Knee Surg Sports Traumatol Arthrosc (2008) 16:855–858
DOI 10.1007/s00167-008-0572-4

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Saphenous nerve block is an effective regional technique for post-menisectomy pain

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Received: 17 March 2008 / Accepted: 15 May 2008 / Published online: 24 June 2008

Abstract In this study we have evaluated the post menisectomy pain relief offered by Saphenous nerve block. This study was planned on 40 patients with a pre-operative and post operative diagnosis of medial meniscus lesion undergoing partial menisectomy arthroscopically. Patients were randomized into 2 groups where Group I received a preoperative Saphenous block while group 2 did not receive a peripheral block, but received 1 ml of saline as placebo injection. After blocks both groups received general anesthesia and IV patient controlled analgesia (PCA) with tramadol for post operative pain relief. Patients rest and activity pain scores were evaluated on post operative 0, 2, 4, 6, 12 and 24 h using visual analog scale (VAS). Total tramadol consumption as well as pain at rest, when weight bearing and the need for external support while walking were recorded. Group I VAS scores were statistically lower then group II during the time of observation periods at rest as well as active movement periods. Tramadol consumption through IV PCA was statistically significantly lower in group I than in group II ($P < 0.05$). Pain during walking measured at 24 h was significantly different with better results in group I ($P < 0.001$). Saphenous nerve block is used for different indications; it can also be a good analgesic method for arthroscopic interventions. We have shown it to be effective after medial partial menisectomies. According to our knowledge this report is the first one utilizing saphenous nerve block for pain after arthroscopic medial menisectomy.

Keywords Saphenous nerve block · Arthroscopic knee surgery · Medial menisectomy · Postoperative analgesia

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Introduction

Arthroscopic knee surgery causes minimal tissue trauma through a very small surgical exposure but early postoperative pain is still a major problem in some of these cases making early discharge difficult [13]. Pain sometimes affects early discharge even though different regional anesthesia approaches (both central and peripheral as well as intraarticular) have been utilized up to date with conflicting results [12]. It has been shown that intraarticular local anesthetics are effective in analgesia, in addition femoral nerve blocks have also shown a decrease in the post operative opioid analgesia requirements [7, 9].

The saphenous nerve is the only cutaneous branch of the posterior division of the femoral nerve. It arises in the femoral triangle, descends lateral to the femoral artery, then enters the adductor canal of Hunter where it crosses in front of the femoral artery. The saphenous nerve supplies an extensive cutaneous area over the medial side of the knee, leg, ankle and foot [6]. Saphenous nerve block is used for ankle surgery and varicose vein surgery and also used in pain clinics for saphenous neuralgia and nerve entrapments in the adductor canal [3].

In this study we have aimed at demonstrating the effect of saphenous nerve block in arthroscopic medial menisectomy surgery for better post operative pain, analgesic requirements and patient comfort.

Materials and methods

After Local Ethic Committee approval was obtained two groups composed of 20 patients each, ASA I–II, were planned. A sample size of 20 per group was required to detect any decreasing in VAS according to baseline with a power of 90% at the 5% significance level [8].

After written consent from each patient an envelope was drawn and the patient was allocated into a group. Patients allergic to local anesthetic drugs, those that had active infection, neurological problems and those that had coagulation problems were excluded from the study. Failed blocks were also planned to be excluded from the study. Group I patients received saphenous nerve block while Group II did not receive a block but 1 ml of isotonic saline at the region of the block.

All patients had medial menisectomy. Patients with additional pathologies requiring intervention were excluded from the study and a new envelope with the same group written on was added to the envelopes for randomization.

All patients received 0.01 mg/kg midazolam IM 45 min prior to the operation as premedication. Then patients were admitted to the pre-anesthesia room where an envelope was opened and the patient was allocated into a group during that time the patients were monitorized.

In group I after appropriate preparation and skin cleaning the leg to be operated was raised by the patient to extension and the Sartorius muscle is palpated just superomedially of the patellar edge. The needle is inserted 3–4 cm superior and 6–8 cm posterior to the superomedial border of the patella according to the transsartorial approach of Benzon [2]. Nerve stimulation needle (Stimuplex® D, Braun 10 mm) was passed caudally at a 45° angle and directed slightly posteriorly [2]. After depth of 3–5 cm the nerve stimulator (Stimuplex® DIG) with a 0.6 mA stimulation (2 Hz frequency and 0.1 ms duration) was activated if contraction of the vastus medialis was seen 10 ml of 0.5% levobupivacaine was injected. The block was done by the same investigator (T. A.). Sensory blockade of the medial of the leg was tested by pinprick every 1–2 min for 30 min. After 30 min the patient was transferred to the operating room.

Group II patients were also admitted to the same room and 1 ml of saline was injected to the same region. After 30 min the patient was transferred to the operating room.

Anesthesia induction was performed with propofol 2 mg/kg, atracurium 0.5 mg/kg iv and Laryngeal mask airway (LMA) inserted. 2–4% sevoflurane, 50% N_2O and 50% O_2 was used for maintenance of anesthesia. No opioid medication was given during the peri-operative period. All patients received patient controlled analgesia (PCA) (Pain Management Provider, Abbott®) for 24 h post-operatively. Tramadol IV with 20 mg bolus PCA dose, 20 min lock period and a total of 200 mg for 4 h was adjusted.

Both groups has preoperative (basal) and postoperative 0, 2, 4, 6, 12, 24 h resting and activity (45–60° flexion of the operated knee) pain was measured using visual analog scale (VAS). Also pain at walk 24 h post surgery and whether the patient tolerated walking without support was also noted. Total amount of PCA use as well as related complications (nausea, vomiting) were also noted.

All data was analyzed using SPSS 11.5 program. All data is shown using mean, type I and II error, ±SD s and as %. Students *T*-test or Mann-Whitney *U* test was used to evaluate significance between averages. Categorical comparison was done using Chi-square or Fisher's exact test and $P < 0.05$ was accepted as significant.

Results

Patient characteristics are demonstrated in Table 1. There was no significant difference regarding age, sex, BMI, ASA scores and the duration of operation ($P > 0.05$). All the blocks were performed successfully, one patient in group I and two patients in group II had additional pathologies that required removal from the study groups (their data was not analyzed).

When comparing VAS scores at resting times on post-operative 0, 2, 4, 6, 12 and 24 h all showed a lower value in Group I compared to group II. ($P < 0.05$) (Table 2). Also post-operative VAS scores obtained during activity on post-operative 0, 2, 4, 6, 12 and 24 h all showed a lower value in Group I compared to group II. ($P < 0.05$) (Table 3).

Pain at rest and activity and ability to bear weight and weight bearing pain scores were recorded at 24 h as seen on Table 4. When asked to flex the knee to 45–60° only 1 patient in group I (5%) complained of any pain while 13 (65%) of the patients in group II complained of pain ($P < 0.05$). On weight bearing activity at 24 h post operative period 3 patients (15%) in group I reported pain while 13 (65%) of the patients in group II reported pain on weight bearing.

Table 1 Demographic characteristics of the groups

	Group 1 ($n = 20$)	Group 2 ($n = 20$)	*P*
Age (years)	43.6 ± 9.51	47.9 ± 12.22	0.217
Sex (M/F)	9/11	11/9	0.527
BMI (kg/m^2)	27.7 ± 4.70	27.9 ± 3.81	0.825
ASA	1 (1–2)	1 (1–3)	0.925
Duration of surgery (min)	45.0 ± 8.7	43.8 ± 9.6	0.681

Table 2 Resting VAS scores and statistical evaluation

	Group 1 ($n = 20$)	Group 2 ($n = 20$)	P
Preop	3.85 ± 3.15	3.55 ± 2.21	0.968
0 h	3.15 ± 3.03	5.25 ± 2.17	0.010*
2 h	0.55 ± 0.94	3.25 ± 2.12	<0.001*
4 h	0.75 ± 0.25	2.60 ± 1.10	0.003*
6 h	0.50 ± 0.10	2.25 ± 1.81	<0.001*
12 h	0.34 ± 0.19	1.90 ± 1.64	0.002*
24 h	0.15 ± 0.11	1.70 ± 1.54	<0.001*

Asterisk shows statistically significant differences between groups ($P < 0.05$)

Table 3 VAS scores during activity in bed and statistical evaluation

	Group 1 ($n = 20$)	Group 2 ($n = 20$)	P
Preop	6.95 ± 2.48	6.5 ± 2.01	0.414
0 h	4.25 ± 3.26	6.60 ± 2.46	0.017*
2 h	1.30 ± 1.38	5.0 ± 2.67	<0.001*
4 h	1.8 ± 1.38	3.9 ± 1.59	0.011*
6 h	1.7 ± 1.75	4.05 ± 2.21	<0.001*
12 h	1.45 ± 2.09	2.20 ± 1.91	0.002*

Asterisk shows statistically significant differences between groups ($P < 0.05$)

Total dose of tramadol consumption through the PCA pump in the first 24 h was 108.5 ± 84.68 mg in group I and 217.1 ± 128.37 mg group II ($P < 0.05$) (Table 4).

There was no correlation within both groups regarding the rate of complications ($P > 0.05$) (Table 4).

Discussion

In an age of cost containment and day case surgery methods to decrease pain after surgery facilitates early discharge and also is a virtue for the patient comfort [11]. Different aspects of pain relief has been studied for pain relief after arthroscopic surgery. Various intra-articular agents (local anesthetics, opioids, some Non-steroidal anti inflammatory drugs etc.) have been used with different results [1, 14, 15]. Spinal anesthesia and also femoral blocks have also been used [4]. Some authors even favor arthroscopic surgery under local anesthesia [10]. We have tried a new technique of pain reduction after surgery by using a peripheral block to the saphenous nerve at the level under the tourniquet to see whether it would be feasible to use before surgery by the surgical team to obtain a post operative painless period, therefore facilitate same day discharge. Considering the chance of failed blockage when done by the surgeons before familiarizes themselves with the block and to avoid false negative results of failed blocks, we have used a nerve stimulator.

Saphenous nerve block was first reported by van der Wal M et al. through a trans-sartorial approach [16]. When using the LOR (loss of resistance) technique the rate of blockage is around 80% while using a nerve stimulator gives success rates of over 95%, we have reached 100% in this series [5]. Saphenous nerve block in arthroscopic medial menisectomy has given superior results in resting and activity VAS values during the first day after surgery when compared to the control group and also it facilitated a reduction in the need for post operative analgesia using tramadol for pain relief. Therefore saphenous nerve block can be a good adjunct for post operative pain relief.

Benzon et al. has compared transsartorial, perifemoral, below-the-knee field block, block at the medial femoral condyle and block at the medial malleous which showed saphenous nerve block through transsartorial approach resulted in complete sensorial block on the medial side of the thigh down to the medial part of the foot [2]. Since Saphenous nerve has only sensorial branches in order to test the depth of analgesia offered by its block we have used medial menisectomy as a pioneering procedure for pain relief after arthroscopic surgery.

Anesthesia for arthroscopic surgery can be done through general, spinal or a combination of peripheral blocks with intra-articular injection of large volumes. General anesthesia has the disadvantages of late recovery, cardiac and pulmonary complications, whereas other methods require large volumes of local anesthetics which both preclude early discharge [5, 16]. Selective blocks require lower volumes there can facilitate early discharge and our groups showed a favorable outcome in the saphenous nerve block group. For this study, only preoperative diagnosis of a medial meniscus lesion was included into this study, and preoperative block also used the

Table 4 Pain of various activity 24 h after surgery and statistical evaluation

	Group 1 ($n = 20$)	Group 2 ($n = 20$)	P
Activity in bed	1 (5%)	13 (65%)	<0.001*
Weight bearing	3 (15%)	13 (65%)	<0.001*
Weight bearing without help	13 (65%)	3 (15%)	<0.001*
PCA tramadol dose (mg)	108.5 ± 84.68	217.1 ± 128.37	0.003*
Nausea and vomiting	3 (15%)	2 (10%)	1.00

Asterisk shows statistically significant differences between groups ($P < 0.05$)

advantages of a pre-emptive effect of the block. Future use in patients after a diagnosis may help to show the effectiveness of pre-emptive blockade.

Therefore a blind technique (without nerve stimulator) could be sought to decrease pain relief and facilitate early discharge keeping in mind that there is a chance of 20% failure. If possible cooperation with the anesthesia team to perform the block before surgery and using a long acting local anesthetic will increase the chances success.

Conclusion

This study shows that saphenous nerve block can be a good adjunct for post operative pain relief in patients undergoing medial menisectomy as well as a technique increasing patient comfort after surgery.

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