



A prospective double blinded randomized study of anterior cruciate ligament reconstruction with hamstrings tendon and spinal anesthesia with or without femoral nerve block[☆]



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ABSTRACT

Background: Current literature supports the thought that anesthesia and analgesia administered perioperatively for an anterior cruciate ligament (ACL) reconstruction have a great influence on time to effective rehabilitation during the first week after hospital discharge.

Purpose: The aim of this study is to answer the research question is there a difference in clinical outcomes between the use of a femoral nerve block with spinal anesthesia versus spinal analgesia alone for people undergoing ACL reconstruction?

Methods: ACL reconstruction with spinal anesthesia and patient sedation (Group one); and spinal anesthesia with patient sedation and an additional femoral nerve block (Group two). Patients were re-evaluated for pain, range of motion (ROM), active contraction of the quadriceps, and a Functional Independence Measure (FIM) scoring scale.

Results: Spinal anesthesia with a femoral nerve block demonstrates pain relief 6 h after surgery (VAS 0.37; $p = 0.007$). From the third (VAS = 4.56; $p = 0.028$) to the seventh (VAS = 2.87; $p = 0.05$) days after surgery, this same nerve blockage delivered higher pain scores. Patients had a similar progressive improvement on knee joint range of motion with or without femoral nerve block ($p < 0.002$). Group one and two had 23.75 and 24.29° 6 h after surgery and 87.81 and 85.36° of knee flexion after 48 h post op.

Conclusion: Spinal anesthesia associated with a femoral nerve block had no additional benefits on pain control after the third postoperative day. There were no differences between groups concerning ability for knee flexion and to complete daily activities during postoperative period.

Level of Evidence: Randomized Clinical Trial Level I.

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1. Introduction

Surgical reconstruction is the gold standard in treating ACL tears in the young and athletic populations due to better clinical and bio-mechanical outcomes [1–3]. Current technical advances in ligament

reconstruction have decreased surgical morbidity and, therefore, led to a better postoperative recovery [4,5].

The type of surgery that a patient is to undergo helps to determine the type of anesthesia that he/she will have, such as general, spinal, epidural, or regional anesthesia. Research for better analgesia methods for ACL reconstructed patients has been done, aiming for a more reduced post-operative adverse responses or events and, at the same time, early rehabilitation [6–8].

Many agree that the most appropriate anesthesia results in speedy recovery, leading to less postoperative pain and a shorter hospital stay [7,9,10]. Anesthesia techniques such as the femoral nerve block are often employed in elective surgeries like an ACL reconstruction. Therefore, since there is an anesthetic effect from the nerve blockage at the operated limb, patient could be discharged home and no further hospital staying would be needed, which strengthens the idea of an

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outpatient surgery. Either way, the advantage of supplemental anesthesia from a femoral nerve block is still highly controversial in the literature. Both favorable and unfavorable results for this method have been reported [7,10–12]. Furthermore, hospital-staying time could increase or decrease depending on how much pain the patient has after surgery, and associated anesthetic therapies could modify that.

The purpose of this study is to evaluate the efficacy of the femoral nerve block in addition to spinal anesthesia in respect to postoperative pain control in ACL reconstructed patients and to quantify the significance of additional anesthetic/analgesic administration in early return to activity.

2. Methods

This randomized trial was conducted from January 2010 to December 2011 after institutional review board (IRB) approval (Comite de Ética em Pesquisa da Universidade Federal de São Paulo/Hospital São Paulo–1181/11).

Inclusion criteria for the study group included [1] patients age 18–40 years [2], acute ACL tear with or without an associated meniscus injury, and [3] ipsilateral semitendinosus and gracilis tendons used as autograft in the ACL reconstruction. Patients with [1] associated bone or cartilage injuries [2], previous ligamentous knee surgery [3], concurrent surgery on the contralateral limb, and [4] those who had any other type of ligament graft or any other procedure that could change postoperative analgesia performed with the ACL reconstruction were excluded.

The main outcome measure in this study was the visual analogue scale (VAS) for pain. Type I error was pre-established as 5% (95% confidence interval) and Type II error as 20% (power of 80%) to find at least a two-point difference within the VAS at any time during our evaluation, with a population standard deviation of two points in the VAS [13].

Thus, assuming values previously described in the text, we have anticipated that 15 participants would be required for each group. After signing an informed consent, patients were allocated using a sealed envelope system in two groups considering the type of procedure to

Table 1

Patients' characteristics. F = female, M = male; BMI = body mass index; ACL rec = anterior cruciate ligament reconstruction; MM = medial meniscus, LM = lateral meniscus.

Group 1 vs. Group 2					
Patients	Age	Gender	BMI	Surgery	Concomitant injury
Group 1	28	4 F + 10 M	27.02	ACL rec	2 MM, 2 LM, 1 MM + LM
Group 2	27	5 F + 11 M	29.27	ACL rec	6 MM

be performed: ACL reconstruction with spinal anesthesia and patient sedation (Group one); and spinal anesthesia with patient sedation and an additional femoral nerve block (Group two) (Fig. 1).

The same fellowship-trained, senior orthopedic surgeon performed all surgeries. Similarly, the same anesthesiologist performed all anesthesia and femoral nerve block procedures. He was the only one aware, after opening the respective sealed envelope just before surgery, to which group the patient belonged. The orthopedic surgeon, the patient, and physiotherapists did not have access to the group in which each patient was allocated.

A total of 32 patients undergoing arthroscopic ACL reconstruction were included for study analysis. Two patients were excluded because of associated chondral injury that required a simultaneous osteochondral autograft plug transplantation (OATS). There were 14 subjects in Group one and 16 in Group two (Table 1).

2.1. Spinal anesthesia

Spinal anesthesia was performed with the injection of 3 ml (15 mg) of 0.5% bupivacaine between L4–5.

2.2. Femoral nerve block

The femoral nerve was localized through ultrasound guidance and electrical stimulation with a Sonosite M Turbo® device with a flat transducer. After the nerve was localized, a needle was inserted and 30 ml of

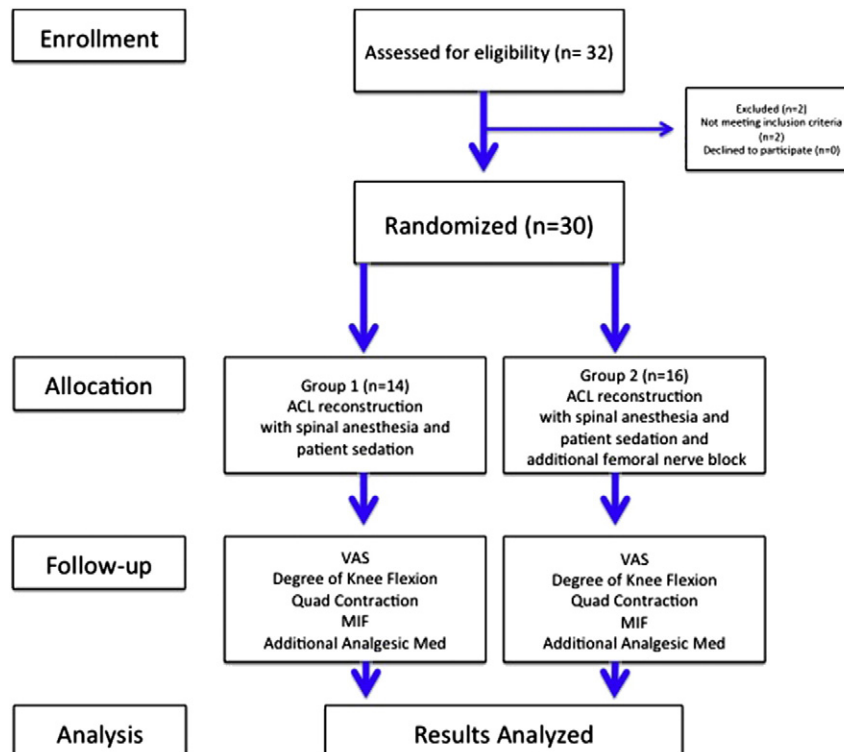


Fig. 1. Clinical trial flow diagram.

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