International Journal of Current Pharmaceutical Research

ISSN- 0975-7066 Vol 17, Issue 6, 2025

Original Article

EFFICACY OF ULTRASOUND-GUIDED SAPHENOUS NERVE BLOCK USING BUPIVACAINE ALONE VERSUS BUPIVACAINE WITH TRIAMCINOLONE ACETONIDE IN OSTEOARTHRITIS KNEE PAIN

ARJUN PIRKAD[1*], SUHEELA TAXAK[2], DRPOONAM SINGH[3]

[1]MGM Medical College and Hospital, Kamothe, Maharashtra, India. [2,3]Institute of Medical Science, Rohtak, Haryana, India
*Corresponding author: Arjun Pirkad; *Email: arjunpirkad@gmail.com

Received: 12 Aug 2025, Revised and Accepted: 02 Oct 2025

ABSTRACT

Objective: Knee osteoarthritis (OA) is a prevalent cause of chronic pain and functional impairment. Ultrasound-guided saphenous nerve block has emerged as a promising non-surgical treatment modality. This study evaluates the comparative efficacy of bupivacaine alone versus bupivacaine with triamcinolone acetonide in ultrasound-guided saphenous nerve block for OA knee pain.

Methods: A prospective, randomized, double-blind study was conducted involving 80 patients aged 30–80 y with chronic OA knee pain (Grade II or III). Patients were allocated to two groups: Group T received 4 ml of 0.5% bupivacaine+40 mg triamcinolone acetonide; Group B received 4 ml of 0.5% bupivacaine alone. Both solutions were diluted to 10 ml with normal saline. Pain intensity (VAS), functional disability (WOMAC index), and patient satisfaction were assessed at baseline, 1 h, 1 w, 2 w, 1 mo, 3 mo, and 6 mo post-block.

Results: Both groups showed significant reductions in VAS and WOMAC scores over time ($p<0.05$). However, Group T showed superior pain relief and functional improvement at all follow-up points ($p<0.05$). Grade II OA patients in both groups had better outcomes compared to Grade III. No significant procedural complications were noted.

Conclusion: Ultrasound-guided saphenous nerve block using bupivacaine with triamcinolone acetonide provides prolonged and superior analgesia and functional improvement compared to bupivacaine alone in patients with OA knee. This technique is safe, effective, and minimally invasive, warranting consideration in non-surgical OA knee management.

Keywords: Knee osteoarthritis, Saphenous nerve block, Ultrasound-guided block, Bupivacaine, triamcinolone acetonide, Chronic knee pain

DOI: https://dx.doi.org/10.22159/ijcpr.2025v17i6.7074 Journal homepage: https://innovareacademics.in/journals/index.php/ijcpr

INTRODUCTION

Osteoarthritis (OA) of the knee is a chronic, progressive degenerative joint disorder that severely impairs quality of life, especially in the elderly [1, 2]. It is characterized by loss of articular cartilage, bone remodeling, pain, stiffness, and reduced joint mobility [3, 4]. The global burden of knee OA continues to rise due to aging populations and increasing obesity rates [5, 6]. Despite various treatment options, effective long-term relief from chronic knee pain remains a clinical challenge [7].

Conventional pharmacological therapies such as NSAIDs and opioids are often limited by side effects and contraindications [8, 9]. Intra-articular injections provide only short-term relief, and surgical options may not be suitable for all patients due to age, comorbidities, or personal preference [10, 11]. Therefore, minimally invasive regional nerve blocks under ultrasound guidance offer a promising alternative to bridge this gap [12, 13].

The saphenous nerve, a purely sensory branch of the femoral nerve, supplies the anteromedial aspect of the knee [14]. It travels through the adductor canal and becomes superficial in the distal thigh, making it an ideal target for ultrasound-guided blockade [15, 16]. Bupivacaine, a long-acting amide local anesthetic, is widely used in peripheral nerve blocks due to its potent analgesic properties [17, 18]. The addition of corticosteroids like triamcinolone acetonide is hypothesized to prolong analgesic effects by reducing inflammation and suppressing ectopic neuronal discharge [19-21].

This study aims to evaluate the efficacy of ultrasound-guided saphenous nerve block using bupivacaine alone versus bupivacaine with triamcinolone acetonide in patients with chronic knee pain due to OA.

MATERIALS AND METHODS

This prospective, randomized, double-blind study was conducted at the Department of Anaesthesia and Intensive Care, Pt. B. D. Sharma PGIMS, Rohtak.

Inclusion criteria

- Grade II/III OA knee pain
- Age 30–80
- VAS>40 mm
- Non-responsive to 4 w of conservative therapy

Exclusion criteria

- Drug allergy
- Neuropathy
- Coagulopathy/infection
- Severe hepatic/renal dysfunction
- Pregnancy/previous knee surgery

Groups

A total of 80 patients were randomly and equally divided into two groups. Group T and Group B.

- Group T (n=40): 4 ml 0.5% bupivacaine+40 mg triamcinolone acetonide (diluted to 10 ml)
- Group B (n=40): 4 ml 0.5% bupivacaine diluted to 10 ml

Procedure

The saphenous nerve was blocked under ultrasound guidance 10 cm above the knee joint line using a 23-G needle and linear probe. Local infiltration with 2% lignocaine was done before injection.

Post-procedure care

Paracetamol 500 mg three times daily for 3 days. Rescue analgesia with diclofenac 50 mg TID if VAS>40 mm.

Outcomes parameters

Pain score

Pain was measured using the Visual Analog Scale (VAS; 0–100 mm) during activities such as sitting, standing, walking, and bending. Assessments were done 30 min before the block, and at 1 h, 1 w, 2 w, 1 mo, 3 mo, and 6 mo post-procedure [22].

Quality of life

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is a three-dimensional, self-administered questionnaire that evaluates pain (5 items), stiffness (2 items), and physical function (17 items). Scores were calculated by averaging the total and converting it to a percentage disability. The WOMAC index was calculated before giving block, 1 h, 1 w, 2 w, 1 mo, 3 mo, and 6 mo after giving block on a four-point scale [23].

Patient satisfaction

Rated on a four-point scale (Excellent to Poor) based on pain reduction:

- **Excellent:** ≥75% reduction
- **Good:** 50–74%
- **Fair:** 25–49%
- **Poor:** <25% or increased pain assessed at 1 h, 1 w, 2 w, 1 mo, 3 mo, and 6 mo post-block.

Statistical analysis

Data were analyzed using SPSS version 18.0. Unpaired t-test was used to compare means between groups, paired t-test for within-group comparisons over time, and Chi-square test for nominal data. A p-value< 0.05 was considered statistically significant at a 95% confidence level.

RESULTS

A total of 80 patients aged between 30-80 y with VAS>40 mm and osteoarthritis grade II and III. Were included in the study. The patients were randomly allocated to one of the two groups, comprising 40 patients in each group.

In terms of demographic data. Group T had a mean age of 56.70±9.99 y and weight of 62.22±7.90 kg; Group B had 54.58±8.72 y and 64.60±7.83 kg, respectively. Male: Female ratio was 13:27 in Group T and 11:29 in Group B. Differences were not statistically significant (p > 0.05) in both groups as displayed in fig. 1.

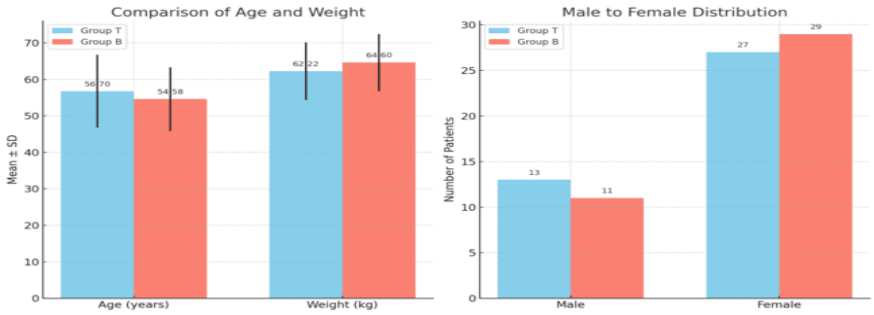

Fig. 1: Demographic distribution, the Kellgren and Lawrence grades based on X-ray findings of knee osteoarthritis were comparable between groups, with no significant difference (p > 0.05). Group T had 50% each of Grade II and III, while Group B had 55% Grade II and 45% Grade III cases as displayed in fig. 2

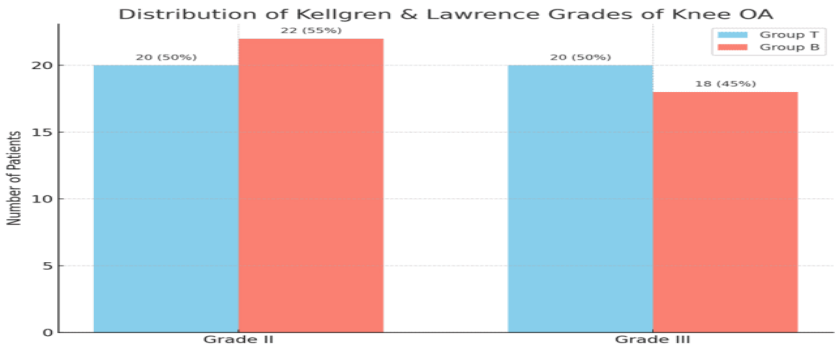

Fig. 2: Kellgren and lawrence grades, visual analogue scale (VAS) pain scores between Group T and Group B over various time points are depicted in table 1

Table 1: VAS score comparison between groups T and B

Time point	Group T (Mean±SD)	Group B (Mean±SD)	p-value
Baseline	74.13±11.03	73.50±10.67	0.644
1 H Post-Block	1.75±3.85	2.10±4.39	0.419
1 W	5.13±5.94	11.13±7.47	0.001
2 W	11.75±5.13	23.50±14.77	0.001
1 Mo	18.63±11.27	34.75±10.00	0.001
3 Mo	24.63±5.36	54.13±6.88	0.001
6 Mo	32.00±4.35	58.13±6.27	0.001

At baseline, both groups had similar pain scores (p = 0.644). However, from 1 w onward, Group T consistently showed significantly lower VAS scores compared to Group B (p = 0.001 at all time points), indicating greater and sustained pain relief in Group T following the saphenous nerve block. The Western Ontario and McMaster Universities (WOMAC) index of osteoarthritis was compared between both groups at various time intervals, as displayed in table 2.

Table 2: WOMAC index scores between groups T and B

Time point	Group T (Mean±SD)	Group B (Mean±SD)	p-value
Baseline	78.3±6.2	76.9±6.5	0.318
1 H	10.2±2.4	12.5±2.8	0.020
1 W	18.9±5.3	28.7±6.1	0.001
2 W	23.6±5.8	36.2±7.0	0.001
1 Mo	31.1±6.2	48.3±7.5	0.001
3 Mo	38.4±6.0	61.5±8.4	0.001
6 Mo	43.7±6.5	65.0±8.1	0.001

Both groups had similar baseline scores ($p = 0.318$), indicating comparable initial disability. However, from 1 h post-block onward, Group T consistently demonstrated significantly lower WOMAC scores than Group B ($p < 0.05$ at all time points), reflecting better improvement in pain, stiffness, and physical function in Group T over the 6-month follow-up period.

DISCUSSION

Osteoarthritis (OA) is a debilitating condition characterized by pain, joint inflammation and joint stiffness and results in a substantial degree of physical disability. It is most common form of arthritis and exerts significant burden on individual and family. It is a major cause of distress and disability, with reduced quality of life and increased healthcare expenditure [1, 2, 5, 8]. Age, race, genetics, body build, obesity, gender, occupational factors, repetitive use and previous injury have all been shown to have an influence to development of OA knee [5].

Goals of osteoarthritis treatment include alleviation of pain and improvement of functional status. Optimally, patients should receive a combination of nonpharmacologic and pharmacologic treatment. These current therapies that help alleviate joint pain have limited effectiveness by certain drugs and procedures; produce unwanted side effects, thereby precluding their long-term use. There is clearly a need to find out some other alternative methods that are simple, effective, efficacious, minimally invasive, widely acceptable and applicable that gives better results. One such promising method is ultrasound-guided saphenous nerve block [15].

Saphenous nerve block gives complete anterior and medial knee pain relief and as most of the knee OA patients have anterio-medial knee pain. It has been successfully used for postoperative pain relief after total knee replacement. Local anaesthetics in combination with steroid are commonly used for prolonged pain relief in many chronic musculosketal conditions like back pain [19, 20].

In our study we have used ultrasound guided saphenous nerve block in knee OA patients where forty patients received 4 ml of 0.5% bupivacaine with 40 mg (1 ml) of triamcinolone acetonide diluted to normal saline to a total 10 ml solution (Group T) and the remaining forty received 4 ml of 0.5% bupivacaine diluted to normal saline to a total 10 ml solution (Group B) and these patients were followed-up at intervals of one hour, one week, two weeks, one month, three months and six months with respect to providing pain relief, improvement in functional disability, need of repeat block and procedural complications.

Group T showed statistically and clinically superior results in both VAS and WOMAC scores. Previous studies have shown the efficacy of corticosteroids when used with local anesthetics for prolonging analgesia [19-21]. This block targets the sensory fibers of the knee without affecting motor function [21].

No complications such as bleeding, infection, or neuropathy were noted in either group, affirming the safety of the ultrasound-guided technique [15, 16].

CONCLUSION

Ultrasound-guided saphenous nerve block using bupivacaine with triamcinolone acetonide significantly improves pain and function in knee OA compared to bupivacaine alone. It is safe, effective, and should be considered for patients unfit for surgery or unresponsive to conservative therapy [15, 16].

FUNDING

Nil

AUTHORS CONTRIBUTIONS

All authors have contributed equally

CONFLICT OF INTERESTS

Declared none

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