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Comparison of Oxytocin 10 IU Intravena Dilution of 10 ml Nacl 0.9% Bolus for 15 Seconds and 60 Seconds to Hemodynamics in Sectio Caesaria Patients with Spinal Anesthesia

Dion Ricardo[1*], Achsanuddin Hanafie[2], Tasrif Hamdi[2]
[1]Study Program of Anesthesiology and Intensive Care, Faculty of Medicine, University of Sumatera Utara
[2]Departemen of Anesthesiology and Intensive Care, Faculty of Medicine, Universitas Sumatera Utara, RSUP H. Adam Malik Medan

***Corresponding Author**: Dion Ricardo, E-mail: dion.anestesi2019@gmail.com

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ABSTRACT

Introduction: Caesarean section (SC) is defined as the birth of a baby through an incision in the abdomen (laparotomy) and uterus (hysterotomy). Spinal anesthesia is the choice for elective SC because it is considered effective and efficient considering its simple technique and ability to provide adequate surgical anesthesia, easy administration, faster onset, and safety. Spinal anesthesia also provides early skin to skin contact which increases maternal satisfaction although the hypotension risk is higher compared to epidural anesthesia which is countered by sympathomimetic vasopressors administration. The aim to research was to compare the administration of 10 IU oxytocin diluted in 10 cc of 0.9% NaCl for 15 seconds with 60 seconds on hemodynamics in sectio caesarean patients under spinal anesthesia.
Method: This study used an RCT (Randomized Clinical Trial) design with double blind, meaning that neither the research subjects nor the observers were aware of the treatment or intervention given. The study sample was patients who underwent Sectio Caesaria at Haji Adam Malik General Hospital Medan, and the Universitas Sumatera Utara Hospital which fulfilled the inclusion and exclusion criteria.
Results: It was found that there was not a significant difference in MAP values between the 15-second and 60-second bolus groups with p-values for the 1st, 3rd, 5th, and 10th minutes respectively 0.804, 0.692, 0.568 , 0.216, 0.754, and 0.390. In addition, it is known that there was a significant difference in pulse values between the 15-second and 60-second bolus groups at 1, 3, 5, 10 and 15 minutes, with the results of the p-value before, 1, 3, 5, 10, and 15 minutes are 0.509, 0.464, 0.805, 0.055, 0.475 and 0.857 respectively. In this study, no side effects were found in either group between 15 second and 60 second boluses.
Conclusion: There were no significant hemodynamic changes in both test groups (15 second and 60 second boluses), at 1, 3, 5, 10 and 15 minutes.

Keywords

Caesarean section, Hemodynamics, Spinal Anesthesia

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INTRODUCTION

Caesarean section (SC) is defined as the birth of a baby through an incision in the abdomen (laparotomy) and uterus (hysterotomy). SC has become one of the most common major surgeries that women undergo worldwide. The CS rate continues to increase for both emergency and elective CS cases with an estimated number of 23 million procedures performed each year. CS is performed to improve maternal and fetal outcomes as well as reduce the risk of complications from spontaneous vaginal delivery. According to a meta-

analysis, an increase in the CS rate of up to 19% is associated with reduced infant morbidity and mortality. However, SC is also associated with morbidity and mortality, most often related to bleeding and infection. Complications of SC include bleeding, infection, thromboembolism, injury to the ureter and urinary bladder.[1]

Oxytocin has been known to have effects on cardiovascular organs so that it can affect the hemodynamic status of the mother. Oxytocin tends to cause hypotension in healthy women undergoing CS with spinal anesthesia. This was compensated for by significant increases in cardiac output (CO) and heart rate (HR). Oxytocin main hemodynamic effect is vasodilation via its receptors on the vascular endothelium that trigger the nitric oxide pathway. So it is considered that the effect of tachycardia and increased CO is a compensatory mechanism.[2] Giving spinal anesthesia can cause side effects of hypotension in the mother which can affect the blood supply to the fetus. Administration of oxytocin may also add to the maternal hypotensive and tachycardic effects. Various studies have been conducted to find the most effective dose of oxytocin to achieve adequate uterine contractions with minimal hemodynamic side effects.

Intravenous oxytocin can exert a uterotonic effect after 60 seconds and has a very short half-life of 4-10 minutes. Additional administration of oxytocin infusion in CS can maintain uterine contractility during the postpartum period. In addition, the speed of administration and the route of administration will have a different effect on hemodynamic changes.[3] The previous consensus stated that there were significant ECG changes in the form of ST segment depression with 10 IU oxytocin for 60 seconds compared to 5 IU for 60 seconds, as well as a decrease in MAP of 9 mmHg when 5 IU was given and 17 mmHg when 10 IU was given.[4]

An RCT also demonstrated that a bolus of 5 IU over 15 seconds of oxytocin was not inferior to a standard 10 IU bolus of 15 seconds of oxytocin in terms of initiating adequate uterine contractions.[4] Previous research conducted at Airlangga University in Surabaya stated that there were no changes in blood pressure, pulse, and MAP between the fast bolus group without dilution and the 10 second and 60 second bolus dilution group.

METHOD

This study used an RCT (Randomized Clinical Trial) design with double blind, meaning that neither the research subjects nor the researchers had to know about the treatment or intervention given. A total of 32 samples consisted of patients undergoing Sectio Caesaria at the Adam Malik Hajj Center General Hospital in Medan and the University of North Sumatra Hospital. Samples were divided into 2 groups which were given oxytocin intervention given for 15 seconds with oxytocin given for 60 seconds.

RESULTS

This research was conducted on patients who underwent cesarean section surgery under spinal anesthesia at Adam Malik Haji Center General Hospital in Medan and North Sumatra University Hospital. The study began on August 5, 2022 after an ethical due diligence was carried out by the Research Ethics Committee of the Faculty of Medicine, University of North Sumatra with a total of 60 study subjects who met the inclusion and exclusion criteria. In this study, demographic data was obtained for the age group of the research subjects.

Table 1 Sample Characteristics

Demographic Data	15 Seconds	60 Seconds	P
Age			
18-20	2 (6.7%)	1(3,3)	0.28
21-30	18 (60 %)	19 (63.3)	0.37
31-40	10 (33.3%)	10 (33.3)	0.18
BMI (Mean)	65,66	65.03	0.32

In table 4.1 it is also known that the age distribution of the subjects of this study in the 15 second group found that there were 2 (6.7%) 18-20 years old, 18 (60%) 21-30 people, and 10 (10) 31-40 33.3%) people with an average BMI of 65.66. In the 60 seconds group, there were 1 (3.3%) 18-20 year olds, 19

(63.3%) 21-30 people, and 10 (33.3%) 31-40 people with an average BMI 65.03. The value of P > 0.05 is obtained, so the data is normally distributed.

Table 2 MAP and pulse in groups 15 seconds and 60 seconds before spinal action

	15 Seconds	60 sec	Normality
FOLDER			
Before	85,64	86,63	0.065
Pulse			
Before	84,93	84,93	0.200

Based on Table 4.2, the average MAP at 15 seconds is 85.64 and 60 seconds is 86.63, the value of p> 0.065 is obtained, while based on the average pulse, it is obtained that at 15 seconds it is 84.93 and 60 seconds is 84.93 with a value of p> 0.200, so with all data normally distributed.

Table 3. Comparison of Hemodynamic Bolus Oxytocin 15 and 60 seconds

		Means		P
		15 seconds	60 sec	
FOLDER				
	Before	85,64	85.02	0.804[a]
	1st minute	84.07	85.07	0.692[a]
	3rd minute	85,47	84.00	0.568[a]
	5th minute	82.44	85,63	0.216[a]
	10th minute	85,88	85.09	0.754[a]
	15th minute	87.03	84.54	0.390[b]
Pulse				
	Before	84,93	86,63	0.509[a]
	1st minute	85.43	87,37	0.464[a]
	3rd minute	87,47	86,80	0.805[a]
	5th minute	87,23	81.87	0.055[a]
	10th minute	86,27	88,20	0.475[a]
	15th minute	86,27	86,27	0.857[a]

[a]Independent T-test, [b]Mann-Whitney

Based on Table 4.3, it is known that there was no significant difference in MAP values between the 15-second and 60-second bolus groups, with the p-values before, 1st, 3rd, 5th, 10th, and 15th minutes respectively 0.804, 0.692, 0.568, 0.216, 0.754 and 0.390. In addition, it was noted that there was no significant difference in pulse values between the 15-second and 60-second bolus groups, with the p-values before, 1st, 3rd, 5th, 10th, and 15th minutes respectively 0.509, 0.464, 0.805, 0.055, 0.475 and 0.857. In this study, no side effects were found in either group between 15 second and 60 second boluses.

DISCUSSION

This study essentially underscores the similarity of rapid IV bolus administration, with a procedure duration of 15 seconds compared to 60 seconds, which in theory aims to compare whether there are differences in oxytocin bolus velocity-induced differences in hemodynamic changes. It is important to note that the majority of studies to date have only compared boluses and infusions, not the duration or rate of the bolus itself. So it is hoped that this study can become the basis of a theory that supports that there is no statistically significant difference regarding the associated bolus rate at 5 IU oxytocin doses.

Determination of the optimal dose of oxytocin that can maximize the therapeutic effect without causing side effects, especially from the aspects of circulation and hemodynamics itself is still quite often implicated. It is known that there is a significant linear relationship to the degree of hemodynamic change with the dose of oxytocin given, which means that the higher the oxytocin dose, the greater the body's compensatory efforts that can be observed. In the last decade, several literatures have mentioned a dose of 0.5-3.0 IU as the recommended dose for the use of oxytocin in SC cases, so it is not uncommon for some health care centers to abandon the 5 IU dose.

As the main limitation of this study, researchers did not evaluate whether there were alterations in other vital signs such as the average breaths per minute, which of course is closely related to changes in the patient's hemodynamics. Furthermore, the investigators only conducted a study of a single dose of oxytocin (5 IU) after dissolving in 0.9% NaCL, without considering whether, over the time period analyzed, there was a significant difference between the higher dose (>5 IU), or the recommended current (0.5-3 IU); regardless of the importance of increasing the sample size to support the study results. Therefore, adequate collaboration between detailed oxytocin administration procedures (both in terms of route, bolus or infusion, duration of each oxytocin injection method), as well as stratification of doses to achieve optimal therapeutic effects without significant side effects is also highly expected to be achieved in the future. To support this goal, a thorough and systematic analysis of various uni- or multi-center investigations is highly recommended considering the routine use of oxytocin in obstetric clinical practice in the management of acute and critical cases.[5-6]

CONCLUSION

There were no significant hemodynamic changes in both test groups (10 IU IV oxytocin bolus for 15 seconds and 60 seconds dissolved in 0.9% NaCl) with P values > 0.05 at all comparison time points (baseline, min-1, -3 .5, -10, and -15). Statistically bolus administration of IV oxytocin 10 IU dissolved in 0.9% NaCl with a duration of 15 seconds with a P value >0.05 at all checkpoints (baseline, minute-1, -3, -5, -10, and -15). Statistically giving bolus IV oxytocin 10 IU dissolved in 0.9% NaCl with a duration of 60 seconds with a P value >0.05 at all checkpoints (baseline, minute-1, -3, -5, -10, and -15) .

DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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AUTHORS' CONTRIBUTIONS

All authors significantly contribute to the work reported, whether in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas. Contribute to drafting, revising, or critically reviewing the article. Approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

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intravenously without rapid bolus dilution compared to 10 cc dilution of 0.9% Nacl bolus for 10 seconds and 60 seconds in sectio caesarean surgery with spinal anesthesia in RSU. Dr. Diss Univ Airlangga 2016; 51–59.

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