg indomethacin daily for 4 days

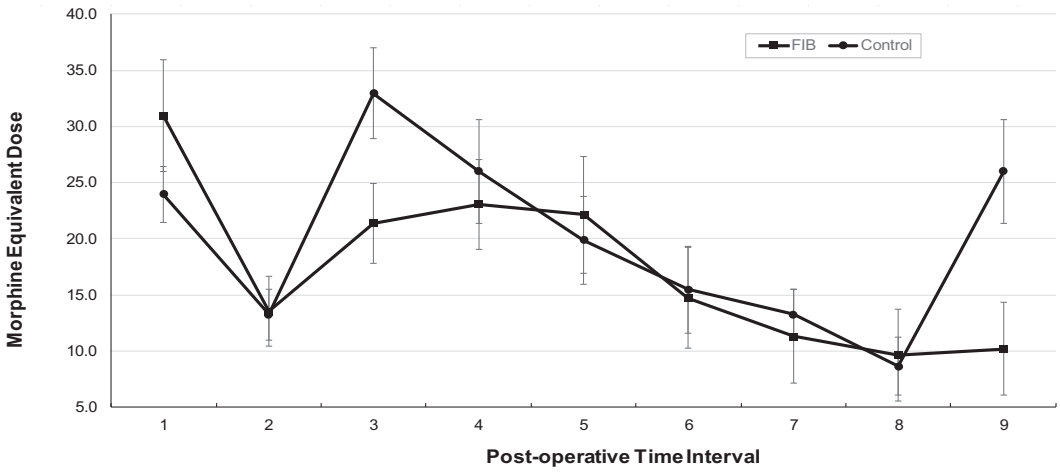

Fig 1. Change in MED from before surgery to the postoperative period during 8 time points. Indicates change in MED between postoperative time periods for the FIB and control groups. (FIB, fascia iliaca block; MED, morphine equivalent dose.)

postoperatively for heterotopic ossification prophylaxis. Lack of a control group was acknowledged as a primary limitation of this study.[15]

Wolff et al.[22] compared the analgesic benefit of the lumbar plexus block, FIB, and general anesthesia alone for hip arthroscopy. The mean postoperative pain scores at 0, 30, 60, 90, and 120 minutes following surgery were significantly lower for the lumbar plexus block group than for both the FIB group and the control group. However, there were no significant differences in discharge times, postoperative nausea, or MED between the groups. There was 1 incidence of seizure in the lumbar plexus block group, but no other complications in any group up to 1 year follow-up was reported.

In contrast to the investigation of Krych et al.[15] and Wolff et al.,[22] Garner et al.[16] terminated their randomized controlled study early because of significantly higher pain ($p = .02$) and opioid consumption ($p = .050$) within the first postoperative hour by hip arthroscopy patients treated with FIB compared with patients treated with 40 mL 0.125% levobupivacaine local anesthetic infiltration.[16] Most of the previously mentioned studies only investigated postoperative pain for 48 hours or less.[8-10,12,16,22] Krych et al.[15] measured patient pain, satisfaction, and opioid consumption on postoperative days 1, 2, 3, 4, and 5. The present study, along with the investigation by Xing et al.,[11] are the only 2 studies to our knowledge to measure patient outcomes for 7 days after surgery. Xing et al.[11] observed an increase in pain scores at 24 hours postoperatively, which they classified as rebound pain as the effects of the FNB subsided. The effects of this rebound pain on patient recovery were not reported. The results of this study did not show evidence of rebound pain in either group.

Limitations

A potential limitation was that every outcome except PACU MED was self-reported. It is possible that patients did not accurately record the timing or dosage when taking postoperative opioids. Although 1 surgeon performed all hip arthroscopies, 4 different anesthesiologists administered the FIB using the same technique. Although the technique and medications were the same, we cannot control for individual differences among the anesthesiologists. Patients who received the preoperative FIB likely felt its effects in the preoperative holding area, which could have introduced bias.

Conclusions

Based on the results of this study, routine preoperative fascia iliaca block for elective hip arthroscopic labral repair and treatment of femoroacetabular impingement is not recommended.

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