

Research Article

Comparison Between The Effect of Ultrasound Guided Adductor Canal Block Versus Femoral Nerve Block on Postoperative Pain After Knee Arthroscopy

Nagy S. Ali, Mohamed Abd-Elmoneim and Ahmed M. Abass

Department of Anesthesia and Intensive Care Unit, Faculty of Medicine, Minia University

Abstract

Introduction: Optimal pain relief is essential for functional recovery after total knee arthroplasty (TKA), addition of femoral nerve block to an analgesic regimen provides superior pain control and shorten hospital stay, in comparison with epidural or intravenous patient-controlled analgesia (PCA) alone, However 0 Prolonged motor blockade from femoral nerve block is associated with a small (2%) but clinically important risk of fall. **Methods:** Patients were randomly classified into 2 groups using computer generated table numbers, each group contained 30 patients. Group (I) who received 150 adductor canal block. Group (II) who received femoral nerve block. **Results:** ultrasound guided adductor canal block is an equally effective as Femoral nerve block with respect to postoperative pain, rescue analgesia, total analgesic requirements and patient satisfaction and it is associated with early mobilization and preservation of quadriceps strength. On the basis of this data ACB is an interesting alternative to FNB in anterior cruciate ligament reconstruction.

Key words: adductor canal, femoral canal, nerve block, postoperative pain, knee arthroscopy..

Introduction

Total joint replacements are gaining popularity, Motor preservation with adequate analgesia has become the optimal postoperative pain goal in orthopedic surgeries to enable earlier physical therapy, faster recovery and shorter hospital stays,(Allen et al., 1999).

With the advent of ultrasonography, the adductor canal can be easily visualized at the mid-thigh level, allowing performance of adductor canal block ACB with a high success rate, (Jaeger et al., 2012)

In recent years, ACB has been successfully used for postoperative pain control after knee surgery (Akkaya et al., 2008)

Anatomical study of the adductor demonstrated that the adductor canal may serve as a conduit for more than just the saphenous nerve, possibly including the vastus medialis nerve, medial femoral cutaneous nerve, articular branches from the obturator nerve, as well as the medial retinacular.

Patients and Methods

After ethical committee approval and written informed consent was obtained from all patients, this prospective randomized single blinded study (patients were blinded to group assignment) was carried out at El-Minia University Hospital during the period from August 2017 to January 2018. A total of 68 patients of either sex, age between 18-60 years. American society of anesthesiologists class I or II were scheduled for elective unilateral anterior cruciate ligament reconstruction under Subarachnoid block.

A careful medical history was taken General examination including (heart rate, mean arterial blood pressure and peripheral arterial oxygen saturation) and physical examination (chest, heart, abdomen and other systems) were carried out. Routine investigations were done such as complete blood count, prothrombin time, partial thromboplastin time, liver and renal functions. Patient instruction about the use of 0-10 numerical rating scale (NRS) with end points of 0 (no pain) and 10 (worst pain)

imaginable) and 0-12 manual muscle testing grading system (as end pint 0) (No muscle activation apparent by palpation or observation) and 12 complete range of motion against gravity and holds against maximal force). Intravenous access was established and 10ml/kg normal saline was given as preload and standard monitoring devices including Electro cardio gram (ECG) plus oximetry and non invasive arterial blood pressure monitoring (Space Labs Healthcare Company, USA).

Lubar puncture with 25 gauge Quinkeneedle. The patient was placed in sitting position, the spinal needle was introduced at level L4-5 interspace as midline approach and under complete aseptic condition after free flow of CSF was obtained, 3ml (15mg) of hyperbaric bupivacaine was injected. After received subarachnoid block patient was placed in supine position, then the pt received adductor or femoral nerve block.

The sample size for this study was calculated based on a pilot study. We determined that if the mean difference between patients who underwent ACB and those who underwent FCB regarding 1st analgesic request –post block (in hour) was 0.1 (\pm standard deviation of 0.14) with 80% power (with a two sided alpha error of 0.05), at least 31 patients per group were needed and taking into account dropouts, we set the target sample size at 34 per group.

Statistical analysis

Data were collected, revised, verified, coded, then entered PC for statistical analysis done by using SPSS statistical

package version 20, for windows (SPSS Inc. Chicago, IL, USA).

Results

The results of this study found that heart rate, mean arterial blood pressure and oxygen saturation were comparable between groups.

Regarding Numerical rating scale at rest and movement during comparing the two groups, there were no statistically significant differences between the two groups in NRS at all time intervals. The time to first analgesic request demonstrated no significant deference between the two groups and subsequently the two analgesic requirements were statistically insignificant between the two groups.

As regard quadriceps muscle strength was significantly increased in adductor group (A) than femoral group (F) and the same for the time of ambulation there were statistically significant differences ($P < 0.05$) between the two groups at time (after nerve block, 1, 6, 8hrs).

Percentage of patients who satisfied from the technique were comparable at all time points.

Numerical rating scale (NRS) decreased less than 4 in both groups (after nerve block, 1, 6, 10, 18 and 20hrs) and none of the patients required analgesia. NRS increased at 24 hrs and 1st dose of analgesia (paracetamol and nalbuphine) was give; at 24hrs NRS was higher insignificantly in (F) group as compared with (A) group. Inter-group comparison showed that values of NRS increased significantly at 24hrs has compared with the basal values in the two groups.

Time	ACB group (n=34)	FNB group (n=34)	Z	P-Value
	Median (IQR)	Median (IQR)		
Post-operative				
After nerve block	1(0-1)	1(0-0.1)	-1.718	0.091
One hour	1(1-2)	1(1-2)	-1.088	0.281
Six hours	1(1-2)	2(1-2)	0.859	0.394
Ten hours	2(1-2)	2(1-3)	-1.656	0.102
Eighteen hours	2(1-3)	2(2-3)	-1.180	0.242
Twenty hours	3(1-3)	3(2-3)	0.884	0.380
Twenty-four hours	*4(2-4)	*4(3-4)	1.214	0.229

Discussion

In this study we evaluated the efficacy, safety and advantages of adductor canal block as compared to femoral nerve block regarding numerical pain score, first analgesic request, total analgesic requirements, quadriceps strength, time of ambulation and patient satisfaction.

In the current study Adductor canal block was effective as femoral nerve block as regard pain score, duration of postoperative analgesia, total analgesic requirement and was associated with early mobilization so it can be used as alternative to FNB in anterior cruciate ligament reconstruction.

As regard numerical pain score at rest and movement, total analgesic requirements and first analgesic request were almost of the same values up to 24hrs postoperative. Preservation of Quadriceps muscle strength measured by using manual muscle test grading system made by (Bohannon, 2001) increased adductor group than femoral group in the time (1hr, 6hrs, 8hrs) after nerve block as p-value <0.05, and the two groups were similar after 8hrs post nerve block till the end of the study.

Regarding Time of ambulation (hours) it was earlier in (A) group (1.52 ± 0.34) than (F) group (8.5 ± 1.4) as p-value <0.001, so patients who received ACB had less effect on quadriceps muscle, allow its preservation and associated with early mobilization.

References

1. Akkaya T, Ersan O, Ozkan D, Sahiner Y, Akin M, Gümüs, H, Ates Y: Saphenous nerve block is an effective regional technique for postmeniscectomy pain, Knee surgery, Sports Traumatology, Arthroscopy 2008, 16:855-858.
2. Allen Hw, Liu SS, Ware PD, Nairn CS, Owens BD: Peripheral nerve blocks improve analgesia after total knee replacement surgery. *Anesthesia & analgesia* 1998; 87:93-97.
3. Baek S-M: Two new cutaneous free flaps: the medial and lateral thigh flaps. *Plastic and reconstructive surgery* 1983; 71:354-365.
4. Bamigboye AA, Hofmeyr GJ: Local anaesthetic wound infiltration and abdominal nerves block during caesarean section for postoperative pain relief. *The Cochrane Library* 2009.
5. Ban CH & Derek: Continuing medical education: Ultrasound guidance for regional blockade-basic concepts. *Canadian Journal of Anesthesia/ Journal canadien d'anesthésie*. 2008 Dec 1;55(12): 869-74.
6. Barys, Ihnatsenka, Boezaart AP.: Ultrasound Basic understanding and learning the language. *International journal of shoulder surgery*. 2010 Jul; 4(3):55.
7. Bloom SL, Sheffield JS, McIntire DD, Leveno KJ: Antennal dexamethasone and decreased birth weight. *Obstetrics & Gynecology* 2001; 97:485-490.