

Critical Review Form
Therapy

Sharma S, Iorio R, Specht LM, Davies-Lepie S, Healy WL. Complications of femoral nerve block for total knee arthroplasty. Clin Orthop Relat Res. 2010 Jan;468(1):135-40.

Objective: Not explicitly stated, but this retrospective review seemed to derive from the hypothesis that “patients with femoral nerve block for postoperative [post-operative was a typo, the authors obviously intended to say pre-operative] analgesia after TKA (total knee arthroplasty) would have decreased length of stay, a decreased number of post-operative complications, and an accelerated rehabilitation”. (p 135)

Methods: Retrospective review of TKA’s performed from Jan 2005 thru Dec 2007 separating those who had pre-operative femoral nerve block (FNB, N = 729, 75% of the cohort) from those who did not (non-FNB, N = 241). Data for FNB patients was collected prospectively. The non-FNB group consisted of patients who refused BNP or anesthesiologists who would perform FNP on some patients. (p 138).

FNB was performed by anesthesiologists in standard sterile fashion using a 2-inch 21-gauge needle and a Stimuplex nerve stimulator to locate the femoral nerve. After palpating the femoral artery, the Stimuplex needle was introduced lateral to the pulsation of the femoral artery with an assistant repeatedly attempting aspiration on the local anesthetic syringe to identify inadvertent intravascular needle placement. With the nerve stimulator set at 1 to 1.5 mA, the needle was advanced until twitching of the quadriceps was observed (usually upward movement of the patella) and then the stimulator was reduced to at or below 0.5 mA to maintain a twitch. Then 30-40 mL of 0.5% ropivacaine or 0.5% bupivacaine plus 1:200,000 to 1:400,000 epinephrine was injected in 5 mL aliquots while assessing for altered mental status, tinnitus, or perioral numbness. (p 136-137)

All TKA were performed via a midline skin incision but without “standardization for operative and anesthetic technique”. (p 138) Post-operatively all patients followed an inpatient clinical pathway that included early mobilization, continuous passive motion, and weight-bearing as tolerated with a walker or crutches. (p 137) Patients were followed at 2 weeks, 6 weeks, 12 weeks, and 1-year post-operatively. Only univariate statistical analyses (p-values) are presented and the authors presented no a priori sample size assumptions.

Critical Review Form: Prognosis

Guide	Comments
Are the results valid?	
<p>Was the sample of patients representative? <i>In other words, how were subjects selected and did they pass through some sort of “filtering” system which could bias your results based on a non-representative sample. Also, were objective criteria used to diagnose the patients with the disorder?</i></p>	No, not for the emergency department hip fracture patients. These are presumably stable and non-traumatic pre-op patients on Orthopedic service with planned total knee arthroplasty. ED hip fracture patients are generally older with more co-morbidities and less familiarity with underlying mental status (delirium risk), pain thresholds, opioid tolerance, or concurrent injuries.
<p>Were the patients sufficiently homogeneous with respect to prognostic risk? <i>In other words, did all patients share a similar risk from during the study period or was one group expected to begin with a higher morbidity or mortality risk?</i></p>	Maybe. “The preoperative characteristics of both groups were similar (Table 1), including the mean body mass index.” (p 136) However, many other factors could skew results. What % of patients in both groups had prior falls – since a prior faller would be more likely to fall in the immediate post-operative period. What % of patients had DM or neuropathy, both of which might increase the risk of post-operative neuropathy unrelated to the FNB.
<p>Was follow-up sufficiently complete? <i>In other words, were the investigators able to follow-up on subjects as planned or were a significant number lost to follow-up?</i></p>	“We followed patients at 2 weeks, 6 weeks, 12 weeks, and 1 year post-operatively.” (p 137) The minimum follow-up was 12 months (range 12-36 months) and “no patients were lost to follow-up”. (p 136).
<p>Were objective and unbiased outcome criteria used? Investigators should clearly specify and define their target outcomes before the study and whenever possible they should base their criteria on objective measures.</p>	No, “we did not define the complications to be studied prospectively; therefore there may be an underestimate of incidence in both groups” (p 138) Although they describe that “symptoms such as extreme quadriceps weakness (giving way of the affected extremity) and severe burning, irritation, or neurologic discomfort in the anterior thigh were causes for further neurologic work-up including electromyography/nerve conduction test” (p 136) they do not provide denominators of how many in each group were referred for further testing – just the overall rate of how many had diagnosed femoral neuropathy.
What are the results?	
<p>How likely are the outcomes over time? <i>For the defined follow-up period, how likely were subjects to have the outcome of interest?</i></p>	<p>No clinically significant differences in hospital length of stay (FNB 3.96 vs. non-FNB 4.1 days) or discharge to rehab hospital (72% vs. 73%).</p> <p>No significant differences in some complications including DVT, PE, a-fib, ileus, renal failure, re-operation, or femoral neuropathy. Differences noted in arthrofibrosis (FNB 0.3% vs. non-FNB 1.5%), pneumonia (FNB 0.3% vs. non-FNB 1.5%), and falls (FNB 1.6% vs. non-FNB 0.4%). All of the falls in both groups occurred within 48 hours of surgery and 4/13 with falls had documented confusion preceding the fall. (p 137).</p>
<p>How precise are the estimates of likelihood? <i>In other words, what are the confidence intervals for the given outcome likelihoods?</i></p>	Unknown because no 95% CI are provided.
How can I apply the results to patient care?	
<p>Were the study patients and their management similar to those in my practice?</p>	Uncertain – we do not operate on patients or manage immediate post-operative recovery or downstream rehabilitation.
<p>Was the follow-up sufficiently long?</p>	Yes, 12-months is sufficiently long and no lost to follow-up was reported.
<p>Can I use the results in the management of patients in my practice?</p>	Probably the best indirect evidence available for some orthopedic surgeon’s concerns about delayed post-operative rehab after ED femoral nerve block for acute hip fracture patients. However, extrapolation to the hip fracture patients is fraught with assumptions including similarity of stimulator guided nerve blocks and POCUS nerve blocks, as well as use of larger anesthetic volume and bupivacaine with epinephrine (ED doesn’t typically use epinephrine).

Limitations:

- 1) Dissimilar population, setting, and nerve block method (**external validity**).
- 2) Retrospective design with inadequate contemplation of known or **unknown confounders**.
- 3) No regression analysis to adjust for confounders.

Bottom Line:

Although this study indicates a concerning trend towards increased falls following femoral nerve block for knee arthroplasty patients, extrapolating these concerns to hip fracture patients in the ED is problematic. First, hip fracture patients are generally older with the possibility of multiple trauma and often cognitively frail at risk of pain-induced delirium related to oligoanalgesia. On the other hand, knee arthroscopy patients are generally more medically stable with less co-morbidities and with more time to titrate analgesia. Second, contemporary ED practice is POCUS femoral nerve block rather than nerve stimulator. Despite these limitations, the results do not highlight sufficient risk to merit avoiding femoral nerve blocks. The concerning preponderance of falls amongst femoral nerve block patients highlights the need for a post-operative fall prevention protocol including monitoring for delirium. In pre-op ED settings there is rational to support nerve blocks as a method to reduce pain-related delirium but this is still being evaluated in ED studies.