ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 10, Issue – 1, January – 2025, Page No. : 132 – 139

Comparison of Intrathecal Atropine versus Dexamethasone for Prevention of Nausea and Vomiting in Patients Undergoing Lower Limb Surgeries under Spinal Anaesthesia

[1]Dr Anshu, MBBS, MD Anaesthesiology, PDCC, Assistant Professor, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu

[2]Dr Neha Chajgotra, MBBS, MD Anaesthesia, Senior Resident, Department of Anaesthesia and Critical Care, Government Medical College, Kathua

[3]Dr Rajesh Angral, MD (Anaesthesia), Associate Professor, Department of Anaesthesiology and Critical Care, Government Medical College, Kathua, Jammu

Corresponding Author: Dr Rajesh Angral, MD (Anaesthesia), Associate Professor, Department of Anaesthesiology and Critical Care, Government Medical College, Kathua, Jammu.

Citation this Article: Dr Anshu, Dr Neha Chajgotra, Dr Rajesh Angral, "Comparison of Intrathecal Atropine versus Dexamethasone for Prevention of Nausea and Vomiting in Patients Undergoing Lower Limb Surgeries under Spinal Anaesthesia", IJMSIR - January – 2025, Vol – 10, Issue - 1, P. No. 132 – 139.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: For better pain management during lower limb surgeries, various adjuvants have been used intrathecally along with local anaesthetics. Spinal anesthesia is a widely used technique for lower limb surgeries, but it is often accompanied by side effects such as nausea and vomiting. Various pharmacological interventions have been explored to mitigate these side effects, including intrathecal atropine and dexamethasone. This study aims to compare the efficacy of intrathecal atropine and intrathecal dexamethasone in preventing nausea and vomiting in patients undergoing lower limb surgeries under spinal anesthesia

Material and Methods: This prospective, randomized, double-blind study was conducted at ASCOMS, Jammu over one year on 100 Patients randomly divided into two groups with one group receiving 0.2 mg of intrathecal atropine along with 12mg of 0.5% hyperbaric bupivacaine and another group receiving 5 mg of intrathecal dexamethasone along with 12mg of 0.5% hyperbaric bupivacaine. The primary outcome measure was the incidence of nausea and vomiting in the intraoperative and postoperative periods. Secondary outcomes included characteristics of the spinal block, hemodynamic changes, and any adverse effects.

Results: In both groups, there was no statistical difference in respect of age, sex, BMI, ASA physical status, duration of surgery, Mean Arterial pressure and HR. It was observed that the occurrence of postoperative nausea and post-operative vomiting was less in group A cases (atropine group) as compared to group B (dexamethasone group) cases (p=0.048 and 0.026 respectively).

Conclusion: In conclusion, intrathecal atropine is more effective than intrathecal dexamethasone in preventing

nausea and vomiting in patients undergoing lower limb surgeries under spinal anesthesia

Keywords: Intrathecal, Nausea and Vomiting, hemodynamic changes

Introduction

Pain is one of the most common and distressing symptoms experienced by patients undergoing lower limb surgeries under spinal anaesthesia. For better pain management during lower limb surgeries, various adjuvants have been used intrathecally along with local anaesthetics, including opioids, alpha-2 agonists, and corticosteroids [1,2,3].

Spinal anaesthesia is a widely used technique for lower limb surgeries, but it is often accompanied by side effects such as nausea and vomiting [2]. One of the most common complications associated with spinal anaesthesia is postoperative nausea and vomiting, which can significantly impact patient comfort, satisfaction, and recovery [4].

In lower limb surgeries under spinal anesthesia, the incidence of postoperative nausea and vomiting has been reported to range from 10% to 80% [5]. This wide variation can be attributed to several factors, including the type of surgery, patient characteristics, and the use of prophylactic anti-emetic medications. It has been increasingly recognized that the prevention of nausea and vomiting is crucial for patient satisfaction and recovery.

To mitigate these side effects, various pharmacological interventions have been explored, including the use of intrathecal atropine and dexamethasone. Atropine, a muscarinic receptor antagonist, has been shown to reduce the incidence of intraoperative nausea and vomiting [6,7]. Dexamethasone, a potent corticosteroid, has also been investigated for its antiemetic properties [8].

Intrathecal atropine is a muscarinic antagonist that has been investigated for its antiemetic properties. Dexamethasone, a potent corticosteroid, has also been studied for its ability to reduce postoperative nausea and vomiting [8]. However, a direct comparison of the efficacy of these two interventions is lacking in the literature.

Atropine is a competitive antagonist of muscarinic acetylcholine receptors. It blocks the action of acetylcholine at muscarinic receptors, which are involved in the emetic reflex arc. Intrathecal administration of atropine has been shown to effectively reduce the incidence of nausea and vomiting in patients undergoing spinal anaesthesia [6].

On the other hand, Dexamethasone is a potent corticosteroid that has been observed to have antiemetic properties. The mechanism of action of dexamethasone in reducing nausea and vomiting is not fully understood, but it is thought to involve the inhibition of prostaglandin synthesis, reduction of 5-HT3 receptor sensitivity, and modulation of the inflammatory response [9].

Intrathecal Atropine and intrathecal Dexamethasone have both shown promise in reducing nausea and vomiting in patients undergoing spinal anaesthesia, but their comparative efficacy has not been well-established [6,8,10].

This study aims to compare the efficacy of intrathecal atropine and intrathecal dexamethasone in preventing nausea and vomiting in patients undergoing lower limb surgeries under spinal anaesthesia.

Material and Methods

This was a prospective, randomized, double-blind study conducted in the Department of Anaesthesia, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu. In the study, 100 Patients were included as per the following inclusion and exclusion criteria:

Inclusion Criteria

- Age between 18-65 years
- Body Mass Index (BMI) between 18.5-35

- Cases scheduled for elective lower limb surgeries under spinal anesthesia
- American Society of Anaesthesiologists' physical status I or II

Exclusion Criteria

- Participant refusal
- Allergy to any of the medications
- Any contraindication to neuraxial block
- Cases with a history of nausea and vomiting as well as those who have taken antimetic medications within the last 2h, were excluded from surgery.

In the study, 100 Patients were randomly allocated into two groups:

Group A (n=50) receiving 0.2 mg of intrathecal atropine along with 12mg of 0.5% hyperbaric bupivacaine

Group B (n=50) received 5 mg of intrathecal dexamethasone along with 12 mg of 0.5% hyperbaric bupivacaine.

All patients received standardized spinal anesthesia with 0.5% hyperbaric bupivacaine at the L3-L4 or L4-L5 intervertebral space. Patients in Group A received 0.2 mg of intrathecal atropine, while patients in Group B received 5 mg of intrathecal dexamethasone, along with the local anaesthetic.

Nausea and vomiting were assessed using a 4-point scale (0 - no nausea/vomiting, 1 - mild, 2 - moderate, 3 - severe). A score of 0 indicated no nausea or vomiting, 1 indicated mild nausea, 2 indicated moderate nausea with or without vomiting, and 3 indicated severe nausea with or without vomiting. Additional rescue antiemetics were administered if the patient experienced a score of 2 or greater.

On arrival of the participant to the operative room, a suitable IV line was inserted. Participants are connected to monitor and assessment of hemodynamic (Heart rate (HR), Respiratory rate (RR), and blood pressure (BP). Preanesthetic hydration by at least 100 ml/h of ringer lactate during the period of fasting in pre-operative room. Participants received spinal anesthesia at level L3-L4 or L4-L5 lumbar segment in a sitting position with doses according to groups.

Hemodynamic parameters, including blood pressure and heart rate, were monitored at regular intervals during the surgical procedure. The characteristics of the spinal block, including the onset and duration of sensory and motor blockade, were also recorded.

The primary outcome measure was the incidence of nausea and vomiting in the intraoperative and postoperative periods. Secondary outcomes included characteristics of the spinal block, hemodynamic changes, and any adverse effects.

A clinical proforma was used to collect the data. The collected data was recorded in a Microsoft Excel sheet and analysed with the help of SPSS version 22.0.

Results and Observations

Table 1: Characteristics of the patients

	Group A (n=50)	Group B (n=50)	
Age (years)			
Mean±SD	35.72±10.32	39.04±12.85	p=0.1575
Sex			
Male	32(64%)	36 (72%)	
Female	18(36%)	14(28%)	

BMI (kg/m2)			
Mean±SD	28.04±2.14	27.12±2.86	p=0.0716
ASA physical status			
ASA I	42(84%)	38 (76%)	
ASA II	8(16%)	12(24%)	
Duration of surgery (min) Mean±SD	20±5.4	21±4.8	p=0.3301

Table 1 depicts the characteristics of the patients in both groups. The mean (SD) age of the population among groups was 35.72(10.32) years for Group A and 39.04(12.85) years for Group B respectively. In both groups, males outnumbered the female patients.

The mean (SD) BMI of the groups was for group A, 28.04(2.14) kg/m2, and for group B, 27.12(2.86) kg/m2. In both groups, the majority of the patients belong to ASA I. Further, there was no significant difference in both the groups with respect to the duration of surgery.

Table 2: Mean Arterial Pressure at different time periods

MAP at different time periods	Group A (n=50)	Group B (n=50)
5 min	94.08	93.68
15 min	91.04	90.24
30 min	96.08	95.32
45 min	87.04	86.44
60 min	91.76	92.44
120 min	90.24	91.76
180 min	94.76	94

Table 2 depicts that there is no significant difference between the groups in terms of mean arterial pressure at various intervals of time.

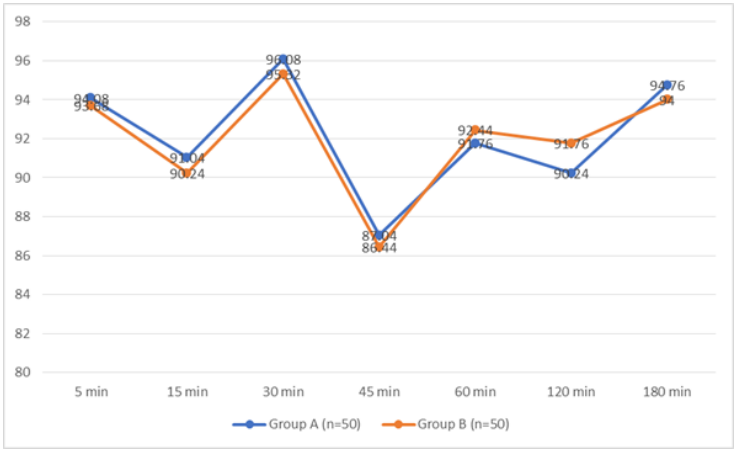

Figure 1: Mean Arterial Pressure at different intervals

Table 3: Heart Rate at different time periods

HR at different time periods	Group A (n=50)	Group B (n=50)
5 min	93.64	93.4
15 min	89.8	90.44
30 min	91.92	90.5
45 min	84.24	85.4
60 min	86.04	87.64
120 min	88.72	87.08
180 min	88.16	89.08

Table 3 shows that there is no significant difference between the groups in terms of heart rate at different time periods.

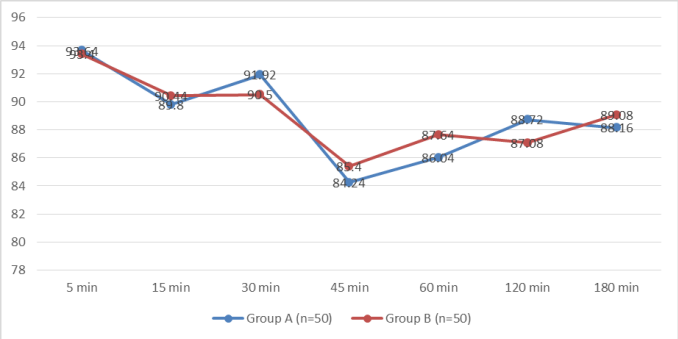

Figure 2: Mean Heart Rate at different intervals

It was further observed in our study that the time to onset of sensory and motor block was similar between the two groups, but the duration of sensory and motor blockade was significantly prolonged in the dexamethasone group compared to the atropine group.

Table 4: PONV of the studied groups

	Group A (n=50)	Group B (n=50)	P value
Post-operative nausea			
Grade 0	48	44	0.048*
Grade 1	1	3	
Grade 2	1	3	
Grade 3	0	0	
Post-operative vomiting			
Grade 0	50	45	0.026*
Grade 1	0	4	
Grade 2	0	1	
Grade 3	0	0	

Table 4 depicts the post-operative nausea and vomiting among the patients in both groups. It was observed that the occurrence of postoperative nausea and postoperative vomiting was less in group A cases (atropine group) as compared to group B (dexamethasone group) cases (p=0.048 and 0.026 respectively).

Table 5: Side effects of the drugs used in the studied groups

Side effects	Group A (n=50)	Group B (n=50)
Mouth dryness	2	0
Initial Bradycardia	1	0
Headache	0	2
Drowsiness	0	1
Distention	0	1

Table 5 depicts the side effects among both groups. It was observed that mouth dryness and initial bradycardia were observed among 3 (6%) patients in Group A (atropine group) whereas Headache, drowsiness, and distention were observed among 4(8%) of the patients in Group-B (dexamethasone group).

Discussion

The present study found that intrathecal atropine was more effective than intrathecal dexamethasone in preventing nausea and vomiting in patients undergoing lower limb surgeries under spinal anaesthesia. The incidence of nausea and vomiting was significantly lower in the atropine group compared to the dexamethasone group during the intraoperative period.

The mechanism of action of atropine in reducing nausea and vomiting is well-established. Atropine blocks the action of acetylcholine at muscarinic receptors, which are involved in the emetic reflex arc. This leads to a reduction in the activation of the vomiting center in the medulla. On the other hand, the antiemetic effects of dexamethasone are less well understood [9,11].

Previous studies have suggested that dexamethasone may inhibit the release of inflammatory mediators, such as prostaglandins and leukotrienes, which are known to stimulate the vomiting reflex. Additionally, dexamethasone may modulate the sensitivity of 5-HT3 receptors, which are involved in the transmission of nausea and vomiting signals [8,12].

The results of this study are consistent with the findings of previous research, which have also demonstrated the efficacy of intrathecal atropine in reducing the incidence of nausea and vomiting in patients undergoing spinal anesthesia.

One notable observation from this study was the prolonged duration of sensory and motor blockade in the dexamethasone group compared to the atropine group. This finding is in line with previous studies that have reported the adjuvant effects of dexamethasone in prolonging the duration of spinal anesthesia. The underlying mechanism for this effect is thought to be the anti-inflammatory and analgesic properties of dexamethasone, which can enhance the local anesthetic action and delay the resolution of the block [13,14.]

In contrast, the use of intrathecal atropine did not significantly prolong the duration of the spinal block, which may be a desirable characteristic in certain clinical situations where a shorter duration of anesthesia is preferred.

The mean (SD) age of the population among groups was 35.72(10.32) years for Group A and 39.04(12.85) years for Group B respectively. In both groups, males outnumbered the female patients. The mean (SD) BMI of the groups was for group A, 28.04(2.14) kg/m2, and for group B, 27.12(2.86) kg/m2. In both groups, the majority of the patients belong to ASA I. Further, there was no significant difference in both the groups with respect to

the duration of surgery. The base characteristics of the patients were similar between the two groups as also reported in previous studies by Thomas S et al. 2007 and Nava D et al. 2018 using intrathecal dexamethasone and intrathecal atropine [15,16].

There is no significant difference between the groups in terms of mean arterial pressure and heart rate at various intervals of time. Hemodynamic parameters like pulse rate and blood pressure did not differ significantly between the two groups

It was observed that the occurrence of postoperative nausea and postoperative vomiting was less in group A cases (atropine group) as compared to group B (dexamethasone group) cases (p=0.048 and 0.027 respectively). The time to onset of postoperative nausea and vomiting was also delayed in group A patients as compared to group B patients. The findings of our study are consistent with the results reported in previous studies by Yared J et al. 2000 and Thomas S et al. 2007 on the antiemetic efficacy of intrathecal atropine and intrathecal dexamethasone [1,15].

It was observed that mouth dryness and initial bradycardia were observed among 3 (6%) patients in Group A (atropine group) whereas Headache, drowsiness, and distention were observed among 4(8%) of the patients in Group-B (dexamethasone group). The side effects occurring in both groups were mild and did not require any specific treatment.

Limitations of the study

The study has several limitations, including the relatively small sample size and the single-center design. Additionally, the study did not assess the long-term outcomes or the cost-effectiveness of the two interventions.

Conclusion

In conclusion, intrathecal atropine is more effective than intrathecal dexamethasone in preventing nausea and vomiting in patients undergoing lower limb surgeries under spinal anesthesia. Intrathecal atropine did not prolong the duration of spinal blockade compared to intrathecal dexamethasone.

References

1. Yared J, Starr N J, Torres F K, Bashour C A, Bourdakos G, Kirchhoff T et al. Effects of single dose, postinduction dexamethasone on recovery after cardiac surgery. Elsevier BV 2000;69(5):1420-1424.
2. Suryawanshi T, Jadhav A, Gupta A, Agrawal P, Sharma A. Comparative Analysis of Anaesthetic Efficacy of 2% Lignocaine with Dexmedetomidine as an Adjunct in Nerve Blocks for Dental Extractions: A Randomised Controlled Study. Cureus Inc.2022.
3. Waldron N H, Jones C A, Gan T J, Allen T K, Habib A S. Impact of perioperative dexamethasone on postoperative analgesia and side-effects: systematic review and meta-analysis. Elsevier BV 2012;110(2): 191-200.
4. Flaatten H, Ræder J. Spinal anaesthesia for outpatient surgery. Wiley 1985;40(11): 1108-1111.
5. Watcha M F, White P F. Postoperative Nausea and Vomiting. Lippincott Williams & Wilkins 1992;77(1): 162-184.
6. Scuderi P E. Pharmacology of Antiemetics. Lippincott Williams & Wilkins 2003;41(4): 41-66.
7. Claybon L. Single dose intravenous ondansetron for the 24-hour treatment of postoperative nausea and vomiting. Wiley 1994;49(1): 24-29.
8. Henzi I, Walder B, Tramèr M R. Dexamethasone for the Prevention of Postoperative Nausea and

Vomiting: A Quantitative Systematic Review. Lippincott Williams & Wilkins 2000;90(1): 186-194.

9. Phillips B, Friend A, Gibson F, Houghton E, Gopaul S, Craig J V, Pizer B. Antiemetic medication for prevention and treatment of chemotherapy-induced nausea and vomiting in childhood. Elsevier BV 2016(2).
10. Ho S, Wang J J, Tzeng J I, Liu H, Ger L P, Liaw W. (2001, March 1). Dexamethasone for Preventing Nausea and Vomiting Associated with Epidural Morphine: A Dose-Ranging Study. Lippincott Williams & Wilkins 2001;745-748.
11. Stewart H C. (1963, March 1). THE PHARMACOLOGY OF ANTI-EMETIC DRUGS. Elsevier BV 1963; 35(3): 174-179.
12. Chu, C., Hsing, C., Shieh, J., Chien, C., Ho, C., & Wang, J. (2013, November 1). The cellular mechanisms of the antiemetic action of dexamethasone and related glucocorticoids against vomiting. Elsevier BV, 2013;722: 48-54.
13. Anupama M K, T R A. (2019, November 15). Dexamethasone an adjuvant in brachial plexus block: Supraclavicular approach: An observational randomised double blind clinical study., 2019;6(4): 497-501.
14. Cepeda M S, Carr D B, Miranda N, Diaz A, Silva C, Morales O. Comparison of Morphine, Ketorolac, and Their Combination for Postoperative Pain. Lippincott Williams & Wilkins 2005;103(6):1225-1232.
15. Thomas S, Beevi S. Dexamethasone reduces the severity of postoperative sore throat. Springer Science+Business Media 2007;54(11): 897-901.
16. Nava D, Nunez J C, Hernandez B, Barito A P, Diab A S. Evaluation of the Effect of Dexmedetomidine on the Suppression of the Adrenergic Response to Laryngoscopy and Intubation. OMICS Publishing Group, 2018;09(06).