

Quadriceps Strength Deficits After a Femoral Nerve Block Versus Adductor Canal Block for Anterior Cruciate Ligament Reconstruction

A Prospective, Single-Blinded, Randomized Trial

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Background: Peripheral nerve blocks, particularly femoral nerve blocks (FNBs), are commonly performed for anterior cruciate ligament (ACL) reconstruction. However, associated quadriceps muscle weakness after FNBs is well described and may occur for up to 6 months postoperatively. The adductor canal block (ACB) has emerged as a viable alternative to the FNB, theoretically causing less quadriceps weakness during the immediate postoperative period, as it bypasses the majority of the motor fibers of the femoral nerve that branch off proximal to the adductor canal.

Purpose/Hypothesis: This study sought to identify if a difference in quadriceps strength exists after an ACB or FNB for ACL reconstruction beyond the immediate postoperative period. Beyond the immediate postoperative period, we anticipated no difference in quadriceps strength between patients who received ACBs or FNBs for ACL reconstruction.

Study Design: Randomized controlled trial; Level of evidence, 1.

Methods: A total of 102 patients undergoing primary ACL reconstruction using a variety of graft types were enrolled between November 2015 and April 2016. All patients were randomized to receive an ACB or FNB before surgery, and the surgeon was blinded to the block type. All patients underwent aggressive rehabilitation without functional bracing postoperatively. The time to the first straight-leg raise was reported by the patient. Isokinetic strength testing was performed at 3 and 6 months postoperatively.

Results: Data for 73 patients were analyzed. There was no significant difference in patient demographics of age, body mass index, sex, or tourniquet time between the FNB ($n = 35$) and ACB ($n = 38$) groups. The mean time to the first straight-leg raise was similar, at 13.1 ± 1.0 hours for the FNB group and 15.5 ± 1.2 hours for the ACB group ($P = .134$). The mean extension torque at 60 deg/s increased significantly for both the ACB ($53.7\% \pm 3.4\%$ to $68.3\% \pm 2.9\%$; $P = .008$) and the FNB ($53.3\% \pm 3.3\%$ to $68.5\% \pm 4.1\%$; $P = .006$) groups from 3 to 6 months postoperatively. There was also no significant difference in mean extension torque at 60 deg/s or 180 deg/s between the FNB and ACB groups at 3 and 6 months. There were no significant differences in postoperative complications (infection, arthrofibrosis, re-tear) between groups.

Conclusion: Although prior studies have shown immediate postoperative benefits of ACBs compared with FNBs, with a faster return of quadriceps strength, in the current study there was no statistically or clinically significant difference in quadriceps strength at 3 and 6 months postoperatively in patients who received ACBs or FNBs for ACL reconstruction.

Keywords: nerve block; ACL; anterior cruciate ligament reconstruction; adductor canal; lower extremity; quadriceps strength

Anterior cruciate ligament (ACL) tears are one of the most common orthopaedic injuries in the United States, with an overall incidence of 68.8 per 100,000 person-years, and this

rate is growing annually.^{17,18} With increasing numbers of ACL reconstructions performed, controversy remains about how to best manage postoperative pain while minimizing muscle weakness. The use of regional anesthesia and specifically peripheral nerve blocks for postoperative pain control in ACL reconstruction has become increasingly popular as an adjunct to traditional pain control regimens, as it

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allows local pain control without systemic effects, minimizing the need for general anesthetics and possibly lowering the postoperative opioid burden.¹⁵ Traditionally, the femoral nerve block (FNB) has been used as the peripheral nerve block of choice for ACL reconstruction, as it has been shown to reliably provide adequate analgesia in a number of randomized trials.^{3,4,11,12,19,23,24}

Although the FNB has been shown to provide effective postoperative analgesia, it has also been associated with postoperative quadriceps muscle weakness, which may lead to delayed limb mobilization and longer recovery times.^{6,14,16} A recent study examining quadriceps strength after ACL reconstruction using FNBs in the pediatric population reported that quadriceps muscle weakness persists for up to 6 months postoperatively.¹⁶ Both pain management and quadriceps strength play major roles in early mobilization after ACL reconstruction, and early mobilization has been associated with improved outcomes regardless of the treatment modality.^{13,19}

Analgesic control using the adductor canal block (ACB) has been proposed as an alternative associated with less quadriceps weakness, as this nerve block allows for a sensory blockade and spares the majority of the motor fibers of the femoral nerve, which innervate the quadriceps muscle. The effectiveness of the ACB as a postoperative analgesic for ACL reconstruction remains controversial, as studies have shown promising outcomes with adequate analgesia and decreased quadriceps weakness, while others have noted less adequate analgesia or no change in postoperative strength.^{1,6,7} These studies used methods such as the straight-leg raise (SLR) to gauge outcomes and have not looked at strength deficits beyond the immediate postoperative period.

To date, no study has formally quantified strength assessments postoperatively comparing the FNB and ACB for ACL reconstruction at intermediate and longer postoperative intervals. The purpose of this study was to compare quadriceps strength and function beyond the immediate postoperative period in patients undergoing primary ACL reconstruction (with or without concomitant meniscectomy or meniscal repair) using either the ACB or the FNB as a regional pain block. We hypothesized that there would be no difference in quadriceps strength between patients who received an ACB or FNB for ACL reconstruction beyond the immediate postoperative period. It is important to determine if reported strength deficits persist in intermediate-term and long-term settings, as this knowledge can influence decision making regarding the optimal peripheral nerve block to use in ACL reconstruction.

METHODS

Participants

This prospective, single-blinded, randomized trial received institutional review board approval, and written informed consent was obtained from all adult patients before participation. Before enrollment, the study was registered at ClinicalTrials.gov (NCT02604550). If patients were <18 years of age, assent from the patient and consent from the legal guardian were obtained before participation.

From November 2015 to April 2016, patients undergoing ACL reconstruction with a soft tissue quadriceps tendon autograft, bone–patellar tendon–bone autograft, or tibialis anterior or quadriceps tendon allograft performed by a single senior surgeon (J.W.X.) at an ambulatory surgery center were prospectively enrolled (Figure 1). Graft selection was determined preoperatively and was dictated by surgeon and patient preference.

Exclusion criteria included patients with prior ACL reconstructions, prior contralateral injuries, primary repairs of the ACL, allergies to local anesthetics, chronic pain medication use, weight <50 kg, local infections, known coagulopathies, and liver dysfunction or renal failure.

Randomization and Blinding

Group assignments were created by a computer-generated random number and placed into sealed envelopes in blocks of 4. Upon each patient's enrollment by clinical research staff, a sealed envelope was opened in the preoperative room by the attending anesthesiologist, and the patient was assigned to the FNB group or ACB group. The nerve block was given in the preoperative room, and bandages were placed on both the ACB and FNB sites to blind the surgeon and postoperative clinical staff from group assignment. The patients were able to see the nerve block; however, they were not made aware of which block they were receiving or the theoretical differences between the blocks. As such, the patients were effectively blinded to the group assignment. Although the anesthesiology team was thus aware of the patient's group assignment, the surgeon and postoperative clinical team were blinded to each patient's group assignment.

Procedure

Both nerve blocks were administered with 20 mL of 0.5% ropivacaine. Before the nerve block, all patients underwent sterile skin preparation and received a local anesthetic (1% lidocaine) at the block's injection site. All regional

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Ethical approval for this study was obtained from the Emory University Institutional Review Board.

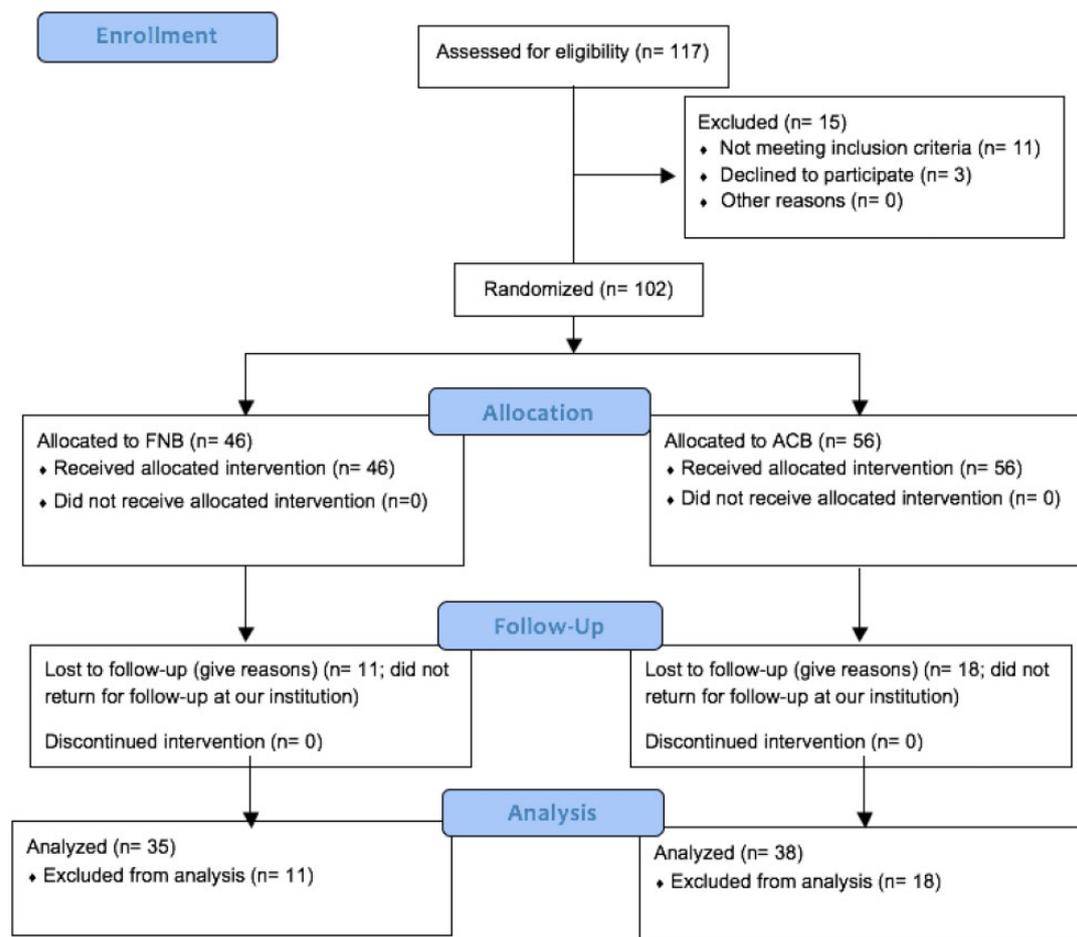


Figure 1. CONSORT (Consolidated Standards of Reporting Trials) flow diagram of patient enrollment, treatment allocation, and follow-up. ACB, adductor canal block; FNB, femoral nerve block.

anesthetic procedures were performed using ultrasound guidance by a single senior anesthesiologist (H.S.). The surgeon performing ACL reconstruction was blinded to the type of block used for each study participant, as described above.

For patients in the ACB group, the ultrasound probe was placed on the medial aspect of the midthigh. The adductor canal was located by visualizing the femoral artery on the short axis bordered superiorly by the sartorius muscle, laterally by the vastus medialis muscle, and medially by the adductor longus muscle.²² A local anesthetic was injected at the block site. Then, a 22-gauge 100-mm Stimuplex needle (B. Braun Medical) was placed under ultrasound guidance in the adductor canal using an in-plane technique, and 20 mL of 0.5% ropivacaine was injected.

For patients in the FNB group, the femoral nerve was located using ultrasound guidance distal to the inguinal ligament. A local anesthetic was injected at the block site. A 22-gauge 50-mm Stimuplex needle was inserted using an in-plane technique lateral to the femoral nerve. The needle was manipulated so that 20 mL of 0.5% ropivacaine would surround the femoral nerve.

Confirmation of a successful nerve block was then conducted by the anesthesiology team before the induction of general anesthesia for all patients. The ACB was deemed successful by pinprick sensation testing. The FNB was deemed successful by demonstrating an inability to perform an SLR and by pinprick sensation testing. Intraoperatively, a thigh tourniquet inflated to 300 mm Hg was used for all patients.

In the postoperative recovery room, 25 to 50 μ g of intravenous fentanyl, up to a cumulative dose of 100 μ g, was administered for substantial breakthrough pain, as needed. For pain not relieved by fentanyl, up to 2 mg of intravenous hydromorphone was administered in 0.5- to 1-mg doses on a case-by-case basis. Before discharge, if still in pain, patients were transitioned to 5 to 10 mg of oral oxycodone. All patients were allowed to bear weight as tolerated with crutches without functional bracing in the immediate postoperative period, per the standard postoperative protocol at our institution. Additionally, all patients were given the same postoperative rehabilitation protocol, which included specific exercises and goals for the immediate postoperative period as well as postoperative weeks 1 to 3, 4 to 6, 6 to 12, and 12 to 26.

Data Collection

All intraoperative data were collected from the surgeon's operative note or the anesthesia record on the day of surgery. Postoperatively, time in the recovery room, the type and quantity of pain medication provided, and average recovery room pain were collected by the nursing staff.

A smartphone application for iOS (Apple) and Android (Google) devices was developed and made available to patients to record postoperative data. When using the application, patients' smartphones would alert them 3 times a day and ask them pertinent outcome questions in an electronic format. As a default, patients were alerted at 8:00 am, 1:30 pm, and 7:00 pm to record outcomes; however, these settings were adjustable to within 3 hours of each default alarm time. Patient responses were automatically downloaded into a Health Insurance Portability and Accountability Act (HIPAA)-secure Excel sheet (Microsoft).

The time to an SLR was determined by prompting patients during each of the 3 daily alerts until they indicated that they were able to perform the maneuver. For all patients, objective assessments of knee function were performed using isokinetic strength testing at 3 and 6 months postoperatively to quantify muscle strength relative to the nonoperative leg. For isokinetic strength testing, we used the Biodex System 4 isokinetic dynamometer to assess isolated quadriceps muscle strength. The protocol for strength testing included a 10-minute warm-up on a stationary bicycle and range of motion set from 0° to 90°. Testing consisted of concentric knee extension/flexion for 5 repetitions at 60 deg/s and 10 repetitions at 180 deg/s. There was a 30-second rest period between 60- and 180-deg/s testing. Patients completed 3 practice repetitions for each speed. Testing was performed on the nonoperative leg first for all patients. Postoperative complications were identified via a chart review. Arthrofibrosis, defined as an inability to passively achieve full knee extension or significant anterior knee pain when forcing full extension, was diagnosed clinically.

Statistical Analysis

Standard descriptive statistics are used to present demographic and operative data. Continuous data were analyzed using Student *t* tests and chi-square tests for categorical data. Two-tailed *P* values <.05 were considered statistically significant. An a priori effect size calculation and a post hoc power analysis were performed using the program G*Power⁹ with a paired *t* test, utilizing an alpha of 0.05 and power of 0.80 to determine the sample size needed to detect a significant difference and assess whether our design had enough power to detect an effect of no difference between groups. The post hoc power analysis revealed that the effect size of this study was extremely small, with Cohen *d* = 0.02. With the sample size of patients who completed this study, we were powered to detect a minimum of a 10% difference in quadriceps strength between the 2 groups from 3 to 6

TABLE 1
Patient Demographics^a

| | ACB Group | FNB Group | <i>P</i> Value |
|------------------------------------|------------|------------|----------------|
| Sex, n (%) | | | .919 |
| Male | 16 (42.1) | 15 (42.9) | |
| Female | 22 (57.9) | 20 (57.1) | |
| Age at procedure, y | 25.1 ± 1.8 | 24.2 ± 1.7 | .711 |
| Body mass index, kg/m ² | 25.0 ± 0.7 | 23.3 ± 0.5 | .050 |
| Graft type, n (%) | | | .213 |
| Quadriceps tendon autograft | 30 (78.9) | 28 (77.8) | |
| Patellar tendon autograft | 1 (2.6) | 2 (5.6) | |
| Tibialis anterior allograft | 7 (18.4) | 3 (8.3) | |
| Quadriceps tendon allograft | 0 (0.0) | 2 (5.6) | |
| Tourniquet time, min | 83.6 ± 2.5 | 85.9 ± 3.0 | .523 |

^aData are shown as mean ± SEM unless otherwise indicated. ACB, adductor canal block; FNB, femoral nerve block.

months postoperatively, with an alpha of 0.05 and power of 0.80.

RESULTS

Of the 102 initially enrolled patients, 73 had at least 6-month follow-up data and were analyzed, yielding a follow-up rate of 72%. Of the patients included in the analysis, 35 were randomized to the FNB group and 38 to the ACB group. There was no statistically significant difference in the patient demographics of age, body mass index, sex, or tourniquet time between the FNB and ACB groups (Table 1). The type of graft used did not significantly differ between the 2 groups (Table 1).

The mean time to the first SLR after discharge from the recovery room was not significantly different, at 13.1 hours (*n* = 20) for the FNB group and 15.5 hours (*n* = 23) for the ACB group (*P* = .134), although the response rate for SLR data using the smartphone application was low at 59% (43/73). The mean extension torque at 60 deg/s increased significantly for both the ACB (53.7% ± 3.4% to 68.3% ± 2.9%; *P* = .008) and FNB (53.3% ± 3.3% to 68.5% ± 4.1%; *P* = .006) groups from 3 to 6 months postoperatively (Figure 2). The mean extension torque at 180 deg/s increased for both the FNB (63.2% ± 3.1% to 71.4% ± 3.9%; *P* = .10) and ACB (69.0% ± 5.0% to 74.3% ± 3.4%; *P* = .38) groups from 3 to 6 months; however, the difference was not significant (Figure 3). No significant difference in mean extension torque at 60 deg/s or 180 deg/s existed between the FNB and ACB groups at either of the follow-up intervals (Table 2). Compared with the FNB group, the mean extension torque at 60 deg/s for the ACB group was not significantly different at 3 and 6 months postoperatively (*P* = .93 and *P* = .97, respectively), and the mean extension torque at 180 deg/s was higher but not significantly so at 3 and 6 months postoperatively (*P* = .33 and *P* = .66, respectively) (Table 2 and Figure 3).

There were no significant differences in postoperative complications of infection, arthrofibrosis, or retear between

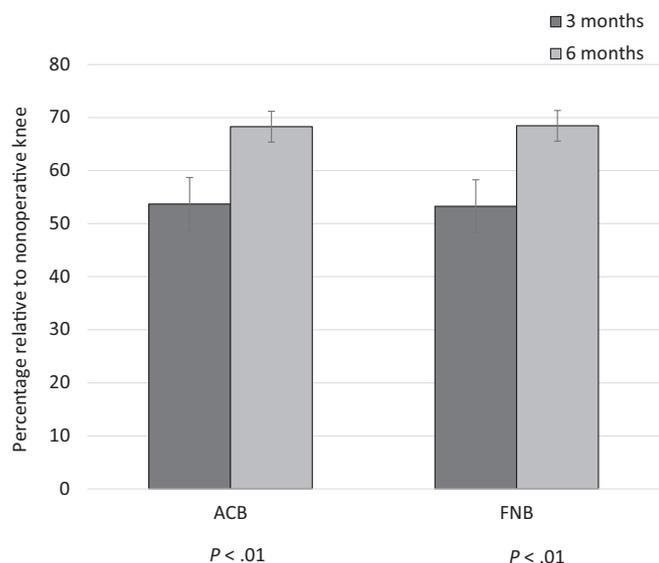


Figure 2. Graph displaying overall significant improvement in mean extension torque at 60 deg/s at 3 and 6 months postoperatively for both the adductor canal block (ACB) and the femoral nerve block (FNB) groups.

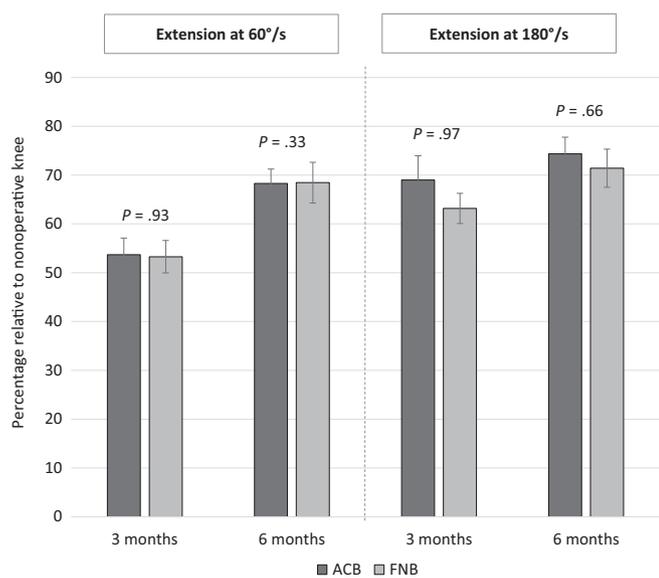


Figure 3. Graph displaying no significant differences in mean extension torque at 60 deg/s or 180 deg/s between the adductor canal block (ACB) and femoral nerve block (FNB) groups at 3 and 6 months postoperatively.

the FNB and ACB groups (Table 3). Five of the 6 patients with arthrofibrosis were treated with subsequent surgery at a mean time to reoperation of 2.5 ± 2.1 months in the ACB group and 2.7 ± 0.6 months in the FNB group ($P = .93$). Overall, graft failure occurred at a mean of 13.5 ± 2.4 months postoperatively (range, 12-17 months). All instances of graft rerupture occurred after returning to sport.

DISCUSSION

This study sought to evaluate short-term and intermediate-term deficits in quadriceps strength after either an ACB or an FNB in the setting of ACL reconstruction. In this study, we were not able to demonstrate a transient deficit in quadriceps strength in the immediate postoperative period in the FNB group compared with the ACB group, measured by the time to the first SLR. Overall, there was a significant improvement in mean extension torque at 60 deg/s from 3 to 6 months postoperatively in both groups (Figure 2); however, there were no significant differences in isokinetic quadriceps strength at 3 or 6 months between patients receiving either block (Figure 3). These results support our hypothesis that beyond the immediate postoperative period, there is no difference in quadriceps strength between patients who received an ACB or FNB for ACL reconstruction.

Our findings of no quadriceps strength deficit in the immediate postoperative period with the use of FNBs are inconsistent with published reports.^{1,6,16} This inconsistency between the current study and prior studies may relate to the grafts used; previous studies have favored patellar tendon and hamstring tendon autografts, whereas the majority of grafts in the current study were quadriceps tendon autografts. The preponderance of quadriceps tendon autografts used in this study may minimize any potential difference in the time to an SLR, which may be related to harvest of the quadriceps tendon. It may also be possible that the local anesthetic injected into the adductor canal could have traveled up the canal and inadvertently affected the motor fibers of the femoral nerve, similar to the effect of the FNB. While these data have yet to be studied, we are currently performing a study to ascertain where the volume is distributed in the canal using magnetic resonance imaging immediately after the injection. Additionally, there was a low response rate of 59% (43/73 patients) for time to an SLR using the smartphone application, thereby limiting the interpretability of these results and introducing a possibility for bias. To our knowledge, we have not had any injuries occur in the immediate postoperative period secondary to either of the nerve blocks, despite our standard postoperative protocol that allows for weightbearing as tolerated without functional bracing. While this study did not demonstrate a significant difference in the mean time to an SLR, the ACB may allow more proprioception and muscle function of the quadriceps muscle, thus decreasing any risk of falling in the immediate postoperative period.

Regarding potential immediate strength deficits between FNBs and ACBs, this study demonstrates that these deficits do not exist at 3 and 6 months postoperatively, suggesting that any initial quadriceps weakness is likely directly related to transient blockade of the motor fibers of the femoral nerve and that these effects wear off between the immediate postoperative period and 3 months postoperatively, with isokinetic strength scores normalizing in that time frame. These findings are contradictory to reports that quadriceps weakness is persistently affected by FNBs up to 6 months postoperatively¹⁶ and suggest that any quadriceps weakness beyond the immediate postoperative period

TABLE 2
Postoperative Strength Results^a

| | ACB Group | FNB Group | P Value |
|-------------------------------------|--------------------------|--------------------------|---------|
| Time to first straight-leg raise, h | 15.5 ± 1.2 (13.16-17.92) | 13.1 ± 1.0 (11.16-15.14) | .134 |
| Extension torque at 3 months, % | | | |
| 60 deg/s | 53.7 ± 3.4 (47.04-60.36) | 53.3 ± 3.3 (46.75-59.81) | .932 |
| 180 deg/s | 69.0 ± 5.0 (59.25-78.75) | 63.2 ± 3.1 (57.13-69.23) | .326 |
| Extension torque at 6 months, % | | | |
| 60 deg/s | 68.3 ± 2.9 (62.52-74.04) | 68.5 ± 4.1 (60.34-76.56) | .974 |
| 180 deg/s | 74.3 ± 3.4 (67.63-81.07) | 71.4 ± 3.9 (64.45-79.66) | .659 |

^aData are shown as mean ± SEM (95% CI). ACB, adductor canal block; FNB, femoral nerve block.

TABLE 3
Complication Rates^a

| | ACB Group | FNB Group | P Value |
|----------------|-----------|-----------|---------|
| Infection | 0 (0.0) | 0 (0.0) | — |
| Arthrofibrosis | 2 (5.3) | 4 (11.1) | .369 |
| Retear | 3 (7.9) | 1 (2.8) | .332 |

^aData are shown as n (%). ACB, adductor canal block; FNB, femoral nerve block.

is unlikely to be directly related to the type of peripheral nerve block given at the time of surgery and more likely related to the surgical procedure itself.

Despite the common use of FNBs, recent reports of quadriceps muscle weakness in the postoperative period have raised some concern for this method of analgesia, prompting a search for alternative peripheral nerve blocks, such as ACBs.^{1,6,16} One of the most appealing aspects of the ACB is its potential to provide adequate analgesia to the knee without causing quadriceps muscle weakness, as the adductor canal is distal to the majority of the motor branches of the femoral nerve. While studies have reliably demonstrated that the ACB provides analgesia comparable with the FNB,^{1,6,20} there is a paucity of evidence comparing differences in postoperative strength outcomes. This study was unable to demonstrate any immediate postoperative advantage of the ACB relative to the FNB with regard to quadriceps strength and found that isokinetic strength was not significantly different beyond the immediate postoperative period. It is worth noting that the average strength deficits at 6 months postoperatively for both nerve block groups were too high to routinely recommend for return to sport at that time.

There were several strengths to this study, including its prospective, randomized design. A single senior surgeon performed all surgeries, and a single senior anesthesiologist performed all preoperative nerve blocks uniformly within each nerve block group, minimizing any variation between procedures. Our inclusion criteria were purposefully broad in an attempt to increase the generalizability of our results to the majority of patients who undergo ACL reconstruction. There were no significant differences in patient demographics and no significant differences in ACL graft type between the 2 groups, allowing for a good direct

comparison between the groups without concern for significant confounding variables. All patients were standardized to identical postoperative pain medication and exercise regimens.

Because of the relatively small sample size of the study groups, a post hoc power analysis and an effect size calculation were performed with power (1 - β) set at 0.80 and alpha of 0.05, 1-tailed, to determine whether our design had enough power to detect an effect of no difference between groups. This analysis was particularly relevant in this case to avoid a type II error. Our analysis revealed that with our sample size, this study was powered to detect a minimum of a 10% difference in isokinetic muscle strength at 6 months postoperatively relative to the nonoperative leg between the 2 groups. The minimal clinically important difference in isokinetic quadriceps strength has been reported to be a change of 31% at 60 deg/s and 39% at 180 deg/s, which is well above the 10% difference in muscle strength that the current study is powered to detect.⁸ Our effect size calculation revealed that a total sample of more than 60,000 patients would be needed to determine no statistical difference between means in the 2 groups. Thus, although we would need a much larger sample size to statistically prove that there was no difference in quadriceps strength between the groups at our time points, our power analysis revealed that we can conclude that if any difference in quadriceps strength existed in this study, it was lower than a 10% difference from the nonoperative leg, which is well below the aforementioned minimal clinically important difference.

There are several limitations to this study. First, there was no third placebo group for comparison to validate our nerve block results. While the purpose of this study was to compare ACBs to FNBs for patients undergoing ACL reconstruction, a placebo group may have helped confirm that the ACB was a valid control group for comparison of quadriceps function. Second, we did not conduct functional testing using the hop test, limiting a direct comparison with prior studies, although we did test time to an SLR in the immediate postoperative period. While the SLR is a useful tool to determine postoperative clinical mobility, the use of quantifiable strength testing in the acute postoperative period would also be of significant utility in assessing ACBs and FNBs to allow for a more objective comparison of strength deficits in the immediate postoperative period. Additionally, the low response rate of 59% for time to an

SLR (n = 20 in FNB group and n = 23 in ACB group) limits the interpretability of the SLR data and allows the possibility of selection bias regarding which patients reported time to an SLR. We were unable to demonstrate any immediate postoperative strength differences between the FNB and ACB groups, which may in part be because of these limitations discussed as well as the frequent use of the quadriceps tendon autograft. Although patients were given the same postoperative instructions regarding weightbearing status and the physical therapy protocol, there was no objective record of patient compliance with physical therapy, which may have affected quadriceps strength.

A third limitation is that this study was only powered to detect a minimum of a 10% difference in quadriceps strength relative to the nonoperative leg between the 2 groups. This leaves the potential for a type II error; however, the effect size of this study was extremely small, with Cohen $d = 0.02$. An effect size of 0.2 has been determined to be a small effect size, indicating that the groups are likely equivalent, independent of sample size.^{2,10,21} Because the effect size was so small, we are confident that there was no difference in strength between the groups. Although there is the potential of a type II error, it is likely below a clinically meaningful difference in strength; if any difference exists, our data support that the strength difference is below 10% between the 2 groups.

CONCLUSION

Our study suggests that there is no difference in postoperative strength outcomes with the ACB or FNB after ACL reconstruction. Patients in this study who received FNBs had similar isokinetic strength outcomes at 3 and 6 months postoperatively compared with those who received ACBs, suggesting that the inferior quadriceps strength after FNBs with ACL reconstruction demonstrated in prior studies does not persist significantly beyond the immediate postoperative period. Any quadriceps muscle weakness that persists beyond this transient period is unlikely to be related to the type of peripheral nerve block utilized at the time of surgery. The results of this study suggest that concerns regarding postoperative quadriceps strength should not be a determining factor regarding which regional block to use for analgesia in ACL reconstruction. This recommendation is a Strength of Recommendation Taxonomy grade B, given that there are still limited published data on this topic.⁵ Other factors such as patient satisfaction, cost-effectiveness analysis, or patient/surgeon preference may have more of a significant role in determining analgesic preference for ACL reconstruction. Although this study demonstrated no clinically significant differences in quadriceps strength beyond the immediate postoperative period, our institution still prefers the use of the motor-sparing ACB to the FNB secondary to the potential initial postoperative quadriceps strength deficits with the FNB and increased patient satisfaction after ACL reconstruction using the ACB.²⁰

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