Novel Regional Anesthetic Protocol Improves Peri-Operative Efficiency After Total Knee Arthroplasty

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INTRODUCTION:
Rising demand for outpatient primary TKA has led to growing interest in protocols that facilitate same-day discharge. While mepivacaine spinal anesthesia offers faster recovery compared to longer-acting agents, motor blockade and occasional placement failure has driven interest in motor-sparing regional anesthetic techniques. However, data comparing the peri-operative efficiency of spinal versus regional anesthesia techniques is limited. We implemented a novel anesthetic protocol incorporating pre-operative motor-sparing regional anesthesia – adductor canal (ACB), infiltration between the popliteal artery and the capsule of the knee (IPACK), and anterior femoral cutaneous nerve blocks (AFCNB) – combined with intra-operative monitored anesthesia care (MAC) using a propofol infusion. We aimed to evaluate whether our protocol improved peri-operative efficiency and length of stay compared to mepivacaine spinal anesthetics.
METHODS:
Patients undergoing primary TKA from July 1, 2024 to May 1, 2025 were prospectively enrolled. Inclusion criteria included age ≥ 18, pre-operative neutral or varus knee alignment, and administration of either a mepivacaine spinal anesthetic or our regional anesthetic block protocol with IPACK, ACB, and AFCNB. Exclusion criteria included pre-operative valgus knee alignment, unicompartmental and conversion TKA, pre-operative genicular nerve ablation, administration of bupivacaine spinal anesthetic, and conversion to general anesthesia.
Anesthetic technique (mepivacaine spinal or block protocol) was assigned pre-operatively based on surgeon and anesthesiologist discretion. Our primary outcome was total time in facility. Secondary outcomes included peri-operative efficiency metrics, time to ambulation, and incidence of straight catheterization
RESULTS:
A total of 120 patients were enrolled (57 blocks, 63 mepivacaine spinals), with 38 undergoing same day surgery (21 blocks, 17 mepivacaine spinals). The mean BMI was 32.7, and all patients were ASA class II and III.
Amongst all patients, Anesthesia Start to Anesthesia Release, In OR to Cut Time, and Total OR Time were shorter in the block protocol group ($p<0.0001$, $p<0.0001$, $p=0.0397$). Similarly, Anesthesia Start to Anesthesia Release and In OR to Cut Time were shorter in the block protocol group for same day surgery patients ($p<0.0001$, $p=0.0105$); however Total OR Time and Total Facility Time were similar between groups.
Time to ambulation did not differ significantly between block protocol and mepivacaine spinal groups, however straight catheterization was more common in the mepivacaine spinal group (12/63, 19%) compared to the block protocol group (1/57, 1.8%) ($p=0.0021$).
DISCUSSION AND CONCLUSION: Our novel anesthetic protocol demonstrated improved intra-operative efficiency and reduced total time in the OR compared to mepivacaine spinals. Although time to ambulation was similar between groups, physical therapy was often delayed until hospital admission. Allowing therapy in the PACU may have revealed faster ambulation in the block group, given the motor blockade associated with mepivacaine spinals. Importantly, the incidence of straight catheterization was significantly reduced in the block protocol group, a complication that could result in overnight admission. Given our findings, we believe our novel anesthetic protocol is a viable alternative to mepivacaine spinals for outpatient TKA.

All Patients

Efficiency Metric	Block Protocol (Mean Minutes)	Mepivacaine Spinal (Mean Minutes)	p-value
Pre-op Ready to SBAR	42	39	0.4785
SBAR to Anes. Start	25	25	0.8738
Anes. Start to Surg. Start	**11**	**18**	**<0.0001**
Surg. Start to Cut Time	21	18	0.0691
In OR to Cut Time	**29**	**34**	**<0.0001**
Cut Time to Surg. Stop	99	102	0.3413
Total Time in OR	**134**	**142**	**0.0397**
Length of PACU Stay	70	73	0.5820
PACU to Floor or Discharge	136	113	0.0871
Total Time in Facility	1460 (24.3 hr)	1768 (29.5 hr)	0.2547
Time to Ambulation	326 (5.4 hr)	357 (6 hr)	0.5603
Time to Urination	203 (3.4 hr)	204 (3.4 hr)	0.9656

Same Day Surgery Patients

Efficiency Metric	Block Protocol (Mean Minutes)	Mepivacaine Spinal (Mean Minutes)	p-value
Pre-op Ready to SBAR	37	38	0.8568
SBAR to Anes. Start	18	22	0.5385
Anes. Start to Surg. Start	**11**	**18**	**<0.0001**
Surg. Start to Cut Time	19	17	0.2149
In OR to Cut Time	**27**	**31**	**0.0105**
Cut Time to Surg. Stop	94	98	0.3336
Total Time in OR	127	134	0.2336
Length of PACU Stay	64	70	0.4654
PACU to Discharge	93	102	0.4610
Total Time in Facility	585 (9.8 hr)	624 (10.4 hr)	0.0990