ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 04 | April - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A PROSPECTIVE OBSERVATIONAL STUDY OF ANAESTHETIC MANAGEMENT OF PATIENTS UNDERGOING CAESAREAN SECTION COMPLICATED BY PERIPARTUM HEMORRHAGE.

Anaesthesiology

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ABSTRACT

Introduction: Maternal mortality is one of the factors that determine the growth of the nation. One of the goals of "sustainable developmental goals" given by WHO is, to decrease maternal mortality to less than 70 per 100000 births. The two main cause of maternal mortality are bleeding and infections. This study is to understand the relationship between anaesthetic management and maternal parameters in patients with peripartum haemorrhage. **Methodology:** All Consenting patients with antepartum bleeding after 24 weeks gestation for LSCS and patients who developed bleeding intraoperative were included in this cohort study. Since it is an observational study, data was collected without interfering with patient management. Demographic details of the patients, anesthesia administered and intraoperative parameters were studied. **Results:** In this study, the mean age of the population was 25.68±4.42 years. All the patients who had history of more than 500 ml of bleeding per vaginum were given general anaesthesia (68.42%) The patients who received general anaesthesia, 89.47% of the women had haemoglobin less than 10 g% and 84.88% had tachycardia preoperatively. 23.69% required obstetric hysterectomy to control the haemorrhage. The association with type of anaesthesia with change in any of the intraoperative parameters was not significant. **Conclusion:** It was inferred from the study that in our hospital both general and spinal anaesthesia are given to patients with obstetric haemorrhage posted for LSCS, Preoperative haemorrhage status and haemoglobin level are considered before deciding the mode of anaesthesia. The mode of anaesthesia does not affect the intraoperative course of the patients. No association could be established between intraoperative heart rate SBP, blood loss, need for blood transfusion with type of anaesthesia.

KEYWORDS

Peripartum haemorrhage, placenta previa, maternal mortality, anaesthesia.

INTRODUCTION

One of the main target in sustainable development goals is reduction in the global maternal mortality ratio (MMR) to less than 70 per 100 000 by 2030; To achieve this goal, the annual decline rate in maternal death should be at least 6.4%. The common causes of maternal mortality are hypertensive disorders of pregnancy, peripartum haemorrhage, sepsis, embolism and complications of unsafe abortion. 27% of them are due to peripartum haemorrhage. It is one of the most preventable and treatable conditions.[1]

The main obstacle in management of peripartum haemorrhage is, it is difficult to diagnose at early stages as the physiological changes of pregnancy like tachycardia, masks the real scenario. Most of the cases in India come as emergency LSCS because of inadequate awareness regarding antenatal check- up preventing early diagnosis of conditions such as placenta previa. The estimation of blood loss is also challenging as the bleeding can be contaminated with amniotic fluid or hidden below drapes or in concealed haemorrhage. In these cases, there could be no bleeding or minimal bleeding per vaginally but with considerable intra uterine haemorrhage which can delay the diagnosis and treatment. [2,3]

Involvement of anaesthesiologist starts from stabilizing the patient preoperatively, administering anaesthesia for LSCS and other interventions for controlling bleeding, managing the intraoperative hemodynamics to ICU and critical care management postoperatively. It is very important for anaesthesiologist to diagnose the severity of the obstetric haemorrhage. Several studies are available about anaesthetic management of obstetric haemorrhage. Still there isn't any clear opinion that which anaesthesia is associated with better outcome. [4,5]

Ours being tertiary care hospital, we receive complicated cases referred from peripheral hospitals even from neighbouring states. The study of these cases can throw light on the factors anaesthesiologist usually consider in deciding the type of anaesthesia and whether it has any relationship with intraoperative status and immediate postoperative outcome. With these aims this observational study of anaesthetic management of obstetric patients with peripartum haemorrhage was planned.

MATERIALS AND METHOD

This cohort study was done in a tertiary care teaching hospital with approximately 6000 total deliveries and 2000 LSCS per year. The study was approved by the institutional review board and data was collected between the years 2021 and 2022. Any patient who came to obstetric OT for LSCS with bleeding per vaginum after 24 weeks of pregnancy or with clinical diagnosis of placenta previa, abruption placenta and uterine rupture were included in the study.

Preoperative variables such as age, parity, gestational age, obstetric score, history of previous LSCS, surgery planned, amount of bleeding per vaginum, previous history of other surgeries, past history of any other associated comorbidities, nature of LSCS {emergency/routine} were noted. Preoperative hemodynamic parameters like pulse rate, preoperative blood pressure, saturation were noted. Other preoperative variables such as pallor, systemic examination and preoperative blood investigations such as haemoglobin, platelet count, total count, packed cell volume, random blood sugar, serum creatinine and USG findings if available were recorded.

The mode of anaesthesia and anaesthetic management for patients was decided by anaesthesiologist in charge and the researcher only collected the data. All patients who received spinal anaesthesia were premeditated with injection metoclopramide 10 mg intravenously and spinal anaesthesia was given after preloading with 500ml of ringer lactate in left lateral position using 25G Quincke needle in the L3-L4 intervertebral space with injection bupivacaine 0.5% heavy 1.8 to 2cc intrathecally . T6-T4 level of spinal anaesthesia was aimed in all the patients.

For administrating general anaesthesia, the patients were premedicated with injection metoclopramide 10 mg and glycopyrolate 0.2mg and induced after preoxygenating with 100% oxygen for 3-5 minutes. The general anaesthesia was administered using injection sodium thiopentone 4-6 mg per kilogram iv or injection propofol 2.5 mg per kilogram or injection ketamine 1-2mg per kilogram according to the hemodynamic status of the patient. Inj.scoline 1- 1.5 mg per kilogram was given before intubation and cricoid pressure was applied on all patients. The patients were intubated and mechanically ventilated and the depth of anaesthesia was maintained with oxygen, nitrous oxide, 1-2% of inhalational sevoflurane. Muscle relaxation was achieved either with intermittent dose of scoline or by nondepolarizing muscle relaxant.

As a part of balanced anaesthesia Injection tramadol 1-1.5mg per kilogram was given in all patients after delivery of the baby for

intraoperative and perioperative analgesia.

All the patients of both spinal and general anaesthesia group were given injection oxytocin 10 units added to the intravenous drip and another 10 units was given intramuscularly after the delivery of the baby. When Atracurium or Vecuronium was used, the residual neuromuscular blockade was reversed and when injection scoline alone was used as a muscle relaxant, the patients were allowed to breathe spontaneously and extubated after the patient achieved power and tone with thorough oral suctioning.

The details regarding number of patients who were converted from regional anaesthesia to general anaesthesia were collected. Duration of surgery was considered from time of skin incision to the time of skin closure. Operative interventions in terms of uterine artery ligation, internal iliac artery ligation, B-Lynch sutures, obstetric hysterectomy were noted. The patients were either extubated or shifted on ventilator in ICU.

Intraoperative pulse rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, saturation and ECG were continuously monitored and noted. Total amount of blood loss was calculated by counting mops, pads, gauze pieces, drapes and suction bottles. Number of patients requiring blood and blood product transfusion, amount of blood and blood products and colloids transfused were considered. Data of the patients requiring ephedrine or noradrenaline support for maintenance of blood pressure was collected. Intraoperative events like tachycardia, arrhythmia, cardiac arrest if any were also noted from the case paper.

Statistical analysis

All the variables were entered in EXCEL sheet and quantitative data were presented in tables as mean and standard deviation and categorical data were stated as number (n) and percentage (%) statistical analysis was done using chi-square test, student t test and Odds ratio with 95% CI. A value of $p<0.05$ was considered as significant

OBSERVATIONS AND RESULTS

Table 1: Characteristics of study population

		Frequency(n=38)	%
	≤ 20	2	5.263
Age	21-30		
		30	78.96
	>30	6	15.78
	1	6	15.78
Gravida	2		
	3	9	23.68
		15	39.47
	>3	8	21.05
Previous LSCS	0	28	73.68
	1	6	15.78
	2	3	7.89
	>2	1	2.63
H/O Bleeding PV	<200ml	6	15.78
	201-500ml	26	68.42
	>500ml	6	15.78

As the study is on peripartum haemorrhage, all of the subjects were female and the mean age of the population was 25.68±4.42 years. 60.52% of the study population had history of three or more pregnancies. 97.34% of the patients came for emergency LSCS. 73.68% of the population did not have history of any previous LSCS, only 15.78% of the patients had history of previous 1 LSCS.

Antepartum bleeding per vaginum was calculated approximately by counting the number of pads soiled. The average bleeding in the study population was 295.53 ±131.54ml. Around 68.42% of the women gave history of around 200 to 500ml of bleeding per vaginum, 15.78% of the women had each more than 500ml bleeding and less than 200ml blood loss. The mean haemoglobin concentration of the study population was 9.8±2 g%. From the total of 38 patients, 65.78% of the patients had placenta previa, 31.57% of the patients had abruption placenta and one patient had ruptured uterus.

Table 2: Mode of Anaesthesia

	No.(n=38)	%
General Anaesthesia	26	68.42
Spinal Anaesthesia	12	31.57

Table 3: Association of preoperative variables with choice of anaesthesia.

		GA (n=26)	%	Spinal (n=12)	%	p- value
H/O Bleeding	>500 (n=6)	6	100	0	0	0.290
	200-500 (n=26)	17	65.38	9	34.61	
	<200ml (n=6)	3	50	3	50	
Pre-Op HR	≥100 (n=17	14	82.35	3	17.64	0.09
	<100 (n=21)	12	57.14	9	42.85	
SBP	<100 (n=2)	2	100	0	0	--
	≥100 (n=36)	24	66.66	12	33.33	
Hb	<10 (n=19)	17	89.47	2	10.52	0.005 *
	≥10 (n=19)	9	47.36	10	52.63	

All the patients who had history of more than 500 ml of bleeding per vaginum were given general anaesthesia. In women who had 200-500ml bleeding, 65.38% received general anaesthesia and 34.61% received spinal anaesthesia In patients who had bleeding less than 200ml, 50% received spinal anaesthesia and 50% received general anaesthesia. The chi square test was applied by clubbing the patients with 200- 500ml of bleeding with patients with more than 500 ml of bleeding, making less blood loss group and more blood loss group. The p value was >0.05 indicates no association between amount of bleeding with type of anaesthesia

82.35% of the patients who had preoperative pulse rate more than 100 per minute were given general anaesthesia but association of pulse rate with type of anaesthesia was not significant. Two patients in this case series had systolic blood pressure less than 100 mm hg and both of them were given general anaesthesia. In patients with systolic pressure more than 100 mm hg, 66.66% received general anaesthesia and 33.33% received spinal anaesthesia.

89.47% of the women with haemoglobin less than 10 g% were given general anaesthesia and 47.36% women with haemoglobin more than 10 g% received general anaesthesia. The p value of <0.05 indicates significance association between preoperative haemoglobin and choice of anaesthesia. The surgery was completed in less than one hour in 14 patients. It took between 1-2 hours in 22 patients (57.89%) to complete the surgery. Two patients out of 38 patients (5.26%) required more than 2 hours for surgery.

From the total of 38 patients, 76.31% of the patients were operated for LSCS, 7.89% of the patients also required uterine artery ligation. Total 6 patients (33.33%) had to undergo obstetric hysterectomy. Two of these 6 patients, were tried internal artery ligation as a measure to control the bleeding before deciding to proceed with obstetric hysterectomy.

Table 4: Association of intra-Op maternal conditions with mode of anaesthesia

		GA (n=26)	%	Spinal (n=12)	%	p-value
Hypotension	Yes (n=13)	10	38.46	3	25	0.416184
	No (n=25)	16	61.53	9	75	
Tachycardia	Yes (n=29)	23	84.88	6	50	0.00953*
	No (n=9)	3	11.53	6	50	
Blood loss	<=1000ML	10	38.46	8	66.66	0.106
	1001-1499ML	6	23.07	3	25	
	1500-1999ML	8	30.76	1	8.33	
	>2000ML	2	7.69	1	8.33	
Blood Transfusion	Yes (n=11)	9	34.61	2	16.66	0.256782
	No (n=27)	17	65.38	10	83.33	
Colloid	Yes (n-9)	8	30.76	1	8.33	0.130498
	No (n=29)	18	69.23	11	91.66	

Ephedrine	Yes (n=12)	10	38.46	2	16.66	0.179102
	No (n=26)	16	61.53	10	83.33	
Noradrenaline	Yes (n=3)	3	11.53	0	0	
	No (n=35)	23	84.88	12	100	

Total 26 patients were given general anaesthesia from these 38.46% patients developed hypotension. Spinal anaesthesia was given to 12 patients from these 25% developed hypotension. In patients who received general anaesthesia, 84.88% had intraoperative tachycardia. In patients who received spinal anaesthesia, tachycardia was observed in 50% of the patients.

The chi square test was applied by clubbing the patients who had intraoperative blood loss 1000-1500ml, 1500-2000 and more than 2000 ml making more blood loss and less blood loss group. The pvalue was >0.05 indicating no association between mode of anaesthesia and intraoperative blood loss. In patients of general anaesthesia group, 34.61% required intraoperative blood transfusion and 30.76% needed colloid administration on comparing with spinal anaesthesia, only 16.66% required intraoperative blood transfusion and 8.33% received colloids. The association with type of anaesthesia with change in any of the intraoperative parameters was not significant.

DISCUSSION

Haemorrhage during pregnancy is alarming situation which is risky for mother as well as baby. So, when the patients encounter this symptom, she is surely to attend the hospital whatever the time may be in an emergency. In our study, 97.34% patients came to us for emergency LSCS. 31.57% patients had abruption placentae which is an emergency requiring immediate LSCS to save mothers and baby's life. Placenta previa, placenta accrete if diagnosed antenatally by sonography, the LSCS can be planned.

In this study, 26.32% of the patients had history of previous LSCS and 73.68% of the population did not have history of any previous LSCS. None of the patients had any history of any uterine or other abdominal surgeries

Kocaoglu Nazan et al (2012) observed the anaesthetic management of patients with placenta previa and found that 56.9% women with placenta previa had history of previous LSCS.[6]

In our study, the incidence of history of LSCS was low compared to other studies. The placenta adhering on previous scar (placenta accreta) which is an emerging cause of peripartum haemorrhage, was not a major cause in our study. One third of the cases in our study had abruptio placentae. Most of the studies found in literature were focused on either management of placenta previa or placenta accrete spectrum.

While studying clinical profile of the study population, the average preoperative heart rate of the patients in the study group was 98±14.73 beats per minute and average preoperative systolic blood pressure was 113.94±13.46 mmhg. The mean heart rate and blood pressure suggests that the patients might have received some resuscitation before coming to the hospital or in emergency department of this hospital

As discussed earlier, mode of anaesthesia was decided by the attending anaesthesiologist, we the researcher anaesthesiologist tried to look for the association between patient related factors with mode of anaesthesia selected by anaesthesiologist.

All the patients who had history of more than 500 ml of bleeding per vaginum were given general anaesthesia. In women who had 200-500ml bleeding, 65.38% received general anaesthesia and 34.61% received spinal anaesthesia. 82.35% of the patients who had preoperative pulse rate more than 100 per minute were given general anaesthesia and 17.64% received spinal anaesthesia. but no association could be detected between blood loss and heart rate with selection of type of anaesthesia. 89.47% of the women with haemoglobin less than 10 g% were given general anaesthesia and 10.52% received spinal anaesthesia. The type of anaesthesia was significantly different with level of Hb. (P<0.05)

Usually, it is the overall assessment of the patients by anaesthesiologists to decide the mode of anaesthesia. Sometimes other factors like duration of surgery, urgency of surgery, willingness of the patient do play a role in deciding the mode of anaesthesia. Our study was having sample size of only 38, study with larger sample size can give better idea about the role of patients related factors on mode of anaesthesia.

In our study, 68.42% of the women received general anaesthesia and the remaining 31.57% received spinal anaesthesia. One patient of spinal anaesthesia group required supplementation of general anaesthesia. This patient was considered under spinal anaesthesia group. Xingxing Liu et al (2020) on his study on mode of anaesthesia for caesarean delivery in 61 patients with placenta previa observed that 27 patients received general anaesthesia and 34 patients received spinal anaesthesia. Anupama Priyadarshini N et al (2017) on a study on anaesthetic management of 30 patients with placenta previa, regional anesthesia was given in 53.4% and 46.6% was given general anesthesia.[7,8]

It was found that the preferred mode of anaesthesia in most of the cases was general anaesthesia because the duration of the surgery in these patients is not predictable and there is possibility of intraoperative haemorrhage and the plan of the surgery can change according to the amount of bleeding and the surgeon's ability to control the bleeding with uterine artery ligation to obstetric hysterectomy. Markley et al found that obstetric hysterectomy is the main reason for conversion of spinal anaesthesia to general anaesthesia. During the surgery as the patient would be covered by drapes and the surgeon operating the patient it will be a challenging task for an anaesthesiologist to convert the regional anaesthesia to general anaesthesia Inadequate exposure and difficult positioning can make even simple intubation difficult.

Duration of surgery was less than one hour in 14 patients. It took between 1-2 hours in 22 patients (57.89%). Two patients out of 38 patients (5.26%) required more than 2 hours for surgery. One patient was given general anaesthesia and the other patient was given spinal anaesthesia, which was later converted to general anaesthesia.

John C Markley et al in 2018 observed neuraxial anesthesia during caesarean delivery for placenta previa with suspected morbidly adherent placenta and noted that the mean duration of surgery was 2.6 hours in patients who underwent the surgery in neuraxial anaesthesia and the duration was 4 hours on an average in patients who were converted from neuraxial anaesthesia to general anaesthesia. Duration of the surgery depends on factors like history of previous LSCS, previous abdominal surgeries, placenta accrete spectrum, need of interventions like uterine artery ligation, obstetric hysterectomy, etc. and the experience of the surgeon. Knowing the probable duration of surgery is important for anaesthesiologist for deciding the type of anaesthesia. Spinal anaesthesia has limited duration and during surgery is extended, one has no option than to convert it to general anaesthesia. If patient had epidural catheter already for labour analgesia, if the patients conditions allows, then the surgery can be done under epidural anesthesia. When the duration of surgery is unpredictable, it is safe to give general anaesthesia with endotracheal intubation.[9]

From the total of 38 patients, 65.78% of the patients were diagnosed to have placenta previa, 31.57% of the patients had abruption placenta and one patient had ruptured uterus. Kocaoglu Nazan et al (2012) studied 65 patients about the anaesthetic management of caesarean section in parturient with the placenta previa and observed that 43.1% had abnormally invasive placentation in which 18.5% of the patients had placenta accrete, 12.3% had placenta increta and 12.3% had placenta percreta. Orhan BiniciIn et al in 2019 on studying the patients with placental invasion anomalies, noted that 53.2% of the patients had placenta previa, 45.65% had placenta percreta and 1.08% had placenta accreta. Most of the studies we reviewed were focused on either management of placenta previa or placenta accrete spectrum.

Intraoperative data about occurrence of hypotension, tachycardia, blood loss, blood transfusion, colloid transfusion, ephedrine and noradrenaline requirement were noted and their association with type of anaesthesia was analysed by Chi square test.

Total 26 patients were given general anaesthesia from these 38.46% patients developed hypotension and 61.53% did not develop hypotension. Incidence of hypotension was comparable between general anaesthesia and spinal anaesthesia group (p>0.05)

In group of patients who received general anaesthesia, 84.88% had tachycardia and 11.53% did not. More number of patients who

received general anaesthesia has tachycardia than who received spinal anaesthesia. ($p<0.05$), the difference was statistically significant.

Orhan BiniciIn et al in 2019 on studying the patients with placental invasion anomalies, on comparing the amount of blood loss with the mode of anaesthesia, patients who received general anaesthesia had around 600 ml of blood loss and the blood loss was around 350 ml in patients who received spinal anaesthesia.[10.]

In patients of general anaesthesia group, 34.61% required intraoperative blood transfusion and 30.76% needed colloid administration on comparing with spinal anaesthesia, only 16.66% required intraoperative blood transfusion and 8.33% received colloids. There was no need of noradrenaline in patients of spinal anaesthesia group in this study.

On comparing patients who received general anaesthesia and spinal anaesthesia, no significant difference was observed for hypotension, intraoperative blood loss, need of blood transfusion and vasopressors. However, a multivariate analysis with confounding factors can throw more light on it.

CONCLUSION

No statistical significant association between preoperative blood loss, tachycardia, hypotension with selection of general anaesthesia or spinal anaesthesia was observed in this study, but a greater number of patients were given general anaesthesia for these conditions. The study could not demonstrate significant difference for hypotension, intraoperative blood loss, need of blood transfusion and vasopressors between group of patients who received spinal anaesthesia and general anaesthesia.Suggesting that mode of anaesthesia might have minimum influence on above mentioned 0parameters. Study with large sample size and multivariable regression analysis can drew definite conclusion

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