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# Effects of Preloading of Crystalloid to Prevent Spinal Anesthesia Induced Hypotension in Patient Undergoing Lower Limb Surgery

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**Abstract:** ***Background and Aims: Hypotension is one of the most frequent side effects of spinal anesthesia. Crystalloid preloading prior to administration of spinal anesthesia to prevent hypotension is common. The aim is to study the effectiveness of preloading for the prevention of spinal anesthesia induced hypotension in lower limb surgery. Methods: 30 patients aged 18 to 65 years of either sex, scheduled for below umbilical surgery under spinal anesthesia were preloaded with 20ml/kg ringer lactate 20mins before spinal anesthesia. All patients were given subarachnoid block with 3ml of bupivacaine heavy with a 25gauge spinal needle at the L3-L4 intervertebral space. Mephentermine 6 mg was administered when the mean blood pressure fall less than 64 mmhg and atropine 0.6mg given to those patients whose heart rate decreased below 55 beats/min. Patients were observed for HR, SBP, DBP, MAP and SPO2 every 5 minutes until the end of the surgery. Result: Mean baseline value and trends at various time intervals of heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure were recorded. Total incidence of hypotension was 13.33% (4 out of 30 patients) and total incidence of bradycardia was 6.67% (2 out of 30 patients). Conclusion: Preloading with 20ml/kg ringer lactate 20 mins prior to induction of spinal anesthesia is effective in prevention of hypotension.***

**Keywords:** Preload, ringer lactate, hypotension

## 1. Introduction

Spinal anaesthesia is a popular and well accepted technique for surgery below umbilicus in adult patients and provides a better quality of analgesia and onset is faster than epidural. However, the rapid onset of sympathectomy that occurs with spinal anaesthesia results in fall in cardiac output and blood pressure. Hypotension is one of the most frequent side effects of spinal anaesthesia. Technique of preloading with crystalloid prior to the administration of spinal anaesthesia to prevent hypotension is common. Fluid loading has recently been recommended as a more logical strategy to use once the local anaesthesia block begins to take effect. By limiting fluid redistribution and excretion, this may enhance intravascular volume expansion during vasodilatation brought on by sympathetic inhibition.

### Aims and Objectives

- The aim is to study the effectiveness of preloading for the prevention of spinal anesthesia induced hypotension in lower limb surgery.
- To assess any side effects such as bradycardia or hypotension as a secondary outcome.

## 2. Materials and Methods

- **Place of Study**: Patients undergoing lower limb surgery in different operation theatres of Assam Medical College and Hospital, Dibrugarh, Assam.
- **Duration of Study**: Two months.
- **Type of Study**: Hospital based observational study.

### Study Population:

All patients aged 18 to 65 years including both sex with American society of Anaesthesiologist (ASA) physical status I & II undergoing undergoing lower limb surgery.

### Sample Size

Considering the standard deviation in systolic blood pressure among the patients after preloading to be 10.80 mmHg, the sample size for the present study is calculated and rounded off to be 30 to estimate a difference of ± 5mmHg systolic blood pressure with 95% confidence and 80% power.

### Selection of Cases

### Inclusion Criteria:

- Patients giving written informed consent
- Patient aged 18 years to 65 years (including both sex).
- American society of anaesthesiologist (ASA) physical status I & II.

### Exclusion Criteria:

- Patients undergoing caesarean section.
- Anatomically abnormal spine, hypertension, bradycardia, coagulopathy.
- Patients having history of cardiovascular disease.

### Method

All patients who were undergoing the study kept NPO 8 hours before surgery and urinary catheterisation was done. An 18 Gauge intravenous cannula was inserted in the forearm of each patient and standard monitors (ECG, non-invasive blood pressure, pulse-oximetry) were connected on arrival to the

operation theatre. Baseline vitals were then recorded. 20 ml/kg Ringer lactate (RL)fluid were preloaded 20 minutes before the start of the surgery. All patients were given subarachnoid block with 3ml of bupivacaine heavy with a 25gauge spinal needle at the L3-L4 intervertebral space. In our current study, hypotension is defined as MAP less than 64 mmHg. Assessment of level of sensory block was done with the pinprick method and if the onset of sensory block was not achieved within 10 minutes, then the block was considered to have failed and these patients were subsequently excluded from the study. Mephentermine 6 mg was administered when the mean blood pressure falls less than 64 mmHg and atropine 0.6mg given to those patients whose heart rate decreased below 55 beats/min. Patients were observed for HR, SBP, DBP, MAP and SPO2 every 5 minutes until the end of the surgery.

**Statistical Analysis**

Data were represented as MEAN ± SD. Data were entered into MS excel and Graph-Pad Prism. All the statistical analysis including test of significance (p-value) were calculated wherever applicable.

## 3. Results

**Table 1:** Demographic data of the patients

| Gender | | | Total |
|---|---|---|---|
| Male | 10 | 40% | 30 |
| Female | 20 | 60% | |

| ASA | | | Total |
|---|---|---|---|
| 1 | 13 | 43.33% | 30 |
| 2 | 17 | 56.66% | |

| | |
|---|---|
| Age (yrs) | 36.98 ± 3.96 |
| Height (cm) | 157.42 ± 3.69 |
| Weight (kg) | 663.37 ± 3.77 |
| BMI | 25.67 ± 1.92 |

**Table 2:** Baseline hemodynamics data of study population (Mean ± SD)

| HR (in bpm) | SBP (in mmHG) | MAP (in mmHG) |
|---|---|---|
| 78.66 ± 5.64 | 125.64 ± 4.57 | 97.82 ± 2.75 |

**Table 3:** Comparison of baseline SBP with SBP at different time interval

| Baseline SBP | Following induction of anesthesia | P Value |
|---|---|---|
| 78.66 ± 5.64 | 78.88 ± 3.24 (at 5 mins) | 0.8537 |
| 78.66 ± 5.64 | 78.9 ± 6.73 (at 10mins) | 0.8815 |
| 78.66 ± 5.64 | 77.90 ± 4.83 (at 15 mins) | 0.5772 |
| 78.66 ± 5.64 | 77.78 ± 5.53 (at 20 mins) | 0.5441 |
| 78.66 ± 5.64 | 75.78 ± 6.45 (at 30 mins) | 0.0707 |

Comparing baseline HR with HR of different time interval shows there was no significant difference at any point of time

**Table 4:** Comparison of baseline SBP with SBP at different time interval

| Baseline SBP | Following induction of anesthesia | P Value |
|---|---|---|
| 125.64 ± 4.57 | 124.66 ± 4.26 (at 5 mins) | 0.3938 |
| 125.64 ± 4.57 | 124.50 ± 4.27 (at 10mins) | 0.3223 |
| 125.64 ± 4.57 | 123.48 ± 5.27 (at 15 mins) | 0.0952 |
| 125.64 ± 4.57 | 123.87 ± 4.23 (at 20 mins) | 0.1250 |
| 125.64 ± 4.57 | 122.87 ± 4.54 (at 30 mins) | 0.0219 |

Comparing baseline SBP with SBP of different time interval shows there was only one significant difference at 30 minutes interval (p value= 0.0219)

**Table 5:** Comparison of baseline MAP with MAP at different time interval

| Baseline MAP | Following induction of anesthesia | P Value |
|---|---|---|
| 97.82 ± 2.75 | 96.90 ± 2.54 (at 5 mins) | 0.1835 |
| 97.82 ± 2.75 | 96.72 ± 2.14 (at 10mins) | 0.0891 |
| 97.82 ± 2.75 | 96.69 ± 2.23 (at 15 mins) | 0.0857 |
| 97.82 ± 2.75 | 97.10 ± 2.10 (at 20 mins) | 0.2591 |
| 97.82 ± 2.75 | 95.99 ± 2.54 (at 30 mins) | 0.0096 |

Comparing baseline MAP with MAP of different time interval shows there was only one significant difference at 30 minutes interval (p value= 0.0096)

## 4. Discussion

- A total of 30 patients fulfilling the inclusion criteria were included in the study. With proper consent and due permission from hospital ethical committee a hospital based observational study was carried out in different OT complex of AMCH.
- Base line values were compared with 5mins, 10mins, 15mins, 20mins and 30 mins time interval.
- While comparing the HR of different time with baseline there was no significant difference noted at any point of time. However HR of 2 patient falls below 50, which were treated with atropine.
- While comparing baseline SBP with SBP of different time interval, only significant difference was noted at 30 mins interval, similarly while comparing the MAP significant difference was noted at 30 mins interval.
- Its is important to note that immediately after the induction of anesthesia, there were no fall of SBP and MAP in the study population, the value may be significant at 30 mins interval but this cant established the relation between fall of SBP and MAP immediately after sympathectomy.

## 5. Conclusion

Preloading with 20ml/kg ringer lactate 20 mins before the start of surgery is effective to prevent spinal anesthesia induced hypotension.

## 6. Limitations of the Study

1) Present study was done in a small group of 30 patients undergoing below umbilical surgery.
2) Patients with ASA 3 and more were excluded from the study. Hence, hemodynamic effect of preloading after SA using bupivacaine could not be evaluated in these categories
3) More studies with large sample size will be needed to confirm our results.

## References

[1] Parmar S, A.Sheikh AN, Shalu PS. a Comparative Study of Preloading Versus Coloading of Crystalloid To Prevent Spinal Anaesthesia Induced Hypotension. J Evol Med Dent Sci. 2012;1(5):746–53.

[2] Ewaldsson CA, Hahn RG. Volume kinetics of Ringer's solution during induction of spinal and general anaesthesia. Br J Anaesth [Internet]. 2001;87(3):406–14. Available from: http://dx.doi.org/10.1093/bja/87.3.406.
[3] Dyer RA, Farina Z, Joubert IA, Du Toit P, Meyer M, Torr G, Wells K, James MF. Crystalloid preload versus rapid crystalloid administration after induction of spinal anaesthesia (coload) for elective caesarean section. Anaesthesia and intensive care. 2004 J
[4] Kamenik M, Paver-Eržen V. The effects of lactated Ringer's solution infusion on cardiac output changes after spinal anesthesia. Anesth Analg. 2001;92(3):710–4.
[5] Mojica JL, Meléndez HJ, Bautista LE. The timing of intravenous crystalloid administration and incidence of cardiovascular side effects during spinal anesthesia: the results from a randomized controlled trial. Anesthesia & Analgesia. 2002 Feb 1;94(2):432-7.