Original Article

ISSN (O): 2456-7388; ISSN (P): 2617-5479

Comparison of Sensory Effects of Ropivacaine Alone and Ropivacaine Along with Dexamethasone in Adductor Block for Post-Operative Analgesia After Lower Limb Surgeries

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Abstract

Background: The present study was undertaken to study the effect of adding dexamethasone to 0.2% ropivacaine in the adductor canal block. **Subjects and Methods:** 52 patients for lower limb surgery were divided into 2 groups. Group R received 20 ml of 0.2% ropivacaine + 2 ml of normal saline and group RD received 20ml of 0.2% ropivacaine with 8 mg of 2 ml dexamethasone. The patient was evaluated for the onset of sensory block and duration of analgesia, side effects and complications. **Results:** The average age was 61.23±8.16 years in the R group and 61.77±7.55 years in RD group. The average body weight 64.63±7.08 kg in the R group and 66.9±6.77 kg in RD group. Both groups had predominantly male patients. There was no significant difference between the 2 groups in terms of ASA grading (P=1.000). The onset of sensory block in group R was 12 ± 1.70 min whereas in group RD it was 11.53 ± 1.66 min, which was not statistically significant (P > 0.05). The duration of analgesia in group R was 507.96 ±149.32 min whereas in group RD it was 1082.63±195.11 min, which was statistically highly significant (P<0.0001). **Conclusion:** The Addition of dexamethasone to 0.2% ropivacaine for the adductor canal block increases the duration of analgesia significantly. But there was no difference in the onset of analgesia.

Keywords: Analgesia, Dexamethasone, Ropivacaine

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Received: 01 October 2020 **Revised: 14 November 2020** **Accepted: 24 November 2020** **Published: 24 December 2020**

Introduction

An ever-increasing demand for regional anesthesia from patients and surgeons matches the growing realization that regional anesthesia can provide superior pain management and perhaps improve patient outcomes to meet evolving expectations for ambulatory, cost-effective surgery.[1] Our aging population presents with an increasing range of co-morbidities, demanding a wider choice of surgical anesthesia options including the use of a variety of regional techniques in conjugation with general anesthesia to optimize clinical care, while at the same time reducing the risks of complications. Thus, the practice of regional anesthesia remains an art for many practitioners and consistent success with these techniques often appears to be limited to anesthesiologists who are regional anesthesia enthusiasts.[2]

Ropivacaine is a long-acting amide local anesthetic agent and first produced as a pure enantiomer. It produces effects by reversible inhibition of sodium ion influx in nerve fibres. Ropivacaine is less lipophilic than bupivacaine and is less likely to penetrate large myelinated motor fibres, resulting in a relatively reduced motor blockade.[3]

Many drugs have been studied as adjuvants for regional anesthetic techniques. These adjuvants include Epinephrine, Clonidine, Opioids, Ketamine and Midazolam. But all have met with limited success.[4] Because of the limited efficacy or questionable toxicity of previously studied drugs, some investigators have begun to evaluate glucocorticoids for regional anesthesia. Known for their anti-inflammatory, analgesic, immunosuppressive, and antiemetic properties, these corticosteroids exert their effects by inhibition of phospholipase A 2 as well as changes in cell function induced by glucocorticoid receptor activation.[5] The present study was undertaken to study the effect of adding dexamethasone to 0.2% ropivacaine in the adductor canal block.

Subjects and Methods

A prospective randomized single-blinded comparative study was conducted among 52 patients for lower limb surgery in the Department of Anesthesiology. Inclusion criteria were patients who underwent elective lower limb surgeries, ASA grade 1 and 2, 18 years old and above and exclusion criteria were patients with known hypersensitivity to local anaesthetics, infection at the site of block, patients with known coagulopathy (abnormal BT, CT) or patient on anticoagulants therapy. The approval for the study was obtained from the institutional ethical committee.

A demographic profile was recorded. Patients were divided into 2 groups. Group R received 20 ml of 0.2% ropivacaine + 2 ml of normal saline and group RD received 20ml of 0.2% ropivacaine with 8 mg of 2 ml dexamethasone. With the patient in the proper position, the skin was cleaned and draped under aseptic precautions and the transducer is placed anteromedially, color doppler scanning is used to trace the femoral artery caudally from the inguinal crease. Once the femoral artery is identified, the needle is inserted in-plane in a lateral-to-medial orientation and advanced toward the femoral artery. Once the needle tip is visualized medial to the artery and after careful aspiration, 1 to 2 mL of local anesthetic is injected to confirm the proper injection site. When injection of the local anesthetic does not appear to result in its spread beside the femoral artery, additional needle repositions and injections may be necessary. After the block was given, the patient was evaluated for the onset of sensory block and duration of analgesia, side effects and complications. The assessment was done every 3 minutes till the development of the sensory block. The results were statistically analyzed. P-value of less than 0.05 was considered significant.

Results

Table 1: Demographic characteristics of the study population

Variable	Group R	Group RD	P-Value
Age (years)	61.23±8.1	61.77±7.55	0.791
Sex (M/F)	18(60%)/1	20(66.6%)/10	0.592
Weight (kg)	64.63±7.(	66.9±6.77	0.209

[Table 1] shows that the average age was 61.23±8.16 years in the R group and 61.77±7.55 years in the RD group. The average body weight 64.63±7.08 kg in the R group and 66.9±6.77 kg in the RD group. Both groups had predominantly male patients. There were no statistically significant differences in the demographic profile of patients ($p > 0.05$).

Table 2: ASA grading of the study population

ASA	Group R		Group RD	
	NO	%	NO	%
1	23	76.6%	23	76.6%
2	7	23.3%	7	23.3%
Total	30	100%	30	100%

[Table 2] shows that there was no significant difference between the 2 groups in terms of ASA grading (P=1.000).

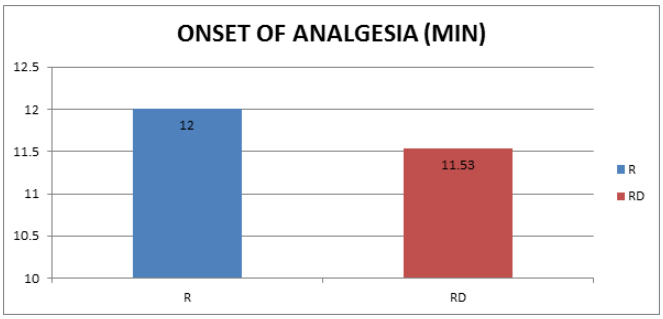

Figure 1: Onset of Analgesia

[Figure 1] shows that the onset of sensory block in group R was 12 ± 1.70 min whereas in group RD it was 11.53 ± 1.66 min, which was not statistically significant ($P > 0.05$).

Table 3: Duration of analgesia

Groups	Duration of analgesia	P-value
Group R	507.96 ± 149.32	<0.0001
Group RD	1082.63±195.11	

[Table 3, Figure 2] shows that the duration of analgesia in group R was 507.96 ±149.32 min whereas in group RD it was 1082.63±195.11 min, which was statistically highly significant (P<0.0001).

Discussion

In recent years, there has been a growing interest in the practice of regional techniques and, in particular, peripheral nerve blocks for surgical anesthesia and postoperative analgesia. The development of local anesthetic agents with lower toxicity and long duration of action had contributed to this change. After going through the relevant literature regarding the use of Dexamethasone as an adjuvant to local anaesthetics, it was hypothesised that the addition of Dexamethasone to Ropivacaine for adductor canal block, will be effective

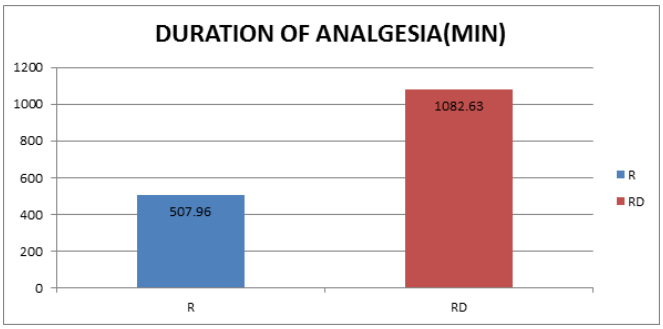

Figure 2: Duration of analgesia

in prolonging the duration of analgesia for post operative patients.[6]

In our study, the drugs selected for the adductor canal block were Ropivacaine and Dexamethasone. Bupivacaine and Ropivacaine are being regularly used for adductor block for post-operative analgesia after lower limb surgeries in our hospital.[7] Ropivacaine has a higher toxic threshold, produces less cardiac and central nervous system effects compared to Bupivacaineand hence is selected as the local anesthetic for our study.

In an attempt to increase the duration of postoperative analgesia, various adjuvant drugs are used along with local anesthetic agents. Adjuvants include Epinephrine, Clonidine, Opioids, Ketamine and Midazolam.[8] But all have met with limited success and also there is also an increase in the incidence of side effects. Dexamethasone, as an adjuvant appears to be effective in prolonging the duration of analgesia of adductor block, with the effect being stronger with Ropivacaine.[9]

Despite concern surrounding 'off label' use of perineural adjuvants, the safety profile of dexamethasone is promising.[10] Additionally, corticosteroids have a long history of safe use in the epidural space for the treatment of radicular pain arising from nerve root irritationand dexamethasone specifically has been studied as an adjuvant to epidural local anaesthetics.[11]

In fact, the use of dexamethasone as an adjunct to local anesthesia for nerve blocks is discussed in prominent textbooks. Hence in our study dexamethasone was selected as an adjuvant to Ropivacaine for studying the effectiveness in prolongation of the duration of analgesia. In our study onset of sensory block in the Ropivacaine group was 12±1.70 min and in Ropivacaine + Dexamethasone group it was 11.53±1.66 which was not statistically significant. In our stud, the duration of analgesia in the Ropivacaine group was 507.96 ±149.32 min whereas in Ropivacaine + Dexamethasone it is 1082.63±195.11min which was statistically highly significant.

In the study duration of analgesia was longer in group RD than in group R. It was 14.67± 2.96 hours (880.2± 177.6 min) in group R and 23.42± 3.35 hours (1405.2± 201min) in group RD respectively (P<0.05). In the study conducted by Cun-Jin Wang et al,[12] there was a statistically highly significant difference in the duration of analgesia between Ropivacaine and Ropivacaine + Dexamethasone group. Duration of analgesia was longer in group RD than in group R. Ropivacaine and Ropivacaine+ dexamethasone values are 14.67± 2.96 hrs (880.2± 177.6 min) and 23.42± 3.35 hrs (1405.2± 201min) respectively (P<0.05).

Hence our study concurs with the above-mentioned study with respect to the duration of analgesia. An extensive review of the literature was done and apart from the above-mentioned study, to the best of our knowledge, no other study has examined the use of dexamethasone along with Ropivacaine in the Adductor canal block. Hence this lack in the literature about the use of dexamethasone with Ropivacaine in particular to the adductor canal block was the main motive for us to carry out this work.

The incidence of adverse events in either group was nil. As care was taken not to exceed the safety margin of Ropivacaine which was 3mg/kg body weight, hemodynamic parameters like Pulse, Blood pressure and Spo2 were stable in the study population without requiring any intervention.

The shortcoming of the study is the small sample size.

Conclusion

The authors concluded that the addition of dexamethasone to 0.2% ropivacaine for the adductor canal block increases the duration of analgesia significantly. But there was no difference in onset of analgesia.

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How to cite this article: Reddy KG, Reddy MA, Babu R. Comparison of Sensory Effects of Ropivacaine Alone and Ropivacaine Along with Dexamethasone in Adductor Block for Post-Operative Analgesia After Lower Limb Surgeries. Acad. Anesthesiol. Int. 2020;5(2):135-138.

DOI: dx.doi.org/10.21276/aan.2020.5.2.28

Source of Support: Nil, **Conflict of Interest:** None declared.