Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 01, 2025

ORIGINAL RESEARCH ARTICLE

RANDOMIZED CONTROLLED TRIAL ON EFFECTIVENESS OF LEG ELEVATION TO PREVENT SPINAL ANAESTHESIA INDUCED HYPOTENSION DURING LOWER SEGMENT CAESAREAN SECTION

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ABSTRACT

Background: Post-spinal hypotension is particularly common in elderly patients and those undergoing caesarean deliveries. Leg elevation (LE) decreases post-spinal hypotension by increasing venous return, which raises stroke volume (SV), cardiac output (CO), and blood flow from the lower extremities to the thorax. Leg Elevation is straightforward, simple and easy to use technique.

Methods: A Randomised control study was conducted in Institute of Anaesthesiology, Madras Medical College, Chennai between January 2022 – December 2022. Sixty patients were selected for the study. The patients admitted for LSCS were randomly allotted in to two groups – Group A leg elevation group and Group B- Control group.

Results: There is no difference in baseline characteristics and demographic data distribution between two groups. There is no difference in duration of surgery, time of block to delivery between two groups. The incidence of Hypotension in leg elevation group is 23.3 % whereas in control group it is 3.33% and the result is significant with p value of 0.016. The severity of hypotension incidence is higher in control group when compared to leg elevation group.

Conclusion: This study demonstrates that leg elevation in elective caesarean sections considerably lowers both the incidence and severity of post-spinal hypotension.

Keywords: Spinal anaesthesia, hypotension, leg elevation, vasopressors

INTRODUCTION

Hypotension is a common side effect of spinal anaesthesia, occurring in 16–33% of cases. Spinal anaesthesia-induced hypotension occurs especially in older patients and those having caesarean sections(1). The prevalence of caesarean sections in the year 2019-21 is estimated to be 21.5 % in India(2). Following spinal anaesthesia for caesarean section, maternal hypotension is frequent. Severe hypotension puts both mothers and foetuses at great danger for suffocation, brain damage, cardiac arrest, and loss of consciousness. Post Spinal Hypotension is primarily brought on by alterations in vascular tone, which reduce systemic vascular resistance and venous

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return[3]. The administration of intravenous fluids, vasopressors like ephedrine, phenylephrine, and norepinephrine, as well as mechanical techniques like leg compression and elevation, primarily by increasing vascular tone and venous return, reduce the incidence of hypotension during spinal anaesthesia for caesarean section. Simple and cost-effective management protocols that can be easily deployed with little knowledge and that have fewer negative effects are crucial in places with limited resources. By moving blood from the lower extremities to the thorax, Leg Elevation (LE) increases venous return, which in turn increases stroke volume (SV), and subsequently cardiac output (CO) and prevents post spinal hypotension. Leg Elevation is simple, easy to follow and it minimises unnecessary expenditure in resource-constrained places.

Aims of the study: The aim of the study is to study the effectiveness of leg elevation to prevent hypotension following spinal anaesthesia.

MATERIALS & METHOD

Type of Study Design: Randomised control study

Study Duration: January 2022 – December 2022

Study Area: Institute of Anaesthesiology, Madras Medical College, Chennai

Study Population: Patients posted for LSCS

Inclusion Criteria

- 18 to 35 yrs old Full-term Singleton Parturient
- American Society of Anaesthesiologists Physical Status I and II
- Elective Caesarean Section
- Patient who gave valid informed consent for the study

Exclusion Criteria

- Patients posted for Emergency Caesarean Section
- Patients with Cardiovascular, Respiratory, Hepatic, Renal, Endocrine, Neurological disease
- Patient with Coagulopathy and bleeding diathesis, hypertension
- Morbid obesity
- Complicated Pregnancy

Randomization

60 eligible patients were selected for the study. The participants were randomly assigned following the randomization procedure to one of two study groups.

Group A: Leg elevation group

Group B: Non leg elevation group

Data Collection Method

Participants were informed about the purpose of the study. Written informed consent was obtained. The participants were assured that the information details obtained will be only for research purposes and would be kept strictly confidential. Under strict aseptic precautions after placing the patient in sitting position leaning forward, parts painted and draped. After giving local infiltration with 2% plain lignocaine, L3-L4 intervertebral space is entered with 25G Quincke-Babcock spinal needle via midline approach. Injection hyperbaric bupivacaine was injected into subarachnoid space at 0.2ml/sec after

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confirming free flow of CSF. Patient was then placed in supine position immediately. Patient are grouped
into A and B.

Group A-Leg elevation for 30 cm using 2 standard pillows positioned under the heels(leg is elevated
approximately 40ºabove horizontal plane) Sensory block was assessed by pinprick method in
midclavicular line using 27G needle. After reaching T6 sensory level pillows are removed. Surgery was
then proceeded.

Group B-Regular supine position with left uterine displacement Intraoperative vitals monitoring was
done every 1 min for 10 min followed by every 5 minutes until the end of surgery. Any occurrence of
hypotension was noted.

Data Analysis

The data were entered in MS Excel and analysed using SPSS 22 version. Categorical determinant
variables were given as proportions. The unpaired t test was used to compare means. The results were
expressed with p-value and $p<0.05$ is considered significant.

Ethics Approval

This study was approved by the Institutional Ethics Committee (IEC) –Madras Medical College.

RESULTS

The randomized control trial was conducted to assess the effect of leg elevation in reducing hypotension in patients undergoing LSCS among 60 patients.The mean age of patients in Group A is 28.3 years +/-2.3 whereas in Group B it is 28.1+/-3.6 years. The results were suggesting equal distribution of age between groups. In group A 53.7% of patients belonged to ASA (American Society of Anaesthesiologists) grade II physical status while in Group B, 53.7% belonged to ASA grade I. There was equal distribution of ASA grades I and II between groups. In both groups, majority of the patients were second gravida. The distribution of parity was equal in both groups. Results were not significant for duration of surgery and time taken for Subarachnoid block to delivery between the groups. There is no significant difference in incidence of nausea/vomiting and bradycardia in groups.

Table-1 Demographic characteristics and Intra-operative characteristics

Parameter		**Group A – Leg elevation**	**Group B Non -leg elevation**
Age in years	Mean	28.3	28.1
	S.D	2.3	3.6
BMI in kg/m2	Mean	23.6	24.1
	S.D	2.43	1.6
Duration of surgery	Mean	37.4	38.6
	S.D	2.5	2.2
Time from SAB to	Mean	18	17

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delivery	S.D	1.5	2.2
Nausea and vomiting		3 (10%)	4 (13.3%)

There was significant rise in heart rate in Group B control group from Time 5 min intra-op to 30 mins and result were significant. The heart rate was stable in leg elevation group which is depicted in Fig-1.

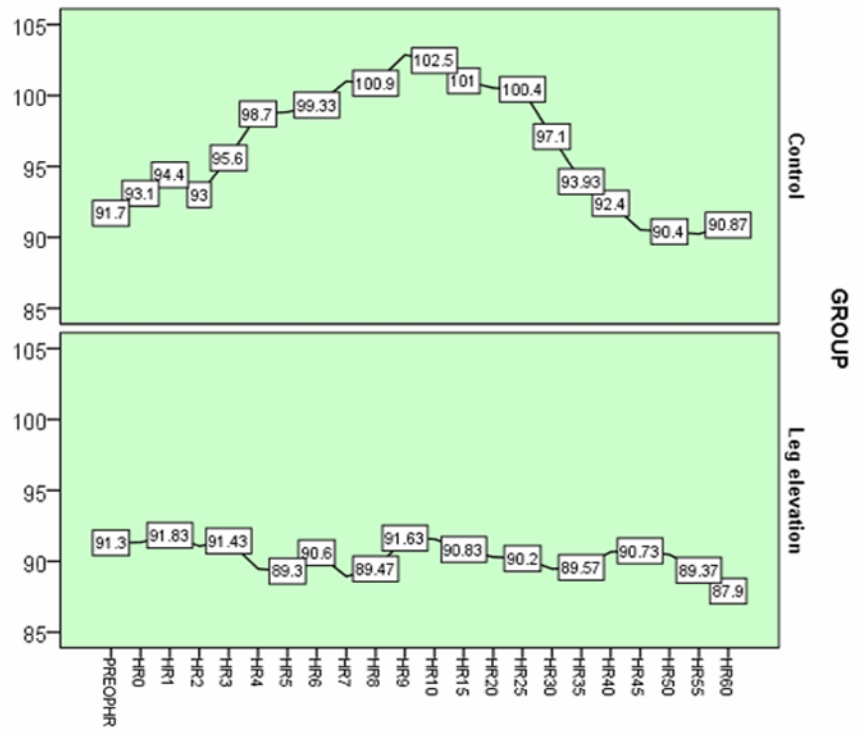

Fig – 1 Heart rate changes

The mean Systolic Blood Pressure was significantly lesser in Group B-non leg elevation when compared to Group A at 1 min intra-op to 15 mins shown in Fig-2. In our study, the DBP is significantly lesser in 1-4 mins in control group when compared to leg elevation group shown in Fig-3.

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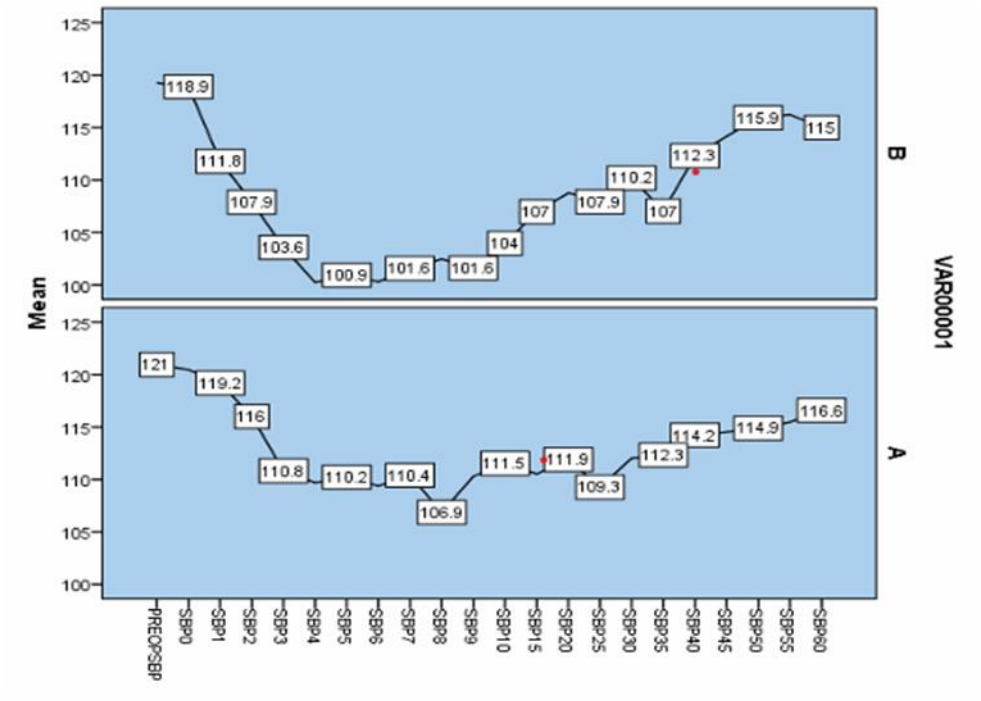

Fig-2 Systolic Blood pressure changes

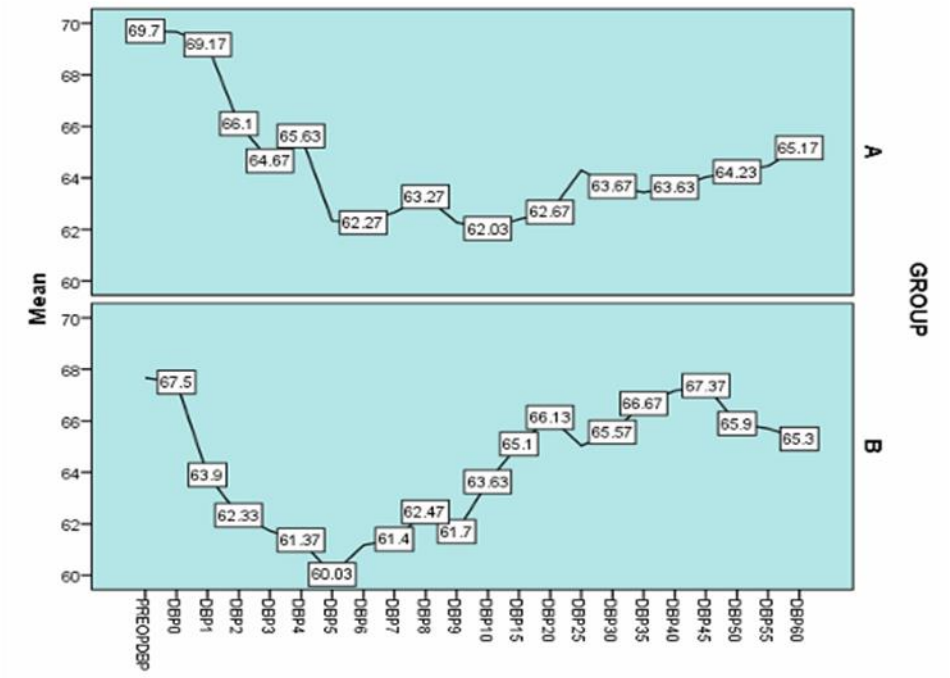

Fig-3 Diastolic Blood pressure changes

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The Mean Arterial Pressure from 1 to 8 min was significantly lower in Group B when compared to Group A. There is no difference in SPO2 changes between groups. The incidence of Hypotension in leg elevation group is 23.3 % whereas in control group it is 53.33% and the result is significant with a p-value of0.016 depicted in Fig-4. The severity of hypotension incidence is higher in control group when compared to leg elevation group. The control group had higher number of ephedrine dose when compared to leg elevation group and results were significant shown in Fig-5.The control group had higher number of ephedrine dose when compared to leg elevation group and results were significant with P value of 0.01. Only 13% needed one dose of ephedrine in leg elevation group, whereas in non-leg elevation group 30%, 6.6 %, 1% needed one, two, three doses of ephedrine respectively.

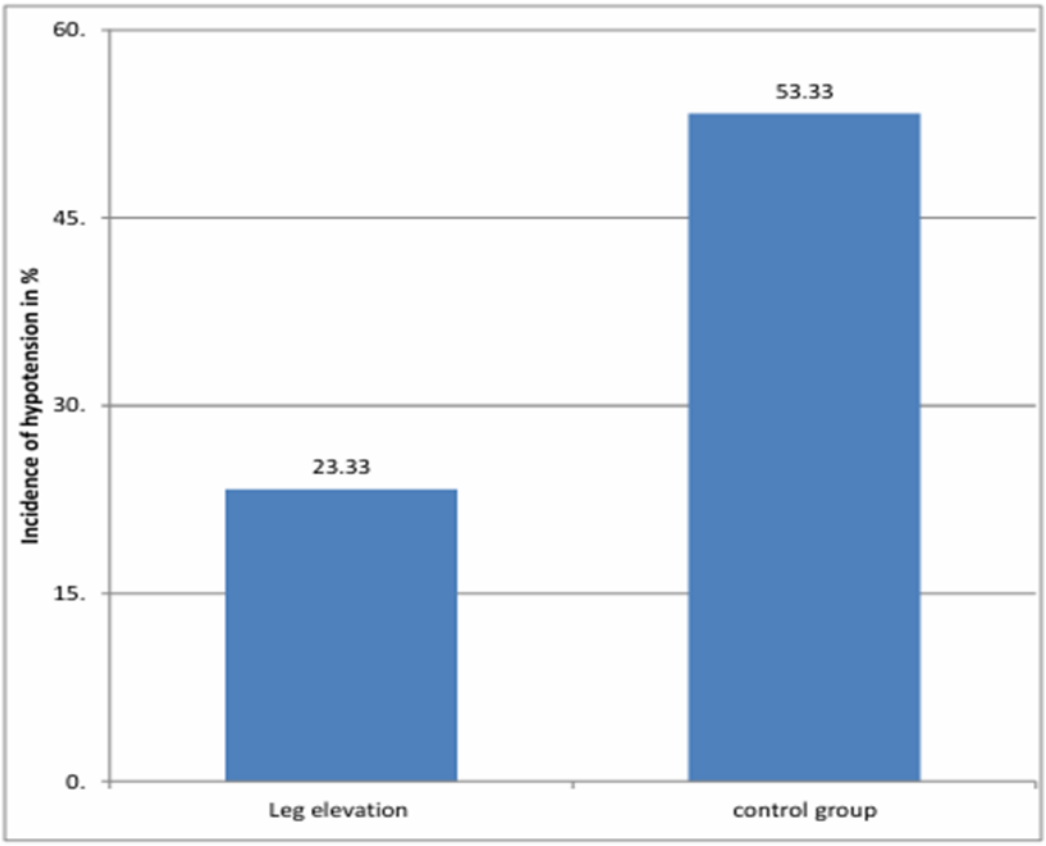

Fig-4 Hypotension incidence

DISCUSSION

The incidence of hypotension following spinal anaesthesia was significantly lower in the leg elevation group (33.3%) compared to the control group (62.5%), according to a study by Assen et al., which is similar to the present study. The results probably reflect the effect of enhanced venous return brought on by leg elevation, which may improve cardiac output and stroke volume. Leg elevation also prevents the chance of experiencing post-spinal hypotension by 47%[(4)]. A RCT done by Rout et al. in Egypt showed that the prevalence of post-spinal hypotension is 44 (58.7%) in the control group and 26 (34.7%) in the leg elevation group[(5)]. Rout et al. conducted a randomised controlled in England. 31 patients from each group participated in

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the trial. With a P value of 0.004, the incidence of PSH in the leg-wrapped, leg-elevated, and control groups, respectively, was 18%, 39%, and 53%. According to Rout et alstudy leg wrapping significantly lowers the likelihood of post-spinal hypotension than leg elevation alone. Hasanin et al study demonstrated that leg elevation decreases overall vasopressor consumption.Total ephedrine consumption was 4.9+7.8 mg in the leg elevation group and 10+ 11 mg in the controlled group, both of which were statistically significant[6] similar to the present study in which control group had higher number of ephedrine dose when compared to leg elevation group and results were significant. Hypotension was observed in 29 (41.4%) patients while 54 (77.1%) patients developed hypotension in Group C in a study done by Sari et al[7].

CONCLUSION

This study demonstrates that leg elevation in elective caesarean sections considerably lowers both the incidence and severity of post-spinal hypotension. Additionally, this technique reduced the need for vasopressors. So, Leg raising is a useful, non-invasive, reversible technique that does not need any special equipment which can be easily followed to prevent post-spinal hypotension.

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