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Comparison of Spinal and General Anaesthesia in Caesarean Section and Its Effect on Mother and Neonate

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Introduction

Now a day the choice of obstetric anaesthesia has been influenced by patient and physician preferences and the frequency of caesarean section births continues to increase steadily worldwide.[1] Even though it is safe over the years and due to advancement but it is still associated with high rates of maternal and perinatal mortality and morbidity.[2]

Spinal anaesthesia is a mainstay in Caesarean Section. It avoids a general anaesthetic with risks of failed intubation in case of anatomical abnormalities in mother, and risks of ventilation in respiratory diseases. It is easy to administer, improved needles reducing the post punctural headache and also the faster onset time is in the favour of spinal anaesthesia. Also the mother is conscious and partner can be present at the time of birth of the baby.

General anaesthesia has superior control over ventilation, lower incidence of hypotension as seen with spinal anaesthesia, speed of induction, and there is lack of awareness of the perioperative period is preferred in emergency situations and in selected and elective procedures,[3] but complications such as maternal aspiration syndrome may occur during general anaesthesia and thus contribute towards maternal mortality.[4] Use of anaesthetic drugs that cross the placental barrier can nevertheless produce neonatal depression.[5]

Thus rates of caesarean section using spinal anaesthesia have been increasing and spinal anaesthesia is becoming the preferred anaesthetic technique for avoiding maternal and fetal complications.[6,7] Some anaesthetists prefers spinal anaesthesia under elective conditions. But due to sympathetic blockade of spinal anaesthesia-related hypotension may affect neonatal short-term outcomes by impairing uteroplacental perfusion[8] also cerebrospinal fluid (CSF) leakage following lumbar puncture may cause headache, nausea and vomiting.[9] In some occasion conversion of spinal to general anaesthesia has been seen due to insufficiency of regional blockade. Now a days the choice of anaesthesia depends on the mother's request, obstetric reasons and the anaesthesiologist's experience level.

Aims and Objectives

To study the effects of anaesthesia during Caesarean Section -General or spinal on mothers by assessing
Mean arterial Blood pressure changes
Maternal pre/postoperative haematological parameters,
Maternal intra/postoperative hemodynamic parameters
To study the effects of anaesthesia during Caesarean Section -General or spinal on neonates by assessing
Apgar Scores
Umbilical cord blood parameters: such as: pH, PCO_2, PO_2,

Materials and Methods

This study was approved by the ethical committee. This prospective study involved pregnant women, between 20 and 35 years of age, who delivered at term (37-40 weeks) by means of elective caesarean section in a CCM MC and hospital between 2016 to 2017.

Informed consent was obtained from the mothers.

Patients undergoing emergency caesarean section due to maternal or fetal causes were excluded from this study. Multiple gestations, multiparity (> 4 delivery), polyhydramnios, oligohydramnios, placental abnormalities,

such as placental abruption, adherent placenta or placenta previa, preterm delivery, pre-eclampsia, gestational diabetes mellitus and unsuitability for regional anaesthesiawere excluded from the study.

The cases included in the study were enrolled in general anaesthesia group (n=25) and spinal anaesthesia group (n=25)

Patient's demographic information was collected and each patient was given an information sheet and a consent form was signed.

General anaesthesia was given after preoxygenation for 3 minutes, intravenous induction was done followed by intubation through cricoid pressure, and maintained with 50% oxygen. After delivery, and clamping of the umbilical cord, Patients were reversed and extubated.

Spinal anaesthesia was given after preloading with normal saline, patients were lateralized to the left for 5-10 minutes in a supine position. The patient's head was elevated to 30˚, thus placing her in an appropriate position. Oxygenation at 5 litre/minute with was administered. If Mean Arterial Pressure (MAP) dropped to less than 20% of the base line ephedrine (6 mg boluses) was given.

Patients who developed bradycardia (heart rate < 50 /minute), 0.5 mg of atropine sulphate IV was administered. If oxygen saturation (SpO_2) falls to lower than 90%, as detected using pulse oximetry, were saturated and 100% O_2 was administered at the rate of 4 l/m, through a face mask.

After applying the anaesthesia to the respective groups, a lower-segment transverse uterine incision was made, placenta was removed manually.

Documentation of maternal and fetal parameters, umbilical cord venous blood readings were documented as per standard guidelines. Blood pressure and heart rate was recorded every minute for the first five minutes, and thereafter at 5 minute intervals till completion of the procedure.

The assessment on the new-born was made by a paediatrician. Existence of meconium, sex, weight, first and fifth minute Apgar scores, information about hospitalization in the paediatric clinic and indications for hospitalization about new-born was recorded.

Postoperative treatment was similar for each group, for the first hour patients were monitored in the intensive care unit. Blood pressure, mean arterial blood pressure, heart rate, peripheral oxygen saturation (SpO_2) and first-hour urine output were recorded.

All the patients were given only oral liquid intake, particularly water, from the sixth postoperative hour onwards, and were only allowed to have aqueous food intake within the first 24 hours to facilitate the return of gastrointestinal functions.

Haemoglobin and haematocrit values were determined both before and in the 24th hour following the surgery.

Statistical analyses were performed using the Statistical Package. Descriptive statistics were reported using mean and Standard Deviation

Results

Two groups of general anaesthesia (n=25) and spinal anaesthesia (n=25) were compared.

Table 1: comparison of maternal parameters

Parameters		**Spinal Anesthesia**	**General Anesthesia**
Age in Years			
	Mean	26.24	24.55
	Standard Deviation	4.59	5.04
Weight in Kg			
	Mean	58.5	54.5
	Standard Deviation	10.52	9.54
Mean arterial pressure			
	Mean	82.56	85.54
	Standard Deviation	7.45	4.51
Gravid status			
	I	10	15
	II	12	7
	III	3	3

In our study mean age of the patients receiving spinal anaesthesia was 26.24 with SD 4.59 while age of the patients for general anaesthesia was 24.55 with SD 5.04

Mean weight in spinal anaesthesia group was 58.5 (SD 7.45) and in general anaesthesia group was 54.5 (SD 9.54)

Table 2: Comparison of effect of anaesthesia and surgical time

		Spinal Anesthesia	General Anesthesia
Anaesthesia to delivery time in minutes			
	Mean	18.5	9.5
	Standard Deviation	4.55	4.25 (P < 0.0001)

From induction of anaesthesia to delivery time in spinal anaesthesia group was 18.5 minutes (SD 4.55) and in general anaesthesia group was 9.5 (SD 4.25). Statistically significant difference was found between two groups (P<0.0001)

Table 3: Comparison of Neonatal parameters

	Spinal Anesthesia	General Anesthesia	P value
Apgar score in the first minute	8 (3-10)	9 (7-10)	**< 0.001**
Apgar score in the first minute < 7	2/25 (8%)	0/25 (0%)	< 0.001
Apgar score in the fifth minutes	10 (8-10)	10 (9-10)	>0.001
NICU admission	2 (8%)	3 (12%)	>0.001

Table 4: Umbilical cord blood parameters

	Spinal Anaesthesia	General Anaesthesia
pH (Mean/S D)	7.36/.045	7.34/.040
pCO2 (Mean/S D) mm/hg	44.18/6.21	45.24/7.31
HCO3 (Mean/S D) mmol/L	22.56/2.7	22.45/2.17

No significant alteration in neonatal cord blood parameters were noted.

In summery in general anaesthesia group surgical time was much faster than spinal group. Significant difference was observed in Apgar score in the first and in the first minute < 7, while no significance was noted in Apgar score in the fifth minutes and NICU admissions

Discussion

The choice of anaesthetic for a caesarean depends on many factor such as the urgency of the situation, maternal medical condition, maternal choice or anaesthetistchoice. But the main purpose of the caesarean section is to deliver a baby in a good or better condition.Influence of the choice of anaesthesia on the neonatal outcome should be examined.[10] Still there is no recognized and ideal caesarean technique nor is there a single anaesthetic method, although the global trend is shifting towards spinal anaesthesia.[11]

There are number of factors for increasing trend of the spinal anaesthesia like new-borns do not get exposed to the depressant effect relating to inhalation, low rate of risk of lung aspiration, the mother is awake after the caesarean delivery, presence of partner or relatives in the operation theatre and early establishment of the bond between mother and new-born.[12,13] In recent years general anaesthesia is preferred in emergency obstetric such as cord prolapse, placenta previa.

Spinal anaesthesia is preferred because of its implementation in a shorter span of time, faster onset of action and requiring less medication, and its capacity to form a strong sensory and motor block.[14] Common maternal complications of spinal anaesthesia is intraoperative hypotension and the risk factors for this is increased sympathetic tonus, advanced age, obesity, high-level block.[15]

In the present study, between spinal and general anaesthesia groups we noted that surgical time, from induction to delivery was significantly reduced in the general anaesthesia group. Krishnan et al. concluded that delivery should be completed within 6-8 minutes after GA induction to prevent neonatal respiratory depression due to inhalant gas.[16] Kamat et al. also showed a lowering of Apgar score in prolonged delivery time.[17]

In our study the mean time from Initiation of anaesthesia to delivery was 9.5 mins in the general anaesthesia group as compared to spinal anaesthesia time which was 18.5 minutes. These findings were similar with the study done by Kamat et al.[17]

In our study significant difference was observed in Apgar score in the first and in the first minute < 7, while no significance was noted in Apgar score in the fifth minutes and NICU admissions. This finding was similarwith the studies by authorsKamat et al and Krishnan et al.[17,16]

There is a role of oxygenation to mother as earlier studies shows that when 65% oxygen was given to mothers it improves the fetal hypoxia.[18]

Hypotension is the most common side effect of spinal anaesthesia and if untreated can lead to fetal acidosis because of diminished uteroplacental blood flow.[19] In our study we have not noticed any significant acidosis in blood gas analysis who were delivered by spinal anaesthesia even though maternal hypotension was observed in that group.

These findings were similar with the earlier study of retrospective database analysis by Strouch et al.[20]

Spinal anaesthesia is as effective as general anaesthesia and maternal hypotension can be managed successfully with modest doses of ephedrine and IV fluid infusions. However general anaesthesia can be considered the operation is an emergency, any systemic problems or anatomical abnormality and patient's choice.

Conclusion

In our study we noted that Spinal Anaesthesia leads to a significant drop in BP without significant fetal acidosis. However oxygenation of the neonate is better with General Anaesthesia. There were no alterations in umbilical cord blood parameters but no conclusion is drawn as the study size was limited. Larger study groups, inclusion of Epidural and spinal with epidural anaesthesia cases, emergency cases and longer term follow up of neonates is required to confirm these observations. So to conclude spinal anaesthesia is superior to general anaesthesia in terms of fetal wellbeing. Also with regard to obstetric cases with fetal problem it would be more appropriate to prefer the method of spinal anaesthesia.

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