ORIGINAL ARTICLE

Comparison of Intra-Articular Analgesics for Analgesia After Arthroscopic Knee Surgery

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Summary

Post Arthroscopic intra-articular analgesia is a better method to avoid post operative pain after arthroscopic surgery, thus avoiding the adverse effects of systemic analgesics. In this prospective randomized double blind study conducted on 90 patients, 30 patients in group A received 20 ml of intra-articular saline, 30 patients in Group B received 10ml of intra-articular saline and 10 ml of 0.25% bupivacaine and 30 patients in Group C received 10 ml of 0.25% bupivacaine, 1 ml (30 mg) of ketorolac and 9 ml of saline intra-articularly. Ambulatory status, duration of analgesia and requirement for supplemented analgesia were compared in these three groups. Patients receiving this intra-articular analgesic combination of bupivacaine and ketorolac required significantly less supplemental post-operative analgesics. This combination significantly prolonged the duration of analgesia. Patients receiving this combination of drugs for intra-articular analgesia ambulated earlier.

Key Words: Arthroscopy, Intra-articular, Bupivacaine, Ketorolac

Introduction

Due to increasing cost of hospitalization, there has been a trend towards more out patient surgery. In order to safely perform outpatient surgery, it is important to avoid potential adverse reactions of systemic analgesics. The administration of analgesics in the recovery room, by the oral or intramuscular route has its own problems. Oral medication is not possible in the peri-operative period, as the patient is often advised against oral intake. Further, intramuscular absorption is unpredictable in the patient who often has peripheral vasoconstriction from a hypothermic operating room environment. Intravenous narcotics have the potential to cause respiratory depression, bradycardia, sedation, nausea and vomiting.

Judicious doses of local analgesics can produce a pain free patient who is able to ambulate in a short time after emergence from general and spinal anesthesia. Previous studies with intra-articular morphine, bupivacaine, prilocaine, ketorolac and neostigmine have yielded variable results. Morphine does provide analgesia, but the onset is delayed[1]. Bupivacaine when given in larger doses results in significant analgesia but not in smaller doses[2]. A combination of bupivacaine and adrenaline has been tried in order to prolong the effect of bupivacaine[3]. No significant analgesia can be attributed to pilocaine[4]. According to published reports a ketorolac and bupivacaine combination provides satisfactory analgesia[5]. Recent studies suggest significant analgesia associated with the use of neostigmine[6].

Although, most local anesthetics probably would provide for effective analgesia when administered intra-articularly, bupivacaine was chosen in this study because of its long duration of action and its ability to produce adequate sensory analgesia with minimal block of motor fibers. Ketorolac was chosen because of its rapid and potent analgesic action and its suitability for

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parenteral administration. This comparative study was formulated with objective of finding a safe and effective post-arthroscopic intra-articular analgesic.

Materials and Methods

This study was approved by the Ethics Committee of Kasturba Hospital Manipal. Informed written consents were obtained from 90 patients scheduled to undergo elective arthroscopy by a single surgeon. Patients were eligible for participation if they were more than 18 years of age and if they were ASA physical status I. The patients who underwent arthroscopy from March 2003 to January 2004 were included in this study. Patients excluded from the study were those who underwent ligamentous reconstruction, who required suction drainage after the operation, those who had more than two portals of entry, who needed surgical debridement, synovectomy, abrasion chondroplasty and meniscal repair with a separate incision.

Patients were assigned to one of three treatment groups in a double blind randomized manner. Group A received 20 ml of intra-articular saline. Group B received 10ml of intra-articular saline and 10 ml of 0.25% bupivacaine. Group C received 10 ml of 0.25% bupivacaine, 1 ml (30 mg) of ketorolac and 9 ml of saline intra-articularly. The anaesthetic technique was standardized. The patient was fasted for at least 6 hours pre-operatively. No narcotics were permitted for a period of 4 hours pre-operatively. Spinal anesthesia was given with 5% xylocaine with adrenaline. All patients had a tourniquet applied with pressure set at 250-400 mm Hg. Trial medication was injected intra-articularly after the completion of arthroscopy. The arthroscopic portal sites were not infiltrated with drug because direct infiltration into the portal sites was considered unnecessary since there would be diffusion from within the joint through the puncture holes.

The observer recorded pain at hourly intervals till end of 6 hours. Further readings were obtained at 12, 24 and 48 hours after injection of drugs in the study. Graded linear horizontal visual analog scale as suggested by Kampon Sriwatanakul et al was used[7]. The instrument used to measure the pain was the ABACUS, which works on the basis of self-reported measure of pain. This is a 10cm linear rectangle with a moveable wooden bead, with 0 cm corresponding to no pain and 10cm the worst imaginable pain. If the pain scale is >5, then injection ketorolac 30 mg was given.

Duration of analgesia i.e. the time for intra-articular injection of study drugs to the first requirement of supplemental analgesia was noted. Patients were encouraged to sit up and begin ambulation when they felt comfortable to do so. The time when they started ambulation was noted.

Results and Observation

Base line characteristics were compared among the three groups and no statistical difference was found when comparing age, sex and weight (Table: I). The operative procedures consisted of meniscal excision, loose body removal, medial plica excision and diagnostic arthroscopies. There were no complications or side effects from the medications used. However, 5% of patients had back pain or headache due to spinal anesthesia.

Ambulatory status:
One way analysis of variance (using Tuckey-HSD procedure in terms of ambulatory status of patients), showed significant difference between group A and group C (p-value of <0.050), whereas between group A, B and B, C there was no statistically significant difference (p-value >0.050).

Duration of analgesia:
One way analysis of variance (using Tuckey-HSD procedure in terms of ambulatory status of patients), showed significance difference between group A and C and group B and C (p-value of <0.050). But between group A and B, there was no statistically significant difference (p-value >0.050).

Requirements of supplement analgesia:

a. The use of injection ketorolac throughout the 48 hours of observation between three groups was studied using chi-square test with Yates correction. It showed statistically significant difference between group A and C (p-value <0.00001) and between group B and C (p-value <0.00001), whereas between group A and B, no significant difference (p-value 0.06) was observed.
b. The number of injection ketorolac used among the three groups was studied using Mann-Whitney U test. There was significant difference between Group A and C with p-value of <0.00001 and significant difference between group B and C with p-value of <0.00001. There was no significant difference between groups A and B (p-value 0.33).

Table I: Patient Characteristics in the study

	Group A	Group B	Group C
Age (years)	29.5±8.32	32.5±10.08	32.66±8.86
Weight (Kgs)	62.4±12.79	61.2±10.25	62.9±11.35
Male	25	27	26
Female	5	3	4

Discussion

A variety of analgesic techniques have been used to manage post-operative pain after knee arthroscopic surgery. Although, the reports have shown varying degrees of success, intra-articular injection of local anesthetics and/or opiod analgesics are currently being used for post operative analgesia after ambulatory arthroscopic knee surgery. Past studies suggest that the effectiveness of intra-articular bupivacaine injection, on post-operative pain management is quite controversial. Scott et al[5] showed that ketorolac when administered along with bupivacaine through intra-articular route results in a significant improvement in analgesia, increased patient comfort, and increased time to first analgesic request and a decreased need for post-operative analgesic and this is confirmed by our study.

Bupivacaine alone has had fair results perhaps because of low dosage. Increasing the dosage of bupivacaine will give better results, most probably because of increased local action. Adding ketorolac is another factor contributing to good results in our study. This technique is supported by Scott et al[5] study. Geeta Wasudev et al[8] reported that the plasma level of bupivacaine after intra-articular injection are well below the toxic levels if significant synovial surgery has not been performed and with 50 mg of bupivacaine, none of our patients had any complications. It may be worthwhile to study the effect of ketorolac alone. The majority of arthroscopists do not routinely inject analgesics after arthroscopic surgery. Based on the results of this study, it is recommended that this can become a standard practice, since it is both safe and effective.

Conclusion

Effective intra-articular analgesia following knee arthroscopy can be achieved with a combination of bupivacaine and ketorolac. Patients receiving this intra-articular analgesic combination required significantly less supplemental post-operative analgesia. This combination significantly prolonged the duration of analgesia. Patients receiving this combination of drugs for intra-articular analgesia ambulated earlier. No significant efficacy was demonstrated by the use of bupivacaine as the only drug for post-arthroscopic intra-articular analgesia.

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