

## Preloading or Coload of Crystalloid for Prevention of Hypotension during Caesarian Section under Spinal Anaesthesia, a Randomised Control Trial

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### Abstract:

**Background:** Hypotension after spinal anesthesia for cesarean delivery is common. Previous studies have demonstrated that a crystalloid fluid “coload” (rapid administration of a fluid bolus starting at the time of intrathecal injection) is superior to the conventional crystalloid preload (fluid administered before the intrathecal injection) for preventing hypotension. However there is paucity of study on the effectiveness or otherwise of coload as against the common practice of crystalloid preloading for caesarian section under subarachnoid block. This study compared crystalloid preloading to coload in preventing hypotension usually associated with subarachnoid block for caesarian section

**Methods:** In this double-blind study, 60 patients were randomly assigned to receive a preload of 1L of normal saline over a period of 15–20 min before initiation of spinal anesthesia or an identical fluid (bolus of normal saline) starting at the time of identification of cerebrospinal fluid. Vasopressors (ephedrine) were administered if systolic arterial blood pressure decreased less than 80% of the baseline pressure and <100 mm Hg. The primary outcome was the incidence of hypotension (defined as the administration of at least one dose of vasopressor). Other complications like nausea and vomiting were also sought for.

**Results:** There was no significant difference in the two groups in the incidence of hypotension ( $p= 0.823$ ), nausea and vomiting and vasopressor requirements.

**Conclusion:** There is no difference in the incidence of hypotension whether patients were coloaded or preloaded.

**Keywords:** Anaesthesia; spinal. Hypotension, preloading; coload.

### I. Introduction

Single-shot spinal anesthesia has become the technique of choice for cesarean section. It is a simple, fast, reliable, and cost-effective technique, but significant concern is maternal hypotension, which is associated with undesirable maternal and fetal/neonatal effects<sup>1</sup>. Clinical studies confirm that the “spontaneous” incidence of hypotension is approximately 75%<sup>2</sup>. Maternal morbidity from hypotension consists mainly of nausea and vomiting, altered consciousness, cardiovascular collapse, and other complications<sup>3</sup>. Additionally, maternal hypotension may cause a decrease in uteroplacental blood flow with potential deleterious consequences for the fetus. Although usually limited to transient neonatal acidosis in healthy term infants, compromised and very premature fetuses may not tolerate the decrease in uteroplacental perfusion<sup>4</sup>. Thus, the aim should be to treat maternal hypotension quickly and efficaciously, or better yet, to actively prevent it.

### II. Methods

After approval from the ethical committee this study was carried out on pregnant women being planned for elective caesarian section in obstetric department of LAUTECH Teaching Hospital Osogbo. Patients were recruited after they have satisfied inclusion criteria and they provided written informed consent to participate in the study. The study population was randomized into two groups by picking opaque envelopes containing table of random numbers generated with a computer. They were thus divided into two groups; A which were patients to have crystalloid preloading and group B to have crystalloid coload. Patients were admitted a day before surgery and routine investigations like the packed cell volume, bedside clotting time were done. On the morning of surgery all patients had their baseline vital signs checked. Group A were preloaded with normal saline at 20mls/kg for about 10mins before the spinal interspace L3/L4 were located using size 25 spinal needle in an aseptic manner. The coload (group B) also had their vital sign checked and thereafter the spinal interspaces L3/L4 were located in an aseptic manner using the same spinal needle as above. After the subarachnoid space was located evident by free flow of cerebrospinal fluid normal saline was rushed through

the wide bore cannula which has been inserted preoperatively while the local anaesthetic agent the same dose as above was injected into the subarachnoid space simultaneously. Patients then assume a supine position and the level of block were checked and thereafter surgery was allowed to proceed. Intraoperative vital signs were monitored notably the blood pressure, oxygen saturation, the respiratory rate. Episodes of hypotension were watched out for and crystalloids were given initially and later vasopressor (ephedrine) were given when the blood pressure was 30mmHg systolic or 20mmHg diastolic less than the preoperative value. The ephedrine was given in doses of 3mg every 15minutes until the blood pressure comes to the preoperative value. The requirements for ephedrine and number of doses required were noted. Blood loss was also noted and patients were transfused when the total blood loss was more than 20% of the total blood volume. Patients were taken out at the end of surgery and the postoperative blood pressure, saturation, respiratory and pulse rate were recorded every 30mins for the first 2hours postoperatively and also incidences of side effects were watched out for

### III. Results

Out of sixty patients recruited for the study only data from fifty eight patients were analyzed, one of the patients in the preloading group had failed spinal while a patient in the coloadng group had severe hemorrhage as a surgical complication and data from the two patients were discarded. In term of hypotension 17 and 15patients in groups A and B respectively had incidence of hypotension, p value 0.052 which was not significant(Table 1)

Of the fifty eight cases that were analyzed; 15 patients in group A as against 23 patients in group B had no episode of hypotension and did not have any dose of vasopressor p value 0.03which is significant.5 patients and nil patient in groups A and B respectively had two doses of 0.3mg ephedrine respectively p value 0.001which is also significant.(Table 2)

The average time to occurrence of hypotension was more longer in the group B (coloadng) than in group A p value 0.02s (Table 3)

The fluid requirements are as above; the maximum fluid used was 3.5L of which a patient in groups A and B were involved.(Table 4)

Nausea and vomiting was more common in the preloading group (Table 5)

**Table 1** Incidence Of Hypotension

Incidence	Group A	Group B	P value
N	14	06	0.02
Percentage	48.3	20.7	

**Table 2** Uses Of Vasopressors

Vasopressor	Group A	Group B	P value
Nil	15	23	0.03
Single	09	06	0.064
Double	05	0	0.001
Total	29	29	

**Table 3** Average Time To Occurrence Of Hypotension

	Group A(Minutes)	Group B(Minutes)	P Value
Time To Hypotension	7	15	0.02

**Table 4:** Total Volume Of Fluid Used

VOLUME(LITRES)	A	B	TOTAL
1.5	3	1	4
2	8	9	17
2.5	6	4	10
3.0	12	13	25
3.5	1	1	2
TOTAL	29	29	58

**Table 5:** Incidence Of Vomiting

	Group A	Group B	Total
NAUSEA N (%)	09	08	17
Vomiting N (%)	06	04	10

### IV. Discussion

Spinal anaesthesia is a common choice of anaesthesia for ceasarian section because less risk of mortality associated when compared to general anaesthesia.Spinal anaesthesia is associated with better analgesia in the immediate postoperative period, other advantages includes minimized blood loss, early ambulation and

lesser physiological response to surgery<sup>5</sup>. However as good spinal anaesthesia is, it is associated with some complications of which hypotension is the commonest.

Several preventive measures have been advocated for the prevention of hypotension associated with spinal anaesthesia. This includes the use of mechanical pumps compressing the leg to reduce peripheral venous pooling of blood and increase venous return, maintaining head up position immediately after spinal anaesthesia to reduce the level of block. Others include the use of vasopressor either to treat or prevent hypotension, the use of crystalloid pre or coloadng to prevent hypotension<sup>6</sup>.

This study compared crystalloid given before institution of spinal anaesthesia to rapid infusion of crystalloid after observing flow of cerebrospinal fluid (CSF) to prevent hypotension. The secondary outcome studied included the time of occurrence of hypotension, ephedrine use and amount, the total volume of crystalloid use, incidence of vomiting. The demographic characteristics were similar in both groups, the age, weight, height, dose of local anaesthetic used were similar in both patients. This study found out that the incidence of hypotension in the coloadng group B was 20.7% as against 40.7% in the preload group (p value 0.02). The time to first episode of hypotension was prolonged in the coloadng while more patients in the preloading had more than a dose of ephedrine. All these shows that the coloadng limits the incidence and severity of hypotension that accompanies spinal anaesthesia. The result is similar to a study by Williamson et al<sup>7</sup>. Some studies has been done comparing crystalloid preloading to co loading in parturient that underwent spinal anaesthesia but the results were inconsistent thereby necessitating this study. A study has shown a sustained increase in cardiac output during rapid administration of crystalloid after initiating spinal anaesthesia<sup>8</sup>. Some studies have shown that rapid administration of crystalloid reduces the incidence of hypotension because the timing of fluid administration coincides with the period of maximal vasodilatation that accompanies spinal anaesthesia<sup>9, 10</sup>. Al Young et al<sup>11</sup> also found out that incidence of hypotension was lower in the coload group (p value 0.02) compared to the preload with fewer patients in the coload group requiring ephedrine (pvalue 0.015) while the dose of ephedrine required was also smaller in the coload group. This study has a resemblance to that of al Young et as more patient in the preload group have hypotension than the coload group (14 vs 6) p value 0.02 while more patients in the preloading group also needed vasopressor (14 vs. 6) p value 0.06 and episodes of hypotension occurred earlier in the preloading group. While all patients in the coloadng group that needed vasopressor only had it once, 5 of the fourteen patients that had vasopressor in the preloading group had it twice (p value 0.001). In terms of complications, nausea and vomiting was the only complication noticed and the difference between the two groups were not significant while 6 patients in preloading group had vomiting only four patients in the coloadng group had vomiting.

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