

Adductor canal catheters vs. single shot blocks for total knee arthroscopy under spinal anesthesia with intrathecal morphine

Zasmine Hymes-Green MD, Andrew S. Braun MD, Jacelyn E. Peabody Lever MD, PhD, Alexander Kofskey MD, Promil Kukreja MD, PhD

Department of Anesthesiology and Perioperative Medicine
University of Alabama at Birmingham

Introduction

- The management of post-operative pain in patients receiving total knee arthroscopy (TKA) is fundamental in the recovery of patients, contributing to early rehabilitation and patient satisfaction [1].
- The use of regional anesthesia is widely employed in efforts to reduce opioid consumption while simultaneously providing adequate pain control.
- Adductor canal blocks (ACB) are preferential over femoral nerve blocks given they are less likely to incur quadriceps muscle weakness [2].
- Intrathecal morphine (ITM) has shown to be a safe and efficacious modality for analgesia following TKA [3].

Methods

- Retrospective chart review was conducted by authorized personnel of patients at University of Alabama at Birmingham (UAB) Hospital who underwent TKA in 2023 under SA in conjunction with ITM and ACB.
- All patients received 100mcg ITM at the time of spinal anesthesia.
- The patient cohorts include those who received single shot (SS) adductor canal block and those who received continuous catheter adductor canal blocks.
- Information on patient demographics, pain outcomes, and postoperative ambulation was obtained.

Results

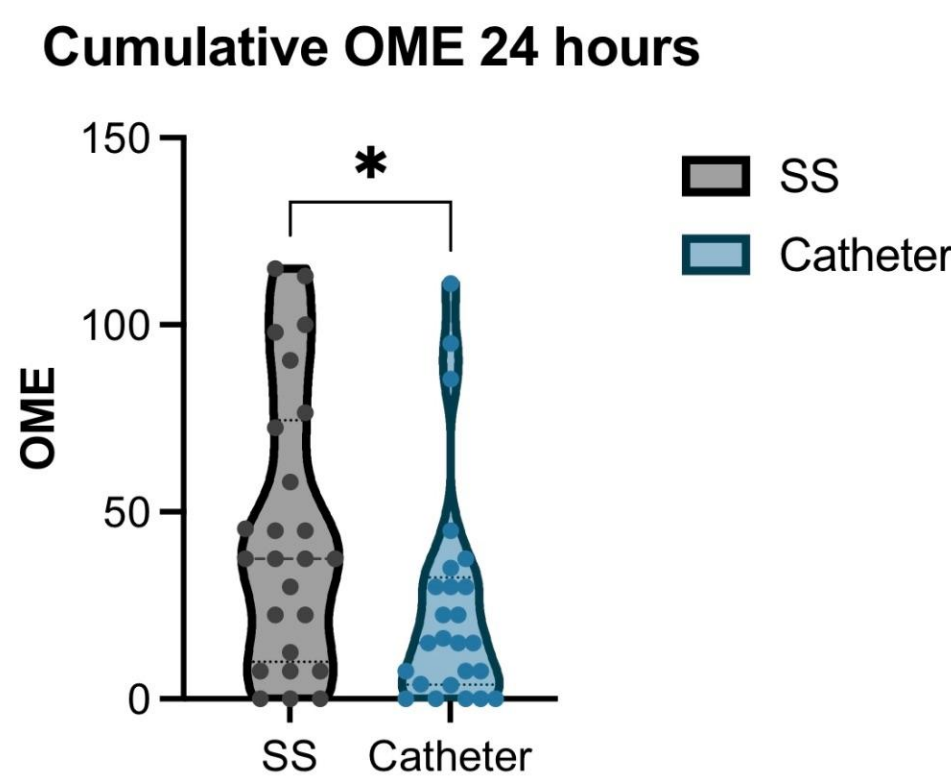
- A total of 50 patients were included: 25 single shot (SS) and 25 continuous catheter (CC).
- Cumulative oral morphine equivalents (OME) by unpaired T-Test at 24-hours postoperatively was found to be statistically significantly: mean difference $19.34 \pm \text{SEM } 9.501$ (95% CI -38.44 to -0.2362), $p=0.04$.
- There was no significant difference in OME usage at 48 hours (95% CI -54.65 to 14.29), $p=0.24$. There was no difference in Visual Analog Pain Scale (VAS) in the PACU or at 6, 12, 24, or 48 hours
- There was no difference in ambulation distance (feet) on postoperative day (POD) 1 (95% CI -59.93 to 13.40, $p=0.21$).
- There was no difference between groups in terms of demographics or ASA class.

Table 1: Demographics of study participants.

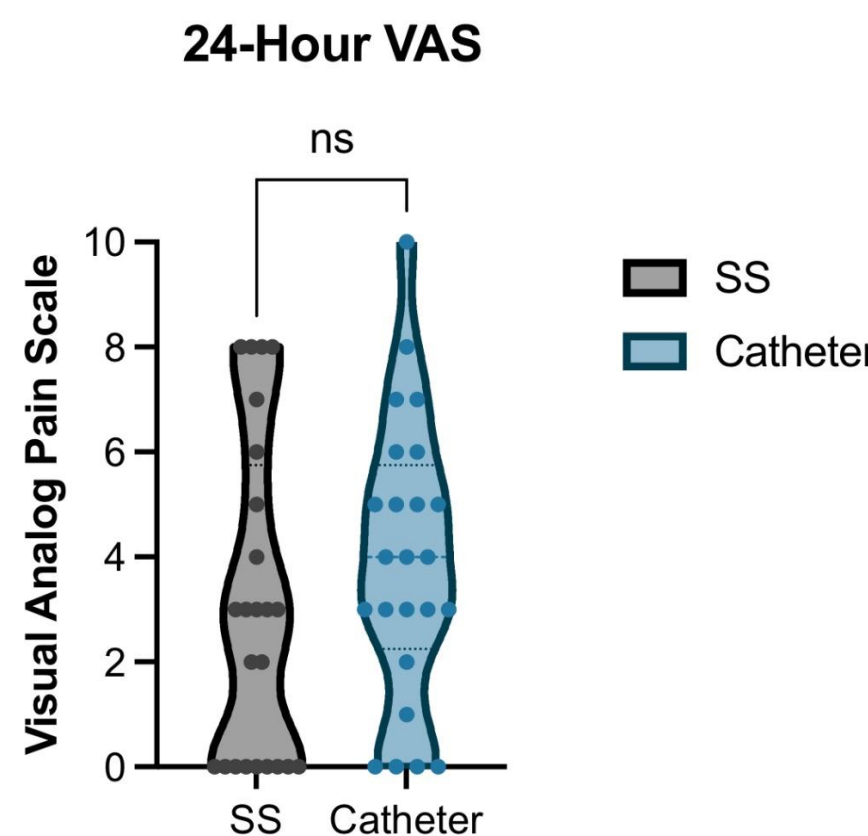
Demographic	Single Shot Control (n=25)	Catheter (n = 25)
Age (years), mean (SE)	65.4 (1.6)	64.8 (3.0)
Sex, N (%)		
Female	14(56%)	17 (68%)
Male	11 (44%)	8 (32%)
BMI, mean (SE)	31.9 (0.9)	33.4 (1.5)
ASA score, mean (SE)	2.9 (0.07)	2.8 (0.08)

Table 2: Summary of primary and secondary outcomes.

Outcome	Single Shot Control (n=25)	Catheter (n = 25)	P*
OME, mean (SE)			
24 hours (cumulative)	44.8 (7.3)	25.4 (6.1)	0.04
48 hours (cumulative)	69.5 (12.5)	49.3 (11.7)	0.24
Pain score, mean (SE), <u>maximum</u>			
PACU	1.2 (0.6), 10	1.3 (0.6), 10	0.89
6 Hours	2.4 (0.5), 8	1.8 (0.5), 9	0.43
12 hours	2.7 (0.7), 9	1.8 (0.6), 9	0.37
24 hours	3.0 (0.6), 8	3.9 (0.5), 10	0.29
48 hours	4.0 (1.1), 8	3.8 (0.7), 7	0.89
Ambulation Distance (feet) mean (SE)			
Day of surgery	36.7 (9.1)	50.1 (15.0)	0.44
24 hours	97.7 (15.5)	74.4 (8.9)	0.21
Length of stay (hours), mean (SE)	58.0 (9.3)	48.7 (6.8)	0.42



Cumulative OME at 24-hours postop is statistically significantly different between catheter and SS groups, mean difference-19.34 $\pm$ SEM 9.501 (95% CI -38.44 to -0.2362), $p=0.04$ unpaired T-Test.



VAS at 24-hours post-op was not statistically significantly different between catheter and SS groups, mean difference- 0.8750 $\pm$ SEM 0.8262 (95% CI -0.7880 to 2.538), $p=0.29$ unpaired T-Test.

Discussion

- Both SS and CC ACB are associated with unique strengths and limitations. Block procedure length, technical skills, and various patient factors play a significant role when choosing a modality, but both have been shown to provide equivalent pain control [4].
- When using SS ACB with ITM and additional multimodal agents, such as intravenous ketamine or repeated postoperative ACBs, it has not been shown to result in reduced opioid consumption or pain scores [5].
- This preliminary data demonstrates continuous adductor canal catheters were associated with decreased opioid consumption in the first 24 hours postoperatively in patients undergoing TKA under SA with ITM.
- Interestingly, despite reduced OMEs in 24 hours, the catheter patients did not report lower pain scores at any time point.

References

- Li JW, Ma YS, Xiao LK. Postoperative Pain Management in Total Knee Arthroplasty. Orthop Surg. 2019;11(5):755-761.
- Koh IJ, Choi YJ, Kim MS, et al. Femoral Nerve Block versus Adductor Canal Block for Analgesia after Total Knee Arthroplasty. Knee Surg Relat Res. 2017;29(2):87-95.
- Kukreja P, Streetzel C, Short R T, et al. Intrathecal Morphine Use Improves Postoperative Analgesia and Reduces Opioid Consumption in Patients Undergoing Total Knee Arthroplasty Under Spinal Anesthesia: A Retrospective Study. Cureus. 2023; 15(8).
- Hussain N, Brull R, Zhou S, et al. Analgesic benefits of single-shot versus continuous adductor canal block for total knee arthroplasty: a systemic review and meta-analysis of randomized trials. Reg Anesth Pain Med. 2023;48(2):49-60.
- Muñoz-Leyva F, Jack JM, Bhatia A, et al. No Benefits of Adding Dexmedetomidine, Ketamine, Dexamethasone, and Nerve Blocks to an Established Multimodal Analgesic Regimen after Total Knee Arthroplasty. Anesthesiology. 2022;137(4).