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Brief Title: Effect of Adductor Canal Block Versus Femoral Block on Pain and Quadriceps Strength

Official Title: Effects of Ultrasound-guided Adductor Canal Block Versus Femoral Nerve Block on Pain and Quadriceps Strength After Ambulatory Knee Arthroscopic Surgery

Study Protocol/Design

Patients undergoing arthroscopic knee surgery (ACL and non-ACL surgery) typically receive an ultrasound-guided femoral nerve block or an adductor canal block in the pre-operative phase for post-operative pain control. While an effective method for post-operative analgesia, the femoral nerve block is associated with profound quadriceps weakness for the duration of the nerve block, which can impair ambulation, rehabilitation, and increase the risk of falls. The more distal adductor canal block, however, contains primarily sensory branches of the femoral nerve and has been been purported by small volunteer studies to provide equally effective analgesia with minimal motor block and quadriceps weakness (as compared to femoral nerve block). We will prospectively randomize patients undergoing knee arthroscopy at the UCSF Orthopaedic Institute to receive either a single-shot femoral nerve block (control) or adductor canal block preoperatively after taking baseline measurements of quadriceps strength (quantified by maximum voluntary isometric contraction). The quadriceps muscle strength will be checked 20 minutes after the nerve block to assess strength. All patients will subsequently undergo a general anesthetic. The primary outcome variable will be post-block quadriceps strength as a percentage of baseline from pre-block values. Secondary outcome variables that we will also investigate include: VAS pain score in the post anesthesia recovery unit and post-operative day 1, time to onset of sensory block, duration of nerve blockade, block performance time, patient satisfaction score, perioperative opioid use, perioperative analgesic consumption, incidence of paresthesias, number of needle passes, incidence of post-operative nausea, vomiting, constipation, and any other complications.

Statistical Analysis:

This study is designed as a prospective two-treatment parallel-design study. The primary outcome is quadriceps strength (as measured by maximal voluntary isometric contraction, or MVIC, using a dynamometer). We will obtain baseline measurements of quadriceps strength in the pre-operative phase (pre-block), as well as post-block before surgery. Based on previous research, we assume a reduction in quadriceps strength from baseline of 48% in the adductor canal block group and 82% in the femoral block group. Setting $\alpha = 0.05$ and power = 0.8 we calculated 30 patients per group to show a significant difference with a two-sided test. To adjust for drop out and lost to follow up we increased the sample size by 10% and plan to recruit 33 patients per study group per surgery type (ACL vs. non-ACL arthroscopic surgery). 66 patients will be in the ACL surgery group and 66 patients will be in the non-ACL group. Secondary outcomes will be analyzed separately. Categorical data will be analyzed using Chisquare analysis or Fischer's exact test, depending on sample size. Comparison of means will be performed using the independent sample t-test or the Mann-Whitney U test, depending on distribution. A P-value of 0.05 or smaller will be considered statistically significant.