

Original Research

Study of General Anaesthesia versus Spinal Anaesthesia on Blood Glucose Concentration in Patients Undergoing Caesarean Section Surgery: A Comparative Evaluation at a Tertiary Care Centre

Kishore Goud.N¹, Vijaya Laxmi², Tejovathi Bandike³, Sana Parveen⁴

¹Assistant Professor, Department of Anaesthesiology, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India.

²Associate Professor, Department of Obstetrics and Gynaecology, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India.

³Assistant Professor, Department of Biochemistry, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, Telangana, India.

⁴Assistant Professor, Department of Biochemistry, Karuna Medical College and Hospital, Chittur, Palakkad, Kerala, India.

Corresponding Author:

Dr. Sana Parveen

Assistant Professor, Department of Biochemistry, Karuna Medical College and Hospital, Chittur, Palakkad, Kerala, India.

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ABSTRACT

Background: Neuraxial anesthesia benefits patients' recovery in a number of ways. When neuraxial blockade is employed, meta-analysis has demonstrated statistically significant decreases in intraoperative blood loss, length of surgery, and occurrences of deep vein thrombosis and pulmonary embolism. This study was conducted to assess the comparison of spinal anaesthesia versus general anaesthesia on blood glucose concentration in patients undergoing elective caesarean section surgery.

Materials and Methods: A total of 60 patients scheduled to undergo caesarean section were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were randomly divided into two study groups with 30 patients in each group as follows: Spinal anaesthesia group and General anaesthesia group. Blood glucose concentration was recorded in all the patients at four different time intervals: 5 minutes before induction and 5 minutes after induction in general anaesthesia group while 5 mins before and 5 mins after injection of local anesthetic solution in spinal anaesthesia group, 5 minutes before the end of surgery and 30 minutes after the end of surgery. All the values were compared using SPSS software.

Results: In this study, the mean duration of spinal and general anaesthesia 5 minutes before induction was 69.4 as well as 66.5 minutes, respectively. The mean duration of spinal and general anaesthesia 5 minutes after induction was 69.9 as well as 72.1 minutes, respectively. The mean duration of spinal and general anaesthesia 5 minutes before the end of surgery was 84.4 as well as 89.5 minutes, respectively. The mean duration of spinal and general anaesthesia 30 minutes after the end of surgery was 74.7 as well as 115.6 minutes, respectively.

Conclusion: When under spinal anaesthesia as opposed to general anaesthesia, the rise in blood glucose level is substantially smaller. It makes sense to recommend that individuals under general anaesthesia have their blood sugar levels checked during the procedure.

Keywords: Spinal Anaesthesia, General Anaesthesia, Glucose, Blood, C-Section.

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INTRODUCTION

Neuraxial anesthesia benefits patients' recovery in a number of ways. When neuraxial blockade is employed, meta-analysis has demonstrated

statistically significant decreases in intraoperative blood loss, length of surgery, and occurrences of deep vein thrombosis and pulmonary embolism.¹ Additionally, neuraxial anesthesia appears to enhance

the long-term results for patients.² A patient's uncontrolled glucose homeostasis could be harmful. For orthopedic trauma victims with or without a history of diabetes, hyperglycemia is an independent risk indicator for surgical-site infection.^{3,4} On the other hand, managing hyperglycemia results in blood glucose variations and a higher risk of hypoglycemia. Notably, even brief and mild hypoglycemia episodes have the potential to cause irreversible brain damage. Anabolic hormones like insulin as well as testosterone are secreted less often than catabolic hormones like cortisol as well as catecholamines, which together account for the total metabolic impact of the stress reaction following surgery.⁵⁻⁷ Insulin resistance is characterized by a relative shortage of insulin, decreased tissue insulin sensitivity, and poor glucose utilization due to an increase in catabolic hormone levels in plasma. Blood glucose levels will therefore rise even in the absence of pre-existing diabetes.^{8,9} This study was conducted to assess the comparison of spinal anaesthesia versus general anaesthesia on blood glucose concentration in patients undergoing elective caesarean section surgery.

MATERIALS AND METHODS

A total of 60 patients scheduled to undergo caesarean section were enrolled. Complete demographic and clinical details of all the patients was obtained. All the

patients were randomly divided into two study groups with 30 patients in each group as follows: Spinal anaesthesia group and General anaesthesia group. Blood glucose concentration was recorded in all the patients at four different time intervals: 5 minutes before induction and 5 minutes after induction in general anaesthesia group while 5 mins before and 5 mins after injection of local anesthetic solution in spinal anaesthesia group, 5 minutes before the end of surgery and 30 minutes after the end of surgery. All the values were compared using SPSS software.

RESULTS

This study comprised of 60 subjects. There were 30 subjects in spinal anaesthesia group and 30 subjects in the general anaesthesia group.

The mean duration of spinal and general anaesthesia 5 minutes before induction was 69.4 as well as 66.5 minutes, respectively. The mean duration of spinal and general anaesthesia 5 minutes after induction was 69.9 as well as 72.1 minutes, respectively. The mean duration of spinal and general anaesthesia 5 minutes before the end of surgery was 84.4 as well as 89.5 minutes, respectively. The mean duration of spinal and general anaesthesia 30 minutes after the end of surgery was 74.7 as well as 115.6 minutes, respectively.

Table 1: Group-wise distribution of subjects.

| Groups | Number of subjects | Percentage |
|---------------------|--------------------|------------|
| Spinal anaesthesia | 30 | 50% |
| General anaesthesia | 30 | 50% |
| Total | 60 | 100% |

Table 2: Mean blood glucose concentrations for general and spinal anaesthesia at different time intervals.

| Time | Type of anaesthesia | Mean | P-value |
|-------------------------------------|---------------------|-------|---------|
| 5 minutes before induction | General anaesthesia | 66.5 | P=0.239 |
| | Spinal anaesthesia | 69.4 | |
| 5 minutes after induction | General anaesthesia | 72.1 | P=0.265 |
| | Spinal anaesthesia | 69.9 | |
| 5 minutes before the end of surgery | General anaesthesia | 89.5 | P=0.327 |
| | Spinal anaesthesia | 84.4 | |
| 30 minutes after the end of surgery | General anaesthesia | 115.6 | P=0.002 |
| | Spinal anaesthesia | 74.7 | |

DISCUSSION

A multisystem metabolic disorder, diabetes mellitus has seen a substantial rise in the number of cases in recent years.¹⁰ A research found that diabetes affected 2% to 4% of surgery patients.¹¹ Diabetes mellitus in perioperative patients may result in a precipitous rise in blood glucose levels, which may increase the risk of diabetic acute complications including infections, postoperative mortality, and delayed wound healing.^{12,13} Diabetes patients who are pregnant face greater risks to both the mother and the fetus. This high-risk group often requires caesarean sections.¹⁴ Pregnancy's most prevalent medical consequence is gestational diabetes mellitus. It is linked to

unfavorable consequences for mothers and babies.¹⁵ According to the International Association of Diabetes and Pregnancy Study Groups criteria, the most widely used screening technique globally, the prevalence of GDM was 14.7%.¹⁶ This study was conducted to assess the comparison of Spinal Anaesthesia versus General Anaesthesia on Blood Glucose Concentration in Patients Undergoing Elective Caesarean Section Surgery. This study comprised of 60 subjects. There were 30 subjects in spinal anaesthesia group and 30 subjects in the general anaesthesia group. In this study, the mean duration of spinal and general anaesthesia 5 minutes before induction was 69.4 as well as 66.5 minutes, respectively. The mean duration

of spinal and general anaesthesia 5 minutes after induction was 69.9 as well as 72.1 minutes, respectively. The mean duration of spinal and general anaesthesia 5 minutes before the end of surgery was 84.4 as well as 89.5 minutes, respectively. The mean duration of spinal and general anaesthesia 30 minutes after the end of surgery was 74.7 as well as 115.6 minutes, respectively. Tanaka et al.¹⁶ showed that there was glucose intolerance and impairment of insulin secretion and glucose utilization during sevoflurane and isoflurane anesthesia in a dose-independent manner. According to the results of a study by Cok et al.¹⁷, although isoflurane and propofol, both combined with remifentanyl, provided a clinically comparable insulin and cortisol response to surgery in craniotomy operations, propofol attenuated the increase in plasma blood glucose. This suggested that propofol may be preferred over isoflurane when tight control of blood glucose is a goal. Amiri F et al investigated the effect of general versus spinal anesthesia on blood sugar level and hemodynamic changes in patients undergoing curettage surgery. 50 patients who were candidate for elective curettage surgery were divided into two groups of general (n = 25) and spinal (n = 25) anesthesia. In both groups, blood glucose level was evaluated 10 minutes before, 20 and 60 minutes after initiation of anesthesia. Also, heart rate and mean arterial blood pressure were evaluated at 10 minutes before, 10, 20, 30, 40, 50 and 60 minutes after initiation of anesthesia. There was not significantly difference between blood glucose level of both groups during 10 minutes before, 20 and 60 minutes after the initiation of anesthesia. Heart rate changes in the general and spinal groups compared to the baseline level were decreased up to maximum 12.5% and 14.5%, respectively. The mean arterial pressure changes in the general and spinal groups compared to the baseline level were decreased up to maximum 5.4% and 8%, respectively. Blood glucose and hemodynamic changes caused by surgical stress were not significantly different between two groups.¹⁸

CONCLUSION

When under spinal anesthesia as opposed to general anesthesia, the rise in blood glucose level is substantially smaller. It makes sense to recommend that individuals under general anesthesia have their blood sugar levels checked during the procedure.

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