ISSN Online: 3007-1941 ISSN Print: 3007-1933 https://msra.online/index.php/Journal/about

Multidisciplinary Surgical Research Annals
https://msra.online/index.php/Journal/about
Volume 3, Issue 2 (2025)

IMPACT OF INTRAOPERATIVE HYPOTENSION ON CLINICAL OUTCOMES IN PATIENTS UNDERGOING SPINAL AND GENERAL ANESTHESIA

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Article Details

Keywords: Intra-operative hypotension, Clinical outcomes, Spinal anesthesia, General Anesthesia

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ABSTRACT

During anesthesia, intraoperative hypotension is a frequent consequence that affects up to 80% of patients. Despite being common, intra operative hypotension can have serious clinical consequences, such as increased morbidity and mortality, cerebral hypo-perfusion, renal dysfunction, and decreased cardiac output. Intra operative hypotension is linked to both spinal anesthesia and general anesthesia, albeit the risk factors and causes may be different. Developing successful prevention and care strategies for intra operative hypotension requires an understanding of its occurrence, risk factors, and clinical outcomes. With the goal of giving anesthesiologists and perioperative care teams important information, this study will look into how intra operative hypotension affects clinical outcomes in patients receiving spinal and general anesthesia. This study aims to examine the impact of intra operative hypotension on clinical outcomes in patients undergoing spinal and general anesthesia. In this cross-sectional study, 100 patients from the Bahria International Hospital Lahore participated. Standard instruments were used to gather data. There was assurance of the validity and reliability. Data analysis was facilitated with SPSS version 25. The study involved one hundred patients. According to the data, the average age is 55 years old (40%), females with high risk (55%) that have been under weight (47%) and are literate (65%). In conclusion, intraoperative hypotension during spinal and general anesthesia is a serious issue that can have a big impact on patient outcomes. In order to avoid and manage intra operative hypotension, the results of this study emphasize the significance of careful blood pressure monitoring and timely intervention. The frequency and impact of intra operative hypotension can be reduced by anesthesiologists and perioperative care teams by identifying high-risk patients and putting evidence-based measures into practice.

INTRODUCTION:

Intraoperative hypotension presents significant challenges for both patients and healthcare systems, particularly during surgical procedures such as cesarean sections. This condition can lead to severe complications, including acute kidney injury, myocardial damage, and increased mortality rates. Research has established a strong correlation between intraoperative hypotension and adverse clinical outcomes, such as readmissions, delirium, and prolonged hospital stays. Effective management strategies, including advanced hemodynamic monitoring and regular blood pressure assessments, are essential to mitigate these risks and improve patient outcomes (1,2).

Antepartum bleeding, particularly due to placenta previa, is a major contributor to maternal morbidity and mortality worldwide. This condition often necessitates cesarean delivery, which carries a heightened risk of bleeding complications. Tranexamic acid (TXA), an antifibrinolytic agent, has shown promise in reducing blood loss during various surgical procedures; however, its efficacy and safety in cesarean sections for women with placenta previa remain uncertain. A systematic review and meta-analysis are warranted to evaluate the effectiveness of TXA in minimizing blood loss in this specific patient population (3,4).

The choice of anesthetic technique during emergency cesarean sections is critical, as it can significantly influence maternal and fetal outcomes. Spinal anesthesia is often preferred due to its rapid onset and favorable safety profile. However, comprehensive evaluations of its effectiveness and safety in emergency situations are limited. This study aims to address this gap by examining the outcomes associated with spinal anesthesia in emergency cesarean sections, focusing on both maternal and fetal health (5).

Effective management of emergency cesarean sections also involves fluid therapy and hemodynamic control to address potential complications such as hypotension and fluid overload. Recent studies have highlighted the relationship between body mass index (BMI) and the incidence of hypotensive events during spinal anesthesia, emphasizing the need for careful monitoring and management protocols. This research seeks to integrate existing evidence to provide a clearer understanding of the safety and efficacy of spinal anesthesia in emergency cesarean sections (6,7).

Patel (2018) conducted a prospective, randomized controlled trial involving 120 patients undergoing emergency cesarean sections, comparing spinal and general anesthesia. The study found that spinal anesthesia was associated with a higher incidence of hypotension (40% vs. 20%) and respiratory depression (10% vs. 5%) compared to general anesthesia. However, maternal satisfaction was notably higher with spinal anesthesia (90% vs. 80%). The study concluded that spinal anesthesia could be appropriate for patients with low complication risks, emphasizing the need for careful monitoring and management to minimize potential risks (8,9).

Lee et al. (2020) performed a systematic review and meta-analysis across various obstetric and surgical units, evaluating the efficacy and safety of spinal anesthesia in emergency cesarean sections. The analysis included 15 studies with over 2,000 patients and revealed that spinal anesthesia was associated with lower maternal mortality and morbidity, as well as reduced fetal complications compared to general anesthesia. These findings support the use of spinal anesthesia as a safer alternative in emergency cesarean deliveries (10).

This study not only aims to clarify the safety and efficacy of spinal anesthesia in emergency cesarean sections but also seeks to enhance clinical practices by providing evidence-based recommendations for anesthetic management. By integrating findings from various studies, this research can inform healthcare providers about optimal anesthetic techniques and fluid management strategies, ultimately improving maternal and fetal outcomes during emergency procedures (11,12).

In conclusion, the management of intraoperative hypotension and the choice of anesthetic technique are critical factors influencing outcomes in emergency cesarean sections. This study highlights the importance of spinal anesthesia as a potentially safer option compared to general anesthesia, while also addressing the need for effective fluid management and monitoring protocols. By synthesizing existing evidence, this research aims to contribute to improved clinical practices and patient care in obstetric anesthesia, ultimately enhancing

maternal and fetal health outcomes.

METHODOLOGY

Study Design: The cross-sectional descriptive research approach was used.

Study Setting: Data was collected from the patients of Bahria International Hospital, Lahore.

Study Duration: The study was conducted from September 2024 to February 2025 in the selected hospital after approval of synopsis.

Sample size: Sample drawn from the population was 100. Formula is n = (Nz^2 P(1-P))/ (E^2 (N-1) +z^2 P(1-P)) (14)

Sampling Technique: Convenient random sampling technique was used in this study.

Sample Selection:

Inclusion criteria:
Patients undergoing spinal or general anesthesia
Age limitations: 18-80 years old (13)
Patient with available postoperative outcome data
Voluntary participate and give consent

Exclusion criteria:
Patients undergoing local or regional anesthesia
Patients with pre-existing conditions
Patients taking chronic medication
Refuse to take part in the research

Data Collection Procedure: The researcher approached the subjects with the permission of the medical superintendent of hospital, following approval from the ethical approval committee. In order to gather data, the researcher worked with the nursing superintendent to arrange for the collection of data from patients for 20 minutes at a time. Face-to-face interviews were used to gather data, and the researcher was watching practice segments. The sociodemographic characteristics of patients, including their age, gender, education, and weight was collected. Data of intraoperative and postoperative was also collected.
Data Analysis: The computer program SPSS version 25 used to examine the data. For categorical variables, frequency and percentage were used to characterize the sociodemographic data; for continuously distributed, normally distributed data, mean, median, and standard deviation were used.

RESULTS:

The demographic profile of the survey respondents revealed a diverse group. Age distribution was relatively balanced, with 40% falling within the 51–80-year age bracket, 37% between 18-30 years, and 23% between 31-50 years. A slight majority of respondents were female, comprising 55% of the sample, while males represented 45%. Regarding weight, a notable 47% of respondents reported being underweight, followed by 30% classified as obese, and 23% indicating normal weight. Educational attainment showed a predominance

of literacy, with 65% of respondents reporting being literate, compared to 35% who were illiterate. These findings illustrate a respondent pool characterized by a wide age range, a female majority, a significant presence of underweight individuals, and a generally literate population.

Table 1: Responders Demographics

Responders	Category	Frequency	Percentage
1.Age	a)18-30 years old b) 31-50 years old c) 51-80 years old	a) 37 b) 23 c) 40	a) 37% b) 23% c) 40%
2.Sex	a) Male b) Female	a) 45 b) 55	a) 45 % b) 55 %
3.Weight (kg)	a) Normal weight b) Under weight c) Obese	a) 23 b) 47 c) 30	a) 23% b) 47% c) 30%
4. Education	a) Literate b) illaterate	a) 65 b) 35	a) 65 % b) 35 %

Table 2: Surgical and Anesthesia

The surgical characteristics of the respondents revealed that a majority (57%) underwent orthopedic surgery, while 43% had non-orthopedic procedures. Spinal anesthesia was more frequently utilized (63%) than general anesthesia (37%). A significant proportion of surgeries (75%) lasted more than two hours, with only 25% completed in under two hours. Regarding anesthesia agents, propofol was the most commonly used (33%), followed by lidocaine (24%), other agents (23%), and bupivacaine (20%).

Responders	Category	Frequency	Percentage
5.Type of surgery	a) Orthopedic b) Non-Orthopedic	a) 57 b) 43	a) 57 % b) 43%
6.Type of anesthesia	a) General Anesthesia b) Spinal Anesthesia	a) 37 b) 63	a) 37% b) 63%
7.Duration of surgery	a) More than 2 hours b) Less than 2 hours	a) 75 b) 25	a) 75% b) 25%
8. Anesthesia agents used	a) Propofol b) Bupivacaine c) Lidocaine d) others	a) 33 b)20 c)24 d)23	a) 33% b)20% c)24% d)23%

Table 3: Intraoperative Hypotension

The intraoperative experience of the respondents revealed a significant occurrence of hypotension, with 64% of patients experiencing this complication, while 36% did not. Among those who experienced hypotension, the lowest mean arterial pressure (MAP) recorded was predominantly within the 60-65 mmHg range, accounting for 55% of cases. A smaller proportion, 25%, experienced a MAP between 50-59 mmHg, and 20% experienced a MAP below 50 mmHg. Furthermore, the duration of intraoperative hypotension was predominantly prolonged, with 80% of affected patients experiencing it for more than 10 minutes, and only 20% experiencing it for less than 10 minutes.

Responders	Category	Frequency	Percentage
9. Did the patient experience	a) Yes	a) 64	a) 64%

intraoperative hypotension?	b) No	b) 36	b) 36%
10. If yes, what was the lowest mean arterial pressure recorded during surgery?	a) 60-65 mmHg b)50-59 mmHg c) <50 mmhg	a) 55 b) 25 c) 20	a) 55% b) 25% c) 20%
11. What was the duration of Intra operative hypotension?	a) Less than 10 minutes b) More than 10 minutes	a) 20 b) 80	a) 20% b) 80%

Table 4: Clinical Outcomes

The results indicate that postoperative complications were reported by 41% of responders, while 59% reported no complications. The length of hospital stay was relatively balanced, with 48% of responders staying less than 5 days and 52% staying longer. Regarding mortality, 39% of responders experienced it, and 61% did not. These findings highlight a significant incidence of postoperative complications and mortality within the studied group, alongside a nearly even distribution in hospital stay durations.

Responders	Category	Frequency	Percentage
12.Postoperative complications	a) Yes b) No	a) 41 b) 59	a) 41% b) 59%
13.Length of hospital stay	a) <5 days b) >5 days	a) 48 b) 52	a) 48% b) 52%
14.Mortality	a) Yes b) No	a) 39 b) 61	a) 39% b) 61%

Table 5: Additional Information

The study revealed that 30% of responders reported the administration of vasopressors or inotropes during surgery, while 70% indicated they were not used. Furthermore, a substantial 69% of responders noted notable changes in the patient's hemodynamic status during the surgical procedure, contrasting with the 31% who reported no such changes. This data suggests that while the majority of surgeries did not require vasopressor or inotrope support, hemodynamic instability was a relatively common occurrence.

Responders	Category	Frequency	Percentage
15. Were any vasopressors or inotropes administered during surgery?	a) Yes b) No	a) 30 b) 70	a) 30% b) 70%
16. Were there any notable changes in the patient's hemodynamic status during surgery?	a) Yes b) No	a) 69 b) 31	a) 69% b) 31%

DISCUSSION:

The demographic profile of our survey respondents reveals a diverse cohort, with a significant concentration in the 51–80-year age bracket. This age range is particularly relevant in surgical contexts, as older patients often present with comorbidities that can complicate surgical outcomes. Research has shown that age-related physiological changes and the presence of comorbid conditions can increase the risk of postoperative complications (14). The slight female predominance (55%) aligns with general population trends and may reflect specific surgical populations, particularly in orthopedic procedures, which often involve a higher proportion of female patients (15).

A notable finding from our study is the high prevalence of underweight respondents (47%), which warrants further investigation. Underweight status is associated with nutritional deficiencies that can adversely affect wound healing and increase susceptibility to complications (16). This highlights the importance of nutritional assessment and intervention in surgical patients, particularly those who are underweight, to optimize surgical outcomes (17).

The high literacy rate (65%) among respondents suggests a population capable of providing informed consent and understanding postoperative instructions. However, the 35% illiteracy rate indicates a need for tailored communication strategies to ensure that all patients receive adequate information regarding their care (18). Effective communication is crucial in enhancing patient understanding and compliance, which can ultimately improve postoperative outcomes (19).

Surgical characteristics revealed a majority of orthopedic surgeries (57%), which may reflect the specific focus of this study or the patient population sampled. The frequent use of spinal anesthesia (63%) over general anesthesia (37%) is notable, as regional anesthesia is often preferred in orthopedic procedures due to its benefits in pain management and reduced systemic effects (20). The extended duration of surgeries, with 75% lasting over two hours, is a critical factor, as prolonged surgical time is associated with increased risks of complications, including infection and hemodynamic instability (21).

A significant finding was the high incidence of intraoperative hypotension (64%), a major concern due to its potential to lead to organ hypoperfusion and adverse outcomes (22). The severity of hypotension, indicated by the lowest mean arterial pressure (MAP) recorded, with a majority (55%) falling within the 60-65 mmHg range, underscores the clinical significance of this issue. Prolonged hypotension, with 80% lasting over 10 minutes, further exacerbates the potential for harm, as studies have linked intraoperative hypotension to increased rates of postoperative complications and mortality (23). These findings highlight the need for vigilant monitoring and aggressive management of intraoperative hypotension (24).

Postoperative outcomes revealed a considerable rate of complications (41%) and mortality (39%), underscoring the challenges associated with surgical procedures, particularly in the context of the observed demographic and intraoperative factors. The nearly even distribution of hospital stay durations (48% <5 days, 52% >5 days) suggests a variety of factors influencing postoperative recovery and discharge, including the severity of complications, patient comorbidities, and healthcare resource availability (25,26).

The administration of vasopressors or inotropes during surgery (30%) indicates a need for hemodynamic support in a significant portion of cases. The substantial prevalence of notable changes in hemodynamic status (69%) further emphasizes the dynamic and potentially unstable nature of patients' physiological responses during surgery. This data suggests that while vasopressor/inotrope use was not universal, hemodynamic instability was a common occurrence, requiring careful monitoring and intervention (27,28).

In conclusion, the findings of this study highlight the complex interplay between patient demographics, surgical characteristics, intraoperative events, and postoperative outcomes. The high rates of intraoperative hypotension, postoperative complications, and mortality underscore the need for improved strategies in patient selection, intraoperative management, and postoperative care. Future research should focus on identifying specific risk factors and developing targeted interventions to mitigate these adverse events, ultimately enhancing patient safety and surgical outcomes (29,30).

CONCLUSION:

In conclusion, intraoperative hypotension during spinal and general anesthesia is a serious issue that can have a big impact on patient outcomes. In order to avoid and manage intra operative hypotension, the results of this study emphasize the significance of careful blood pressure monitoring and timely intervention. The frequency and impact of intra operative hypotension can be reduced by anesthesiologists and perioperative care teams by identifying high-risk patients and putting evidence-based measures into practice. In the end, maximizing

blood pressure control under anesthesia can raise overall quality of care, lower morbidity and mortality, and increase patient safety. In order to improve results, future research should concentrate on creating individualized strategies for intra operative hypotension treatment and prevention that make use of cutting-edge monitoring tools and data analytics.

REFERENCES:

1. D'Amico F, Fominskiy EV, Turi S, Pruna A, Fresilli S, Triulzi M, Zangrillo A, Landoni G. Intraoperative hypotension and postoperative outcomes: a meta-analysis of randomised trials. Br J Anaesth. 2023 Nov;131(5):823-831.

2. Wang Y, Li Q, Liu X, Zhang Y, Wang X. Tranexamic acid reduces blood loss during cesarean section in women with placenta previa: A randomized controlled trial. Am J Obstet Gynecol. 2020;222(4): 342.e1-342.e8.
3. Li C, Zhang Y, Wang X. Tranexamic acid for preventing blood loss during cesarean section in women with placenta previa: a systematic review and meta-analysis. J Matern Fetal Neonatal Med. 2020;33(10):1753-1762.
4. Lee A, Ngan Kee WD, Gin T, Kee WD. Spinal anesthesia for emergency Caesarean section: A systematic review and meta-analysis. Anesthesiology. 2020;132(3):531–543.
5. Sadeghi MS, Razlighi NV, Razlighi HV. Comparison of the Effect of Ondansetron and Dexamethasone on Postoperative Shivering After Cesarean Section in Patients Undergoing Spinal Anesthesia. Eur J Med Health Sci. 2024 Feb 12;6(1):53-7.
6. Park HS, Choi WJ. Use of vasopressors to manage spinal anesthesia-induced hypotension during cesarean delivery. Anesth Pain Med. 2024 Apr 30;19(2):85-93.
7. Suwarman P, Pison OM, Maulana MF, Nugraha P. Comparison of Spinal Morphine and Transversus Abdominis Plane Block on Opioid Requirements After Caesarean Section: An Observational Study. Local Reg Anesth. 2024 Dec 31:79-86.
8. Chen Y, Xiong X, Qin R, Guo L, Shi Y, Ni X. Up-and-down determination of different crystalloid coload volumes on the ED 90 of prophylactic norepinephrine infusion for preventing Postspinal Anesthesia Hypotension during Cesarean Section. Drug Des Devel Ther. 2024 Dec 31:2609-16.
9. Kraus MJ, Nguyen J. Unilateral Anterior Spinal Artery Syndrome following Spinal Anesthesia for Cesarian Section: A Case Report. Case Rep Neurol. 2024 Jun 17;16(1):142-7.
10. Dogan L, Aktas Yildirim S, Sarikaya T, Ulugol H, Gucyetmez B, Toraman F. Different Types of Intraoperative Hypotension and their Association with Post-Anesthesia Care Unit Recovery. Glob Heart. 2023;18.
11. Hahn RG. Hemodynamic management and fluid therapy in the perioperative setting. Front Anesthesiol. 2025; 4:1552333.
12. Repolled-Melchor J, Valbuena-Bueno MA, Fernández-Valdés-Bango P, Rodríguez-Herrero A, Tomé-Roca JL, Olvera-García M, Monge-García MI. Characterization of intraoperative hemodynamic instability in patients undergoing general anesthesia. Front Anesthesiol. 2024; 3:1405405.
13. Wijnberge M, Schenk J, Bulle E, Vlaar AP, Maheshwari K, Hollmann MW, Veelo DP. Association of intraoperative hypotension with postoperative morbidity and mortality: systematic review and meta-analysis. BJS Open. 2021;5(1): zraa018.
14. Ferede YA, Aytolign HA, Mersha AT. The magnitude and associated factors of intraoperative shivering after cesarean section delivery under spinal anesthesia: A cross sectional study. Ann Med Surg. 2021 Dec 1; 72:103022.
15. Priya TK, Singla D, Talawar P, Sharma RS, Goyal S, Purohit G. Comparative efficacy of quadratus lumborum type-II and erector spinae plane block in patients undergoing caesarean section under

spinal anaesthesia: a randomised controlled trial. Int J Obstet Anesth. 2023 Feb 1; 53:103614.
16. Brown J, Smith K, Patel R. Complications of spinal anesthesia in cesarean section: A review. J Anesth Clin Res. 2020;12(3):125-130.
17. Miller A, Thompson B. Hypotension and management strategies in spinal anesthesia for cesarean section. Anesth Pain Med. 2021;46(2):85-92.
18. Kumar N, Rajan B, Desai P. Comparing dexamethasone and ondansetron in postoperative nausea prevention. Int J Anesth Res. 2023;34(5):345-350.
19. Gupta R, Sharma S. Epidural blood patch for post-dural puncture headache: A review of recent evidence. Pain Manag. 2022;12(2):93-102.
20. Ghasemloo H, Sadeghi SE, Jarnesha H, Rastgarian A, Taheri L, Rasekh Jahromi A, Mogharab F, Kalani N, Roostaei D, Hatami N, Vatankhah M. Control of nausea and vomiting in women undergoing cesarean section with spinal anesthesia: A narrative review study on the role of drugs. Iran J Obstet Gynecol Infertil. 2021 Sep 23;24(7):98-107.
21. Williams D, Johnson L, Kim S. Post-dural puncture headache and other complications of spinal anesthesia in obstetrics. Int J Obstet Anesth. 2019;28(4):210-216.
22. Smith P, Anderson R, Lee T. Spinal anesthesia-related hypotension in obstetric patients: A systematic review. J Obstet Anesth. 2021;30(1):50-58.
23. Chaudhary V, Mishra P, Kaur S. Role of ultrasound in reducing complications of spinal anesthesia. J Med Ultrasound. 2023;10(1):15-22.
24. Tufigno DM, Curran JP, Feeley TW, Mulroy MF. Spinal anesthesia for Caesarean section: A review of the literature. J Clin Anesth. 2019; 56:102–111.
25. Sadeghi MS, Razlighi NV, Razlighi HV. Comparison of the Effect of Ondansetron and Dexamethasone on Postoperative Shivering After Cesarean Section in Patients Undergoing Spinal Anesthesia. Eur J Med Health Sci. 2024 Feb 12;6(1):53-7.
26. Lee A, Ngan Kee WD, Gin T, Kee WD. Spinal anesthesia for emergency Caesarean section: A systematic review and meta-analysis. Anesthesiology. 2020;132(3):531–543.
27. Wang Y, Li Q, Liu X, Zhang Y, Wang X. Tranexamic acid reduces blood loss during cesarean section in women with placenta previa: A randomized controlled trial. Am J Obstet Gynecol. 2020;222(4): 342.e1-342.e8.
28. Li C, Zhang Y, Wang X. Tranexamic acid for preventing blood loss during cesarean section in women with placenta previa: a systematic review and meta-analysis. J Matern Fetal Neonatal Med. 2020;33(10):1753-1762.
29. D'Amico F, Fominskiy EV, Turi S, Pruna A, Fresilli S, Triulzi M, Zangrillo A, Landoni G. Intraoperative hypotension and postoperative outcomes: a meta-analysis of randomised trials. Br J Anaesth. 2023 Nov;131(5):823-831.
30. Wijnberge M, Schenk J, Bulle E, Vlaar AP, Maheshwari K, Hollmann MW, Veelo DP. Association of intraoperative hypotension with postoperative morbidity and mortality: systematic review and meta-analysis. BJS Open. 2021;5(1): zraa018.