

Quicker and More Predictable Return of Motor Function and Ambulation After Mepivacaine vs. Bupivacaine Spinal: A Double-Blind RCT in Primary TKA and THA

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Introduction: Spinal anesthesia provides several benefits for patients undergoing total knee arthroplasty (TKA) and total hip arthroplasty (THA), but historically comes at the cost of slower return of lower extremity motor function. In this prospective, double-blind, randomized clinical trial, we sought to determine if a mepivacaine spinal would allow substantially quicker and more predictable return of motor function as compared to traditional low-dose bupivacaine spinal anesthesia during primary TKA and THA.

Methods: This trial was conducted at a single academic institution. Prior to trial initiation, strong internal pilot data determined that 154 patients were required to achieve 80% power. Patients were randomized in a 1:1 fashion with advanced computerized stratification based on procedure, sex, age group, and BMI. Following surgery, motor function was assessed in the non-operative lower extremity according to the Bromage scale and discontinued once Bromage 0 was achieved (spontaneous movement at hip/knee/ankle).

Results: Mean time to return of lower extremity motor function was 29 minutes quicker and less variable in patients receiving mepivacaine: 184 minutes (95% CI=168-199 minutes), compared to low-dose bupivacaine: 213 minutes (95% CI=184-241 minutes). Mean time to successful participation in physical therapy including ambulation was 20 minutes quicker and less variable in patients receiving mepivacaine: 399 minutes (95% CI=375-423 minutes), compared to low-dose bupivacaine: 419 minutes (95% CI=388-451 minutes). The proportion of patients experiencing postoperative orthostatic hypotension or transient neurologic symptoms in those receiving mepivacaine compared to low-dose bupivacaine was 18% vs. 11% and 0% vs. 0%, respectively (non-significant).

Conclusions: For patients undergoing primary TKA and THA, spinal anesthesia with mepivacaine allowed quicker and less variable return of lower extremity motor function compared to low-dose bupivacaine, without a concomitant increase in complications potentially associated with spinal anesthetics. This is particularly of value in an era of short-stay and outpatient surgery.