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Effect of Spinal Anesthesia on Pregnant Women and Newborns

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Abstract: Background: Many intravenous anaesthetics administered into the mother can pass the placental barrier, enter the fetal blood, and potentially sedate or depress the newborns respiratory system. Spinal anaesthesia and epidural anaesthesia are two forms of local anaesthetic used for caesarean deliveries. Reduced general anesthesia-related problems and improved early mother-child bonding are two benefits of local anaesthesia. General anaesthetics used in caesarean section cross the placenta and can cause neonatal depression, fetal respiratory distress, and low Apgar scores in neonates. **Objective:** The purpose of this study was to investigate the effects of effect of spinal anaesthesia on pregnant women and newborns. **Patients and Methods:** This study has focused on the assessment of assessment of health outcomes for pregnancy. mothers where data were collected from health outcomes for pregnancy mothers in different hospitals in Iraq between 9th April 2021 to 17th July 2022, for pregnancy mothers with ages with 32.44± 5.3. This data was examined in comparison to this study's outcomes with Carroll's study. A statistical study was conducted for health outcomes for pregnant mothers using the SPSS program. **Results and Discussion:** Because the average postoperative EBL volume and the difference among pre- and postoperative HCT levels were higher with anesthesia than with spinal anesthesia, our findings demonstrate that general anesthesia tends to produce more bleeding than spinal anesthesia. According to French research, even if caesarean sections are performed to improve mother and fetal health, their morbidity and death rates are still very high. As for the length of stay in the hospital, where our study found that the maximum stay in the hospital is up to 5 days, as the fetal weight is 2.974.4 ± 624.7 under spinal anesthesia, compared to patients with general anesthesia that was applied in Carroll's study, it was less with general anesthesia 2.971 .4 ± 592.5. In addition, in the evaluation of pregnant patients who underwent spinal anesthesia Apgar score (1 min) < 7 (%) had reached 21.43 ± 13.77 and the Apgar score (5 min) < 7 (%) had reached 1.14 ± 3.56. **Conclusion:** In this study, the general anesthesia group had greater EBL and lower postoperative levels than the spinal anesthesia group. It is interesting to note that the general anesthetic group's operation duration was much longer than the spinal anesthesia group's, mostly because more surgical manipulations were used to halt bleeding. This study found that spinal anesthesia is better than general anesthesia in use during an operation.

Keywords: Caesarean operation; Gravity, General anaesthesia; Spinal anaesthesia; and APGAR Score.

INTRODUCTION

The number of surgeries in pregnant women, not related to pregnancy, has increased in recent years, which presents a great challenge to the concerned professionals whose responsibility lies with two patients, the mother, and the fetus [Kinsella, S.M. *et al*., 2010; Scrutton, M. *et al*., 2003]. Interdisciplinary communication and collaboration (anaesthesiology, surgery, nursing, obstetrics, and paediatrics) help plan and improve perioperative care, with a clear improvement in outcomes. Some people do not know their pregnancy status at the time of the procedure [Levy, D.M, 2006; Casey, W.F, 2000]. An incidence of 1.2% was found in teenage pregnancies undergoing surgery, and about 0.7% to 2.3% of pregnant patients who had surgery during pregnancy, [Wenstrome, K.D, 2004] which is about 80,000 procedures/year broken down as follows: 42% in the first trimester and 35% in the second and 23% in the third. The effects that may have on pregnancy development will depend on the gestational age, the type and severity of the intervention/injury, and the degree of change in maternal and fetal physiology [Chauhan, S.P. *et al*., 1997; Mackenzie, I.Z. *et al*., 2002]. Any type of emergency surgery can occur during pregnancy, and this should not be delayed, given the potential risks to the mother and fetus. Elective surgery should be postponed until 6 weeks postpartum, which is the time needed to resolve the physiological changes experienced by the mother [American Society of Anaesthesiology, 2007; Cyan, A.M. *et al*., 2007]. Elective surgery should only be performed when necessary for the well-being of the mother, fetus, or both, and should be performed in the second trimester when premature uterine contractions and the risk of miscarriage are much lower. The most common surgical indications may be directly related to or associated with pregnancy or completely independent. [Algert, C.S. *et al*., 2009; Enkin, M. *et al*., 2001]

General or spinal anaesthetic is employed during caesarean sections. General anaesthesia has benefits such as speeding up procedures in emergency deliveries and making unconsciousness more comfortable for labouring mothers. The possibility of aspiration pneumonia, maternal intraoperative consciousness owing to insufficient

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sedation, failure of intubation, and respiratory issues in the mother and newborn are all drawbacks of general anaesthesia. Many intravenous anaesthetics administered into the mother can pass the placental barrier, enter the fetal blood, and potentially sedate or depress the newborns respiratory system. [Ng, K. *et al*., 2004; Dyer, R.A. *et al*., 2003; Hong, J.Y. *et al*., 2003]

Spinal anaesthesia and epidural anaesthesia are two forms of local anaesthetic used for caesarean deliveries. Reduced general anesthesia-related problems and improved early mother-child bonding are two benefits of local anaesthesia (because the mother is awake during the procedure) [Afolabi, B.B. *et al*., 2012]. Due to its quick start, effectiveness, and lessened need for local anaesthetic, spinal anaesthesia has recently been chosen over epidural anaesthesia for caesarean sections; yet, it is linked to a high incidence of arterial hypotension. Whole spinal anaesthesia or spinal anaesthesia utilizing only a little dose of local anaesthetic are less likely to harm the mother's system. Hence it seems sense to compare the results of general anaesthesia versus spinal anaesthesia during caesarean section in terms of mother and fetal outcomes. [Mancuso, A. *et al*., 2010]

General anaesthetics used in caesarean section cross the placenta and can cause neonatal depression, fetal respiratory distress, and low Apgar scores in neonates. General inhalation anaesthetics have a high incidence of cardiovascular depression, this is attributed to rapid blood-myocardial equilibrium, less contractile mass, less baroreceptor reflex response, greater passage through the blood-brain barrier, less equilibration time between the inspired and expiration and changes in calcium homeostasis in the myocardial fiber that decrease contractile capacity [Sener, E.B. *et al*., 2003]. The passage to the central nervous system of narcotics is facilitated by the lack of development of the blood-brain barrier (4). The entry of these is facilitated by the blood-brain solubility coefficient of the drugs, which is significantly lower in the fetus and new-borns than in children and adults. [Ronsmans, C. *et al*., 2006]

In addition, general anaesthesia for caesarean section, preferred in many centers due to rapid induction, can cause problems such as maternal aspiration of gastric contents, difficulty in intubation, postpartum haemorrhage, postoperative pain, delayed mobilization, and increased risk. of thromboembolism. These risk factors tend to decrease when epidural or spinal anaesthesia methods are used. [Bergholt, T. *et al*., 2003]

Using perioperative hemodynamic data (pre- and postoperative systolic blood pressure, heart rate), haematocrit, blood loss estimates, and Apgar ratings, this retrospective study examined the medical records of women who underwent caesarean sections under general or spinal anaesthesia. new-borns in the two anaesthetic groups at 1 and 5 minutes [Wong, C.A, 2010]. The purpose of this study was to investigate the effects of effect of spinal anaesthesia on pregnant women and newborns.

PATIENTS AND METHODS

This study has focused on the assessment of assessment of health outcomes for pregnancy.

Mothers where data were collected from health outcomes for pregnancy mothers in different hospitals in Iraq between 9th April 2021 to 17th July 2022, for pregnancy mothers with ages with 32.44± 5.3. This data was examined in comparison to this study's outcomes with Carroll's study. This study focused on the use of spinal anesthesia, but Carroll's study used general anesthesia. A statistical study was conducted for health outcomes for pregnant mothers using the SPSS program.

This data focused on the study of the effect of spinal anesthesia on pregnant women and newborns where these collected data presented demographic characteristics of spinal anesthesia for pregnancy women's patients' age, gravity, time of operation, spinal anesthesia (min), smoking in each side yes, and no that can be clarify in **Table 1.** To follow that, this paper was examined with outcomes of pregnant women patients according to UTA, GA, and parity gestational age at delivery (weeks), mean (SD), parity, median (IQR), and UTA bilateral notching absence which can be seen in **Table 2.**

All data were estimated adjuvant drugs of spinal anesthetic used for pregnant women patients where it has moved to these parameters which are Epinephrine, Morphine, and Fentanyl that can be seen in **Table 3.**

In comparison with previous studies, it has been distributed of maternal and fetal variables through the study of all these parameters which contain preoperative SBP, postoperative SBP, preoperative HR (beats/min), and postoperative HR (beats/min)

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and **Table 4.** According to maternal and fetal measures, these measures depended on DHCT, and hospital stays **Figure 1**.

Furthermore, this paper has done all comparison of our study and Carroll's study for maternal and fetal based on Fetal agents where it focused on Fetal weight (g), Apgar score (1 min) < 7 (%), and Apgar score (5 min) < 7 (%) which presented in **Table 5**.

RESULTS

Table 1: Demographic characteristics of spinal anaesthesia for pregnancy women's patients

Parameters	pregnancy women's patients (N=70)
Age	32.44± 5.3
Gravity	4.2±1.77
Time of operation	54.33 ± 11.67
Spinal anaesthesia (min)	74.22 ± 12.55
Smoking	N (%)
Yes	48 (68.57%)
No	2 2(31.43%)

Table 2: Outcomes of pregnant women patients according to UTA, GA, and parity

Parameters	Pregnancy women's patients (N=70)
Gestational age at delivery (weeks), mean (SD)	41.22 (0.22)
Parity, median (IQR)	1.4 (1–2)
UTA bilateral notching absence	67 (95.71%)

Table 3: Adjuvant drugs of spinal anaesthetic used for pregnant women patients

Parameters	Pregnancy women's patients (N=70)
Epinephrine	0.23–0.27
Morphine	0.164–0.244
Fentanyl	0.013–0.026

Table 4: Distribution of maternal and fetal variables

Parameters	Pregnancy women's patients (N=70)
Preoperative SBP	129.88 ± 19.22
Postoperative SBP	115.24 ± 14.4
Preoperative HR (beats/min)	82.74 ± 15.77
Postoperative HR (beats/min)	70.55 ± 13.61

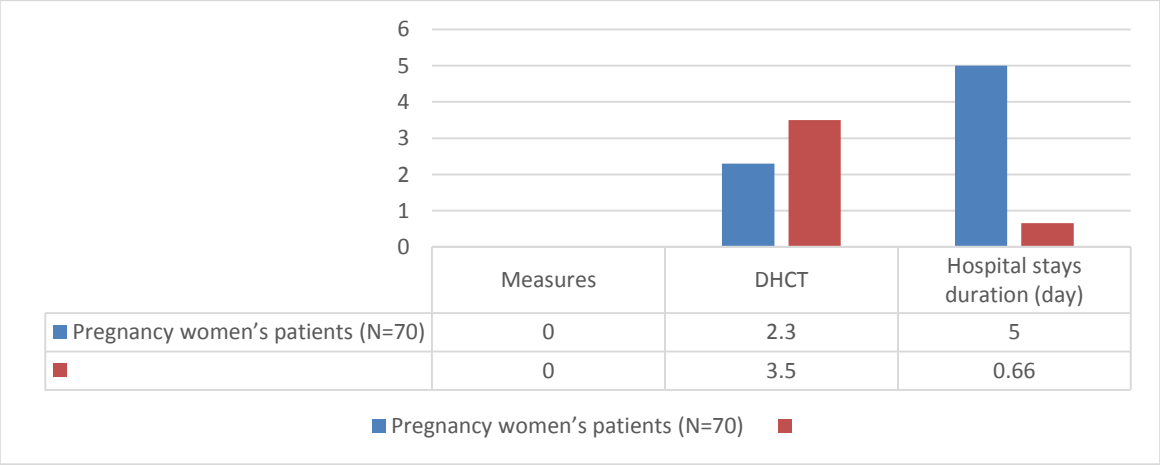

Figure 1: Outcomes of maternal and fetal measures based on dhct and hospital stays.

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Table 5: Comparison of our study and Carroll's study for maternal and fetal based on Fetal agent.

Measures	Pregnancy women by Spinal anaesthesia	Pregnancy women by General anaesthesia for Carroll's study
Fetal weight (g)	2.974.4 ± 624.7	2.971.4 ± 592.5
Apgar score (1 min) < 7 (%)	21.43±13.77	33.2±20.55
Apgar score (5 min) < 7 (%)	1.14±3.56	5.5±4.77

DISCUSSION

Because the average postoperative EBL volume and the difference among pre- and postoperative HCT levels were higher with anesthesia than with spinal anesthesia, our findings demonstrate that general anesthesia tends to produce more bleeding than spinal anesthesia [Saygı, A.İ. *et al*., 2015]. According to French research, even if caesarean sections are performed to improve mother and fetal health, their morbidity and death rates are still very high. [Guay, J, 2006]

Around 33.5% of caesarean sections result in maternal morbidity. The main factor contributing to cesarean-section deaths is bleeding after the operation [Wallis, J.P. *et al*., 2005]. General anesthesia is more likely than local anesthetic to cause maternal hemorrhage during a caesarean section. The effects of uterine re-salting brought on by inhalation anesthesia may account for increased maternal hemorrhage following surgery under general anesthesia as opposed to regional anesthesia. [Kavak, Z.N. *et al*., 2001]

As for the length of stay in the hospital, where our study found that the maximum stay in the hospital is up to 5 days, as the fetal weight is 2.974.4 ± 624.7 under spinal anesthesia, compared to patients with general anesthesia that was applied in Carroll's study, it was less with general anesthesia 2.971 .4 ± 592.5. In addition, in the evaluation of pregnant patients who underwent spinal anesthesia Apgar score (1 min) < 7 (%) had reached 21.43 ± 13.77 and the Apgar score (5 min) < 7 (%) had reached 1.14 ± 3.56. Interestingly, the general anesthesia group took significantly longer to perform than the spinal anesthesia group did, and allegedly more operations were required to control bleeding [Tonni, G. *et al*., 2007]. Dosage range (mg) of Adjuvant drugs where it depended on three options Epinephrine 0.23–0.27, Morphine 0.164–0.244, and found Fentanyl 0.013–0.026.

CONCLUSION

The postoperative mean volume and the difference in between pre- and postoperative HCT levels were higher with general anaesthesia than with spinal anaesthesia, which is consistent with our findings that general anaesthesia tends to induce higher bleeding than spinal anaesthesia. Even though caesarean sections are utilized to improve both mother and fetal health, they are nevertheless associated with high rates of maternal morbidity and death.

The primary factor contributing to caesarean section-related deaths is perioperative haemorrhage. General anaesthesia is more common than regional anaesthetic for maternal haemorrhage associated with caesarean sections. The uterine-relaxing effects of inhalation anaesthetics may be the cause of increased maternal postpartum haemorrhage under general anaesthesia compared to regional anaesthesia.

According to French practice guidelines, a spinal or epidural block is preferred in most caesarean deliveries because the baby is exposed to the least amount of medication and the mother can still actively participate in the delivery of the baby. However, general anaesthesia may be necessary in some cases.

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