Femoral nerve block versus adductor canal block for postoperative pain control after anterior cruciate ligament reconstruction: A randomized controlled double blind study

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ABSTRACT

Background: The objective of this study was to evaluate the reliability of the postoperative pain control using adductor canal block (ACB) compared that using the femoral nerve block (FNB) in patients with anterior cruciate ligament reconstructions (ACLR). Materials and methods: One hundred and twenty-eight patients who had been scheduled to patellar graft ACLR were included in this double blind study, and were randomly allocated into two groups; group ACB and group FNB (64 patients each). All patients received general anesthesia. At the end of the surgery, patients in group FNB received a FNB and those in group ACB received an ACB. The postoperative pain (visual analog scale [VAS]) and muscle weakness were assessed in the postoperative care unit and every 6 h thereafter for 24 h. The total morphine requirements were also recorded. Results: Patients in group ACB had significantly higher VAS (at 18 h and 24 h), higher morphine consumption, but significantly less quadriceps weakness than those in group FNB. Conclusion: In patients with patellar graft ACLR, the ACB can maintain a higher quadriceps power, but with lesser analgesia compared with the FNB.

Key words: Anesthetic techniques, anesthetics local, equipment, femoral, regional, ropivacaine, ultrasound machines

INTRODUCTION

The anterior cruciate ligament injury is a common athletic injury and one of the most commonly treated conditions of the knee. Approximately, 60,000-175,000 anterior cruciate ligament reconstructions (ACLR) procedures are performed annually in the United States (US). The ACLR is widely accepted as the treatment of choice for individuals with functional instability due to anterior cruciate deficiency. Femoral nerve blocks (FNB) have been shown to significantly improve postoperative analgesia compared with systemic opioid therapy, and it may even reduce hospital length of stay after knee procedures. Therefore, FNB was commonly added to general or centroxial anesthesia to achieve adequate pain control after ACLR. Recently, the adductor canal block (ACB) has been described and used frequently as postoperative analgesia after total knee arthroplasty, where it was shown to provide a reliable postoperative pain control with less quadriceps weakness compared with that of using the FNB. However, the analgesic effectiveness of the ACB after ACLR surgeries has not yet been adequately studied. The objective of this study was to evaluate the reliability of the postoperative pain control using ACB compared that using the FNB in patients with patellar graft ACLR.

MATERIALS AND METHODS

This prospective controlled randomized double-blind study was approved by the Research and Ethical Committee of Burjeel Hospital, Abu Dhabi, UAE, and was conducted between January and July 2014. One hundred and twenty-eight patients (American Society of Anesthesiologist [ASA] I or II, aged 18-45 years) who were scheduled for patellar...
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Variables | Group FNB | Group ACB | P
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Age (year) mean (SD) | 28 (12) | 27 (13) | 0.651
Gender (male/female) | 58/6 | 53/11 | 0.297
ASA (I/II) | 52/12 | 55/9 | 0.633
BMI (kg/m²) mean (SD) | 27.5 (3.9) | 26.7 (3.6) | 0.230
Duration of surgery (min) mean (SD) | 118 (36) | 105 (48) | 0.085

ASA: American Society of Anesthesiologist; BMI: body mass index; SD: Standard deviation; FNB: Femoral nerve block; ACB: Adductor canal block
less quadriceps muscle weakness, but also in a less analgesia compared with that of the FNB.

The ACL is the most common torn knee ligament and its reconstruction is the second most common knee surgery.[15] Early ambulation after ACLR surgery is one of the most important targets of modern anesthesia. It minimizes the bedridden related risks, improves the patient recovery and allows early hospital discharge.[16] Two main parameters can hasten or delay the early ambulation; the muscle power and the severity of pain during movements. Unfortunately, improving one of these parameters usually impairs the other. For many decades, the femoral nerve has been used to achieve analgesia after lower limb surgery.[5-7] Recently, a selective block of the femoral nerve branches within the adductor canal has been described.[9-12] The adductor canal is an inter-muscular space lying in the mid-thigh, between the adductor longus, sartorius, and the vastus medialis muscles. It contains superficial femoral vessels and only two branches of the femoral nerve; the saphenous nerve (a pure cutaneous nerve) and the nerve to vastus medialis.[9-12]

Many studies have shown that the ACB can provide adequate analgesia after knee arthroplasty comparable to that with the FNB.[9-12] Unlike the knee arthroplasty, during the ACLR, an allograft (hamstring or patellar tendon) is usually harvested. The patellar tendon (used in this study) is purely supplied by the motor fibers of the femoral nerve. This may explain the better analgesia achieved with FNB group in the current result compared with that in ACB group. In contrast, a recent study showed that both blocks had comparable postoperative analgesia after ACLR.[17]

In the current study, ACB has shown to reduce the quadriceps muscle strength in some patients, but to a limited extent compared to the FNB patients. This may be due to blocking the nerve to vastus medialis muscle that lies within the adductor canal. Jaeger et al.[18] reported that the ACB can reduce quadriceps muscle strength (8%) compared with placebo, but such reduction was not considered functionally important. In comparison, the FNB reduced quadriceps strength by 49%.[18] It was also reported that both the ACB and the FNB may reduce adductor strength as the ACB may block the posterior branch of the obturator nerve while the FNB blocks the innervations of the pectineus muscle and may spread to the obturator nerve.[18,19]

All the studied patients underwent ACLR using patellar tendon graft and most of them were males. Therefore, the above result may not be applicable for other knee procedures or for the female gender.

CONCLUSION

In patients with patellar graft ACLR, the ACB can maintain a higher quadriceps power, but with lesser analgesia compared with the FNB.

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Figure 1: Visual analogue scale values. *statistically significant

Figure 2: Quadriceps motor block. ACB: Adductor canal block, FNB: Femoral nerve block, *statistically significant
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