EFFECT OF ULTRASOUND-GUIDED SUBSARTORIAL APPROACH FOR SAPHENOUS NERVE BLOCK IN CASES WITH SAPHENOUS NERVE ENTRAPMENT IN ADDUCTOR CANAL FOR CONTROLLING CHRONIC KNEE PAIN.

ARMAN TAHERI*, MARYAM HATAMI**, MAJID DASHTI***, ALIREZA KHajeHNASIRI**** and MAHSA GHAJARZADEH*****

Abstract

**Background:** Saphenous nerve neuropathy is one of the causes of chronic pain of the knee.

Blockade of saphenous nerve under sonographich guide has been used for controlling pain in recent years. The goal of this study was to evaluate the effect of saphenous nerve block for controlling pain in patients with chronic knee pain.

**Method:** Thirty five patients with chronic knee pain referred to Amir Alam hospital during June 2012-June 2013 were enrolled in this study. Under sonographic approach, subsartorial blockade of saphenous nerve conducted and patients were followed up for 3 months after treatment. Demographic data, ASA (American Society of Anesthesiologists) category, weight, height, complications of intervention and pain scores were recorded.

**Results:** In 54%, the NRS was zero 30 minutes after intervention. In one patient (2.8%) all NRSs were 0 after intervention. We observed no sensory dysfunction in enrolled cases.

**Conclusion:** the result of current study showed that ultrasound guided subsartorial approach is moderately effective in blockade of saphenous nerve in cases with saphenous nerve entrapment in adductor canal for controlling chronic knee pain.

**Keywords:** ultrasound-guided block, knee pain, pain management.

Introduction

Saphenous nerve is a terminal branch of the femoral nerve which innervates medial, anteromedial, and posteromedial aspects of the lower extremity. Saphenous nerve entrapment is one of the causes of chronic knee pain (especially at medial site) which could mimic orthopedic disorders of the knee or L4 radiculopathy.

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* FIPP, Assistant professor of Anesthesiology, Iran section of World Institute of Pain Director, Chairman of Tehran University of Medical Science Fellowship Program, Department of Anesthesia & Pain Management Amiralam Hospital, Tehran University of Medical sciences, Tehran, Iran.
** Pain fellowship, Department of Anesthesia & Pain Management, Tehran University of Medical Sciences, Tehran, Iran.
*** Cardiac anesthesia fellowship, department of anesthesia, Shahid rajaee hospital, Tehran University of Medical Sciences, Tehran, Iran.
**** Assistant Professor of Anesthesiology and Pain, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran.
***** Brain and Spinal Injury Repair Research Center, Tehran University of Medical Sciences, Tehran, Iran.

**Corresponding author:** Maryam Hatami MD. E-mail: swt_1392@farasa.org
Blockage of saphenous nerve could be applied for procedures on the medial aspect of the distal leg. Different approaches could be applied for blockage of saphenous nerve such as perifemoral, trans-sartorial, block at the medial femoral condyle, below-the-knee field block, and blockade at the level of the medial malleolus. Benzon et al found that trans-sartorial approach was the best approach for complete sensory blockade.

In recent years, blockade of the saphenous nerve under the guidance of ultrasound has been considered as an acceptable approach. Tsai et al reviewed the medical records of 39 cases who underwent subsartorial saphenous nerve block for lower extremity surgery and found that this technique was successful in 77% of cases.

The aim of the study is to evaluate effect of saphenous nerve block in cases with saphenous nerve entrapment in adductor canal for controlling chronic knee pain.

**Method and material**

In this cross sectional study which conducted between June 2012-June 2013 in Amir Alam hospital (affiliated hospital of Tehran university of medical sciences), patients with chronic knee pain (pain more than 3 months), Numeric rating scale ≥7 and tenderness in adductor canal were enrolled. Patients with previous surgery of lower extremities, recent trauma to the knee, consumption of anti-coagulant agents, drug abuse, severe osteoarthritis (according to radiologic findings), allergy to local anesthetic agents, psychologic disorders, and active infection were excluded.

For blockade, patients were placed in supine position, with the lower extremity rotated externally at the hip, and the knee slightly flexed. The mid-thigh area was prepped and 8-12 MHz linear probe was placed at the proximal aspect of the leg (10 cm proximal to medial condyle) to obtain a cross-sectional view of the femoral artery in short-axis. The saphenous nerve was defined as a highly hyperechoic structure medial to femoral artery. The needle was inserted lateral to femoral artery then proceeded to the medial aspect of the artery where the saphenous nerve was located. After negative aspiration, 10 cc Bupivacaine 25% and 40 mg methyl prednisolone sulphate under the sonography guidance were injected. Maximal NRS was recorded after 30 minutes, one week, one month and three months after intervention. The Numeric Rating Scale (NRS) is a 10-point scale for patient self-reporting of pain. Zero means ‘No pain’ and 10 means ‘Worst possible pain’.

Official approval from ethics committee of TUMS was obtained for the study and all the patients gave informed consent.

Demographic data, ASA, weight, height, and complication of intervention were recorded.

Statistical analyses were performed with SPSS software version 18.0 (Statistical Product and Service Solutions, SSPS Inc., Chicago). Results are presented as mean ± SDs, and frequencies. The Student’s t test was used for continuous variables, and the Pearson χ² test with Fisher’s exact test was applied for categorical variables. Repeated measure ANOVA was used to compare mean NRS during study period. P value <0.05 was considered statistically significant.

**Results**

Thirty five cases enrolled in this study. Mean age of all cases was 54.6 ± 12.8 years. Twenty four cases (68.6%) were female and 11 (31.4%) were male. Twenty there (65.7%), 9 (25.7%), and 3 (8.6%) patients were ASA class I,II, and III respectively. Only the left knew was affected in 9 patients (25.7%), only the right knee was affected in 11 patients (31.4%) while both knees were affected in 15 patients (42.9%).

Mean BMI, and pre-intervention NRS were 25.1 ± 2.3 (kg/m²) and 8 ± 0.8 (7-10) respectively.

Repeated measure ANOVA showed that mean NRS significantly decreased throughout the evaluation time (p <0.001) (Table 1).

In nineteen patients (54%), the NRS was zero at 30 minutes after intervention (Table 2).

Only one patient (2.8%) had a NRS of 0 throughout the study period. We observed no sensory dysfunction in in all enrolled cases.
Discussion

The result of this study showed that ultrasound-guided sub-sartorial blockade of saphenous nerve in cases with saphenous nerve entrapment in adductor canal is a successful method for controlling pain during post intervention period in patients with chronic knee pain.

We observed that pain NRS became zero 30 minutes after intervention in 54% of cases and pain eradicated in 2.8% of patients who suffer from chronic knee pain. However, this success rate is lower that the rates in previous studies.

Romanoff et al evaluated 30 patients with saphenous nerve entrapment in adductor canal who underwent series of nerve blockade (mean 1.9 of blockade). They reported VAS score of 6.4 at baseline and 2.8 at the end of the study. Eighty seven of cases had improved at the final stage of the study.

Their findings along with our results show that saphenous nerve blockade in cases with saphenous nerve entrapment in adductor canal is effective for controlling pain.

In Tsai et al study the success rate of saphenous nerve blockade in cases who underwent lower extremity surgery was 77% and in Benzon et al study the success rate was 70%. In their study saphenous nerve block was performed in conducted for patients who were candidate for menisectomy.

In another study by Manickam, et al, blockade of the saphenous nerve at the distal part of adductor canal for patients who underwent ankle or foot surgery resulted in 100% success rate.

The lower success rate in the current study could be attributed due to our first experiment in doing sub-sartorial blockade of saphenous nerve.

During follow up we found that NRS decreased significantly and then increased but the mean score at the end of follow up was lower than pre intervention score. It could show that this approach is useful for reducing pain for a short time and it is not applicable for eradicating pain. May be continuous blockades or other methods such as radio frequency (RF) is necessary for eradicating pain in cases with chronic knee pain.

Chronic knee pain is a disabling condition which affects quality of life of the patients and limits daily activity. Different underlying diseases such as osteoarthritis, rheumatoid arthritis, bursitis, chondromalacia patella, baker’s cyst and jumper’s knee are among common causes of chronic knee pain.

This study has some limitations. First, the sample size was low and the follow up period was short. Larger studies with long follow up periods are recommended.

Conclusion: The results of the current study showed that ultrasound guided subsartorial approach is moderately effective in blockade of saphenous nerve in cases with saphenous nerve entrapment in adductor canal for controlling chronic knee pain.

Table 1
(mean ± SD) NRS during evaluation time

<table>
<thead>
<tr>
<th></th>
<th>NRS before intervention</th>
<th>NRS after 30 minutes</th>
<th>NRS after one week</th>
<th>NRS after one month</th>
<th>NRS after 3 months</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>8 ± 0.8</td>
<td>0.7 ± 0.8</td>
<td>1.5 ± 1.3</td>
<td>2.2 ± 1.8</td>
<td>5.2 ± 2.6</td>
<td>&lt;0.001</td>
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Table 2
Success rates during follow up

<table>
<thead>
<tr>
<th>Success rate</th>
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<tr>
<td>Reduction of NRS scores to 0 after 30 minutes</td>
<td>19 (54.3%)</td>
</tr>
<tr>
<td>Reduction of NRS scores to 0 after one week</td>
<td>7(20%)</td>
</tr>
<tr>
<td>Reduction of NRS scores to 0 after one month</td>
<td>4(11.4%)</td>
</tr>
<tr>
<td>Reduction of NRS scores to 0 after 3 months</td>
<td>3 (8.6%)</td>
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</tbody>
</table>
References


The key to

Lock-up

Postoperative Pain

Initial bolus
Inject 1 ampoule Tramal® 100 mg i.v. or i.m. slowly over 2-3 minutes

Ways of administration after initial bolus

Infusion
Inject 2 ampoules Tramal®, each 100 mg, in 500 mL of infusion solution. Infusion rate 12-24 mg Tramal® (0.016-0.020 mL/kg/min) or 30-60 mL/h.

PCA
Subsequent increments of 10 mg with a lock-out time of 5 minutes.

Injection
Usual dose 10 mg at 100 mg 14 hourly up to a total daily dose of 400 mg except in special clinical situations which might necessitate daily dose up to 600 mg. Further treatment with Tramal® balso on demand.

Follow-up
- 1-2 capsules every 4-6 hours
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- slow release
- 100 mg, 150 mg, 200 mg
- 1 tablet every 12 hours

Intra-Operative
Loading dose 2.5 - 3 mg/kg at wound closure

Post-Anaesthesia Care Unit
An intra-operative loading dose of Tramal® will reduce PONV rates

If intra-operative dose not given then:
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100 mg over 2-3 mins

* If needed further doses of 50 mg up to a total of 200 mg (including the initial bolus) may be given within the first 60 min.

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BRIDION is indicated for the reversal of neuromuscular blockade induced by rocuronium or vecuronium. In children and adolescents (aged 2-17 years), BRIDION is only recommended for routine reversal of moderate rocuronium-induced neuromuscular blockade.

**Important safety information**
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BRIDION has not been investigated in patients receiving rocuronium or vecuronium in the Intensive Care Unit (ICU) setting.

If neuromuscular blockade is required within 24 hours of BRIDION administration, a nondepolarising neuromuscular blocking agent should be used instead of rocuronium or vecuronium. The most commonly reported adverse reactions were dysesthesia (metal or bitter taste) and anesthetic complications (movement, coughing, grimacing, or sucking on the endotracheal tube). In patients treated with BRIDION, a few cases of awareness were reported. The relation to BRIDION was uncertain. In a few individuals, allergic-like reactions (i.e., flushing, erythematous rash) following BRIDION were reported. Clinicians should be prepared for the possibility of allergic reactions and take the necessary precautions. In a trial of patients with a history of pulmonary complications, bronchospasm was reported in 2 patients and a causal relationship could not be fully excluded.

Volunteer studies have demonstrated a slight (17%-22%) and transient (<30 minutes) prolongation of the prothrombin time/activated partial thromboplastin time (PT/aPTT) with BRIDION; however, clinical studies have demonstrated no clinically relevant effect on peri- or postoperative bleeding complications with BRIDION alone or in combination with anticoagulants. As BRIDION has demonstrated an in vitro pharmacodynamic interaction with anticoagulants, caution should be exercised in patients on anticoagulation for a pre-existing or concomitant condition. This pharmacodynamic interaction is not clinically relevant for patients receiving routine postoperative prophylactic anticoagulation. Although formal interaction studies have not been conducted, no drug interactions were observed in clinical trials. Preclinical data suggest that clinically significant drug interactions are unlikely with the possible exceptions of toremifene, fusidic acid, and hormonal contraceptives.

**Footnotes:**
1. Train-of-four
2. Post tetanic count
3. Second twitch

**References:**
1. BRIDION Summary of Product Characteristics (SPC).

Please see summary of product characteristics for full prescribing information.

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