Intraoperative Surgeon Administered Adductor Canal Block May Have Early Functional Benefits After Primary Total Knee Arthroplasty

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INTRODUCTION: The shift toward outpatient total knee arthroplasties (TKA) has led to a demand for effective perioperative pain control methods. A surgeon-performed "low-adductor canal block (ACB)" technique, involving an intraoperative adductor canal block, is gaining popularity due to its efficiency and early pain control potential. This study examines the transition from traditional preoperative anesthesiologist performed ultrasound-guided adductor canal blocks ("high-ACB") to low-ACB, evaluating pain control, morphine consumption, functional outcomes, and complications.

METHODS: Following IRB approval, a retrospective review of 2,620 patients at a single institution who underwent a primary TKA between January 1st, 2019 and December 31st, 2022 who received either a low-ACB or high-ACB were examined. Patient characteristics and outcomes such as morphine milliequivalents (MME), Visual Analog Scale pain scores, gait distance (feet), length of stay (days), and postoperative complications (30-day readmission and 30-day ED visit) were collected.

RESULTS: Cohorts included 1,248 patients and 1,372 patients in the low-ACB and high-ACB groups, respectively. Demographics and operative times were similar. The low-ACB cohort had higher pain scores over the first 24 hours (5.05 versus 4.86, $p < 0.001$). The low-ACB cohort had higher MME at 6 hours (11.49 versus 8.99, $p < 0.001$) but no difference at 12 or 24 hours (20.81 versus 22.07 and 44.67 versus 48.78, respectively). The low-ACB cohort showed longer gait distance at first physical therapy visit (188.5 versus 165.1 feet, $p < 0.001$), shorter length of stay (0.88 versus 1.46 days, $p < 0.01$), but no difference in 30-day complications.

DISCUSSION: High-ACBs are frequently used for pain management during TKAs but have the drawbacks of blocking some motor branches, taking up to thirty minutes preoperatively, and being costly. As of December 2021, our institution has completely switched to low-ACBs which have the benefit of being quicker, cheaper, and being just as effective as high-ACBs. In terms of pain control outcomes, the low-ACB showed early inferiority with increased VAS pain scores (5.1 versus 4.6, $p < 0.001$) and increased 6-hour MME consumption (11.49 versus 8.99, $p < 0.001$) but the difference is not clinically significant. Additionally, the difference in MME was gone at 12 ($p = 0.59$) and 24 ($p = 0.11$) hours postoperatively. Functionally, the low-ACB showed superiority with further initial gait distance (188.5 versus 165.1 feet, $p < 0.001$) and decreased hospital LOS (0.88 versus 1.46 days, $p < 0.01$). For time and cost, low-ACBs are faster and cheaper as they are performed intraoperatively with no additional professional or technology fees. Limitations of this study include its retrospective nature and short follow-up duration due to the outpatient procedure.

SIGNIFICANCE/CLINICAL RELEVANCE: The low-ACB can be considered a viable pain mitigation alternative to the high-ACB while eliminating the cost and additional preoperative time in the setting of total knee arthroplasty.

	Low-ACB	High-ACB				Low-ACB	High-ACB	
	N= 1,248	N= 1,372				N= 1,248	N= 1,372	
	Frequency (%)		p-value^			Mean ± SD		p-value°
Sex			0.09		Age (years)	69.1 ± 9.1	68.3 ± 8.9	0.02*
Male	504 (40.4%)	510 (37.2%)			BMI (kg/m²)	32.1 ± 5.0	32.4 ± 4.8	0.14
Female	744 (59.6%)	862 (62.8%)			CCI Score	4.3 ± 1.6	4.2 ± 1.6	0.22
					ASA Score	2.5 ± 0.5	2.5 ± 0.5	0.96

Table 1. Comparison of Patient Demographics for Low-ACB and High-ACB Cohorts. ACB= adductor canal block; SD= standard deviation; BMI= body mass index; kg= kilogram; m= meter; CCI= Charlson Comorbidity Index; ASA= American Society of Anesthesiologists. ^= chi-square test; °= t-test; *$p < 0.05$.

	Low-ACB	High-ACB	
	N= 1,248	N= 1,372	
	Mean ± SD		p-value
Postoperative MME 6 Hours	11.49 ± 10.12	8.99 ± 10.76	<0.001
Postoperative MME 12 Hours	20.81 ± 15.33	22.07 ± 17.75	0.59
Postoperative MME 24 Hours	44.67 ± 26.45	48.78 ± 31.22	0.11
<24 Hour Postoperative VAS Pain Score	5.05 ± 1.84	4.86 ± 1.58	<0.001
Gait Distance at Initial PT Visit (feet)	188.48 ± 103.73	165.08 ± 101.39	<0.001
Operative Time (minutes)	94.2 ± 20.4	93 ± 23.4	0.08
Hospital LOS (days)	0.88 ± 1.04	1.46 ± 1.85	<0.01
	Frequency (%)		p-value
ED Visits within 30 Days	46 (3.69%)	69 (5.03%)	0.06
Hospital Readmissions within 30 Days	30 (2.40%)	43 (3.13%)	0.22

Table 2. Clinical Outcome Measurements for Low-ACB and High-ACB Cohorts. ACB= adductor canal block; SD= standard deviation; MME= morphine milligram equivalents; VAS= Visual Analog Scale; PT= physical therapy; LOS= length of stay; ED= emergency department.