ORIGINAL ARTICLE

Comparison of the Efficacy of Intra-Articular Bupivacaine with Intra-Articular Admixture of Bupivacaine and Tramadol in the Immediate Postop Management of Pain after knee Arthroscopy

AGHA MOMIN, SIBTAIN RAZA, AMER AZIZ

ABSTRACT

Background: Arthroscopic knee surgery is commonly performed as an outpatient procedure and is often associated with postoperative pain. Unrelieved postoperative pain may result in inability to participate in rehabilitation programmes, resulting in delayed recovery, poor outcome and greater use of healthcare resources after discharging to home. A widely used local anesthetic intra-articular injection is bupivacaine. Its prolonged duration of action makes it well suited for postoperative analgesia (10%) in this surgical population.

Aim: To determine the efficacy of intraarticular bupivacaine and intraarticular admixture of bupicacaine and tramadol in the immdediate postoperative management of pain after knee arthroscopy

Study design: Randomized controlled trial

Setting: Department of Orthopaedics and Spinal Surgery, Ghurki Trust Teaching Hospital/Lahore Medical and Dental College, Lahore.

Method: A total number of sixty patients, divided into two groups; group A (intraarticular injection 0.5% bupivacaine) and group B (intraarticular injection of admixture 0.5% bupivacaine and 100 mg tramadol) were included in the study. The two groups was compared for efficacy (pain relief) by applying Chi-square test. P value (one tailed) <0.05 was considered as significant.

Result: The percentage of patients in group B benefiting from intraarticular injection of mixture of bupivcaine and tramadol i.e. pain relief (score of less than 3 on Visual Analogue Scale at the end of 24 hours is effective pain relief) was 76.7%, which is significantly higher than the percentage of patients in group A (13.4%). Thus the efficacy of intraarticular admixture of tramadol and bupivcaine is better than intraarticular bupivcaine alone

Conclusion: Intraarticular admixture of 100 mg tramadol with 0.5% bupivacaine decreased both visual analogue pain scale and provided longer postoperative analgesia than that produced by intraarticular injection of either bupivacaine alone.

Keywords: Intraarticular injection, arthroscopy, pain score

INTRODUCTION

Arthroscopic knee surgery is commonly performed as an out patient procedure and is often associated with postoperative pain[1,2]. Unrelieved postoperative pain may result in inability to participate in rehabilitation programmes, resulting in delayed recovery , poor outcome and greater use of healthcare resources after discharging to home[3]. Adequate analgesia after knee arthroscopy not only adds to the patient's acceptance of the procedure but it may also affect the recovery profile and discharge times from hospital[5]. Good pain relief is important for the postoperative knee rehabilitation and it may influence the overall outcome[4]. To reduce the occurrence of side effects or complications, an analgesia protocol should be preferably multimodal and should block pain at its origin. Furthermore, it should maintain maximum muscle control to optimize postoperative mobilizationand allow active physical therapy. Parentral narcotics still play a major role in postoperative pain management in knee arthroscopy[6]. Intra-articular analgesia is a popular technique after arthroscopic knee surgery[7]. Intra-articular local anesthetics are often used for the prevention of pain after arthroscopic knee surgery[8]. A widely used local anesthetic intra-articular injection is bupivacaine. Its prolonged duration of action makes it well suited for postoperative analgesia (10%) in this surgical population[5,8]. In an effort to find the ideal Regime for sufficient, long-lasting postoperative analgesia, many different drugs, including opiods, nonsteroidal anti-inflammatory drugs, ketamine, clonidine and neostigmine, have been added to intra-articular local anesthetics[1,2].

Department of Orthopaedics & Spine Surgery, Ghurki Trust Teaching Hospital, Lahore

Correspondence to Dr. Agha Momin, Senior Registrar, Orthopaedics, UCMD/UOL/NSSSH Email: aghamomin@yahoo.com

Intra-articular narcotics have proven efficacy for providing pain relief after knee arthroscopy[9]. Alagol et al[10] showed that tramadol provided lower pain scores and longer analgesic effect after intra-articular administration more than intravenous infusion of the same doses with no significant side effects. Intra-articular admixture of tramadol and bupivacaine however has provided longer postoperative analgesia (73.3%) than intra-articular bupivacaine or tramadol given separately[8].

The rationale of my study is to choose the best intra-articular analgesic for postoperative pan relief after knee arthroscopy.

Objective of the study was to determine the efficacy of intraarticular bupivacaine and intraarticular admixture of bupicacaine and tramadol in the immdediate postoperative management of pain after knee arthroscopy .

MATERIAL AND METHODS

This randomized controlled trial was conducted in the Department of Orthopaedics and Spinal Surgery, Ghurki Trust Teaching Hospital/Lahore Medical and Dental College, Lahore for a period of 6 months i.e., from 1st June 2009 to 30th November, 2009.

The calculated sample size is 30 cases in each group with 5% margin of error, 80% power of study taking expected percentage of relief of pain with bupivacaine and combination bupivacaine and tramadol i.e. 1st June 2009 to 30th November, 2009, 10% and 73.3% respectively in patients undergoing knee arthroscopy.

Sampling technique: Non-probability purposive sampling

Inclusion Criteria

- Age range 18 to 60 years
- Both sexes
- Elective arthroscopies (both diagnostic and therapeutic)
- ASA (American Society of Anesthesiologist) I & II (Annexure II attached after proforma)

Exclusion criteria

- Patients using narcotics regularly
- Neuromuscular deficit on neurological examination
- Known allergy or intolerance to bupivacaine or tramadol
- History of bleeding disorder

Data collection procedure: After approval from the hospital ethics committee, 60 patients fulfilling the inclusion criteria admitted through outpatient department were included. Written informed consent was obtained and demographic information like name, age and gender was recorded. Patients were allocated into two equal groups. Odd number patients were placed in group A and even number patients placed in group B. Group A was received intraarticular injection 0.5% bupivacaine. Group B was received intraarticular injection of admixture 0.5% bupivacaine and 100 mg tramadol. The volume of the injectable drug was standardized as 10 ml in both groups. Procedure was done in the operation theatre under spinal or general anaesthesia. At the conclusion of procedure, under aseptic measures intraarticular analgesic was injected into the knee.

Pain was assessed at predetermined intervals (2, 4, 6, 8, 10, 12, 16 and 24 hours) over a period of 24 hours using Visual Analogue Scale during post-operative period and severity of pain was documented accordingly on a proforma. A score of less than 3 on VAS at the end of 24 hours was considered as pain relief.

Data analysis: All the collected information was entered and analyzed using SPSS version 11. The quantitative variable like age was presented by calculating mean and standard deviation. The qualitative variables like gender and efficacy (pain relief) were presented by calculating frequency and percentage. The two groups was compared for efficacy (pain relief) by applying Chi-square test. P value (one tailed) <0.05 was considered as significant.

RESULTS

A total number of sixty patients, divided into two groups; group A (intraarticular injection 0.5% bupivacaine) and group B (intraarticular injection of admixture 0.5% bupivacaine and 100 mg tramadol) were included in the study. Each group was comprised of 30 patients. Out of which 7(23.3%) were females and 23(76.7%) were males in group A and in group B, there were 5(16.7%) females and 25(83.3%) males. Male to female ratio was 1:3.3 in group A and 1:5 in group B (Table 1).

The patients shown in table 2 were divided in four age groups. In group A, the first age group, patients aged 18-30 years 11(36.7%), in second age group, patients aged 31-40 years 8(26.7%), third age group, patients aged 41-50 years 7(23.3%) and in the fourth age group, patients aged 51-60 years 4(13.3%). While in group B, patients in first age group 18-30 years 14(46.7%), second age group, patients aged 31-40 years 4(13.3%), third age group, patients aged 41-50 9(30%) and in the fourth age group, patients aged 51-60 years 3(10%). Statistically the significant difference was not significant ($P>0.05$).

The percentage of patients in group B benefiting from intraarticular injection of mixture of bupivcaine and tramadol i.e., pain relief (score of less than 3 on Visual Analogue Scale at the end of 24 hours is

effective pain relief) was 76.7%, which is significantly higher than the percentage of patients in group A (13.4%). Thus the efficacy of intraarticular admixture of tramadol and bupivcaine is better than intraarticular bupivcaine alone (Table 3).

Table 1: Sex distribution in both groups

Gender	Group A	Group B
Male	23(76.7%)	25(83.3%)
Female	7(23.3%)	5(16.7%)
Male to female ratio	1:3.3	1:5

Key:
Group A Intraarticular injection 0.5% bupivacaine
Group B Intraarticular injection of admixture 0.5% bupivacaine and 100 mg tramadol

Table 2: Age distribution in both groups

Age (Yrs)	Group A	Group B
18 – 30	11(36.7%)	14(46.7%)
31 – 40	8(26.7%)	4(13.3%)
41 – 50	7(23.3%)	9(30%)
51 – 60	4(13.3%)	3(10%)
Mean±SD	37.1±12.5	33.8±11.8
P value	P>0.05	

Key: Group A Intraarticular injection 0.5% bupivacaine
Group B Intraarticular injection of admixture 0.5% bupivacaine and 100 mg tramadol

Table 3: Comparison of efficacy of pain relief in both groups

Assessment	Group A	Group B
Efficacy (pain relief)	4(13.4%)	23(76.7%)
Chi square value		
P value	P<0.001 (Highly significant)	

Key:
Group A: Intraarticular injection 0.5% bupivacaine
Group B: Intraarticular injection of admixture 0.5% bupivacaine and 100mg tramadol

DISCUSSION

Knee arthroscopy is associated with considerable postoperative pain. Good pain relief is important for postoperative knee rehabilitation. Surgical trauma during the arthroscopy modifies the responsiveness of the nervous system in two ways. It causes peripheral sensitization by reducing the threshold for afferent nociceptive neurons. It also causes central sensitization by increasing the excitability of spinal neurons. Analgesia at the surgical site has shown to prevent central sensitization and improves postoperative pain control. Thus providing analgesia locally in the area of surgical trauma with minimal side effects is an attractive option. Intraarticular injections of different analgesics following knee arthroscopic surgery have shown to reduce requirement for postoperative analagesics and early discharge from hospital.

A study showed that neostigmine and colomidine are comparatively more effective drugs than tenoxicam, morphine and bupivacaine when administered intraarticularly[1]. Bupivacaine, a local anesthetic is often utilized because of its extended duration of action.

Moreover, intraarticular tramadol has been used for management of postoperative pain of knee arthroscopy[11]. Alagol et al[10] have reported that 100 mg tramadol without local anesthesia provide lower visual scale pain scores and longer analgesic effect after intraarticular administration more than intravenous injection of the same dose with no significant side effect. Intravenous administration of tramadol for postoperative analgesia can result some major side effects like headache, nausea, vomiting, dizziness and somnolence[12]. The cause of nausea and vomiting seems to be related mainly to the peak serum concentrations reached by a direct intravenous loading dose, which causes more symptoms than a subsequent infusion or local infiltration[13]. This may explain the absence of side effects of tramadol in patients during intraarticular administration.

Different adjuvant drugs including opioids, nonsteroidal anti-inflammatory drugs, ketamine, colonide and neostigmine have been added to the intraarticular local anesthetics to improve the duration and quality of analgesia after arthroscopic surgery of knee. Evidence indicates that a variety of these drugs have synergistic effects through a local, rather than a central mechanism[1].

This study was conducted to evaluate the efficacy of intraarticular bupivacaine and mixture of bupivacaine and tramadol in the immediate postoperative management of pain using visual analogue scale pain scores in patients undergoing arthroscopic knee surgery.

It was hypothesized that intraarticular admixture of bupivacaine and tramadol is more effective than intraarticular bupivacaine alone in the management of immediate postoperative pain after knee arthroscopy.

For the purpose, a sample of 60 patients was divided equally into two groups A and B. Group A received only intraarticular bupivaaine and group B received intraarticualr mixture of bupivacaine and tramadol. The mean age distribution in group A was 37.1±12.5 years, whereas in group B it was 35.8±11.8 years. The gender distribution in group A was 76.7% males and 23.3% females, whereas in group B it was 83.3% males and 16.7% females.

The efficacy of intraarticular injection (bupivacaine) in group A in terms of effective pain relief (visual analogue scale less than 3 at the end of 24 hours) was 13.4% and that of intraarticular injection (bupivacaine + tramadol) in group was 76.7%. Thus the hypothesis has been proved by this study.

Whereas, according to Zeiden et al[8] intraarticular bupivacaine injection had shown efficacy of 10% and intraarticular combination of bupivacaine and tramadol showed an efficacy of 73.3%, which is comparable with our results.

It is possible that the combination of intraarticular tramadol and bupivacaine provide its regional analgesic effect by a multimodal mechanism of action, which gives synergistic effect, as evidenced by the decreased visual analogue scale pain scores, decreased need for postoperative analgesics and an increased analgesic duration, as well as early unassisted ambulation and discharge.

Although tramadol was initially considered to be a weak μ-opioid agonist, it appears to have multimodal mechanism of action. It is now accepted that in addition to the μ-opioid agonist effect, tramadol enhances the function of spinal descending inhibitory pathway by inhibition of reuptake of both 5-hydroxytryptamine (5-HT) and norepinephrine, together with presynaptic stimulation of 5-HT release.[14,15] 5-HT_3 receptors are expressed on the peripheral and spinal terminals of nocieptive primary afferent fibers, as well as, on the superficial lamina of the dorsal horn, which indicates possible peripheral sites of analgesia action for tramadol[16,17].

Boden et al[18] found a significant effect of intraarticular tramadol when injected alone and synergistic effect when added to bupivacaine.. Wilford et al[19] reported that maintaining tourniquet inflation for 10 minutes after injection of intraarticular mixture of tramadol and bupivacaine improved postoperative analgesia, presumably by tissue binding of both drugs before tourniquet release, thus preventing tissue washout of the drugs which would occur as a result of post-tourniquet hyperemia.

It is also reported that tramadol when added to local anesthesia modifies peripheral anesthesia. Tramadol increases the duration of analgesia when added to local anesthesia for axillary plexus blockade[20,21].

CONCLUSION

Intraarticular admixture of 100 mg tramadol with 0.5% bupivacaine decreased both visual analogue pain scale and provided longer postoperative analgesia than that produced by intraarticular injection of either bupivacaine alone. This was also associated with earlier recovery, unassisted ambulation and home discharge. Also, the intraarticular combination of tramadol-bupivacaine was not associated with any side effects.

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