



RESEARCH PAPER

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Frequency of hypotension induced by spinal block in patients preloaded with crystalloid solution in elective caesarian section

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Abstract

The aim of the study is to find hypotension induced by spinal anesthesia preloaded with crystalloid solution in elective Cesarean patients. A Descriptive cross-sectional study carried out in Lady reading hospital (LRH) from March to June of 2018 after acceptance of approval from committee of institute of paramedical science (IPMS) Khyber Medical University Peshawar and by Head of the Department of Anesthesia, Lady reading hospital (LRH). A total 246 participants presenting for elective Cesarean section under spinal anesthesia preloaded with crystalloid solution with different ages of total 200 hypotensive, Hypotension occurred after 2 minutes (N=58, 29%), 5 minutes (N=64, 32%), 7 minutes (N=49, 24.5%) and 10 minutes (N=29, 14.5%). 240 (81.3%) patients are found hypotensive whereas other patients (18.7%) remain stable. To prevent Spinal Anesthesia induced hypotension in Caesarean Section, preloading of crystalloid solutions is not of much benefit.

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Introduction

Caesarean Section is a surgical procedure in Obstetrics. In this incisions are given in the mother's abdomen and uterus in order to deliver one or more babies (Kenny *et al.*, 2017). Caesarean Section (CS) is a common surgical procedure in women globally. General Anesthesia as well as Spinal anesthesia can be offered in delivery through Caesarean Section. During 1998-2000 the main technique general anesthesia in Cesarean section, the reason was lack of nurse and anesthetist. The main anesthesia technique for Cesarean section after 2004 was spinal anesthesia because of advantages (Chumpathong *et al.*, 2006). Due to higher percentage of maternal mortality, use of General Anesthesia is reduced (Fakherpour *et al.*, 2018).

Spinal Anesthesia is frequently used in Caesarean Section. Spinal Anesthesia, also known as Spinal block is a method of neuraxial regional anesthesia. Usually a needle of 9cm is used to inject a local anesthetic or opioid into the Subarachnoid Space. It is the preferred method of anesthesia induction in surgeries of lower extremities or below the umbilicus (Serpell *et al.*, 2002). With an incidence of 71%, hypotension is its drawback. It causes hypotension by blocking Preganglionic Sympathetic Fibers and reduces Systemic Vascular Resistance giving complications of hypotension, bradycardia and shivering. It is due to higher activity of baroreceptors, parasympathetic and activation of Bezold-Jarisch reflex. Hemodynamic changes takes place swiftly as compared to Epidural technique. This may lead to hypotension and its manifestations. Heart rate is a noninvasive and easy to apply method of assessing Autonomic Nervous System Activity (Joshi *et al.*, 2018; Montoya *et al.*, 2009; Tatikonda *et al.*, 2019).

Decrease in vascular resistance or cardiac output (CO) or both is thought to be the cause of hypotension after spinal anesthesia. Exaggerated response seen in old age patients because of reduced baroreceptor function and negative influence on higher resting sympathetic tone can be cause of higher incidence of Spinal induced hypotension (Hofhuizen *et al.*, 2019).

Maternal Hypotension occurs in 60-70% of Spinal Anesthesia candidates (Ni *et al.*, 2017). 16-33% patients experienced Hypotension (Hofhuizen *et al.*, 2019). In CMH Quetta patients presented for elective Cesarean section were preloaded with crystalloid solution experienced Hypotension with incidence of 62.2% (Farid *et al.*, 2016). In some papers hypotension induced by spinal anesthesia is 80% (Bottiger *et al.*, 2016). One study in India show SIH incidence in general population is about 25%-75%, which is less than induced in elective C section (Bajwa *et al.*, 2013). Spinal incidence hypotension for elective cesarean section was about 83% (Rocke *et al.*, 1995).

To avoid the spinal induced hypotension in elective cesarean section, many anesthetists prefer crystalloid solution. Crystalloid solution co-loading is beneficial in preventing hypotension. However, Crystalloid solution preloading is questionable (Ni *et al.*, 2017). The aim of the study is to find hypotension induced by spinal anesthesia preloaded with crystalloid solution in elective Cesarean patients.

Materials and methods

Study Settings

After the approval of our proposed research topic from the committee of institute of paramedical science (IPMS) Khyber Medical University Peshawar and by Head of the department of anesthesia in Lady reading hospital (LRH), we collected our data from LRH. The study duration is 4 months from March to June of 2018.

Study Design

This is Descriptive cross-sectional study.

Sampling Technique

Sampling of patients was based on convenience sampling technique.

Inclusion Criteria

The patients presented for Elective Cesarean Section of ASA Class I, healthy Parturient presented for Elective Cesarean section under Spinal Anesthesia, preloaded with Crystalloid solution.

(Preload of 20ml/kg of BW or (500-1000ml) or in patient having Intra-operative hypotension considers as decrease mean of 20% from baseline or Systole less than 100mm Hg was included in study.

Exclusion Criteria

Patient those who have Cesarean section under spinal but after converted into GA, Emergency Cesarean section and no preloading or less than our criteria were excluded from study.

Sampling Size

Sampling size were calculated from prevalence of hypotension induced by spinal block in patient preloaded with crystalloid solution in elective cesarean section. Through this formula $n = z^2 \times p(1-p)/m^2$ Here we used the 20% of prevalence of SIH. After putting the value in this formula, the sampling size $n = 246$.

Data Collection Procedure

The data for the study was collected from the participants through a pre-formed proforma. The participants visited to Gynae OT at lady reading Hospital Peshawar. Data were collected from those parturient presenting for Elective Cesarean section and preloaded with crystalloid solution. Informed consent was taken from the parturient. Conforming ASA Class from patient Chart. Before spinal anesthesia Patient Blood Pressure were noted is if hypertensive or not. After spinal anesthesia the onset of hypotension was noted on 2,5,7 and 10 minutes.

Statistical analysis

After collecting the whole Data from the participants were entered and analyzed through SPSS Software Version 23. For Categorical variable we find frequencies and percentages. We analyzed this data by using Chi square test.

Results

A total 246 participants presenting for elective Cesarean section under spinal anesthesia preloaded with crystalloid solution with different ages. About 70 parturient were preloaded with 500 to 600ml of crystalloid solution, which is 28.5% of total. Of these 70 parturient, 17.4% were normotensive. (Table: 01).

Parturient preloaded with 800-1000ml crystalloid solutions were 135 (76.1%), of which 35 remained stable and remaining went into hypotension. Out of these 135 patients hypotension developed at 2 mins, 5mins, 7min and 10 minutes was 25, 37, 25 and 13 respectively. Most of the patients (51.6%, N=127) were preloaded with 1000ml crystalloids solution. Patients preloaded with 500,600,700 ml and 800ml were (18.3, N=45), (6.9 N=17), (6.9, N=17) (4.1, N=10) patients respectively. (Table: 01) of total 200 hypotensive, Hypotension occurred after 2 minutes (N=58, 29%), 5 minutes (N=64, 32%), 7 minutes (N=49, 24.5%) and 10 minutes (N=29, 14.5%). (As shown in Table-01) Normotensive found were 46(18.7%), of which 35 (76.1%) were preloaded with 800 to 1000ml, whereas 8 (17.4%) loaded with 500 to 600 ml and remaining 3 were loaded between 600-800ml. (Table; 02)

Table 1. Show volume of Crystalloid solution preloaded and frequency of hypotension notice at different time.

Variable	Frequency	Percentage
Hypotension Stable	46	18.7
After 2 mins	58	23.6
After 5 mins	64	26.0
After 7 mins	49	19.9
After 10 mins	29	11.8
Total	246	100.0
Volume loaded (ml)		
500-600	70	28.455
600-700	24	9.756
700-800	12	4.878
800-1000	135	54.878
1000-1500	05	2.032
Total	246	100

Table 2. Show normotensive patient's frequency and percentage after loaded with various volume of crystalloid solution.

Volume loaded (per ml)	Frequency	Percentage
500-600	08	17.39
600-700	01	2.17
700-800	02	4.35
800-1000	35	76.09
1000-1500	0	0
Total	46	100

Discussion

Most common complication of spinal anesthesia is hypotension. The causes of hypotension are many reasons like patients position after spinal anesthesia, supine hypotension syndrome (Rout *et al.*, 1993).

Out of 246 patients presented for elective C-section under spinal anesthesia were preloaded about 15 to 20 minutes with crystalloid solution before spinal anesthesia. 240 (81.3%) patients are found hypotensive whereas other patients (18.7%) remain stable.

Incidences of hypotension reported by many researchers like 35%, 55% and 83% (Rocke *et al.*, 1995; Rout *et al.*, 1993; Oh *et al.*, 2014; Rocke *et al.*, 1994).

According to Birnbach, hypotension incidence decreased after patients were preloaded with greater volume. Incidence of hypotension following spinal anesthesia would not be affected by volume preloading but up to some extent the response of hypotension gets blunt (Bassell *et al.*, 1994).

Control hypotension was found with preloading of volume in elective C section under spinal block. Most researchers report that preload is insufficient to avoid hypotension (81%). Similar result is found in our study (81.3%) (Rout *et al.*, 1994). This finding showing similarity with present study.

Many factors contributing to hypotension such as obesity, twin pregnancy, supine hypotension, patients position after spinal anesthesia and volume of local anesthetic drugs for intrathecal injection. Patients were preloaded before spinal anesthesia about 15 to 20 minutes before. We found that with passing time the frequency of hypotension decreases and also found when co-loaded along with crystalloid solution. A review paper show similar finding as co-loading is one option in reducing spinal induced hypotension (Hasanin *et al.*, 2017). The dose of hyperbaric solution and position of patients after spinal anesthesia is caustic factors in causing hypotension.

Conclusion

240 (81.3%) patients are found hypotensive whereas other patients (18.7%) remain stable. To prevent Spinal Anesthesia induced hypotension in Caesarean Section, preloading of crystalloid solutions is not of much benefit.

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