Analgesic Efficacy of Single-Shot Adductor Canal Block Before Versus After Primary Total Knee Arthroplasty: A Randomized Controlled Trial.

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Abstract

Background: Total knee arthroplasty (TKA) is associated with severe postoperative pain. Multimodal analgesia, including peripheral nerve block, is recommended for post-operative pain relief. Administration of some pain medications prior to surgery has shown to be more effective than after the operation. This is a prospective, randomized controlled trial designed to compare the analgesic efficacy of the adductor canal block (ACB) performed immediately before or immediately after primary total knee arthroplasty (TKA). We hypothesized that ACB before the surgery will reduce postoperative pain and improve knee function.

Methods: A total of 50 patients were enrolled and randomized into 2 groups, with 26 patients receiving a preoperative ACB and 24 receiving a postoperative ACB.

Results: Treatment groups were similar in terms of gender (p=0.83), age (p=0.61) weight (p=0.39) and ASA score. Average visual analogue scale (VAS) on arrival to the post-anesthesia care unit (PACU) were 4.9±3.2 in the preoperative ACB versus 3.4±2.8 for the postoperative ACB (p=0.075). VAS scores at different time points as well as the mean, minimal and maximal reported VAS scores were not significantly different between the two groups. The cumulative quantities of Fentanyl administered by the anesthesia team was comparable between the groups. Similarly, the dosage of Morphine, Tramadol, Acetaminophen and Dipyrone showed only small variations. The Quality of Recovery Score, Knee Society Scores and knee range of motion did not differ between the groups.

Conclusions: Our findings demonstrate no significant differences in patient total narcotics consumption, pain scores and functional scores, between preoperative and postoperative ACB in patients undergoing TKA.

Trial Registration: The trial was registered at www.clinicaltrials.gov and was assigned the registration number NCT02908711

Level of Evidence: level I randomized controlled trial

Introduction

Total knee arthroplasty (TKA) is associated with moderate-to-severe early postoperative pain, which may result in immobility-related complications and prolonged hospital stay (1, 2), despite its' beneficial long-term effects. In addition, TKA has been particularly associated with long-term opioid use and misuse (3). Hence, effective peri-operative analgesia is of paramount importance in patients undergoing a TKA.

The ideal modality of analgesia should facilitate early mobility, facilitate rehabilitation, decrease opioid use and reduce the length of hospital stay (4). Multimodal analgesia, including a peripheral nerve block, is recommended for post-operative pain relief (5) and has become a critical component to the success of the fast-track surgical programs (6). Perineural analgesia offers the advantage of extended pain relief up

to 24 hours after surgery (7). Classically, femoral nerve block (FNB) has been performed for post-TKA analgesia with its' main drawback being a motor weakness and concomitant increased risk of falls (8, 9). The adductor canal block (ACB) may offer motor nerve-sparing benefits and has been studied as an alternative to FNB in this regard. Overall, the results suggest that ACB offers at least equivalent analgesia, but with superior ambulation ability, less quadriceps weakness, faster functional recovery after TKA than FNB (3, 10–14).

While the effectiveness of ACB was demonstrated in several randomized controlled trials, there is no consensus with regards to the optimal timing to perform the block. In some of the studies the block was administered prior to the TKA procedure (10, 11) while in others, it was given post-surgically, either immediately or as late as the second postoperative day (4, 15, 16).

To the authors' knowledge, there are no studies comparing different time frames of administering ACB in the perioperative management of TKA. We aimed to perform a prospective, randomized controlled trial designed to compare the analgesic efficacy of the adductor canal block (ACB) performed immediately before or immediately after primary total knee arthroplasty (TKA).

The primary end point are pain scores associated with knee motion following TKA. Secondary end points include assessment of postoperative ambulation, range of motion, pain at rest, opioid consumption, and functional scores between the two analgesic approaches. We hypothesized that preemptive ACB will reduce patients' postoperative pain and improve their functional outcomes

Materials And Methods

Study Design and Patients

Following institutional review board approval, the trial was registered at www.clinicaltrials.gov and was assigned the registration number NCT02908711. The CONSORT (Consolidated Standards of Reporting Trials) statement guidelines were followed to perform this, randomized controlled trial and to present the results. Patients undergoing primary TKA by three of the authors (**, **, **) were screened for eligibility by the senior author (**) preoperatively. In order to eliminate the preemptive analgesic effect of neuraxial anesthesia, only patients that were planned to have the surgery under general anesthesia were included. Other inclusion criteria were patients older than 18 undergoing unilateral, primary TKA, ability to complete study procedures, and American Anaesthesiologists classification 1,2 and 3 .Exclusion criteria included: patient refusal to give written consent, patients with history of opioid dependence, abuse, or tolerance (defined as daily use more than 20-mg oxycodone equivalents at time of surgery), contraindication to peripheral nerve block (significant coagulopathy or active infection at the site of block), and pre-existing significant neuropathy in the operative extremity. Informed written consent was obtained from all patients.

Randomization

Study subjects were randomized to receive either preemptive anesthesiologist-delivered, ultrasound-guided ABC (PreACB) or postoperative anesthesiologist-delivered, ultrasound-guided ABC (PostACB). Randomization was performed by an independent research statistician. Study allocation was put in opaque, sequentially numbered envelopes, which were opened by key personnel upon signing the consent. The patient remained blinded to the allocation.

Anesthesia Technique

Both the PreACB and PostACB were performed by experienced anesthesiologists that had performed more than 50 cases prior to the study. PreACBs were placed either in the regional anesthesia bay or the OR prior to anesthesia induction and surgery, or in the OR or Post anesthesia care unit immediately upon completion of surgery. Blocks were performed using a sterile technique while the patient is positioned supine. The needle insertion site, approximately 10cm proximal to the operated knee, is exposed. The skin is disinfected with 2% Chlorhexidine and the ultrasound probe placed in a sterile sleeve. The femoral artery is identified with a high frequency linear transducer (Philips 4-12L linear transducer with a frequency of 6-12 MHz, Milwaukee, WI or) proximal to the operative knee. The appropriate location for injection is determined by following the femoral artery cephalad until the artery is directly posterior to the Sartorius muscle. At this level, the saphenous nerve is located lateral to the femoral artery. An 18g insulated sonographic Tuohy needle (Pajunk GmbH, Geisingen, Germany) is inserted in an in-plane approach, under constant ultrasound visualization, through the Sartorius muscle to a final location in close proximity to the saphenous nerve. Once satisfied with needle placement and following negative aspiration, 20 cc of 0.5% ropivacaine is injected gradually through the needle under visualization, with recurrent aspirations to verify absence of intra-vascular injection signs. The subsequent TKA and anesthetic regimen were conducted per the standard of care at our institution. All patients underwent a cemented total knee utilizing a medial parapatellar approach, including patellar resurfacing. A tourniquet was used in all cases. Posterior capsule infiltration was administered with 20cc of 0.25% bupivacaine, as the preferred method of providing sciatic nerve analgesia (17, 18) ,per current institutional protocol.

Intraoperative analgesia was administered per anesthesiologists' discretion.

Post-operative analgesia

Postoperatively, all patients were given a standard regimen of IV acetaminophen 1000mg q8hr, and IV Tramadone 100 mg q8hr, both started intraoperatively prior to conclusion of surgery, and continuing for 48 hours. While in PACU, all patients will be administered a morphine patient controlled analgesia (PCA) infusion pump (Graesby 3300®, Smith Medical International Ltd. Watford, UK; IVAC® PCAM®, Cardinal Health Inc., Rolle, Switzerland), for at least 48 hours. Per institutional protocol, PCA will be connected after bolus loading of IV 0.1 mg/kg morphine in the PACU.

Bleeding and thrombo-embolism prophylaxis

All patients received Enoxaparin 40mg once daily for thrombophylaxis. All patients received a standard postoperative mobilization protocol, starting on POD1. A continuous passive motion machine (CPM) was not utilized. Per institutional protocol, all patients undergoing TKA received 1 gr of IV tranexamic acid intraoperatively, after induction of anesthesia, in order to reduce intra-operative bleeding(19).

Data collection

Patients were enrolled for the study during the orthopedic surgical appointment upon the scheduling of the surgery. Upon enrollment, patients completed a baseline Knee Society score (KSS) questionnaire, had a VAS pain score recorded, and had their pre-operative analgesic medication documented. To assess the effect of pain with motion and overall strength, on post-operative day (POD) 1, the patients indicated their level of pain using VAS numeric scale (1-10). The Quality of recovery (QoR) score (20) was collected at two time points: 24 hours from the placement of the ACB and at 24 hours postoperatively.

In addition, at their 4-6 week orthopedic follow-up appointment, the enrolled patients completed a KSS and a QoR questionnaires, VAS scores were obtained and the consumption of analgesic medications was documented.

Statistical analysis

Sample Size and Statistical Analysis

We conducted an a priori sample size analysis aimed to determine how many patients would be required to detect a clinically important difference in pain with a power of 80% and alpha= 0.05. We considered a 2 points difference in reported pain to be a clinically relevant one, with a standard deviation within groups of 2. We then used an analysis of variance power analysis, based on these values, and it was determined that 20 patients per group was adequate. We therefore selected a final number of 25 patients per for the study. For the data analysis, continuous variables were tested for normality of distribution via the Shapiro-Wilk test. As none of the variables were normally distributed for both groups ($p<0.05$), it was decided to compare the groups using the Mann-Whitney U test. Categorical variables were examined using Pearson's chi-square test. Statistical significance was set as $P < .05$. All analyses were performed using SPSS (SPSS 24.0, IBM Inc., Somers, NY).

Results

Patients

A total of 67 patients were screened from October 2016 to January 2018, of which 7 did not meet inclusion criteria, 9 declined to participate, and 50 were enrolled. The 50 enrolled patients were consented and randomized into 2 groups, with 26 patients receiving a preoperative ACB and 24 receiving a postoperative ACB (Figure 1).

Treatment groups were similar in terms of sex (p=0.83), age (p=0.61), and weight (p=0.39) (Table 1). All 50 patients were classified as ASA 2 or 3, with no significant difference between the treatment groups. Knee Society Scores (KSS) as well as knee flexion range of motion did not vary significantly between the two groups.

Post-operative vital signs and Pain Scores

Vital signs were recorded on arrival to PACU until discharge. The mean as well as the range of Oxygen saturation along with the mean arterial blood pressure were compared and did not vary significantly between the treatment groups (Table 2).

Postoperative pain scores in the PACU were recorded immediately after arrival to the unit and continued to be monitored in the Orthopaedic floor. Average VAS on arrival to PACU were 4.9 ± 3.2 in the preoperative ACB vs 3.4 ± 2.8 (p=0.075) for the postoperative ACB. On discharge to the orthopedic floor, the average reported pain was not significant between preoperative ACB group (1.8 ± 0.9) and postoperative ACB group (1.8 ± 1.2) (p=0.089). Likewise, the maximal and minimal VAS scores within the first 24 hours showed similarity between the treatment groups.

Intra- and post-operative quantitative opiate use

The cumulative quantities of Fentanyl given by the anesthesia team was compared and found to be similar between the preoperative and postoperative ACB groups (234±61mg vs 230±78mg, respectively). Similarly, the used dosage of Morphine, Oxycodone, Acetaminophen and Dipyrone showed only small variations (Table 2).

Immediate and short-term results

The mean length of hospital stay was slightly shorter for patients receiving postoperative ACB compared to preoperative ACB (5±1.3 vs 5.6±2.2 days, respectively). However, this difference was not substantial (p=0.28).

The Quality of Recovery Score was recorded twice during the study period. At 24 hours postoperatively the scores were almost identical between the two groups (Table 2). At 4-6 weeks postoperatively, the scores were only slightly better for the postoperative ACB group (12.1±3.8 vs 11.9±3.9, respectively), a finding that did not prove to be of statistical significance (p=0.82).

KSS were collected at 4-6 weeks postoperatively. The mean knee score and functional score components did not show a statistically significant difference between the two groups (Table 3). Similarly, knee flexion ROM at 4-6 weeks were 104.2±12.1 in the preoperative ACB group versus 103±11.6 in the postoperative ACB group, and did not differ significantly (p=0.67).

Discussion

Multimodal analgesia refers to a combination of two or more analgesic modalities targeting pain pathways at various levels to improve pain control, and at the same time aiming to reduce opioid consumption and related adverse effects(21). These types of pathways and protocols have been widely accepted in the joint replacement population and there is a wide agreement among adult reconstruction surgeons that such multimodal pain management protocols is integral in minimizing patients' postoperative pain and maximizing their satisfaction (22).

The ACB offers motor nerve-sparing advantages and has been studied as an alternative to FNB in this regard. Several meta-analyses compare FNB to ACB for analgesia and TKA(21). Results from various studies suggest that ACB offers at least equivalent analgesia, but with superior ambulation potential, lesser degree of quadriceps weakness, and faster recovery after TKA when compared to FNB.

Given that there is no consensus on the optimal timeframe of perineural analgesia in knee osteoarthritis patients undergoing TKA, our study was aimed to compare postoperative pain as well as functional recovery, between patients who received an ACB prior or following their procedure.

We Hypothesized that ACB applied preoperatively will reduce postoperative pain and improve functional outcomes, when compared to postoperative ACB.

We based this assumption on findings of several studies that investigated other analgesic modalities in TKA patients, including nonsteroidal anti-inflammatory drugs (NSAIDs) and pregabalin. Munteanu et al (23) compared the cumulative narcotics consumption during 48 h following TKA between patients who received a 120 mg of etoricoxib at 1 h before surgery, at the end of surgery, and a placebo group. They demonstrated that preemptive etoricoxib was superior to either postoperative etoricoxib or placebo in terms of morphine-sparing effect.

Laoruengthana et al. (24) examined the timing of periarticular multimodal drug injection (PMDI) in patients undergoing bilateral simultaneous TKA. The injections were administered either before prosthetic implantation (late PMDI), or just after knee arthrotomy (early PMDI). Late PMDI revealed slightly higher VAS at 6 and 12 h after the operation than early PMDI administration, while no statistical differences between the two groups in all other outcome parameters. A recent randomized controlled study by Kurosaka et al. showed similar results in patients undergoing a total hip arthroplasty, with a clear advantage to early stage periarticular injection when compared to late-stage.

To the authors’ knowledge, this is the first study to compare single-shot ACB performed before and after unilateral TKA. Our results show that preoperative ACB and postoperative ACB both resulted in similar postoperative VAS scores and similar opioid consumption in PACU. The two groups did not differ significantly in the quality of recovery scores, knee society scores and knee ROM at final follow-up. ACB was found to be safe and none of our patients had a block-related complication. This is in line with several other studies that reported no major complications with this block, apart from muscle weakness due to farther spread (25, 26).

We do acknowledge several limitations. First, as with any study assessing pain, subjectivity of patient-reported pain is a limitation. Second, this study has short-term follow-up, and long-term complications as well as patient dissatisfaction may not be captured; however, we expect most block-related complications to occur within first few days following the procedure. Third, it could be claimed that a third group of patients randomized to receive neither block would have offered an additional control group for comparison. It was previously shown, however, that pain relief after TKA is greater when using multimodal analgesia emphasizing peripheral nerve blocks (27). In order to eliminate the preemptive effect of neuraxial anesthesia, the study was conducted only on patients undergoing TKA under general anesthesia, while most of the surgeries in our institute were done under spinal anesthesia. Hence, we can only assume that our findings also valid for surgeries under spinal anesthesia. Lastly, our cohort was relatively small, although it met the requirements of the a priori sample size analysis. Additionally, it is similar in scale to other studies in the field of preemptive analgesia in total joint arthroplasty patients (24, 28).

Conclusion

The results suggest that the timing of the ACB has no effect on pain relief, opioid drugs consumption, quality of recovery, length of stay and functional recovery following TKA.

Abbreviations

TKA: Total knee arthroplasty

ACB: Adductor canal block

FNB: Femoral nerve block

VAS: Visual analogue scale

PACU: Post-anesthesia care unit

CONSORT: Consolidated Standards of Reporting Trials

PCA: Patient controlled analgesia

CPM: Continuous passive motion machine

KSS: Knee Society score

POD: Post-operative day

IV: Intra-venous

QOR: Quality of recovery

PMDI: periarticular multimodal drug injection

Declarations

1. Ethics approval and consent to participate: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the institutional review board of Rabin Medical Center.
2. Consent for publication: Informed written consent was obtained from all patients.
3. Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.
4. Competing interests: The authors declare that they have no conflict of interest.
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6. Authors' contributions: All authors have demonstrated [1] substantial contributions to research design, or the acquisition, analysis or interpretation of data; [2] drafting the paper or revising it critically; [3] approval of the submitted and final versions.
7. Acknowledgements: Not applicable

References

1. Ilfeld BM, Mariano ER, Girard PJ, Loland VJ, Meyer RS, Donovan JF, et al. A multicenter, randomized, triple-masked, placebo-controlled trial of the effect of ambulatory continuous femoral nerve blocks on discharge-readiness following total knee arthroplasty in patients on general orthopaedic wards. Pain. 2010;150(3):477-84.
2. Grosu I, Lavand'homme P, Thienpont E. Pain after knee arthroplasty: an unresolved issue. Knee Surg Sports Traumatol Arthrosc. 2014;22(8):1744-58.
3. Soffin EM, Waldman SA, Stack RJ, Liguori GA. An Evidence-Based Approach to the Prescription Opioid Epidemic in Orthopedic Surgery. Anesth Analg. 2017;125(5):1704-13.
4. Shah NA, Jain NP. Is continuous adductor canal block better than continuous femoral nerve block after total knee arthroplasty? Effect on ambulation ability, early functional recovery and pain control: a randomized controlled trial. The Journal of arthroplasty. 2014;29(11):2224-9.
5. Fischer H, Simanski C, Sharp C, Bonnet F, Camu F, Neugebauer E, et al. A procedure-specific systematic review and consensus recommendations for postoperative analgesia following total knee arthroplasty. Anaesthesia. 2008;63(10):1105-23.
6. Vora MU, Nicholas TA, Kassel CA, Grant SA. Adductor canal block for knee surgical procedures: review article. J Clin Anesth. 2016;35:295-303.

7. O'Donnell BD, Iohom G. Regional anesthesia techniques for ambulatory orthopedic surgery. Curr Opin Anaesthesiol. 2008;21(6):723-8.
8. Soffin EM, Wu CL. Regional and multimodal analgesia to reduce opioid use after total joint arthroplasty: a narrative review. HSS Journal®. 2019;15(1):57-65.
9. Memtsoudis SG, Danninger T, Rasul R, Poeran J, Gerner P, Stundner O, et al. Inpatient Falls after Total Knee ArthroplastyThe Role of Anesthesia Type and Peripheral Nerve Blocks. Anesthesiology: The Journal of the American Society of Anesthesiologists. 2014;120(3):551-63.
10. Patterson ME, Bland KS, Thomas LC, Elliott CE, Soberon Jr JR, Nossaman BD, et al. The adductor canal block provides effective analgesia similar to a femoral nerve block in patients undergoing total knee arthroplasty—a retrospective study. Journal of clinical anesthesia. 2015;27(1):39-44.
11. Li D, Yang Z, Xie X, Zhao J, Kang P. Adductor canal block provides better performance after total knee arthroplasty compared with femoral nerve block: a systematic review and meta-analysis. Int Orthop. 2016;40(5):925-33.
12. Kim DH, Lin Y, Goytizolo EA, Kahn RL, Maalouf DB, Manohar A, et al. Adductor canal block versus femoral nerve block for total knee arthroplasty: a prospective, randomized, controlled trial. Anesthesiology. 2014;120(3):540-50.
13. Jenstrup MT, Jaeger P, Lund J, Fomsgaard JS, Bache S, Mathiesen O, et al. Effects of adductor-canal-blockade on pain and ambulation after total knee arthroplasty: a randomized study. Acta Anaesthesiol Scand. 2012;56(3):357-64.
14. Jæger P, Zaric D, Fomsgaard JS, Hilsted KL, Bjerregaard J, Gyrn J, et al. Adductor Canal Block Versus Femoral Nerve Block for Analgesia After Total Knee Arthroplasty: A Randomized, Double-blind Study. Regional Anesthesia & Pain Medicine. 2013;38(6):526-32.
15. Grevstad U, Mathiesen O, Valentiner LS, Jaeger P, Hilsted KL, Dahl JB. Effect of Adductor Canal Block Versus Femoral Nerve Block on Quadriceps Strength, Mobilization, and Pain After Total Knee Arthroplasty: A Randomized, Blinded Study. Regional Anesthesia & Pain Medicine. 2015;40(1):3-10.
16. Grevstad U, Mathiesen O, Lind T, Dahl J. Effect of adductor canal block on pain in patients with severe pain after total knee arthroplasty: a randomized study with individual patient analysis. British journal of anaesthesia. 2014;112(5):912-9.
17. Bengisun ZK, Salviz EA, Darcin K, Suer H, Ates Y. Intraarticular levobupivacaine or bupivacaine administration decreases pain scores and provides a better recovery after total knee arthroplasty. Journal of anesthesia. 2010;24(5):694-9.
18. Essving P, Axelsson K, Åberg E, Spännar H, Gupta A, Lundin A. Local infiltration analgesia versus intrathecal morphine for postoperative pain management after total knee arthroplasty: a randomized controlled trial. Anesthesia & Analgesia. 2011;113(4):926-33.
19. Melvin JS, Stryker LS, Sierra RJ. Tranexamic acid in hip and knee arthroplasty. JAAOS-Journal of the American Academy of Orthopaedic Surgeons. 2015;23(12):732-40.

20. Myles PS, Weitkamp B, Jones K, Melick J, Hensen S. Validity and reliability of a postoperative quality of recovery score: the QoR-40. Br J Anaesth. 2000;84(1):11-5.
21. Kandarian BS, Elkassabany NM, Tamboli M, Mariano ER. Updates on multimodal analgesia and regional anesthesia for total knee arthroplasty patients. Best Pract Res Clin Anaesthesiol. 2019;33(1):111-23.
22. Maheshwari AV, Blum YC, Shekhar L, Ranawat AS, Ranawat CS. Multimodal pain management after total hip and knee arthroplasty at the Ranawat Orthopaedic Center. Clin Orthop Relat Res. 2009;467(6):1418-23.
23. Munteanu AM, Cionac Florescu S, Anastase DM, Stoica CI. Is there any analgesic benefit from preoperative vs. postoperative administration of etoricoxib in total knee arthroplasty under spinal anaesthesia? European journal of anaesthesiology. 2016;33(11):840-5.
24. Laoruengthana A, Jarusriwanna A, Rattanaprichavej P, Rasamimongkol S, Varakornpipat P, Pongpirul K. Timing of periarticular injection has no effect on postoperative pain and functional recovery in simultaneous bilateral total knee arthroplasty: a prospective randomized, double-blinded trial. BMC musculoskeletal disorders. 2019;20(1):162.
25. Chen J, Lesser JB, Hadzic A, Reiss W, Resta-Flarer F. Adductor Canal Block Can Result in Motor Block of the Quadriceps Muscle. Regional Anesthesia & Pain Medicine. 2014;39(2):170-1.
26. Veal C, Auyong DB, Hanson NA, Allen CJ, Strodtbeck W. Delayed quadriceps weakness after continuous adductor canal block for total knee arthroplasty: a case report. Acta Anaesthesiol Scand. 2014;58(3):362-4.
27. Hebl JR, Kopp SL, Ali MH, Horlocker TT, Dilger JA, Lennon RL, et al. A comprehensive anesthesia protocol that emphasizes peripheral nerve blockade for total knee and total hip arthroplasty. JBJS. 2005;87(suppl_2):63-70.
28. Perry CR, Jr., Fahs AM, Kurdziel MD, Koueiter DM, Fayne RJ, Verner JJ. Intraoperative Psoas Compartment Block vs Preoperative Fascia Iliaca Block for Pain Control After Direct Anterior Total Hip Arthroplasty: A Randomized Controlled Trial. J Arthroplasty. 2018;33(6):1770-4.

Tables

Table 1.

Patient Demographics

	Preoperative ACB	**postoperative ACB**	*P* Value
	(n=26)	(n=24)	
Sex (% Females)	68	64	0.83
Age (mean±SD)	72.1±9.2	70.8±8.3	0.61
Weight (Kg, mean±SD)	84.1±16.1	79.9±18.4	0.39
ASA			0.27
ASA 2 (%)	76	56	
ASA 3 (%)	24	44	

ACB, Adductor Canal Block; SD, Standard Deviation; ASA,American Society of Anesthesiologists Physical Status Classification System

Table 2.

Intraoperative and PACU Data Between the Two Groups.

	Preoperative ACB	**postoperative ACB**	*P* Value
	(n=26)	(n=24)	
PACU vital signs			
Mean O2 Saturation (%)	97.7±1.3	97.8±1.5	0.61
Lowest O2 Saturation (%)	96.1±2.2	95.1±3.5	0.63
mean MAP (mmHg)	99.3±11	100±14	0.92
Minimal MAP (mmHg)	89.5±12.2	89.5±13.8	0.74
VAS			
On arrival to PACU	4.9±3.2	3.4±2.8	0.075
On Discharge	1.8±0.9	1.8±1.2	0.89
Maximal in 24 Hours	8.5±1.9	8.4±1.8	0.9
Minimal in 24 Hours	3.5±2.9	3.9±2.8	0.55
Intra- and post operative quantitative opiate and analgesic use			
Intraoperative Fentanyl (μg/Kg)	234.8±61.6	230.2±78	0.74
Intraoperative Morphine (mg/Kg)	10.6±5.7	7.7±5.7	0.12
Oxycodone (mg/Kg in 48h)	0.64±0.25	0.68±0.27	0.6
Acetaminophen (mg/Kg in 48h)	11.37±4.11	13.74±4.77	0.07
Dipyrone (mg/Kg in 48h)	4.73±6.76	3.53±6.41	0.52
Quality of Recovery Score (24h)	11.6±2.4	11.2±3.4	0.57
Mean LOS (Days)	5.6±2.2	5±1.3	0.28

The data is presented as mean values ± standard deviation; ACB, Adductor Canal Block; MAP,Mean Arterial Pressure; PACU, Post Anesthesia Care Unit; ASA,American Society of Anesthesiologists Physical Status Classification System; VAS, Visual Analogue Scale

Table 3.

Postoperative Recovery Scores and Knee Scores

	Preoperative ACB	**postoperative ACB**	*P* Value
	(n=26)	(n=24)	
Quality of Recovery Score (4-6w)	11.9±3.9	12.1±3.8	0.82
Knee Society Score			
Preoperative KS	32±16.7	32±10.5	0.83
Preoperative FS	47.5±20.9	53.6±25.3	0.16
Preoperative Flexion ROM	103.7±15	106.9±17.4	0.39
Postoperative KS	46.9±11	57.8±19.3	0.25
Postoperative FS	22.7±23.2	41.6±26.4	0.1
Postoperative Flexion ROM	104.2±12.1	103±11.6	0.67
Maximal Pain	5.9±2.6	7.3±2.1	0.07
Minimal Pain	1.5±2	2.3±2.2	0.16

The data is presented as mean values ± standard deviation; ACB, Adductor Canal Block; KS, knee Scores; FS, functional scores ASA; ROM, Range of Motion

Figures

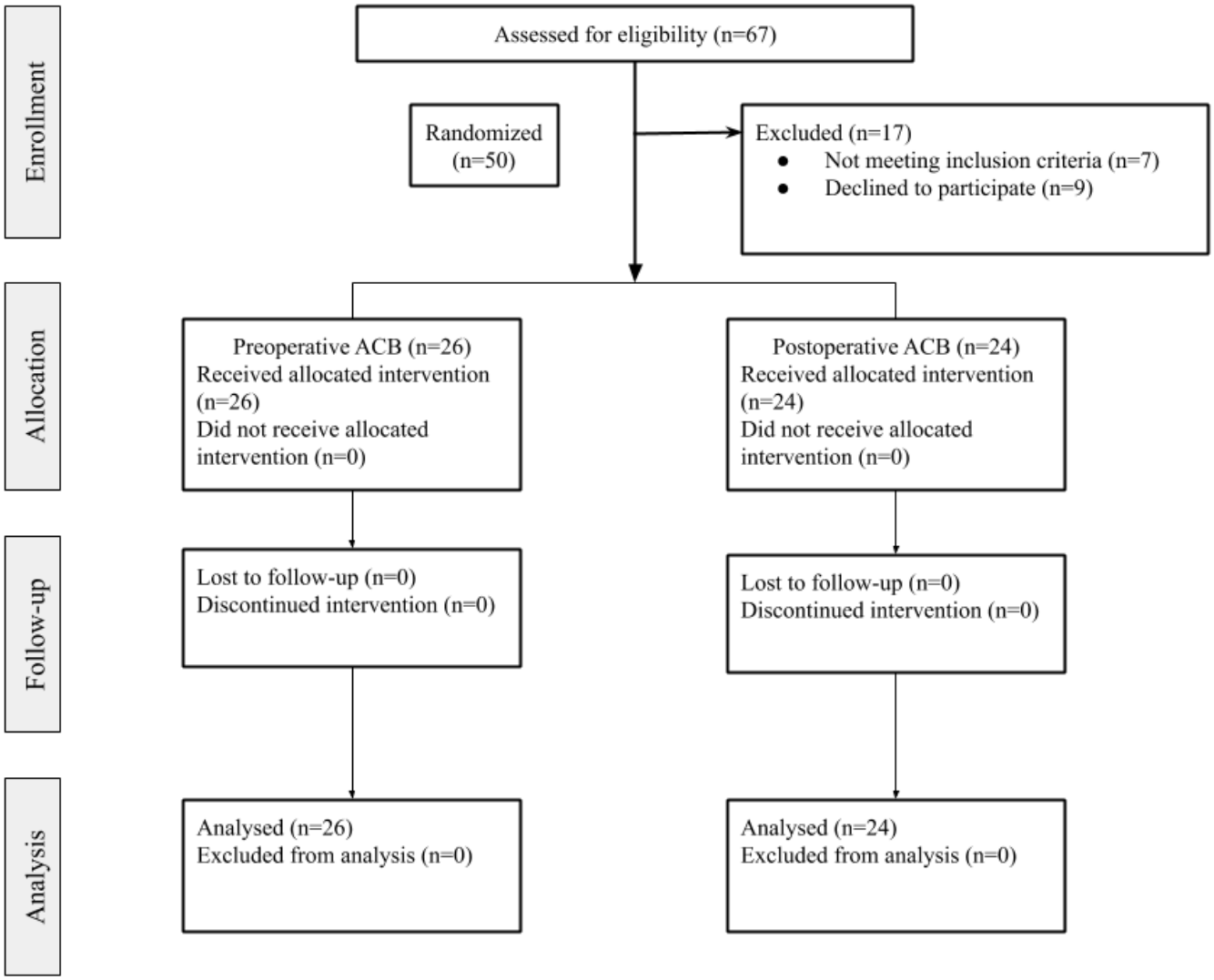

Figure 1

CONSORT flow diagram. CONSORT, consolidated standards of reporting trials. Flow diagram demonstrating patient selection and randomization.