

Comparative efficacy of ultrasound-guided proximal versus distal adductor canal block in knee arthroscopy post operative pain management

Eficacia comparativa entre el bloqueo del canal adductor proximal versus distal guiado por ultrasonido en artroscopia de rodilla: Manejo del dolor posoperatorio

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ABSTRACT

Background: Postoperative pain control after knee arthroscopy improves recovery and alleviates opioid-related complications. The adductor canal block is considered a promising method for providing effective analgesia with minimal motor impairment, but the most effective site for injection has yet to be determined. **Aim:** This randomized controlled trial evaluated the effectiveness of ultrasound-guided proximal versus distal ACB compared with standard care without nerve block for pain management after knee arthroscopy. **Patients and Methods:** Seventy-five patients undergoing elective knee arthroscopy were randomly divided into three groups, each consisting of 25 individuals: Proximal ACB, Distal ACB, and Control. The ACB groups received 20 mL of 0.375% bupivacaine administered at their respective locations under ultrasound guidance. Assessments were conducted over 24 hours to evaluate postoperative pain intensity (VAS scores), opioid use (tramadol), motor function (Bromage scale), and recovery indicators. Statistical analysis was conducted using ANOVA and Chi-square tests, with a threshold of $P < 0.05$ for significance. **Results:** The cumulative tramadol consumption was the lowest in the Proximal ACB group, with a consumption of 95.2 ± 18.6 milligrams, followed by the Distal ACB group at 108.4 ± 19.5 milligrams and the Control group at 165.8 ± 25.4 milligrams, with a highly significant difference of $P < 0.001$. Pain scores based on the Visual Analogue Scale were significantly lower for both ACB groups compared with the Control group, with a highly significant difference of $P < 0.001$, and the Proximal ACB group demonstrated the best pain relief. Motor function was maintained in all groups, with a Bromage score of 0 observed in 100% of patients at 24 hours. The proximal ACB group exhibited a significantly longer delay in initial pain medication requests, with a mean time of 385 ± 112 minutes, compared with distal ACB (298 ± 95 minutes) and the Control group (145 ± 65 minutes, $P < 0.001$). Both groups had higher patient satisfaction ratings and experienced fewer opioid-related side effects, such as nausea and vomiting. **Conclusion:** Proximal ultrasound-guided ACB was associated with better postoperative pain relief, lower opioid usage, and faster recovery than distal ACB and typical treatment protocols. The motor-sparing characteristics of this technique make it a valuable component in multimodal pain management strategies for knee arthroscopic procedures.

Keywords: Adductor canal block, knee arthroscopy, postoperative analgesia, opioid consumption.

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RESUMEN

Antecedentes: El control del dolor posoperatorio después de la artroscopia de rodilla mejora la recuperación y alivia las complicaciones relacionadas con los opioides. El bloqueo del canal aductor se considera un método prometedor para proporcionar analgesia efectiva con una mínima alteración motora, pero aún no se ha determinado el sitio más efectivo para la inyección. **Objetivo:** Este ensayo controlado aleatorizado evaluó la efectividad del ACB proximal guiado por ultrasonido en comparación con el distal, en comparación con el cuidado estándar sin bloqueo nervioso para el manejo del dolor después de una artroscopia de rodilla. **Pacientes y Métodos:** Setenta y cinco pacientes sometidos a artroscopia de rodilla electiva fueron divididos aleatoriamente en tres grupos, cada uno compuesto por 25 individuos: ACB Proximal, ACB Distal y Control. Los grupos ACB recibieron 20 mL de bupivacaína al 0,375% administrados en sus respectivas ubicaciones bajo guía ecográfica. Las evaluaciones se realizaron durante 24 h para evaluar la intensidad del dolor posoperatorio (puntuaciones en la escala VAS), el uso de opioides (tramadol), la función motora (escala de Bromage) y los indicadores de recuperación. El análisis estadístico se realizó utilizando pruebas ANOVA y Chi-cuadrado, con un umbral de $P < 0,05$ para la significancia. **Resultados:** El consumo acumulado de tramadol fue el más bajo en el grupo ACB Proximal, con un consumo de $95,2 \pm 18,6$ miligramos, seguido por el grupo ACB Distal con $108,4 \pm 19,5$ miligramos y el grupo Control con $165,8 \pm 25,4$ miligramos, con una diferencia altamente significativa de $P < 0,001$. Las puntuaciones de dolor basadas en la Escala Visual Analógica fueron significativamente más bajas para ambos grupos ACB en comparación con el grupo de Control, con una diferencia altamente significativa de $P < 0,001$, y el grupo ACB Proximal demostró el mejor alivio del dolor. La función motora se mantuvo en todos los grupos, con una puntuación de Bromage de 0 observada en el 100% de los pacientes a las 24 h. El grupo de ACB proximal mostró un retraso significativamente mayor en las solicitudes iniciales de medicación para el dolor, con un tiempo medio de 385 ± 112 minutos, en comparación con el grupo de ACB distal (298 ± 95 minutos) y el grupo de Control (145 ± 65 minutos, $P < 0,001$). Ambos grupos tuvieron calificaciones de satisfacción del paciente más altas y experimentaron menos efectos secundarios relacionados con los opioides, como náuseas y vómitos. **Conclusión:** El ACB proximal guiado por ultrasonido se asoció con un mejor alivio del dolor posoperatorio, un menor uso de opioides y una recuperación más rápida que el ACB distal y los protocolos de tratamiento típicos. Las características de preservación motora de esta técnica la convierten en un componente valioso en las estrategias multimodales de manejo del dolor para los procedimientos artroscópicos de rodilla.

Palabras clave: Bloqueo del canal aductor, artroscopia de rodilla, analgesia posoperatoria, consumo de opioides.

Introduction

Knee arthroscopy, a frequent minimally invasive orthopedic surgery, improves healing. Despite being minimally invasive, many patients feel severe postoperative pain, which can slow recovery and lower satisfaction[1],[2]. Femoral nerve block (FNB) has been the gold standard for postoperative pain management, although it decreases quadriceps strength, delaying movement and increasing the risk of falls. Thus, adductor canal blocks (ACBs) have been popular because they give excellent analgesia while retaining quadriceps function[3],[4].

The adductor canal contains the saphenous nerve, a sensory branch of the femoral nerve. Blocking this nerve within the adductor canal provides knee analgesia without significantly affecting motor function[5]. Clinical studies have demonstrated that ultrasound-guided ACB effectively reduces postoperative pain and opioid consumption[6]-[8]. Proximal ACB, targeting the adductor canal near the junction of the sartorius and adductor longus muscles, may offer superior analgesia compared to distal ACB, performed closer to the adductor hiatus. However, the extent of this difference and its clinical significance are still under investigation[6].

There is no consensus on whether proximal or distal ACB offers the best balance of pain relief, opioid sparing, and preservation of motor function. Most studies have compared ACB to FNB without distinguishing between different block sites, and there is limited data comparing these approaches to standard care without a nerve block (6, 7). This study aims to address these gaps by comparing the efficacy and safety of proximal versus distal ACB, with a control group receiving standard pain management.

Patients and Methods

Study Design

This randomized controlled trial (RCT) was conducted across two centers: Assiut University Hospital and New Valley University Hospital, over six months. Ethical approval was obtained from the Institutional Review Board (IRB) of Assiut University (Approval No. 04-2024-300520) and the Medical and Nursing Ethics Committee (MNVREC) of New Valley University (Approval No. 20240930010). Written informed consent was obtained from all participants prior to enrollment. The flowchart of this trial is shown in Figure 1.

A total of 75 patients undergoing elective knee arthroscopy were randomized into three equal groups of 25 each:

1. Proximal ACB Group ($n = 25$): Patients received a proximal adductor canal block.
2. Distal ACB Group ($n = 25$): Patients received a distal adductor canal block.
3. Control Group ($n = 25$): Patients did not receive a nerve block but were managed with standard postoperative analgesia.

Eligibility criteria

Inclusion criteria:

- Patients aged 18-80 years.
- ASA classification I-III.
- Elective knee arthroscopy.

Exclusion criteria:

- Chronic opioid use or chronic/neuropathic pain.
- Known allergies to local anesthetics.

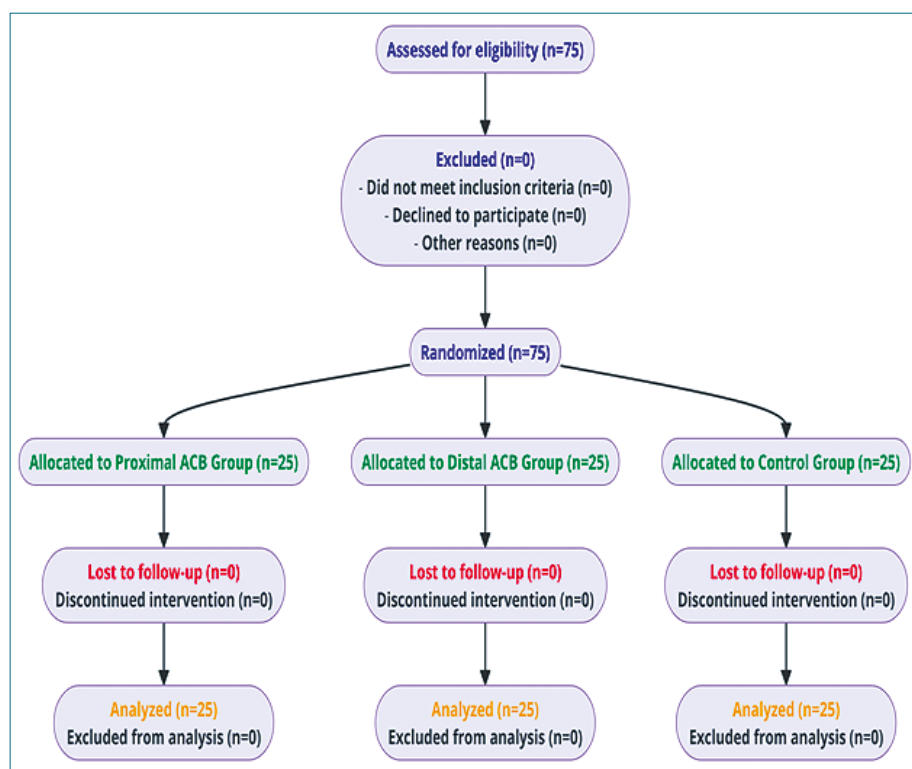


Figure 1. Flow chart of the study.

- Inability or unwillingness to provide consent.
- Significant cognitive impairment or psychiatric conditions.

Randomization and blinding

Patients were randomized in a 1:1:1 ratio using a computer-generated randomization sequence concealed in sealed envelopes. The anesthesiologist performing the blocks was unblinded, while patients, nurses, and outcome assessors were blinded to group assignments.

General anesthesia management

A standardized general anesthesia protocol was used for all patients. Monitoring included pulse oximetry, electrocardiography, and non-invasive blood pressure. Anesthesia induction involved intravenous (IV) propofol (2-3 mg/kg), fentanyl (1 µg/kg), and atracurium bromide (0.3 mg/kg). Airway management was achieved using a laryngeal mask airway, and anesthesia was maintained with sevoflurane (2%) in a 50:50 oxygen-air mixture. All patients received intraoperative dexketoprofen (50 mg IV) and granisetron (1 mg IV) to prevent postoperative nausea and vomiting.

Adductor canal block technique

Blocks were performed after induction of general anesthesia under sterile conditions using a high-frequency linear array ultrasound (Sonosite M-Turbo).

1. Proximal ACB: The block site was located at the intersection of the medial borders of the sartorius and adductor longus muscles.

2. Distal ACB: The block was administered at the adductor hiatus, where the femoral artery exits beneath the sartorius muscle.

For both blocks, a 21-gauge, 85-mm needle was advanced using an in-plane ultrasound technique, and 20 mL of 0.375% bupivacaine was injected after confirming negative aspiration.

Postoperative analgesia protocol

Postoperative pain was managed using patient-controlled analgesia (PCA) devices delivering tramadol (3 mg/mL) with a 20 mg bolus dose and a 20-minute lockout period. IV dexketoprofen (50 mg) was administered for breakthrough pain if the VAS score was ≥ 4 .

Data collection

Data collection included preoperative demographic and clinical characteristics, intraoperative parameters (surgical duration, tourniquet time, anesthesia usage), and postoperative outcomes. Postoperative data focused on pain intensity (VAS at rest and movement), motor function (Bromage scale), analgesic consumption (tramadol use, rescue doses), recovery parameters (time to first analgesic request, PACU stay, ambulation), and patient satisfaction (10-point Likert scale). Measurements were recorded at 2, 4, 8, 12, and 24 hours postoperatively.

Sample size

The sample size was calculated based on detecting a 20% difference in tramadol consumption between groups with an

alpha level of 0.05 and a power of 80%. Based on preliminary data, 25 patients per group were needed, resulting in a total of 75 patients.

Statistical analysis

Data were analyzed using IBM SPSS 27.0. Continuous variables were expressed as mean $\pm$ standard deviation (SD) and compared using one-way ANOVA, with post-hoc Bonferroni correction for multiple comparisons. Non-normally distributed variables were analyzed using the Kruskal-Wallis test. Categorical variables were analyzed with Chi-square or Fisher's exact tests. Repeated measures ANOVA was used for pain and motor block trends. Statistical significance was set at $P < 0.05$.

Results

Table 1 shows comparable demographic and baseline clinical characteristics among the Proximal ACB, Distal ACB, and Control groups. No significant differences were observed in age, gender, BMI, ASA classification, comorbidities, surgical duration, tourniquet time, preoperative pain scores, or previous knee surgery (all $P > 0.05$).

Table 2 demonstrates comparable surgical and anesthetic parameters across all groups, with no significant differences in surgical duration ($P = 0.872$) or tourniquet time ($P = 0.956$). Anesthetic requirements, including propofol ($P = 0.974$), fentanyl ($P = 0.793$), and isoflurane consumption ($P = 0.052$), were also similar.

Figure 2 demonstrates consistently lower cumulative tram-

Table 1. Demographic and clinical characteristics of study participants

Characteristic	Proximal ACB (n = 25)	Distal ACB (n = 25)	Control (n = 25)	P-value
Age (years)				
Mean $\pm$ SD	45.8 $\pm$ 12.3	46.2 $\pm$ 11.9	45.5 $\pm$ 12.5	0.988
Gender				
Male	14 (56%)	13 (52%)	14 (56%)	0.927
Female	11 (44%)	12 (48%)	11 (44%)	
BMI (kg/m²)				
Mean $\pm$ SD	27.3 $\pm$ 4.1	26.8 $\pm$ 4.3	27.1 $\pm$ 4.2	0.933
ASA Classification				
I	10 (40%)	11 (44%)	10 (40%)	0.986
II	12 (48%)	11 (44%)	13 (52%)	
III	3 (12%)	3 (12%)	2 (8%)	
Comorbidities				
Hypertension	6 (24%)	5 (20%)	6 (24%)	0.927
Diabetes Mellitus	4 (16%)	3 (12%)	4 (16%)	1.000
Asthma	2 (8%)	2 (8%)	1 (4%)	1.000
Surgical characteristics				
Surgery Duration (min)	65.4 $\pm$ 15.2	66.8 $\pm$ 14.9	65.9 $\pm$ 15.3	0.872
Tourniquet Time (min)	52.3 $\pm$ 12.4	53.1 $\pm$ 11.8	52.8 $\pm$ 12.1	0.973
Type of arthroscopy				
Meniscectomy	14 (56%)	13 (52%)	14 (56%)	0.977
Synovectomy	6 (24%)	7 (28%)	6 (24%)	
Chondroplasty	5 (20%)	5 (20%)	5 (20%)	
Preoperative Pain Score (VAS)				
Mean $\pm$ SD	4.2 $\pm$ 1.8	4.1 $\pm$ 1.7	4.3 $\pm$ 1.9	0.982
Previous Knee Surgery				
Yes	3 (12%)	2 (8%)	3 (12%)	1.000
No	22 (88%)	23 (92%)	22 (88%)	

Data are presented as mean $\pm$ SD or number of patients (%); ASA: American Society of Anesthesiologists; BMI: Body Mass Index; VAS: Visual Analog Scale (0-10); ACB = Adductor Canal Block; min = minutes; n = number of patients. P-value < 0.05 considered statistically significant.

Table 2. Surgical, and anesthesia parameters of study participants

Parameter	Proximal ACB (n = 25)	Distal ACB (n = 25)	Control (n = 25)	P-value
Surgical procedure				
Duration of surgery (min)	65.4 ± 15.2	66.8 ± 14.9	65.9 ± 15.3	0.872
Tourniquet time (min)	52.3 ± 12.4	53.1 ± 11.8	52.8 ± 12.1	0.956
Anesthesia parameters				
Propofol (mg)	185.4 ± 35.6	182.8 ± 34.9	188.2 ± 36.2	0.974
Fentanyl (µg)	97.5 ± 15.4	95.8 ± 16.2	99.7 ± 16.0	0.793
Isoflurane (MAC)	1.1 ± 0.15	1.1 ± 0.16	1.2 ± 0.2	0.052

Data are presented as mean ± SD. ACB: Adductor Canal Block; MAC: Minimum Alveolar Concentration. Statistical analysis performed using one-way ANOVA with post-hoc Bonferroni correction. *P < 0.05 compared with Distal ACB group; †P < 0.001 compared with Control group.

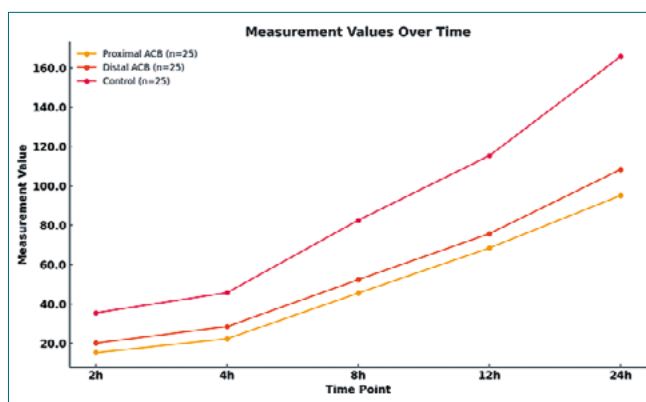


Figure 2. Cumulative tramadol consumption (mg) of study participants.

adol consumption in ACB groups compared to control at all time points ($P < 0.001$). Proximal ACB showed the lowest consumption (12 h: ~60 mg), followed by Distal ACB (~70 mg) and Control (~95 mg). This trend indicates sustained analgesic efficacy of ACB, with superior outcomes in the Proximal group ($P < 0.05$).

Table 3 shows comparable motor function among all groups at all time points. The differences in Bromage scores between the Proximal ACB, Distal ACB, and Control groups were minimal and not statistically significant ($P > 0.05$). All patients regained full motor function by 24 hours ($P = 1.000$).

Table 4 illustrates consistently lower pain scores in ACB groups at rest and during movement ($P < 0.001$). The Proximal ACB group maintained superior pain control, with significantly lower scores compared to Distal ACB and Control at 2 h (Rest: 1.8 ± 0.9 vs. 2.1 ± 1.0 vs. 4.5 ± 1.5 , $P < 0.001$) and 8 h (Movement: 3.5 ± 1.4 vs. 4.2 ± 1.5 vs. 7.1 ± 2.0 , $P < 0.001$).

Table 5 shows that the time to first analgesic was significantly longer in the Proximal ACB group (385 ± 112 min) compared with the Distal ACB (298 ± 95 min) and Control (145 ± 65 min) groups ($P < 0.001$). The number of rescue analgesic doses was significantly lower in both ACB groups than in the Control group ($P < 0.001$). The Distal ACB group demonstrated faster ambulation (158 ± 38 min) and a shorter PACU stay (65.3 ± 16.8 min) than the other groups ($P < 0.001$). The incidence of postoperative nausea and vomiting was also lower in the ACB

groups (Proximal: 4%, Distal: 8%) compared with the Control group (20%) ($P = 0.038$).

Discussion

This randomized controlled trial assessed the efficacy of ACB administration at the proximal and distal sites of arthroscopic knee surgery. The results showed that ACB provided significantly better pain relief and reduced opioid use at the proximal compared to the distal site, without compromising muscle strength in the front of the thigh. The results demonstrated that the proximal ACB was a more desirable method for managing pain following knee surgery.

Combining pain relief methods is crucial for reducing opioid-related side effects and providing effective pain management with additive or synergistic effects[9]. Nerve blocks, including ACB, have become widely accepted due to their capacity to improve pain relief during surgery while reducing the amount of opioids needed. Traditionally, femoral nerve block and femoral triangle block were widely employed for knee operations; nonetheless, these methods have largely been discontinued due to their link with extended hospital stays and heightened fall risk resulting from motor weakness[10],[11]. Distal methods, such as ACB, have come to the forefront as an alternative for blocking peripheral nerves and providing effective analgesia while maintaining motor power[12]-[14].

Previous research have shown distal nerve blocks' benefits. Saphenous nerve blocks reduce VAS pain at rest and during physical activity and opioid use in the first 24 hours after surgery compared to placebo[15],[16]. The objective of our study was to evaluate and compare the pain-relieving effectiveness and treatment results of ACB administered at various injection locations (the proximal and distal sites). Several studies have compared the proximal and distal ACB, but relatively few have compared with control group, within the same research trial.

A recent study by Tamam et al. 2023[6], reported comparatively to mid- and distal ACB groups, proximal ACB considerably lowered opioid intake and VAS scores ($P = .001$ and $P = .004$). Emphasizing the higher efficacy of proximal ACB. A meta-analysis consisting of 348 patients, as reported by Zhang et al. in 2020[17], revealed no notable discrepancies in total opioid consumption, average VAS pain scores, or block success rates between proximal and distal ACB.

Table 3. Motor function assessment (Bromage Scale) of study participants

Time point	Proximal ACB (n = 25)	Distal ACB (n = 25)	Control (n = 25)	P-value
0 h				
0	15 (60%)	20 (80%)	12 (48%)	0.237
1	8 (32%)	4 (16%)	10 (40%)	
2	2 (8%)	1 (4%)	3 (12%)	
3	0 (0%)	0 (0%)	0 (0%)	
2 h				
0	17 (68%)	21 (84%)†	13 (52%)	0.168
1	7 (28%)	3 (12%)	9 (36%)	
2	1 (4%)	1 (4%)	3 (12%)	
3	0 (0%)	0 (0%)	0 (0%)	
4 h				
0	19 (76%)	23 (92%)†	15 (60%)	0.117
1	5 (20%)	2 (8%)	8 (32%)	
2	1 (4%)	0 (0%)	2 (8%)	
3	0 (0%)	0 (0%)	0 (0%)	
8 h				
0	21 (84%)	24 (96%)†	18 (72%)	0.110
1	4 (16%)	1 (4%)	6 (24%)	
2	0 (0%)	0 (0%)	1 (4%)	
3	0 (0%)	0 (0%)	0 (0%)	
12 h				
0	23 (92%)	25 (100%)†	20 (80%)	0.061
1	2 (8%)	0 (0%)	5 (20%)	
2	0 (0%)	0 (0%)	0 (0%)	
3	0 (0%)	0 (0%)	0 (0%)	
24 h				
0	25 (100%)	25 (100%)	25 (100%)	
1	0 (0%)	0 (0%)	0 (0%)	
2	0 (0%)	0 (0%)	0 (0%)	
3	0 (0%)	0 (0%)	0 (0%)	

Data are presented as number of patients (%). ACB: Adductor Canal Block. Bromage Scale: 0: No motor block; 1: Can't raise extended leg; 2: Can't flex knee; 3: Can't flex ankle. Statistical analysis performed using Chi-square or Fisher's exact test. *P < 0.05 compared with Distal ACB group; †: P < 0.001 compared with Control group.

As well as, Fei et al. (2020)[18], reported that proximal ACB led to considerably lower opioid intake compared to mid-ACB when a catheter was inserted at both proximal and middle sites. Our study results were consistent with previous findings; it showed that proximal ACB resulted in better pain relief and lower tramadol usage than the mid- and distal ACB groups after knee arthroscopy.

Abdallah et al.[19], conducted a randomized study in 2021 to compare the effectiveness of three different locations for the administration of analgesic catheter blocks. They found that the location closest to the pain site offered the most significant benefits in terms of reduced opioid use and lower pain scores over a 24-hour period.

The advantages of the proximal ACB are attributed to its capacity to target extra sensory nerves, such as the saphenous nerve, the superomedial genicular nerves, and the posteromedial branch of the nerve to vastus medialis, with the femoral nerve's motor branches being left intact[20].

Our study found that the incidence of postoperative nausea was greater in the control group, possibly because of elevated tramadol consumption. This finding supports Tamam et al. (2023)[6], who found a direct correlation between reduced opioid consumption and a lower incidence of postoperative nausea and vomiting. The results of this study are consistent with previous research by Fei et al. (2020)[18], which found a correlation between higher opioid use and increased rates of nausea

Table 4. Evaluation of the VAS Scores According to groups and time of study participants

Time point	Proximal ACB (n = 25)	Distal ACB (n = 25)	Control (n = 25)	P-value
VAS Scores at Rest (cm)				
2 h	1.8 ± 0.9*†	2.1 ± 1.0†	4.5 ± 1.5	< 0.001
4 h	2.2 ± 1.1*†	2.6 ± 1.2†	5.2 ± 1.6	< 0.001
8 h	2.5 ± 1.2*†	3.0 ± 1.3†	5.8 ± 1.7	< 0.001
12 h	2.8 ± 1.3*†	3.2 ± 1.4†	5.5 ± 1.6	< 0.001
24 h	2.6 ± 1.2*†	3.0 ± 1.3†	5.0 ± 1.5	< 0.001
VAS Scores During Movement (cm)				
2 h	2.8 ± 1.2*†	3.4 ± 1.3†	6.2 ± 1.8	< 0.001
4 h	3.2 ± 1.3*†	3.9 ± 1.4†	6.8 ± 1.9	< 0.001
8 h	3.5 ± 1.4*†	4.2 ± 1.5†	7.1 ± 2.0	< 0.001
12 h	3.8 ± 1.5*†	4.4 ± 1.6†	6.8 ± 1.8	< 0.001
24 h	3.5 ± 1.4*†	4.1 ± 1.5†	6.5 ± 1.7	< 0.001

Data are presented as mean ± SD. ACB: Adductor Canal Block; VAS: Visual Analog Scale; n: number of patients. Statistical analysis performed using repeated measures ANOVA with post-hoc Bonferroni correction. *P < 0.05 compared with Distal ACB group; †: P < 0.001 compared with Control group.

Table 5. Analgesic Consumption and recovery parameters of study participants

Parameter	Proximal ACB (n = 25)	Distal ACB (n = 25)	Control (n = 25)	P-value
Time to first analgesic request (min)	385 ± 112*†	298 ± 95†	145 ± 65	< 0.001
Number of rescue analgesic doses	1.8 ± 0.9*†	2.3 ± 1.1†	4.2 ± 1.5	< 0.001
Nausea/Vomiting	1 (4%)	2 (8%)	5 (20%)	0.261
PACU stay duration (min)	72.5 ± 18.4*†	65.3 ± 16.8†	95.8 ± 22.4	< 0.001
Time to ambulation (min)	185 ± 45†	178 ± 38†	225 ± 52	< 0.001
Patient satisfaction score (0-10)	8.2 ± 1.1*†	7.9 ± 1.2†	6.4 ± 1.5	< 0.001

Data are presented as mean ± SD. ACB: Adductor Canal Block; PACU: Post-Anesthesia Care Unit. Statistical analysis performed using one-way ANOVA with post-hoc Bonferroni correction. *P < 0.05 compared with Distal ACB group; †: P < 0.001 compared with Control group.

and vomiting among patients undergoing distal ACB. Regional block techniques, including ACBs, are crucial for minimizing opioid needs, as evidenced by the enhanced results observed in this study.

Another important result was preservation of motor function; distal ACB showed early postoperative period greater motor function retention. Comparatively to 60% in the proximal ACB group and 48% in the control group, at 0h 80% of patients in the distal ACB group had no motor block (Bromage 0). This result is in line with those of Elkassabany et al. (2022) [21], who found better motor preservation with distal ACB. By 24 h, however, all groups showed complete motor recovery, therefore supporting the motor-sparing character of ACB. This study's application of the Bromage scale conforms with earlier studies evaluating motor inhibition efficiency. Consistent with other studies, this result emphasizes the motor-sparing advantage of ACBs[22],[23].

Conclusions

In conclusion, while both ACB techniques represent effective alternatives to standard care for post-arthroscopic knee pain management, the choice between proximal and distal approaches should be individualized based on specific patient factors and surgical priorities. Further research exploring long-term outcomes and potential refinements to these techniques may help optimize their clinical application.

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