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Original Research

Assessment of effect of intra-articular Ropivacaine for postoperative analgesia in arthroscopic knee surgeries

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ABSTRACT:

Background: Arthroscopic knee surgery in people with degenerative knee disease is the most common ambulatory orthopaedic procedure, and the ninth most commonly performed ambulatory procedure overall. Ropivacaine causes reversible inhibition of sodium ion influx, and thereby blocks impulse conduction in nerve fibres. Hence; the present study was undertaken for assessing the effect of intra-articular Ropivacaine for postoperative analgesia in arthroscopic knee surgeries. **Materials & methods:** A total of 40 patients scheduled to undergo arthroscopic knee surgery were enrolled. All the patients were randomized into two study groups; Group 1 (Control Group) and Group 2 (Intra-articular Ropivacaine group). Pre-anaesthetic evaluation was done in all the patients on the evening before surgery. Complete demographic details of all the patients were obtained. Complete haematological and biochemical profile of all the patients was obtained pre-operatively. All the patients underwent arthroscopic surgeries according to their respective groups. Continuous monitoring of hemodynamic parameters was done. Postoperatively Visual analogue scale was used for evaluating the requirement of postoperative analgesia. **Results:** While comparing statistically, it was observed that significant higher variation in the heart rate was seen among the patients of the control group in comparison to the study group. While comparing statistically, significant results were obtained. In the present study, mean time to first postoperative analgesic requirement among the patients of control group was found to be 99.5 minutes while among the patients of the study group was found to be 241.8 minutes. While comparing statistically, significant result were obtained. **Conclusion:** Intra-articular dose of ropivacaine enhanced the duration of postoperative analgesia significantly without any adverse effects. However

Key words: Ropivacaine, Analgesia, Knee surgery

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INTRODUCTION

Arthroscopic knee surgery in people with degenerative knee disease is the most common ambulatory orthopaedic procedure, and the ninth most commonly performed ambulatory procedure overall. Postoperative arthroscopic knee surgery is the one of the most common minimally invasive surgical procedures in modern orthopedic setup. It is associated with variable amount of postoperative pain, which is caused by irritation of free nerve endings of synovial tissue, anterior fat pad, and joint capsule during surgical excision and resection. Intra-articular opiate can induce analgesia up to 24 hours and reduce the amount of chronic pain.[1-3]

Local anesthetics block transmission of action potentials through inhibition of related sodium channels. Intra-articular administration of midazolam may produce analgesic effects similar to its use in central neuraxial analgesia. Bupivacaine is a well-established long-acting regional anaesthetic, which like all amide anaesthetics has been associated with cardiotoxicity when used in high concentration or when accidentally administered intravascularly. Ropivacaine is a long-acting regional anaesthetic that is structurally related to Bupivacaine. It is a pure S (-) enantiomer, unlike Bupivacaine, which is a racemate, developed for the purpose of reducing potential toxicity and improving relative sensory and motor

block profiles. Ropivacaine causes reversible inhibition of sodium ion influx, and thereby blocks impulse conduction in nerve fibres. This action is potentiated by dose-dependent inhibition of potassium channels.[4- 6] Hence; the present study was undertaken for assessing the effect of intra-articular Ropivacaine for postoperative analgesia in arthroscopic knee surgeries.

MATERIALS & METHODS

The present study was conducted in the department of anaesthesia with the aim of assessing the effect of intra-articular Ropivacaine for postoperative analgesia in arthroscopic knee surgeries. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 40 patients scheduled to undergo arthroscopic knee surgery were enrolled.

Inclusion Criterion

- ASA group I and II patients undergoing Arthroscopic Knee Surgeries.
- Age group18 to 60 years.

All the patients were randomized into two study groups; Group 1 (Control Group) and Group 2 (Intra-articular Ropivacaine group). Pre-anaesthetic evaluation was done in all the patients on the evening before surgery. Complete demographic details of all the patients were obtained. Complete haematological and biochemical profile of all the patients was obtained pre-operatively. All the patients underwent arthroscopic surgeries according to their respective groups. Continuous monitoring of hemodynamic parameters was done. Postoperatively Visual analogue scale was used for evaluating the requirement of postoperative analgesia. All the results were compiled in Microsoft excel sheet and were analysed by SPSS software version 17.0. Chi- square test, Mann-Whitney U test and unpaired t test were used for assessment of level of significance.

RESULTS

In the present study, a total of 40 patients were analysed. Mean age of the patients of the group 1 and group 2 was found to be 42.8 and 43.4 years respectively. Mean heart rate among the patients of group 1 at postoperative 1 hour, postoperative 2 hours postoperative 8 hours, postoperative 12 hours and postoperative 24 hours as found to be 85.9, 96.3, 101.7, 81.9 and 90.2 respectively. Mean heart rate among the patients of group 2 at postoperative 1 hour, postoperative 2 hours postoperative 8 hours, postoperative 12 hours and postoperative 24 hours as found to be 76.2, 78.1, 79.2, 80.1 and 87.6 respectively. While comparing statistically, it was observed that significant higher variation in the heart rate was seen among the patients of the control group in comparison to the study group. Mean VAS among the patients of group 1 at postoperative 1 hour, postoperative 2 hours postoperative 8 hours, postoperative 12 hours and postoperative 24 hours as found to be 2.9, 3.8, 4..2, 3.2 and 3.4 respectively. Mean VAS among the patients of group 2 at postoperative 1 hour, postoperative 2 hours postoperative 8 hours, postoperative 12 hours and postoperative 24 hours as found to be 0, 0.9, 1.4, 1.9 and 2.9 respectively. While comparing statistically, significant results were obtained. In the present study, mean time to first postoperative analgesic requirement among the patients of control group was found to be 99.5 minutes while among the patients of the study group was found to be 241.8 minutes. While comparing statistically, significant result were obtained.

Table 1: Age-wise distribution of patients

Age group (years)	Group 1		Group 2	
	Number of patients	Percentage	Number of patients	Percentage
18 to 20	1	5	2	10
21 to 30	3	15	3	15
31 to 40	6	30	5	25
41 to 50	6	30	6	30
51 to 60	4	20	4	20
Total	20	100	20	100

Table 2: Comparison of mean heart rate

Heart rate (beats/min)	Group 1	Group 2	p- value
Preoperative	76.5	75.1	0.11
Postoperative – baseline	80.1	81.9	0.39
Postoperative 1 hour	85.9	76.2	0.00*
Postoperative 2 hours	96.3	78.1	0.01*
Postoperative 8 hours	101.7	79.2	0.00*
Postoperative 12 hours	81.9	80.1	0.02*
Postoperative 24 hours	90.2	87.6	0.27

*: Significant

Table 3: Comparison of mean respiratory rate

Respiratory rate (per min)	Group 1	Group 2	p- value
Preoperative	14.5	14.2	0.75
Postoperative – baseline	14.1	13.8	0.69
Postoperative 1 hour	13.8	14.1	0.27
Postoperative 2 hours	13.9	13.7	0.34
Postoperative 8 hours	13.4	13.9	0.19
Postoperative 12 hours	14.1	13.7	0.39
Postoperative 24 hours	13.8	14.2	0.48

Table 4: Comparison of mean VAS

VAS	Group 1	Group 2	p- value
Postoperative – baseline	0	0	-
Postoperative 1 hour	2.9	0	0.00*
Postoperative 2 hours	3.8	0.9	0.00*
Postoperative 8 hours	4.2	1.4	0.01*
Postoperative 12 hours	3.2	1.9	0.00*
Postoperative 24 hours	3.4	2.9	0.44

*: Significant

Table 5: Time to first postoperative analgesia requirement

Time to first postoperative analgesia requirement	Group 1	Group 2	p- value
Time (minutes)	99.5	241.8	0.00*

*: Significant

DISCUSSION

Arthroscopic knee surgery is performed as an outpatient procedure using a variety of anesthetic techniques. This procedure is minimally invasive and involves repair of ligaments and menisci, and additional analgesia is required to provide pain relief due to substantial pain complained by the patients postoperatively. This can be particularly challenging for the anesthesiologist who must decide on the appropriateness of the patient and procedure for outpatient surgery and an anesthetic that is adequate for the procedure, but provides the patient's expectation of an uncomplicated postoperative recovery with minimal pain.[6, 7] Arthroscopic knee surgeries can evoke variable levels of pain, which at times is very distressing for patients. Postoperative pain can prevent early mobilization, discharge, and rehabilitation. Different analgesic agents for day care arthroscopy have been studied but an ideal agent needs to be identified.[8] Hence; the present study was undertaken for assessing the effect of intra-articular Ropivacaine for postoperative analgesia in arthroscopic knee surgeries.

In the present study, a total of 40 patients were analysed. Mean age of the patients of the group 1 and group 2 was found to be 42.8 and 43.4 years respectively. While comparing mean heart rate statistically, it was observed that significant higher variation in the heart rate was seen among the patients of the control group in comparison to the study group. Schwarz SK et al tested the hypothesis that the addition of a preincisional femoral 3-in-1 block to intra-articular instillation with ropivacaine 0.2% at the end of surgery improves postoperative pain control in patients undergoing arthroscopic anterior cruciate ligament reconstruction (ACLR) under general anesthesia. They found no effect of a femoral 3-in-1 block with ropivacaine 0.2% on postoperative analgesic consumption, compared to intra-articular instillation with ropivacaine 0.2% alone, in patients undergoing ACLR under general anesthesia.[9]

In the present study, mean VAS among the patients of group 1 at postoperative 1 hour, postoperative 2 hours postoperative 8 hours, postoperative 12 hours and postoperative 24 hours as found to be 2.9, 3.8, 4..2, 3.2 and 3.4 respectively. Mean VAS among the patients of group 2 at postoperative 1 hour, postoperative 2 hours postoperative 8 hours, postoperative 12 hours and postoperative 24 hours as found to be 0, 0.9, 1.4, 1.9 and 2.9 respectively. While comparing statistically, significant results were obtained. Møiniche S et al evaluated double-blind, randomized, controlled trials of intra-articular local anesthesia compared with placebo or no treatment in the control of postoperative pain after arthroscopic knee surgery. Only in two of six studies, where time to first analgesic request was evaluated, a significant prolongation of pain relief was observed as lasting between 30 and 50 minutes. There is a weak evidence for a reduction of postoperative pain after intra-articular local anesthesia in patients undergoing arthroscopic knee surgery, which although being sinall to moderate and of short duration, may be of clinical significance in day-case surgery.[10]

In the present study, mean time to first postoperative analgesic requirement among the patients of control group was found to be 99.5 minutes while among the patients of the study group was found to be 241.8 minutes. While comparing statistically, significant result were obtained. Zaric D et al investigated the dose response of sensory and motor block during continuous epidural infusion of 0.1, 0.2, or 0.3% ropivacaine in volunteers in a double-blind manner. Bupivacaine 0.25% and isotonic saline were used as reference and control, respectively. The regression phase was significantly shorter with all three concentrations of ropivacaine than with bupivacaine ($P < .01$). Ropivacaine 0.1% produced limited analgesia and minimal motor block, so that ambulation was possible throughout the investigation.[11]

CONCLUSION

From the above results, the authors concluded that intra-articular dose of ropivacaine enhanced the duration of postoperative analgesia significantly without any adverse effects. However; further studies are recommended.

REFERENCES

1. Barash GP, Cullen FB, Stoelting KR, Cahalan KM, Stock MC. Clinical anesthesia. In: Terese TH, Denise JW, editors. Anaesthesia for Orthopaedic Surgery. 6 th ed. India: Wolters Kluwer; 2009. p. 1385.
2. Miller RD, Eriksson IL, Fleisher AL, Weiner-Kronish JP, Young WL. Miller's anesthesia. In: Michael KU, editor. Anesthesia for Orthopedic Surgery. 7 th ed. Philadelphia: Churchill Livingstone; 2010. p. 2249-50.
3. Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. Arthritis Rheum 2008;58:26–35.
4. Cullen KA, Hall MJ, Golosinskiy A. Ambulatory surgery in the United States, 2006. Natl Health Stat Report 2009;Jan 28;(11):1–25.
5. Manuar MB, Majumdar S, Das A, et al. Pain relief after Arthroscopic Knee Surgery: A comparison of intra-articular ropivacaine, fentanyl, and dexmedetomidine: A prospective, double-blinded, randomized controlled study. Saudi J Anaesth. 2014;8(2):233–237. doi:10.4103/1658-354X.130727
6. Nahravani M, Tekye SM, Alipour M, Makhmalbaf H, Aghaee MA. Analgesia Following Arthroscopy - a Comparison of Intra-articular Bupivacaine and/or Midazolam and or Fentanyl. Arch Bone Jt Surg. 2017;5(1):28–31.
7. Kuthiala G, Chaudhary G. Ropivacaine: A review of its pharmacology and clinical use. Indian J Anaesth. 2011;55(2):104–110. doi:10.4103/0019-5049.79875
8. Fanelli G, Borghi B, Casati A, Bertini L, Montebugnoli M, Torri G. Unilateral bupivacaine spinal anesthesia for outpatient knee arthroscopy. Italian Study Group on Unilateral Spinal Anesthesia. Can J Anaesth 2000;47:746-51.
9. Schwarz SK1, Franciosi LG, Ries CR, Regan WD, Davidson RG, Nevin K, Escobedo S, MacLeod BA. Addition of femoral 3-in-1 blockade to intra-articular ropivacaine 0.2% does not reduce analgesic requirements following arthroscopic knee surgery. Can J Anaesth. 1999 Aug;46(8):741-7.
10. Møiniche S1, Mikkelsen S, Wetterslev J, Dahl JB. A systematic review of intra-articular local anesthesia for postoperative pain relief after arthroscopic knee surgery. Reg Anesth Pain Med. 1999 Sep-Oct;24(5):430-7.
11. Zaric D1, Nydahl PA, Philipson L, Samuelsson L, Heierson A, Axelsson K. The effect of continuous lumbar epidural infusion of ropivacaine (0.1%, 0.2%, and 0.3%) and 0.25% bupivacaine on sensory and motor block in volunteers: a double-blind study. Reg Anesth. 1996 Jan-Feb;21(1):14-25.