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Efficacy of Femoral Nerve Block Compared to Adductor Canal Block for Post Operative Pain Management After Total Knee Arthroplasty

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DECLARATIONS

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ABSTRACT

Background: After total knee arthroplasty, regional anaesthetic methods such as femoral nerve and adductor canal blocks are frequently used to ease the pain. **Objective:** To assess how femoral nerve and adductor canal blocks affect post-operative mobility, healing time, and pain management following total knee arthroplasty. **Methodology:** From October 8, 2023, to September 25, 2024, a tertiary care hospital hosted this cross-sectional study. We randomly assigned 160 patients receiving unilateral primary total knee replacement to either the adductor canal or femoral nerve block (80 in each group). Before surgery, each group had their nerve block. Postoperative pain was measured at 6, 12, 18, and 24 hours using the numeric rating scale. Mobility on postoperative days 1–7 and the time until straight leg raise were recovery markers. **Results:** Age (femoral nerve block: 65.4±8.3 years; ACB: 64.8±7.9 years), gender distribution, body mass index, and ASA physical state did not significantly differ across groups. At every time point, the femoral nerve block group's pain scores were significantly lower: at 6 hours, this score was 3.8±1.2, compared to the adductor canal block's 4.2±1.3 ($p=0.04$). These tendencies continued at later evaluations ($p<0.03$). About 35% of the femoral nerve block group and 67.5% of the ACB group, respectively, attained straight leg raise greater than 30° on Day 1 ($p<0.001$). By Day 7, 93.75% of the femoral nerve block group and 100% of the ACB group had pain-free straight leg raise ($p=0.05$). According to multiple regression analysis, femoral nerve block was substantially linked to quicker recovery and lower pain scores ($B=-0.5$, $p=0.001$). **Conclusion:** After total knee arthroplasty, femoral nerve block provides better postoperative pain management and a faster recovery than adductor canal block, although adductor canal block allows for earlier leg mobilization and improves straight leg raise recovery.

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INTRODUCTION

Total knee arthroplasty (TKA) is a common and successful surgical procedure for treating osteoarthritis in the knee. TKA surgeries have become the most popular surgical surgery in industrialized nations, exceeding all other procedures, in the previous ten years.[1] The healing process may be hampered by the moderate to severe postoperative discomfort that TKA is known to cause. People who experience discomfort after TKA are more likely to experience a number of postoperative complications, including infections, joint loosening, reflex sympathetic dystrophy, and immobility-related problems such as deep vein thrombosis (DVT).[2,3]

Because of its high effectiveness in lowering pain and its ability to spare opioids, femoral nerve block (FNB) is the gold standard percutaneous neuromodulation (PNM) treatment for patients undergoing TKA.[4,5] Since performing TKA as an outpatient procedure has reduced the length of stay (LOS) in the hospital, it is becoming more widely acknowledged that strong analgesia that maintains motor strength during early rehabilitation is a crucial component of the current perioperative protocol after the procedure. An adductor canal block (ACB), which produces a sensory block with minimal motor involvement, has been shown to be a useful part of a multimodal approach for post-TKA pain management.[6]

Peripheral nerve blocks (PNBs) are a major method of pain relief after TKA. In addition to reducing pain, nerve blocks also shorten hospital stays and lower the risk of readmission.[7–9] A frequent nerve block operation that has been shown to reduce opioid usage and decrease hospital stays following TKA is an FNB. However, if FNB causes a reduction in quadriceps muscle strength, which makes postoperative ambulation difficult, patients may be at increased risk of falls after surgery.[10–12] ACB is another nerve block technique that is currently attracting the attention of scientists since it may be superior to FNB. Several studies have demonstrated that ACB is better than FNB in maintaining postoperative quadriceps muscle strength, facilitating postoperative ambulation, and encouraging functional recovery without sacrificing pain control.[13–15] However, in terms of quadriceps strength, analgesic effect, and postoperative functional recovery, two recent trials did not find a statistically significant difference between ACB and FNB. Thus, the purpose of this study is to evaluate the effectiveness of FNB and ACB following TKA in terms of pain management, recovery time, and post-procedure mobility.

METHODOLOGY

This cross-sectional study examined the efficacy of ACB and FNB in reducing post-operative pain following TKA. The study was cross-sectional and conducted at a tertiary care facility from October 8, 2023, to September 25, 2024. All participating patients provided written informed permission, and the study was approved by the institutional review board. After enrollment, 160 patients were split into two groups at random: FNB and ACB (80 in each group). Participants were to be between 45 and 80 years old and free of any illnesses that would preclude them from undergoing regional anaesthesia for a unilateral primary total knee arthroplasty. Participants were excluded if they had a history of opioid use disorders, peripheral vascular disease, local anaesthetic allergies, or neurological conditions.

Every patient received a comprehensive preoperative evaluation, which included gathering demographic information, categorizing their physical condition in accordance with the American Society of Anaesthesiologists (ASA), and searching for any co-occurring conditions such as osteoarthritis, diabetes, or hypertension. We first used the Numeric Rating Scale (NRS) to quantify the patient's pain at baseline in order to develop a thorough anesthesia plan. General anaesthesia was administered to both groups prior to surgery. Using ultrasonography to guide the injection, 20 mL of 0.25% bupivacaine was injected into the femoral nerve at the inguinal crease in the FNB group to perform a femoral nerve block. The ACB group received an adductor canal block, with the needle aimed at the saphenous nerve inside the adductor canal, using the same quantity and dosage of local anesthetic and a similar technique. The block was administered before to the incision to ensure adequate analgesia before the procedure started. Using the NRS to measure

Table 1. Demographic characteristics

	Variables	FNB Group (n=80)	ACB Group (n=80)	p-value
Age (years)		65.4±8.3	64.8±7.9	0.64
BMI (kg/m^2)		30.2±5.4	29.8±5.1	0.57
Gender	Male	40 (50.0%)	38 (47.5%)	0.76
	Female	40 (50.0%)	42 (52.5%)	
Residence	Urban	45 (56.3%)	43 (53.8%)	0.75
	Rural	35 (43.7%)	37 (46.2%)	
ASA Physical Status	ASA I	12 (15.0%)	10 (12.5%)	0.68
	ASA II	58 (72.5%)	60 (75.0%)	
	ASA III	10 (12.5%)	10 (12.5%)	
Comorbidities	Hypertension	40 (50.0%)	42 (52.5%)	0.78
	Diabetes Mellitus	18 (22.5%)	20 (25.0%)	0.72
	Osteoarthritis	70 (87.5%)	68 (85.0%)	0.67
Operative Side	Left	38 (47.5%)	40 (50.0%)	0.74
	Right	42 (52.5%)	40 (50.0%)	

pain at 6, 12, 18, and 24 hours after surgery was one of the numerous methods used to assess postoperative pain management. Additionally, measures were made to assess mobility and measure the time required to perform a straight leg raise (SLR) on days 1 through 7 following the procedure. Mobility was defined as the ability to sit up, transfer from a bed to a chair, and walk with assistance. Mobility, SLR times, pain scores, and group allocations were recorded and assessed by unaffiliated observers. Secondary outcomes including opioid intake (morphine equivalents), postoperative complications (e.g., nausea, vomiting, hemorrhage, infection), and the need for further analgesia were associated with these primary outcomes.

R Studio and SPSS version 26.0 were used for statistical analysis, descriptive statistics were calculated for variables both before and after surgery. The independent t-test was employed for between-group comparisons with continuous data. Categorical data were compared using the chi-square or Fisher's exact test. In statistical terms, a p-value of less than 0.05 was considered significant. To find out if nerve block type had an independent effect on pain scores and recovery outcomes, the researchers of the study employed multiple regression analysis after adjusting for factors like age, body mass index (BMI), and baseline pain levels.

RESULTS

There were no notable differences between the ACB and FNB groups in terms of clinical characteristics or demographics. Both groups were identical in terms of body mass index (30.2±5.4 kg/m^2 for FNB and 29.8±5.1 kg/m^2 for ACB, p=0.57), average age (65.4±8.3 years for FNB and 64.8±7.9 years for ACB, p=0.64), and gender distribution (50 percent male in both groups). Regarding residence, ASA physical state, and comorbidity profiles (osteoarthritis, diabetes mellitus, and hypertension; p-values ranged from 0.67 to

Table 2: Pain assessment at different intervals (NRS)

Time (Hours)	FNB Group (n=80)	ACB Group (n=80)	p-value
6 Hours	3.8±1.2	4.2±1.3	0.04
12 Hours	4.1±1.3	4.6±1.4	0.03
18 Hours	4.3±1.4	4.8±1.5	0.02
24 Hours	4.5±1.5	5.1±1.6	0.01

0.78), no significant differences were seen between the groups. There was no appreciable variation in the percentage of left- and right-sided procedures between the two groups, which were nearly equal (p=0.74). Patients in the FNB group experienced significantly less discomfort at 6, 12, 18, and 24 hours following surgery than those in the ACB group. At six hours, the ACB group recorded a slightly higher level of pain (4.2±1.3; p=0.04) than the FNB group, which had an average of 3.8±1.2. The difference continued after 12 hours (FNB: 4.1±1.3 vs ACB: 4.6±1.4, p=0.03), 18 hours (FNB: 4.3±1.4 vs ACB: 4.8±1.5, p=0.02), and 24 hours (FNB: 4.5±1.5 vs ACB: 5.1±1.6, p=0.01). These findings suggest that the FNB group experienced significantly less pain during the trial than the ACB group. The table compares the leg mobilization after surgery on different days for the ACB and FNB groups. The proportion of patients in the FNB group who were able to move their legs was significantly lower (37.5%) than in the ACB group, which had 70% mobility on the first day (p<0.001). Over time, both groups improved, but the disparity persisted. Only 60% of FNB patients were able to mobilize by the second day, compared to 85% of patients in the ACB group (p=0.01). By day seven (p=0.04), leg mobility had increased to 90% in the FNB group and 98.75% in the ACB group. By the end of the week, 93.75% of the FNB group and 100% of the ACB group had achieved full leg mobilization (p=0.05). Although both groups shown significant improvement in leg mobility over time, the ACB group's percentage of patients who were able to mobilize their legs at each interval was consistently higher.

Table 3 compares the SLR test outcomes between the FNB and ACB groups at various intervals after surgery. The FNB group had a much lower rate of 35% (p<0.001) than the ACB group, which saw 67.5% of patients achieve an SLR greater than 30° on the first day. With a p-value of 0.002, by day two, 85 percent of the ACB group and 56.25 percent of the FNB group had SLRs greater than 45%. By day three, 92.5% of the ACB group had an SLR higher than 60%, compared to 75% of the FNB group (p=0.01). On day 4, 97.5% of the subjects in the ACB group and 87.5% of the subjects in the FNB group obtained a complete SLR (p=0.04). By the conclusion of the week, 92.5% of the FNB group reported no pain during SLR, while 100% of the ACB group did the same (p=0.05). The ACB group demonstrated more consistent and superior results, particularly in reaching higher levels of SLR earlier than the FNB group, despite the fact that both groups made progress over time.

FNB and ACB were compared in this study, and the results of the regression analysis show a relationship between a number of variables and the study's conclusions. With a p-value of 0.001 and a coefficient of -0.5 (95% CI: [-0.8, -0.2]), the group variable (FNB vs. ACB) indicates a statistically significant negative correlation between the two variables. The outcome marginally increases with each year, according to the minor positive coefficient for age (0.01, 95% CI: [0.00, 0.02]), which is statistically significant (0.046). Additionally, there is a significant gender component; males perform better (0.3, p=0.003). There was no significant effect of BMI on the outcome (p=0.183). Lastly, the substantial positive correlation between the two variables (coefficient: 0.6, p=0.001) indicates that a higher result is associated with a higher baseline pain level.

The correlation matrix presented above shows how many variables connected to post-operative recovery are related to one another. The positive connection between the two scores (0.72) indicates that higher pain ratings at 6 hours are associated with higher pain ratings at 24 hours. There were significant correlations between the number of days needed to achieve an SLR and pain scores at 6 and 24 hours (0.45 and 0.6, respectively), suggesting that longer recovery durations are associated with greater pain scores at these intervals. Mobility and the number of

Table 3: Leg mobilisation following surgery on different days

Days	FNB Group (n=80)	ACB Group (n=80)	p-value
1st Day	30 (37.5%)	56 (70%)	<0.001
2nd Day	48 (60%)	68 (85%)	0.01
3rd Day	58 (72.5%)	72 (90%)	0.02
4th Day	64 (80%)	75 (93.75%)	0.03
5th Day	68 (85%)	78 (97.5%)	0.01
6th Day	70 (87.5%)	78 (97.5%)	0.02
7th Day	72 (90%)	79 (98.75%)	0.04
After 1 Week	75 (93.75%)	80 (100%)	0.05

Table 4: Straight leg raise (SLR) test at different time points following surgery

Days	FNB Group (n=80)	ACB Group (n=80)	p-value
1st Day SLR >30°	28 (35%)	54 (67.5%)	<0.001
2nd Day SLR >45°	45 (56.25%)	68 (85%)	0.002
3rd Day SLR >60°	60 (75%)	74 (92.5%)	0.01
4th Day Full SLR	70 (87.5%)	78 (97.5%)	0.04
After 1 Week Pain-free SLR	74 (92.5%)	80 (100%)	0.05

days to SLR have a substantial negative correlation on days 3 and 7 (-0.65 and -0.7, respectively), indicating a relationship between delayed SLR recovery and decreased mobility. Mobility on day 3 and 7 have a strong positive correlation (0.88), suggesting that patients who exhibit greater mobility on day 3 also typically exhibit greater mobility on day 7.

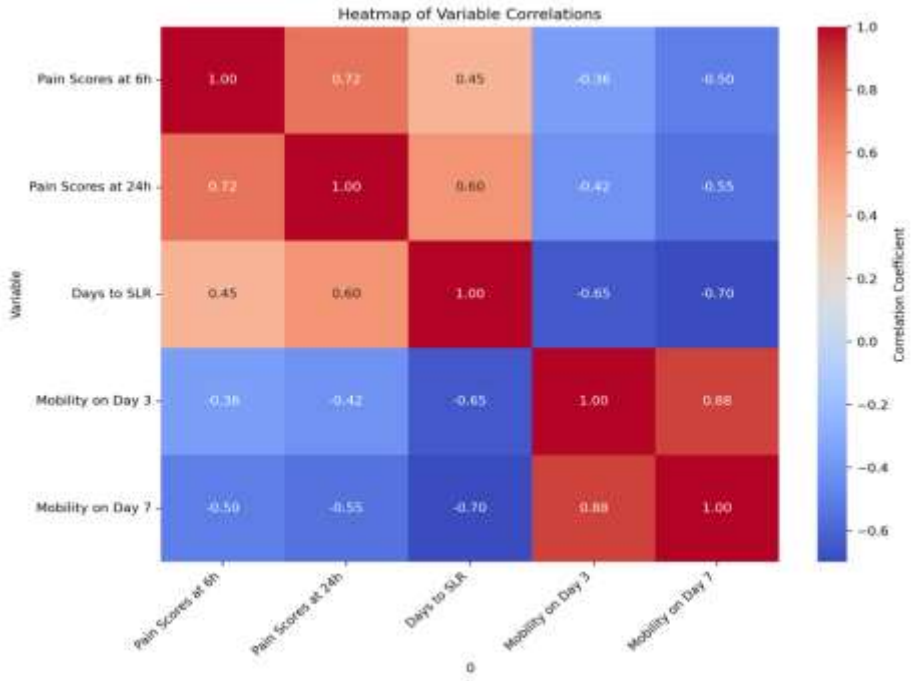
DISCUSSION

Total knee arthroplasty is a surgical surgery with a very high success rate and a very good postoperative survival rate. Since the main objective of TKA is to decrease pain and improvefunctional mobility, there must be any leeway in handling this aspect of the patient's complaint. In addition to causing physical suffering, severe, untreated postoperative pain prolongs hospital stays, hinders recovery, and raises the possibility of long-term pain issues. Prior research indicated that a greater number of patients experienced severe pain following TKA, and that the procedure was poorly managed.[16,17] Approximately 44–57% of individuals have pain within the first three days after TKA. About 19% of TKA patients report feeling unhappy as a result of the vicious cycle that occurs when sleep deprivation reduces the pain threshold. Therefore, it appears that persistent postoperative discomfort and disturbed sleep are significant predictors of chronic functional deficits one and three months after total knee arthroplasty.[18]

Our results demonstrate that, in terms of pain management and opioid use during TKA, neither anesthesia method is better than the other, which is in line with earlier studies. A recent meta-analysis found that the effects of ACB and FNB on patients undergoing TKA were comparable.[4] Both groups reported similar levels of discomfort and morphine intake during perioperative period at 1, 24, and 48 hours following surgery.[19,20] The ACB and FNB groups were also shown to be similar in terms of opioid use and pain scores by Jaeger et al. and Kim et al. In terms of both muscle strength and mobility, ACB performs better than FNB, which is in line with previous study findings. By obstructing the motor fibers of the femoral nerve distally, where they split off, ACB is thought to spare the quadriceps. Studies by Jaeger et al. and Kwofie et al. showed that ACB maintained quadriceps strength differently than FNB. Patients receiving continuous ACB had quadriceps strength that was 52% of the baseline value, according to Jaeger et al.'s study, but patients receiving continuous FNB alone had strength of 18%.[21,22]

The meta-analysis model showed no statistically significant difference in fall risk between the two regimens. In any case, after administering FNB, Kwofie et al. found a higher risk of quadriceps muscle weakness and falls using the Berg Balance Scale. After 48 hours, Elkassabany et al. discovered that the FNB group experienced a higher rate of falls using the Tinetti Scale for gait and balance. Furthermore, it was demonstrated

Figure 1: Heatmap, highlighting the relationships between variables



by Thacher et al. that FNB weakens the quadriceps; during physiotherapy, 13% of FNB patients and 2% of ACB patients suffered near-fall occurrences (knee-buckling), a statistically significant difference.[23–25] The two peripheral nerve blocking techniques being examined in this study have a lot of potential advantages, but they might also have significant disadvantages.

Peripheral nerve blockades carry several dangers, such as the possibility of nerve damage and systemic and local toxicities because of the large amount of local anesthetic used. Although ACB helps maintain muscular strength following surgery, there are some hazards associated with it, including the possibility of infection, neuropathy, and myositis due to the local anesthetic that is injected into the adductor canal close to the surgical site. Additionally, tourniquet constriction may result in ischemia.[26–28] The operation will require a highly experienced physician if the nerves are deep or small, or if the patient has subcutaneous emphysema, edematous tissues, or a high body mass index, all of which are known to diminish the ultrasound's visibility and make nerve blockade difficult. This is yet another significant barrier to the use of peripheral nerve blocking procedures guided by ultrasonography.[29,30]

The single-center approach and homogeneous sample population may limit the generalizability of the findings. Rapid surgical analgesia is the main focus, with long-term consequences like functional recovery or chronic pain management usually ignored. Bias may result from subjective pain assessments and inconsistent nerve block administration by different professionals.

CONCLUSION

In conclusion, in terms of pain management, FNB was found to be more effective than ACB for postoperative pain management after total knee arthroplasty, as evidenced by lower pain scores at multiple time intervals. The adductor canal block was found more efficacious for faster restoration of leg mobilization and SLR in the ACB group. Additionally, FNB facilitated reduced post-operative discomfort, contributing to a more efficient and pain-free postoperative period. Multiple regression analysis indicated that FNB significantly improved outcomes with baseline pain scores. Age and gender also play important roles. These findings suggest that FNB is a preferred technique for postoperative pain management in total knee arthroplasty, enhancing both pain control and reduced postoperative restlessness.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were

Table 5: Regression analysis

Variables	Coefficient (B)	95% CI	Std. Error	t-value	p-value
Groups (FNB = 1, ACB = 0)	-0.5	[-0.8, -0.2]	0.15	-3.33	0.001
Age (years)	0.01	[0.00, 0.02]	0.01	2	0.046
Gender (Male = 1, Female = 0)	0.3	[0.1, 0.5]	0.1	3	0.003
BMI (kg/m^2)	0.02	[-0.01, 0.05]	0.015	1.33	0.183
Baseline Pain Score	0.6	[0.4, 0.8]	0.1	6	0.001

performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

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REFERENCES

1. View of A comparative study between ultrasound-guided four-in-one block vs. femoral
nerve block vs. adductor canal block to enhance recovery after knee replacement surgery | Anaesthesia, Pain & Intensive Care [Internet]. [cited 2024 Nov 19]. Available from: https://www.apicareonline.com/index.php/APIC/article/view/1834/2749
2. JT Wegener BOCDMHBPMS. Value of single-injection or continuous sciatic nerve block in addition to a continuous femoral nerve block in patients undergoing total knee arthroplasty: a prospective, randomized, controlled trial. Reg Anesth Pain Med. 2011;36:481–8.
3. DH Kim Y. Adductor canal block versus femoral nerve block for total knee arthroplasty: a prospective, randomized, controlled trial. Anesthesiology. 2014;120:540–50.
4. Gao F, Ma J, Sun W, Guo W, Li Z, Wang W. Adductor Canal Block Versus Femoral Nerve Block for Analgesia After Total Knee Arthroplasty: A Systematic Review and Meta-analysis. Clin J Pain [Internet]. 2017 [cited 2024 Dec 1];33(4):356–68. Available from: https://pubmed.ncbi.nlm.nih.gov/27322397/
5. A Randomized Study of the Effectiveness of Suprascapular Nerve Block in Patient Satisfaction and Outcome After Arthroscopic Subacromial Decompression - ScienceDirect [Internet]. [cited 2024 Nov 25]. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0749806311005299
6. Koh IJ, Chang CB, Lee JH, Jeon YT, Kim TK. Preemptive low-dose dexamethasone reduces postoperative emesis and pain after TKA: A randomized controlled study. Clin Orthop Relat Res. 2013;471(9):3010–20.
7. BM Ilfeld KDMD. The association between lower extremity continuous peripheral nerve blocks and patient falls after knee and hip arthroplasty. Anesth Analg. 2010;111:1552–4.
8. AM Morin L. Does femoral nerve catheter placement with stimulating catheters improve effective placement? A randomized, controlled, and observer-blinded trial. Anesth Analg. 2005;100(5):1503–10.
9. ME Patterson K. The adductor canal block provides effective analgesia similar to a femoral nerve block in patients undergoing total knee arthroplasty-a retrospective study. J Clin Anesth. 2014;
10. H Wulf JLKHGTS. Femoral nerve block with ropivacaine or bupivacaine in day case anterior crucial ligament reconstruction. Acta Anaesthesiol Scand. 2010;54:414–20.
11. T Wiesmann TSGWHWJSMZ. Supplemental single shot femoral nerve block for total hip arthroplasty—impact on early postoperative care, pain management and lung function. Minerva Anestesiol. 2014;80(1):48–57.
12. E-Y Chan MFDPPANC. Femoral nerve blocks for acute postoperative pain after knee replacement surgery. Cochrane Database Syst Rev. 2014;5:CD009941.

13. SG Memtsoudis D. Subsartorial adductor canal vs femoral nerve block for analgesia after total knee replacement. Int Orthop. 2014;
14. JP Benthien DH. Efficacy of continuous catheter analgesia of the sciatic nerve after total knee arthroplasty. Swiss Med Wkly. 2015;145:w14119.
15. U Grevstad OMLVPJKHJD. Effect of adductor canal block versus femoral nerve block on quadriceps strength, mobilization, and pain after total knee arthroplasty. Reg Anesth Pain Med. 2015;40:3–10.
16. RL Mizner SPLSM. Quadriceps strength and the time course of functional recovery after total knee arthroplasty. J Orthop Sports Phys Ther. 2005;35:424–36.
17. K Sato Tansnn. Continuous versus single-injection sciatic nerve block added to continuous femoral nerve block for analgesia after total knee arthroplasty: a prospective, randomized, double-blind study. Reg Anesth Pain Med. 2014;39:225–9.
18. MT Jenstrup PJJLJFSBOMTLJD. Effects of adductor-canal-blockade on pain and ambulation after total knee arthroplasty: a randomized study. Acta Anaesthesiol Scand. 2012;56:357–64.
19. Ilfeld B. Continuous peripheral nerve blocks: a review of the published evidence. Anesth Analg. 2011;113:904–25.
20. NB Foss MKHK. Prediction of postoperative morbidity, mortality and rehabilitation in hip fracture patients: the cumulated ambulation score. Clin Rehabil. 2006;20:701–8.
21. P Jaeger DZJFKHJBJGOMTLJD. Adductor canal block versus femoral nerve block for analgesia after total knee arthroplasty: a randomized, double-blind study. Reg Anesth Pain Med. 2013;38:526–32.
22. BM Ilfeld SM. The sciatic nerve and knee arthroplasty: to block, or not to block—that is the question. Reg Anesth Pain Med. 2011;36:421–3.
23. Wiesmann T, Piechowiak K, Duderstadt S, Haupt D, Schmitt J, Eschbach D, et al. Continuous adductor canal block versus continuous femoral nerve block after total knee arthroplasty for mobilisation capability and pain treatment: a randomised and blinded clinical trial. Archives of Orthopaedic and Trauma Surgery 2016 136:3 [Internet]. 2016 Jan 11 [cited 2024 Nov 19];136(3):397–406. Available from: https://link.springer.com/article/10.1007/s00402-015-2403-7
24. D Wasserstein CFRBNMRG. Advanced age, obesity and continuous femoral nerve blockade are independent risk factors for inpatient falls after primary total knee arthroplasty. J Arthroplasty. 2013;28:1121–4.
25. Wiesmann T, Piechowiak K, Duderstadt S, Haupt D, Schmitt J, Eschbach D, et al. Continuous adductor canal block versus continuous femoral nerve block after total knee arthroplasty for mobilisation capability and pain treatment: a randomised and blinded clinical trial. Arch Orthop Trauma Surg [Internet]. 2016 Mar 1 [cited 2024 Nov 19];136(3):397–406. Available from: https://pubmed.ncbi.nlm.nih.gov/26754752/
26. Continuous adductor canal block versus continuous femoral nerve block after total knee arthroplasty for mobilisation capability and pain treatment: a randomised and blinded clinical trial - PubMed [Internet]. [cited 2024 Nov 19]. Available from: https://pubmed.ncbi.nlm.nih.gov/26754752/
27. Kwofie MK, Shastri UD, Gadsden JC, Sinha SK, Abrams JH, Xu D, et al. The effects of ultrasound-guided adductor canal block versus femoral nerve block on quadriceps strength and fall risk: A blinded, randomized trial of volunteers. Reg Anesth Pain Med. 2013 Jul;38(4):321–5.
28. Adductor canal block versus femoral nerve block for pain control after total knee arthroplasty: A systematic review and Meta-analysis - PMC [Internet]. [cited 2024 Nov 19]. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9410636/#ref-list1
29. Ardon AE, Clendenen SR, Porter SB, Robards CB, Greengrass RA. Opioid consumption in total knee arthroplasty patients: A retrospective comparison of adductor canal and femoral nerve continuous infusions in the presence of a sciatic nerve catheter. J Clin Anesth. 2016 Jun 1;31:19–26.
30. Kukreja P, Bevinetto C, Brooks B, McKissack H, Montgomery TP, Alexander B, et al. Comparison of Adductor Canal Block and Femoral Nerve Block for Early Ambulation After Primary Total Knee Arthroplasty: A Randomized Controlled Trial. Cureus. 2019 Dec 9.