



RESEARCH ARTICLE

Comparative Effects of Crystalloid Preload vs. Crystalloid Coload on Post-Spinal Hypotension in Patients Undergoing Cesarean Section**Dr Kishor Pachkor****Assistant Professor, Department of Anesthesia, Rural Medical College and Hospital, Loni****Abstract**

This study investigates the comparative effects of crystalloid preload and crystalloid coload on post-spinal hypotension in patients undergoing elective cesarean sections. Postoperative hypotension is a common complication associated with spinal anesthesia, leading to adverse maternal and fetal outcomes.

In this prospective, randomized controlled trial, we enrolled 100 patients scheduled for elective cesarean delivery under spinal anesthesia. Participants were randomly assigned to receive either crystalloid preload (group A) or crystalloid coload (group B) prior to spinal anesthesia. We measured intraoperative blood pressure, heart rate, and incidence of hypotension, defined as a decrease of 20% from baseline systolic blood pressure.

Results indicated that patients in the preload group experienced significantly higher rates of hypotension compared to the coload group ($p < 0.05$). The mean arterial pressure was more stable in the coload group, and the incidence of hypotensive episodes was lower. Additionally, recovery times and fluid requirements were similar between both groups.

In conclusion, crystalloid coload appears to be more effective than crystalloid preload in preventing post-spinal hypotension during elective cesarean sections, suggesting a need for revised fluid management strategies in this population.

Keywords: spinal anesthesia, crystalloid preload, crystalloid coload, cesarean section, post-spinal hypotension

INTRODUCTION:

Spinal anesthesia is the preferred technique for elective cesarean sections due to its efficacy in providing rapid and profound analgesia with minimal maternal sedation (1). However, one of the most significant complications associated with this technique is post-spinal hypotension, which can lead to serious maternal and fetal consequences, including nausea, vomiting, and impaired uteroplacental blood flow (2, 3). The pathophysiology of post-spinal hypotension is primarily attributed to the sympathetic block induced by the anesthetic agent, resulting in vasodilation, reduced systemic vascular resistance, and decreased venous return (4).

Effective management strategies to prevent hypotension during spinal anesthesia include fluid preload and coload techniques. Crystalloid preload involves administering a fixed volume of fluid before spinal anesthesia, while crystalloid coload involves administering fluid simultaneously with the

induction of anesthesia. Although both techniques aim to maintain intravascular volume and minimize hypotension, their efficacy remains a subject of debate in the literature (5, 6).

Several studies have explored the impact of crystalloid preload and coload on hemodynamic stability during spinal anesthesia. However, findings have been inconsistent, with some studies indicating that crystalloid coload may provide better protection against hypotension than preload alone (7, 8). The choice of fluid management strategy may significantly influence maternal outcomes and neonatal wellbeing, making it imperative to determine the most effective approach in this population.

This study aims to compare the effects of crystalloid preload and crystalloid coload on the incidence of post-spinal hypotension in patients undergoing elective cesarean sections. By evaluating hemodynamic parameters, fluid requirements, and recovery times, we seek to provide evidence that

may guide clinical practice in the management of spinal anesthesia for cesarean deliveries.

Aim and Objectives

Aim: To compare the effectiveness of crystalloid preload versus crystalloid coload in preventing post-spinal hypotension in patients undergoing cesarean sections.

Objectives:

1. To assess the incidence of hypotension in patients receiving crystalloid preload compared to those receiving crystalloid coload.
2. To evaluate the hemodynamic stability and fluid requirements in both groups during the intraoperative period.

Materials and Methods

This prospective, randomized controlled trial was conducted at tertiary care hospital involving 100 women scheduled for elective cesarean sections under spinal anesthesia. Inclusion criteria included

patients aged 18-45 years, American Society of Anesthesiologists (ASA) physical status I-II, and the ability to provide informed consent. Exclusion criteria included history of cardiovascular disease, pregnancy complications, and contraindications to spinal anesthesia.

After obtaining informed consent, patients were randomly assigned to either the crystalloid preload group (Group A) or the crystalloid coload group (Group B). In Group A, a preload of 15 mL/kg of isotonic crystalloid solution was administered 30 minutes before spinal anesthesia. In Group B, 10 mL/kg of crystalloid was administered simultaneously with the induction of anesthesia.

Intraoperative vital signs, including blood pressure and heart rate, were monitored continuously. Hypotension was defined as a decrease of 20% from baseline systolic blood pressure. Fluid requirements, recovery times, and any additional interventions were recorded.

Results

Table 1: Hemodynamic Parameters

Group	Baseline BP (mmHg)	Hypotension Incidence (%)	Mean Arterial Pressure (MAP)
Preload (A)	120 ± 10	42%	68 ± 8
Coload (B)	121 ± 9	20%	80 ± 6

Table 2: Fluid Requirements and Recovery Times

Group	Total Fluids Administered (mL)	Recovery Time (min)
Preload (A)	1000 ± 150	45 ± 10
Coload (B)	950 ± 140	43 ± 8

The results indicated a statistically significant difference in hypotension incidence between the groups ($p < 0.05$), with the coload group experiencing lower rates of hypotension. Additionally, the mean arterial pressure was significantly higher in the coload group ($p < 0.01$). Fluid requirements and recovery times were similar between groups.

Discussion

The findings of this study suggest that crystalloid coload is more effective than crystalloid preload in preventing post-spinal hypotension during elective cesarean sections. The significant difference in

hypotension incidence and mean arterial pressure between the two groups supports the hypothesis that administering fluid concurrently with spinal anesthesia may provide better hemodynamic stability (9, 10).

Previous studies have also indicated that crystalloid coload may offer improved outcomes compared to preload, potentially due to the rapid administration of fluid at the time of sympathetic block onset (11, 12). The timing and volume of fluid administration are critical in managing intravascular volume and preventing hemodynamic instability (13). Our results align with these findings and suggest that the

traditional practice of crystalloid preload may need to be re-evaluated in favor of a coload strategy.

However, this study is not without limitations. The sample size was relatively small, and the findings are based on a single center's experience. Future multicenter studies with larger cohorts may provide more generalizable results and further elucidate the optimal fluid management strategy for spinal anesthesia in cesarean sections (14, 15).

Conclusion

In conclusion, crystalloid coload is more effective than crystalloid preload in preventing post-spinal hypotension during elective cesarean sections. The study underscores the importance of fluid management strategies in enhancing maternal safety and optimizing hemodynamic stability in this population. Clinicians should consider adopting coload techniques to improve outcomes for patients undergoing spinal anesthesia.

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