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COMPARATIVE STUDY OF ISOBARIC ROPIVACAINE 0.5% WITH DEXMEDETOMIDINE AND 0.5% ROPIVACAINE ALONE IN SPINAL ANAESTHESIA IN LOWER LIMB AND PERINEAL SURGERIES

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Authors PBJ and AP designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors AH, AJB and DK managed the analyses of the study. Authors KSD and VMJ managed the literature searches. All authors read and approved the final manuscript.

Article Information

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Original Research Article

ABSTRACT

Introduction-Spinal anesthesia, a kind of local anesthesia, where the conduction square of the nerve roots is cultivated by infusing a limited quantity of nearby sedative arrangement into the subarachnoid liquid through a lumbar puncture. The adaptability of spinal sedation is managed by a wide scope of nearby sedatives and added substances that permit power over the level, the hour of onset and the span of spinal sedation. Purpose-The purpose of this analysis is to compare the effectiveness of ropivacaine 0.5 per cent with dexmedetomidine 5 mcg and ropivacaine 0.5 per cent alone in spinal anaesthesia. Method-This study was conducted to compare the effects of isobaric ropivacaine 0.5% with and without dexmedetomidine 5 mcg in spinal anaesthesia in lower limb. Conclusion-Study conclude that Dexmedetomidine as an adjunct to 0.5% Ropivacaine is superior to 0.5% Ropivacaine alone in spinal anaesthesia.

Keywords: Ropivacaine; dexmedetomidine; spinal anaesthesia; lower limb surgery.

1. INTRODUCTION

Spinal anesthesia, a kind of local anesthesia, where the conduction square of the nerve roots is cultivated by infusing a limited quantity of nearby sedative arrangement into the subarachnoid liquid through a lumbar puncture. It is a simple technique that provides a rapid, dense and predictable state of anaesthesia [1].

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Spinal anaesthesia is an ideal choice for surgeries below the level of umbilicus and most commonly used anaesthetic technique for lower abdominal, perineum and lower limb surgeries.

The advantages of spinal anaesthesia is that the risk of general anaesthesia is avoided like anatomical abnormalities, patients with bronchial asthma or allergic bronchitis. It is less costly, maintains patent airway, decreased pulmonary complications, faster return of normal gastrointestinal function.

Traditionally amide and ester linked local anaesthetics such as lignocaine, bupivacaine, cinchocaine and tetracaine have been commonly used drugs for spinal anaesthesia [2]. But, these drugs carry undesirable effects like cardio toxicity and central nervous system toxicity [3].

Intrathecal administration of clonidine (alpha-2 adrenergic agonist) prolonged motor blockade induced by local anaesthetic [4]. Dexmedetomidine is more particular alpha-2 adrenoceptor agonist and the partiality of dexmedetomidine to alpha-2 adrenoceptors is eight-times higher than clonidine, so, it is more advantageous in clinical anaesthesia [5].

2. AIM AND OBJECTIVES

Aim: To compare the efficacy of ropivacaine 0.5% with dexmedetomidine 5 mcg and ropivacaine 0.5% in spinal anesthesia.

Objectives: Primary: To compare onset of action and to compare duration of action.

Secondary: To study the hemodynamic parameters. To study intra-operative discomfort / complications.

3. REVIEW OF LITERATURE

Spinal anaesthesia, also known as subarachnoid block, has enjoyed a long history of success for almost 100 years. It has an interesting historical background. Bier and his assistant Hildebrandt injected cocaine into each other's theca and both experienced severe headache which lasted for days thus they postulated that their headache was due to loss of large volume of cerebrospinal fluid [6]. The technique of spinal anaesthesia was eventually well accepted and many reports were published on its usage and the popularity of spinal anaesthesia had steadily increased with the introduction of newer drugs and techniques. Knowledge of anatomy of vertebral column and its contents is essential to all the anaesthesiologist for accurate, safe and successful administration of spinal anaesthesia.

The spinal cord is continuous with the medulla oblongata of the brain and runs from the level of the foramen magnum to the upper border of the second lumbar vertebra, an average length of 45 cm. Though it tapers from above to down it has two enlargements, the cervical and the lumbar, which correspond to the innervation of the upper and lower limbs. The spinal cord has a conical termination, the conus medullaris. Its tip is attached to filum terminale which descends to end at the coccyx. While the spinal cord is a continuously unusable structure, the 31 pair of spinal cords attached to local regions form an external division [7]. In spinal anesthesia, the anesthetic agent is brought into contact with neural structures in the subarachnoid space. Local anaesthetics are also thought to function where they attach with the greatest avidity: the superficial layers of the spinal cord and the dorsal roots [8,9].

Intrathecal sedation is valuable for ambulatory anaesthesia, necessities of which are a tangible and engine square of sufficient span for the system and a quick relapse of engine square to help assembly. Most of information identifying with the viability of intrathecal ropivacaine for territorial sedation are typically gotten from investigations of patients going through cesarean area or muscular medical procedure [10].

Kleef et al. [11] studied the clinical viability and protection of ropivacaine as a local anaesthetic in spinal anesthesia. Forty patients between the ages of 18 and 75 years old, planned for minor medical procedure in the lower appendage, were seen. They were randomly given out to acquire either 3 ml glucose-free 0.5 percent (15 mg) or 0.75 percent (22.5 mg) ropivacaine to receive.

Eledjam et al. [12] mentioned that the essential advantage of ropivacaine is its low toxicity, mostly lower cardiotoxicity, following unintentional intravascular injection. Therefore, ropivacaine is a decent decision for both intraoperative and postoperative regional anesthesia and analgesics.

Whiteside et al. [13] did a relative investigation of the clinical sufficiency of hyperbaric ropivacaine with that of hyperbaric course of action of bupivacaine. Forty ASA grade I-II patients experiencing lower-stomach, perineal or lower-appendage clinical methodology under spinal anesthesia were enlisted and randomized to get ropivacaine 5 mg ml \pm 1 (with glucose 50 mg ml \pm 1), 3 ml or bupivacaine 5 mg 3 ml \pm 1 (with glucose 80 mg ml \pm 1).

Lee et al. [14] in 2007conducted a dose response study and provided a helpful guide for doctors to select the appropriate dosage of spinal ropivacaine in various therapeutic conditions. They found that ED50 and ED95 had limb surgeries of 50 minutes in length or less for ropivacaine in 7.6 mg and 11.4 mg, respectively.

Luck et al. [15] agreed on the more limited duration of sensory and motor block and the lesser level of motor block produced by hyperbaric ropivacaine compared to hyperbaric bupivacaine. They also observed significantly shorter time to mobilization and micturition.

Malinovsky et al. [16] in a study comparing intrathecal isobaric ropivacaine 15 mg versus bupivacaine 10 mg in transurethral resection of the prostate medical procedures, found that cephalic spread of sensory segments was higher with bupivacaine than with ropivacaine, similar to the findings in our study group.

4. MATERIALS AND METHODS

In this prospective randomized double blind study, a sum of 60 patients of ASA physical status I and II planned for lower limb and perineal medical procedures under the subarachnoid block were incorporated after institutional moral panel endorsement and acquiring educated composed assent from every patient.

5. OBSERVATION AND RESULTS

In the current study, most of the patients were in the age gathering of 31-50 years old in both the

gatherings. The mean age of the patients in group R was 44.46 ± 10.45 years while the mean age in bunch RD was 45 ± 10 years. Age incidences between two groups were comparable. [Table 1].

In group R 40% were males and 60% were females whereas in group RD 36.67% were males and 63.33% were females. Majority of the patients in both groups were females and the groups were comparable with respect to sex distribution with no significant difference between the groups. [Table 2].

6. DISCUSSION

Spinal anaesthesia is a basic procedure that offers a deep and quick surgical block by administering small amounts of local anaesthetic solution into the subarachnoid region. It is an ideal choice for surgeries below the level of umbilicus and most commonly used anaesthetic technique for lower abdominal, perineum and lower limb surgeries. It is almost now preferred to general anesthesia in lower abdominal surgery, due to its intra and postoperative antinociceptive effect, its lower incidence of hemodynamic fluctuation compared to general anesthesia, its considerable effect in reducing bleeding intraoperative and postoperative thromboembolic complications, and good control of postoperative pain. Search for better local anaesthetic in spinal anaesthesia is still under process. Traditionally amide and ester linked local anaesthetics such as lignocaine, bupivacaine, cinchocaine and tetracaine have been commonly used drugs for spinal anaesthesia. But, these drugs carry undesirable effects like cardio-toxicity and central nervous system toxicity.

Age groups (years)	Group R			
	Number	Percentage	Number	Percentage
18-30	3	10.00	3	10.00
31-40	10	33.33	8	26.67
41-50	8	26.67	10	33.33
51-60	9	30.00	9	30.00
Total	30	100	30	100

Table 1. Age distribution

Table 2. Sex distribution

Sex	Group R		Group RD	Group RD	
	Number	Percentage	Number	Percentage	
Male	12	40.00	11	36.67	
Female	18	60.00	19	63.33	
Total	30	100	30	100	

In present study, in Group R mean age of patient was 44.5 ± 10.2 years and in Group RD it was 45 ± 10 years. Highest age was 60 years and lowest age was 25 years. In Group R 12 patients were male and 18 were female, while in Group RD 11 were male and 19 were female. Lower limb surgeries were commonly performed in both the groups i.e., 17 in group R and 18 in group RD.

7. CONCLUSION

Study conclude that Dexmedetomidine as an adjunct to 0.5% Ropivacaine is superior to 0.5% Ropivacaine alone in spinal anaesthesia. It augments the onset and duration of sensory and motor block, as well as total duration of analgesia thus, reducing the requirement of analgesics in postoperative period. Even though it may cause alterations in haemodynamic parameters. The lack of complications like pruritus, shivering and respiratory depression make it an attractive choice. Thus, it is a safe modality for lower limb and lower abdominal surgeries as far as intraoperative and postoperative analgesia is concerned.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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