*IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*
*e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 9 Ser.8 (September. 2023), PP 01-04*
*www.iosrjournals.org*

# Segmental Spinal Anaesthesia With Combined Use Of Hyperbaric 0.5% Bupivacaine And 0.5% Isobaric Ropivacaine Sequentially As An Alternative To General Anaesthesia In Unilateral Or Subsequent Bi-Level Lower Thoracic And Lumbar Spine Surgeries: A Case Series

Dr Nidhi Sharma[1], Dr Pallavi Jain[2], Dr Manish Banjare[3]
[1](Assistant Professor, Department of Anaesthesiology and Critical Care, M.Y. Hospital, Indore)
[2](Senior Resident, Department of Anaesthesiology and Critical Care, M.Y. Hospital, Indore)
[3](Professor, Department of Anaesthesiology and Critical Care, M.Y. Hospital, Indore)

***Abstract:***
***Background****: Spine injury is nowadays a common injury because of increased incidence of road traffic accidents. this is a prospective study in which segmental spinal anaesthesia was given as an alternative to general anesthesia for thoracic & lumbar spinal surgeries, considering the pros and cons of both the induction methods.*
***Materials and Methods****: This is a case series of 18 patients fulfilling the inclusion criteria, undergoing lower thoracic or lumbar spine surgery involving one or subsequent two spine segment, under segmental spinal anaesthesia using combination of hyperbaric bupivacaine and isobaric ropivacaine sequentially in the same intrathecal space.*
***Results:*** *A total of 18 patients were included in the study with a male to female ratio of 11:7, with 6 patients in ASA PS Grade I & 12 patients in grade ii. the haemodynamic parameter's variability were insignificant with no complications observed. surgeon's satisfaction score was noted at the end of the surgery and it was satisfactory for all the patients.*
***Conclusion****: On the basis of case series that we have conducted, we can conclude that segmental spinal anaesthesia with the combined sequential use of hyperbaric and isobaric local anaesthetic drugs can be used for lower thoracic and lumbar spine surgeries with better efficacy, safety and reduced post-operative complications with enhanced patient recovery.*
***Keywords:*** *Anaesthesia, Spinal anesthesia, Thoracic & Lumbar spine.*

---

Date of Submission: 20-09-2023 Date of acceptance: 30-09-2023

---

## I. Introduction

Spine injury is nowadays a common injury because of increased incidence of road traffic accidents, accidental falls etc. Many spine injuries need surgical corrections under appropriate anaesthesia. Lower thoracic and lumbar spine surgeries can be done under general or regional anaesthesia with former being the gold standard for decades. Along with benefits like secured airway, unawareness during the period of surgery, general anaesthesia has traditionally been preferred by anesthesiologists as well as surgeons because it is widely accepted by patients and facilitates surgery of long duration with patients in a prone position.**(1)** General anaesthesia has its own sets of complications also like airway trauma, bronchospasm, side effects of drugs used for induction and maintenance like PONV, prolonged sedation, residual paralysis, muscle soreness, post-operative pain and even cardiovascular and pulmonary complications.**(2)**

Spinal anaesthesia is an alternative with advantages over general anaesthesia like reduced blood loss and thus relatively clear operating field for surgeon, haemodynamic stability, better head and neck stability in awake patient, better post-operative analgesia, reduced PONV and other related complications of polypharmacy, early recovery and thus decreased hospital stay. But this too does have complications like hypotension, bradycardia, chances of high and total spinal because of the upward spread of hyperbaric spinal drug etc. **(3)** Some of these side effects of spinal anaesthesia like hypotension and bradycardia can be reduced by segmental spinal anaesthesia using combination of hyperbaric bupivacaine and isobaric ropivacaine sequentially in the same intrathecal space. Because isobaric drug does not have cephalic spread due to its non-dependency over gravity, chances of high spinal will be less and adequate level of desired anaesthesia can be achieved. Hyperbaric drug anaesthetizes the lower limb making the positioning comfortable for the patient as well as surgeon **(4)**

## II. Material And Methods

This comparative study consisting of case series of 18 patients was carried out on patients of Department of Anesthesiology at MGM Medical College & M.Y Hospital, Indore from April 2022 to March 2023.

**Study Design:** Comparative study

**Study Location**: This was a tertiary care teaching hospital-based study done in Department of Anesthesiology, at MGM Medical College & M.Y Hospital, Indore

**Study Duration:** April 2022 to March 2023.

**Sample size:** 18 patients.

**Inclusion criteria:**

1. Patients of either gender aged 18-65 years in age
2. ASA physical status 1 and 2.
3. Patients posted for uni-level or subsequent bi-level lower thoracic or lumbar spine surgeries were included

**Exclusion criteria:**

1. Patients who refused for the study.
2. Patients who have psychiatric or mental disorder.
3. ASA PS 3 or more and
4. Patient with any contraindication for the spinal anaesthesia were excluded from the study.

**Procedure methodology**

After obtaining approval from Institutional Ethics Committee, a case series of 18 patients undergoing lower thoracic or lumbar spine surgery involving one or subsequent two spine segment under segmental spinal anaesthesia using combination of hyperbaric bupivacaine and isobaric ropivacaine sequentially in the same intrathecal space was started. All included patients in the study were informed about the procedure and choice of all other anaesthesia options available in detail in their local vernacular languages and then written consent was obtained for regional anaesthesia.

A bed-side revised pre-anaesthetic workup was done a day prior to surgery. Patients were advised for adequate NBM with hydration to be maintained via intravenous fluid during NBM period. Adequate sleep and relaxation were ensured.

In operation theatre, after re-confirming consent, NBM status, hydration and level/site of surgery, patients were connected to multipara monitors and baseline vitals like HR, BP, ECG pattern, SpO2 were recorded and noted. Simultaneously patency of intravenous access was checked and appropriate fluid was started @10ml/kg 20 minutes prior to the induction of anaesthesia.

Patients were briefly re-counselled about the anaesthesia procedure. Antibiotics were given giving after test dose under vigilant monitoring. After making the field sterile under all aseptic precautions, spinal anaesthesia was given with 26 G Quinke's spinal needle a space or two above the operating spine level in lateral decubitus position. After confirming the outflow of CSF, 1ml of 0.5% hyperbaric bupivacaine was given and then after waiting for 60 seconds to avoid mixing of two drugs, 2ml of 0.5% isobaric Ropivacaine added with 30mcg of preservative free Buprenorphine was given through the same needle. Patients were made supine with proper pillow placement under head and neck. Then patients were assessed for the efficacy of anaesthesia by wet swab test and analgesia for sensory component and modified Bromage scale for motor component. Intravenous infusion of 50mcg inj Dexmedetomidine added in 100ml of Paracetamol (containing 1000mg of the drug) was started and infused over 20 minutes for conscious sedation and comfort of the patient. Preparation for the conversion to general anaesthesia were kept ready in case of failed spinal anaesthesia.

After 15 minutes, patients were given prone position with all the precautions, pressure points were padded with the cotton pads and peripheral pulses were palpated. Supplemental oxygen via nasal cannula @ 2lit/min was given throughout the surgery. Continuous vital parameters monitoring was done throughout the surgery and after baseline values, readings were noted immediately after the spinal drug injection and then at 5 minutes interval till 30 minutes and then at 35, 40, 45, 60, 90, 120, 150 minutes. Intravenous fluid input and urine output charting was done throughout the intraoperative period and adequacy was maintained. A rise of blood pressure and pulse rate greater than 25% of the baseline was considered to be due to inadequate analgesia because of fading of anaesthesia effect for which 1ml of 0.5% isobaric ropivacaine was planned to be given intraoperatively in open spine field. After completion of surgery, patients were made supine and then shifted to the post-operative care unit

**Statistical analysis**

Data was analyzed using SPSS version 20 (SPSS Inc., Chicago, IL). Student's *t*-test was used to ascertain the significance of differences between mean values of two continuous variables. Chi-square was performed to

test for differences in proportions of categorical variables between two or more groups. The level $P < 0.05$ was considered as the cutoff value or significance.

## III. Result

A total of 18 patients were included in the study which were all comparable in terms of their demographic data. However, it was statistically insignificant (P>0.05). A higher preponderance of males with M:F ratio of 11:7, with 6 patients in ASA PS Grade I & 12 patients in grade II. The mean age of the patients was 42.77 + 13.95. The mean duration of surgery was 47.5+ 10.32 minutes.

Majority of patients studied had injury at level of L1 i.e., 6 (30%) followed by 3 patients who had injury at the level of L2 L3, 2 each at level L2, L1 L2, T12 and 1 each at level T12 L1, T3 and L4 respectively. For maximum no. of patients [6(30%)] level of segmental sab as per modified bromade scale was at level of T12 L1 followed by 4 (22.22%) at L1 L2, 3(16.67%) at T11 T12, 2 (11.11%) at T10 T11 and 1 (5.56%) each at T2 T3 and L2 L3 respectively. The heamodynamic parameters such as Heart Rate, Mean Arterial Pressure, Systolic and Diastolic blood pressure remained within a range of 20% from the baseline in all the patients. The haemodynamic parameter's variability was insignificant with no complications observed. 1% patients experienced any intra-operative complications such as hypotension or bradycardia.

Surgeon's satisfaction score was noted at the end of the surgery and it was satisfactory for all the patients. In 11 patients i.e.,61.11% surgeons satisfaction score of 4 was recorded while in 7 patients a score of 3 was noted. Post-operative analgesia was measured from time of first rescue analgesia and it was varied from 8 to 10 hours after accomplishment of the surgery. Maximum patients i.e., 6 (30%) were given rescue analgesia at 8 hours whereas 4 (22.22%) patients each were given rescue analgesia at 5 hours, 6 hours and 7 hours respectively.

**Table no 1:** Shows demographic data, surgeon satisfaction score and VAS Score.

| CASES | AGE | SEX | ASA PS | DURATION OF SURGERY | LEVEL OF INJURY | LEVEL OF SEGMENTAL SAB | SURGEON SATISFACTION SCORE | TIME OF FIRST RESCUE ANALGESIA |
|---|---|---|---|---|---|---|---|---|
| 1. | 45 | M | II | 50 min | L2 L3 | L1 L2 | 4 | 5 hours |
| 2. | 32 | M | II | 45 min | T12 | T11 T12 | 4 | 8 hours |
| 3. | 45 | M | I | 60 min | T12 | T10 T11 | 3 | 6 hours |
| 4. | 34 | M | I | 40 min | L1 | T12 L1 | 3 | 5 hours |
| 5. | 46 | F | I | 60 min | L1 | T12 L1 | 3 | 5 hours |
| 6. | 67 | F | II | 60 min | L1 L2 | T12 L1 | 4 | 7 hours |
| 7. | 42 | M | I | 45 min | L1 | T11 T12 | 4 | 8 hours |
| 8. | 53 | F | I | 60 min | L1 | T11 T12 | 4 | 8 hours |
| 9. | 56 | F | II | 70 min | L2 L3 | L1 L2 | 3 | 5 hours |
| 10. | 44 | M | I | 40 min | L2 | L1 L2 | 4 | 8 hours |
| 11. | 28 | M | I | 40 min | L1 | T12 L1 | 4 | 7 hours |
| 12. | 16 | F | I | 45 min | L2 | T12 L1 | 3 | 6 hours |
| 13. | 18 | F | I | 50 min | T12 L1 | T10 T11 | 4 | 7 hours |
| 14. | 45 | M | I | 60 min | T3 | T2 T3 | 4 | 8 hours |
| 15. | 52 | M | II | 70 min | L1 | T12 L1 | 4 | 8 hours |
| 16. | 65 | F | II | 60 min | L4 | L2 L3 | 3 | 6 hours |
| 17. | 47 | M | I | 45 min | L1 L2 | T12 L1 | 3 | 6 hours |
| 18. | 34 | M | I | 40 min | L2 L3 | L1 L2 | 4 | 7 hours |

## IV. Discussion

All the patients were comparable in demographic variables with P-value>0.05 i.e., statistically insignificant. Baseline hemodynamic parameters were also comparable. Intra-operative fluctuations in hemodynamic parameters were less in all the patients except two patients in whom the duration of surgery got prolonged and intra-operative supplementation of spinal anaesthesia with 1ml of 0.5% isobaric ropivacaine had to be done at about 135 minutes and 142 minutes after anaesthesia induction. Surgeon's satisfaction score was noted at the end of the surgery and it was satisfactory for all the patients.

Intraoperative complications were nil in all the patients. Post-operative analgesia was measured from time of first rescue analgesia and it was varied from 8 to 10 hours after accomplishment of the surgery. I.V. paracetamol 10mg/kg was given at the VAS score >4 as the rescue analgesic and study was ended there.

General or regional anaesthesia both can be used for lower thoracic or lumbar spine surgeries with their own advantages and disadvantages. Regional anaesthesia intraoperatively helps in decreasing polypharmacy,

decreases blood loss and provides better field for surgeon, better patient's positioning and post-operatively, it helps in reducing i.v. drugs related side effects, provides analgesia and enhances recovery. The results of our study were in concurrence with study done by Zorrilla-Vaca et al. [(5)]

As stated by Uppal et al., hyperbaric spinal drug has its complications mainly due to cephalic spread along the gravity like hypotension, bradycardia, high and total spinal etc. [(6)] Addition of isobaric drug with reduction of hyperbaric drug could potentially reduce the complications of former and could enhance the efficacy and safety of the overall procedure. [(7)] Similar finding was noted by Rung et al.

## V. Conclusion

On the basis of case series that we have conducted, we can conclude that segmental spinal anaesthesia with the combined sequential use of hyperbaric and isobaric local anaesthetic drugs can be used for lower thoracic and lumbar spine surgeries with better efficacy, safety and reduced post-operative complications. These in turn can enhance patient's recovery. But more studies on the topic with greater sample size and at multiple centres needs to be done in future for adding safety in the procedure.

## References

[1]. Edgcombe H., Carter K., Yarrow S. Anaesthesia In The Prone Position. Br J Anaesth. 2008 Feb;100(2):165–183. Doi: 10.1093/Bja/Aem380. [

[2]. Sekerak R, Mostafa E, Morris MT, Nessim A, Vira A, Sharan A. Comparative Outcome Analysis Of Spinal Anesthesia Versus General Anesthesia In Lumbar Fusion Surgery. J Clin Orthop Trauma. 2020 Nov 27;13:122-126. Doi: 10.1016/J.Jcot.2020.11.017. PMID: 33680810; PMCID: PMC7919949.

[3]. Pierce JT, Kositratna G, Attiah MA, Kallan MJ, Koenigsberg R, Syre P, Wyler D, Marcotte PJ, Kofke WA, Welch WC. Efficiency Of Spinal Anesthesia Versus General Anesthesia For Lumbar Spinal Surgery: A Retrospective Analysis Of 544 Patients. Local Reg Anesth. 2017 Oct 10;10:91-98. Doi: 10.2147/LRA.S141233. PMID: 29066932; PMCID: PMC5644537.

[4]. Van Gesson EF, Forster A, Schweizer A, Gamulio Z. Comparison Of Hypobaric, Hyperbaric And Isobaric Solutions Of Bupivacaine During Continuous Spinal Anesthesia. An&H Analg 1991;72:779-84.

[5]. Zorrilla-Vaca, Andres Bsc[*,†]; Healy, Ryan J. Bsc[*]; Mirski, Marek A. MD, Phd[*]. A Comparison Of Regional Versus General Anesthesia For Lumbar Spine Surgery: A Meta-Analysis Of Randomized Studies. Journal Of Neurosurgical Anesthesiology 29(4):P 415-425, October 2017. | DOI: 10.1097/ANA.0000000000000362.

[6]. Uppal, Vishal FRCA[*]; Retter, Susanne MD[*]; Shanthanna, Harsha MD[†]; Prabhakar, Christopher FRCPC[‡]; Mckeen, Dolores M. FRCRC[*]. Hyperbaric Versus Isobaric Bupivacaine For Spinal Anesthesia: Systematic Review And Meta-Analysis For Adult Patients Undergoing Noncesarean Delivery Surgery. Anesthesia & Analgesia 125(5):P 1627-1637, November 2017. | DOI: 10.1213/ANE.0000000000002254

[7]. Rung, George W. MD; Williams, Dan DO; Gelb, Daniel E. MD; Grubb, Mark MD. Isobaric Spinal Anesthesia For Lumbar Disk Surgery. Anesthesia & Analgesia 84(5):P 1165-1166, May 1997.