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Assessment Of Maternal And Fetal Outcomes In Women Undergoing Emergent Caesarean Section UnderGeneral And Spinal Anesthesia

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ABSTRACT

Background: *Both spinal and general anesthesia for cesarean delivery have advantages and downsides, and no approach is perfect. The most essential variables for choosing anaesthesia are: pregnant systemic issues and wishes, the urgency of the operation, and the surgeon and anesthetist's experience..* ***Aim of the Work:*** *These studies aimed at comparing maternal and fetal outcomes in women undergoing emergent caesarean section and have spinal anaesthesia with those having general anaesthesia.* ***Subjects and Methods:*** *This study was carried out at Makkah Hospital during the period from December 2021 to August 2022 after approval of the hospital health ethical committee. It included186 patients who had C.S and were subdivided into 2 groups according to a randomization scale. On the day ofthe operation, each randomly received a closed opaque envelope for the selection of the procedure (spinal versus general).* ***Results:*** *We noted that the mean haemoglobin and ha[1]ematocrit values at the 24th hour were higher in thespinal anaesthesia group. The estimated blood loss volume was significantly higher in the general anaesthesia group. The median apgar score at the first and the fifth minutes were significantly higher, and the time that elapsed until the first requirement for analgesia was significantly longer in the spinal anaesthesia group.* ***Conclusion and Recommendations:*** *General anaesthesia could be thought the quickest anaesthesia method in an emergency since it avoids the possibility of a failed regional block. Meanwhile, it is associated with higher possibility of blood loss and low Apgar score. Thus, using spinal anaesthesia for elective caesarean section is recommended provided that adequate maternal hydration is established and sparing general anaesthesia for emergency caesarean sections or*

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whenever spinal anaesthesia is contraindicated (e.g. coagulopathy, sever thrombocytopenia, anticoagulation or sever degree of malformation of spine).

Keywords: *Accidental awareness during general anesthesia; combined spinal and epidural; General anesthesia*

INTRODUCTION

Cesarean section is by far one of the most common surgical procedures performed worldwide. Approximately 18.5 million cesarean sections are performed annually worldwide [(1)].

Approximately 40% of countries have CS rates less than 10%, 10% have CS rates between 10 and 15%, and 50% have CS rates greater than 15%. Countries with CS rates <10% account for only 25% (4.5 million) of global CS but 60% (77 million) of all births globally. On the other hand, 73% (13.5 million) of the total number of CS are performed in countries with CS rates >15%, while 37.5% (48.4 million) of the total number of births occur [(1,2)].

When medically indicated, cesarean section can effectively reduce maternal and neonatal mortality and morbidity. However, there is little evidence to support the benefits of cesarean delivery for mothers or infants who do not require it. Caesarean sections, like any other operation, carry both short and long-term risks that might influence the woman's, her child's, and future pregnancies for many years after the delivery. These risks are increased in women with limited access to comprehensive obstetric care [(3)].

This operation necessitates good anesthesia, which can be localized (epidural or spinal) or general in nature. The type of anesthesia used and the care with which it is provided are major determiners of the outcome of cesarean section [(4)].

Both spinal and general anaesthesia used for caesarean section have certain advantages and disadvantages and there is no method which is completely ideal. The most important factors for choice of anaesthesia are; pregnant systemic problems and wishes, the urgency of the operation, and the surgeon and the anesthetists experience[(5)].

General anaesthesia refers to the loss of the ability to perceive pain associated with loss of consciousness produced by intravenous or inhalationalanaesthetic agents. For caesarean section, this involvesthe use of thiopentone for induction, tracheal intubationfacilitated by suxamethonium, positive-pressure ventilation of the lung with a nitrous oxide/ oxygen mixture plus a volatile agent, and a muscle relaxant[(6)].

Spinal anaesthesia refers to the use of local anaesthetic solutions to produce circumscribed area of loss of sensation. The spinal anaesthesia used for caesarean section involves the infiltration of a localanaesthetic agent, usually bupivacaine, into the surroundings of the spinal cord through the lower back of the woman (the drug is injected directlyinto the subarachnoid space)[(6)].

Over the last 30 years, the use of spinal anaesthesia is rapidly increasing [(7)].

Spinal anaesthesia is relatively easy to perform, gives excellent anaesthesia a low potentialof toxicity, allows mother to be awake and interact immediately after the birth of the baby. Compared to general anaesthesia it offers less maternalmorbidity, comparable less blood loss [(8)].

It also enables early recovery of gastrointestinal functions, prolonged interval to first analgesic requirement, less analgesic consumption and early ambulation[(9)].

However, spinal anaesthesia is not free fromside effects and has its own complication like maternalhypotension, hypothermia, post-operative headache, accidental total spinal anaesthesia

and patients at riskof heavy peripartum haemorrhage may not tolerate thehaemodynamic effects of regional anaesthesia [10].

General anaesthesia is a more quickly administered procedure and is often preferred in cases where speed is important [11].

It also used in certain situation like contraindication to regional anaesthesia, failed regional anaesthesia and maternal request [12].

The risks include aspiration of stomach contents, awareness to surgical procedure (due to inadequate anaesthesia), failed intubations, and respiratory problems for both mother and baby [13].

In general, general anaesthesia is preferred for emergency caesarean section since it provides rapid onset of action and more stabilization of the patient's circulation and vital signs, on the other hand regional anaesthesia is preferred for elective operations because of its lower risk of drugs complications to the mother and the fetus[14].

PATIENTS AND METHODS

Type of study:

This study was carried out at Ain Shams University Maternity Hospital during the period from December 2021 to August 2022 after approval of thehospital health ethical committee. It included 186 patients who had C.S and were subdivided into 2 groups according to a randomization scale. On the day of the operation each randomly received a closed opaque envelope for the selection of the procedure (spinal versus general). **The study was approved by the Ethics Board and an informed written consent was taken from each participant in the study.**

Inclusion Criteria: Full term. Singleton pregnancy. Maternalagefrom20-35. Electivecaesareansection.

Exclusion criteria: Multiple pregnancies. Grand multiparity (more than 4 deliveries). Macrosomia (more than or equal 4500 grams). Polyhydramnios (defined as amniotic fluid index more than 25 centimeter). Placental abnormalities such as placental abruption. Preterm rupture of membrane. Preterm delivery (before the 37thweak ofpregnancy). Post term delivery (pregnancy exceeding40th gestational weak). Preeclampsia. Gestationaldiabetes. Unsuitability for regional anesthesia

Elimination criteria: Refusal to participate after counseling. Any intraoperative complication. Presence of intestinal or omental adhesions. Insertion of intra-peritoneal drain. Excessive small bowel manipulation. The study was prospective, randomized, controlled trial.

Randomization: Computer generatedrandomization of the two groups (spinal anesthesia and general anesthesia) was done. Before the operation each participant was received a closed opaque envelope for the selection of the procedure. (Spinal versus general).

Methodology:

Patients were admitted from the emergent clinic at Makkah Hospital and were subjected to the following: Counseling about the two typesof anesthesia and explanation of the procedure. An informed consent to this participation. Full history taking: Full name, age, gravidity and parity. Past medical history of hypertension, DM and other endocrine diseases, also surgical history of abdominal operations. Examination: Vital signs (pulse, temperature, blood pressure and respiratory rate). Measurement of weight (Kg), height (m) to calculate the BMI. Full laboratory investigations especially (CBC, liver and kidney function and RBS). Ultrasound (for assessment of fetal wellbeing). All womenfasted at least 6h prior to the surgery.

Steps:

On arrival to the operation room, standard monitoring was applied with noninvasive blood pressure measurement, electro cardiography and pulse oximetry.

General anesthesia:

Following **Diemunsch and Noll**[15] parturients in this group received standard rapid sequence induction withpre-oxygenation for 3 minutes followed by 4-5 mg/kg succinylcholine, cricoid pressure was applied throughoutinduction once necessary. After correct placement of thetracheal tube was confirmed, anesthesia was maintained with up to 1.5% isoflurane and oxygen, neuromuscular blockade was maintained with 0.4 mg/kg atracurium.

Spinal anesthesia:

Following **Armstrong**[16]**,** parturients in thisgroup were rehydrated with 500ml lactated ringer solution intravenously within 15 min in the sitting position. Low back was prepared and draped in a sterile fashion with betadine solution 10%.

Spinal anesthesia was performed at L2-3 orL3-4 Inter vertebral space using a fine spinal needle (size 22G 3.5 inch). Injection of local anesthetics into the subarachnoid space, Bupivacaine (Marcaine) (1.5-3.5ml) was used.

Operative data: C.S was done by the senior resident according to standard technique demonstrated by **Louis et al.** [17]**.** The skin was opened with the modified pfannenstiel incision. The anterior abdominal wall was opened in layers. The peritoneum was opened by elevatingit with two clamps placed about 2 cm apart. The peritoneum is incised sharply superiorly to the upper pole of the incision and down warded to just above the peritoneal reflection over the bladder. The lower flap ofvisceral peritoneum was elevated, and the bladder is gentlyseparated by blunt dissection from the underlyingmyometrium. The uterus was opened in the lower segment(the lower uterine segment is incised transversely). Thebaby was delivered: a hand is slipped into the uterine cavity. The head is elevated with the fingers and palmthrough the incision then the shoulder and baby was delivered. After the shoulders are delivered, an intravenousinfusion containing (20 units) of oxytocin per liter of crystalloid is infused at 10 ml/min until the uterus contractssatisfactorily. The placenta was then delivered by spontaneous delivery, with some cord traction. The uterineincision was then closed with two layers using blunt needleand continuous absorbable suture (Vicryl No.0) intra abdominally. The visceral and parietal peritoneum were closed using continuous absorbable suture (Vicryl No. 0). The recti muscles were approximated with two figure-of- eight sutures of 0 Vicryl. The rectus sheath and subcutaneous tissue was sutured using continuous absorbable suture (Vicryl 1) and the skin was closed bysubcuticular suture (Prolene 2.0). The evaluation of thenewborn was performed by the pediatrician who was present in the operating room. The apgar scores in the 1st and 5th minutes after the birth were recorded.

After the operation: After the operation all patientswere transferred to post-operative room for 6 hours where they were under close observation for vital data, vaginal bleedingand urine output and then transferred to the word until discharge. Both groups had the same hospital fluid regimen which is 500cc of 5% glucose every 6 hours, 500cc of ringerevery 12 hours and 500cc of saline 9% every 24 hours. Allparticipant received the same intra operative prophylactic antibiotic Amoxicillinetrihydrate +Flucloxacillinemonohydrate 1:1 (Flumox) vial 1gm before skin incision thathad been repeated every 8hrs for the first 24hrs and from thesame formula one capsule 500mg tds for one weak was recommended. For postoperative analgesia, intramuscular doses of 75mg diclofenac sodium (Voltaren, Novartis Pharma, t), a nonsteroidal anti-inflammatory medication,were offered. The first was given once needed after waning ofthe effect of anesthesia and the second 12 hours later. The timeneeded for first analgesic request was recorded. Auscultationfor intestinal sound was started 2 hours after operation and wasperformed at one hour interval till normal bowel sounds were detected. Patients were observed if they experienced nausea ornot(the patient reported that she had sensation of

the need tovomit) at 6 hours intervals after the operation. The presence ofvomitingor not was observed and recorded at 6 hours intervalsafter the operation. The presence of shivering or not wasobserved and recorded. Patients were asked if they experienced headache attacks. CBC was done 24 hours postoperative. No oral or rectal bowel stimulants were givenafter surgery. Urinary catheter was removed 6 hours postoperatively and patients were encouraged to ambulate. Eligible criteria for hospital discharge included, stable vital signs with no febrile morbidity for at least 24 hours, ability to ambulate and urinate without assistance, passage of a bowelmotion, ability to tolerate solid food without emesis and absence ofunresolved other postoperative complications.

Statistical Methods:

Data were analyzed using SPSS 25. Numerical variables were presented asmean and SD and between-group differences were compared using the unpaired t test. Categorical variables were presented as number and percentage and differences were compared using Fisher's exact test. Ordinal data were compared using the chi-squared test for trend. Time to event analysis was done using the Kaplan-Meier method P-values <0.05 were consideredstatistically significant.

RESULTS

The current study was conducted on 186 pregnant women at Ain Shams University Maternity Hospital from December 2017 to August 2018 to compare the maternal and fetal outcomes after general versus spinal anaesthesia in caesarean section.

Demographic data of the patients participatedin the study as shown in the next table (1). There were no significant differences between women of both groups regarding age and body mass index.

Variable	Spinal anesthesia (n=93)		General anesthesia (n=93)		Difference	95%CI	P-value*
	Mean	SD	Mean	SD			
Age (years)	28.5	4.7	27.8	5.3	-0.7	-2.1 to 0.7	0.341
BMI (kg/m^2)	26.8	1.8	26.7	1.6	-0.1	-0.6 to 0.4	0.651

Table (2) illustrates that there is no statistically significant difference between study groups regarding the parity

Parity	nal anesthesia (n=93)		eral anesthesia (n=93)		χ2(df=1)	P-value*
	N	%	n	%		
PG	16	17.2%	26	28.0%	1.842	0.175
P1	22	23.7%	19	20.4%		
P2	25	26.9%	22	23.7%		
P3	30	32.3%	26	28.0%		

Table (3) illustrates that there is no statisticallysignificant difference between study groups as regards to the indication of caesarean section.

cation for CS	Spinal anesthesia (n=93)		General anesthesia (n=93)		P-value*
	N	%	N	%	
Previous CS	44	47.3%	41	44.1%	

Obstructed labor	13	14.0%	9	9.7%	
Failed progress	9	9.7%	21	22.6%	
Breech presentation	14	15.1%	9	9.7%	0.289
Transverse lie	1	1.1%	3	3.2%	
Infertility	7	7.5%	6	6.5%	
Cardiac disease	3	3.2%	2	2.2%	
Previous cervical repair	2	2.2%	1	1.1%	
Epilepsy	0	.0%	1	1.1%	

Table (4) displays that there is statistically significant differences with p- value (< 0.0001) between study groups as regards to the postoperative hemoglobin with high mean among spinal anesthesia group. Table (4) reveals that there is statistically significant difference with p-value (0.002) betweenstudy groups as regards the absolute hemoglobin drop (g/dl) with high mean among general anesthesia group.

Table (4) demonstrates that there is statistically significant difference with p-value (0.001) between study groups as regards to the postoperative haematocrit with high mean among spinal anesthesia group. Table (4) shows that there is no statistically significant difference with p-value (0.133) betweenstudy group as regards to the absolute haematocrit drop values (%). Table (4) illustrates that there is a statistically significant difference with p-value(0.035) between study groups as regards tothe estimated blood loss (ml) with high mean among general anesthesia group.

Variable	**Spinal anesthesia (n=93)**		**General anesthesia (n=93)**		**fference**	**% CI**	**P-value***
	Mean	**SD**	**Mean**	**SD**			
Postoperative hemoglobin (g/dl)	10.4	1.1	9.4	1.5	-0.9	-1.4 to -0.6	<0.0001
Absolute Hemoglobin drop (g/dl)	0.91	0.66	1.29	0.95	0.38	0.1 to 0.6	0.002
Postoperative hematocrit (%)	32.2	3.2	30.1	4.0	-2.0	-3.1 to -1.0	<0.001
Absolute Hematocrit drop (%)	2.9	1.9	3.4	2.8	0.5	-0.2 to 1.2	0.133
EBL (ml)	411.6	100.3	501.2	119.7	89.5	6.3 to 172.8	0.035
TFA request (min)	2.4	1.8	1.7	1.2	0.7	0.3 to 1.1	0.002
Time to recover intestinal sounds (h)	6.0	1.3	7.1	1.5	1.1	0.7 to 1.5	<0.0001

Fig (1): Postoperative hemoglobin in both study groups.Horizontal line (black) represents the mean. Error bars (green) represent the standard error (SE). Markers represent individual observations.

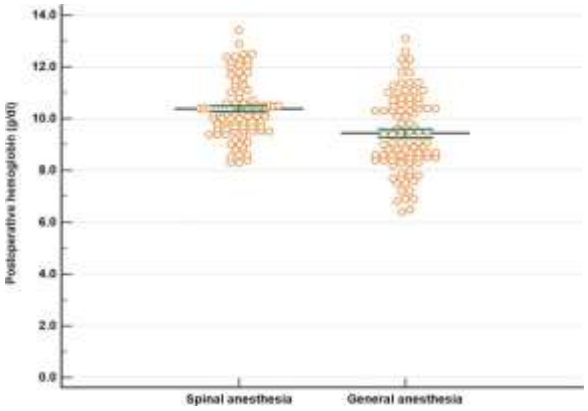

Fig (2): Drop in hemoglobin in both study groups. Horizontal line (black) represents the mean. Error bars (green) represent the standard error (SE). Markers represent individual observations

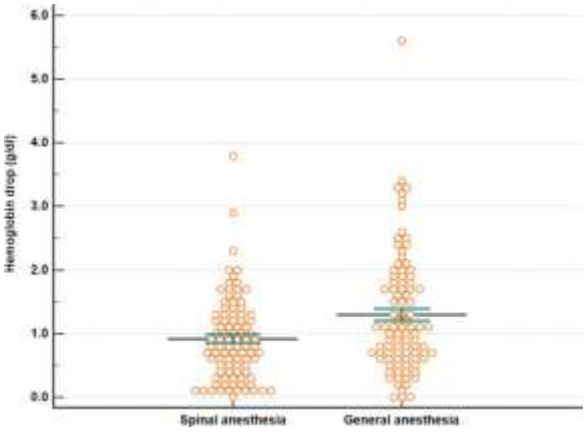

Fig (3): Postoperative hematocrit in both study groups. Horizontal line (black) represents the mean. Error bars (green) represent the standard error (SE). Markers represent individual observations

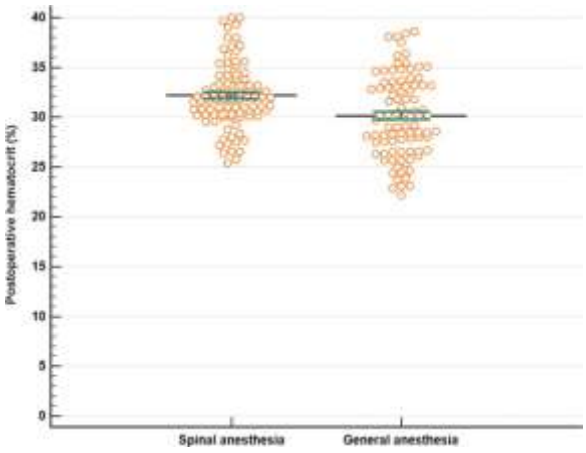

Fig (4): Drop in hematocrit in both study groups. Horizontal line (black) represents the mean. Error bars (green) represent the standard error (SE). Markers represent individual observations.

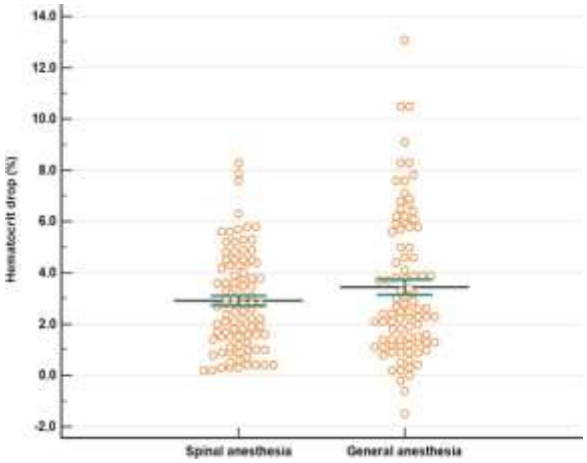

Table (5) expresses that there is statistically significant difference between study group as regards to apgar score at 1 minute (p<0.001) and apgar score at 5 minute(p=0.010)with high mean among spinal anesthesia group.

Variable	Spinal anesthesia (n=93)		General anesthesia (n=93)		Difference	95% CI	P-value*
	Mean	SD	Mean	SD			
Apgar 1	6.8	1.3	6.0	1.6	-0.8	-1.2 to -0.4	<0.001
Apgar 5	8.6	0.6	8.3	1.2	-0.4	-0.6 to -0.1	0.010

Table (6) illustrates that there is statistically significant difference with p-value(0.001) as regards to incidence of low apgar score at 1 minute with high mean among generalanesthesia group.

Table (6) indicates that there is statistically significant difference between both group with p-value (0.024) as regards to the incidence of shivering with high mean among spinal anesthesia

group, whereas there is nostatistical difference regarding the incidence of nausea (p=0.247), vomiting (p=1.000), headache(p=0.098) and pain requiring analgesic (p=0.497).

Adverse outcome	inal anesthesia (n=93)		neral anesthesia (n=93)		χ2(df=1)	P-value*
	N	%	n	%		
Low Apgar 1	31	33%	53	57%	10.507	0.001
Low Apgar 5	1	1.1%	2	2.2%	-	1.000#
Nausea	8	8.6%	13	14.0%	1.342	0.247
Vomiting	2	2.2%	1	1.1%	-	1.000#
Headache	23	24.7%	14	15.1%	2.733	0.098
Shivering	44	47.3%	29	31.2%	5.073	0.024
Pain requiring analgesic	91	97.8%	93	100%	-	0.497#

Table (7): illustrates that spinal anesthesia is associated with significantly lower risk for low (<7) Apgar score at 1 minute (RR=0.58, 95%CI =0.42-0.82, P=0.002), but it is associated with significantly higher risk for shivering (RR=1.52,95% CI=1.05-2.20, P=0.027).

Outcome	RR	95% CI	Z	P-value	NNT / NNH	95% CI
Low Apgar 1	0.58	0.42 to 0.82	3.116	0.002	4.2	2.7 (Benefit) to 10.2 (Benefit)
Low Apgar 5	0.50	0.05 to 5.42	0.570	0.569	93.0	39.3 (Harm) to 21.3 (Benefit)
Nausea	0.62	0.27 to 1.41	1.143	0.253	18.6	27.1 (Harm) to 6.9 (Benefit)
Vomiting	2.00	0.18 to 21.68	0.570	0.569	93.0*	21.3 (Harm) to 39.3 (Benefit)
Headache	1.64	0.90 to 2.99	1.624	0.104	10.3*	4.7 (Harm) to 58.4 (Benefit)
Shivering	1.52	1.05 to 2.20	2.206	0.027	6.2*	7 (Harm) to 3.3 (Harm)
Pain requiring analgesic	0.98	0.95 to 1.01	1.414	0.157	46.5*	19.6 (Benefit) to 125.4 (Harm)

DISCUSSION

Cesarean section is by far one of the most common surgical procedures performed worldwide. Approximately 18.5 million cesarean sections are performed annually worldwide [(1)].

This operation requires effective anaesthesia which can be regional (epidural or spinal) or a general anaesthesia. The type of anaesthesia used and the care with which it is administered is an important determinant of theoutcome of caesarean section [(4)].

Both spinal and general anesthesia for cesarean delivery have advantages and downsides, and no approach is perfect. The most essential reasons for choosing anaesthesia are systemic

difficulties, the urgency of the surgery, the surgeon's and anesthetist's experience and wishes [5].

This prospective randomized controlledstudy compared between general and spinal anaesthesia regarding the maternal and fetaloutcomes after caesarean section. In this study there was no demographic difference between women in both groups regarding the mean age, BMI, parity and indication of caesarean section ($p>0.05$).

Also there was no significant difference between both groups as regard to preoperative blood pressure, heart rate and temperature ($p>0.05$). This study showed non significant difference between both groups as regard to preoperative haemoglobin levels as $p=0.586$;the mean preoperative haemoglobin levels was 11.3±1.2 g/dl in spinal anaesthesia group vs. 11.2±1.3 g/dl in general anaesthesia group.

As regard to the postoperative haemoglobin there was a significant difference between both groups ($p<0.0001$), there was less reduction in haemoglobin level in spinal group than general group (the mean postoperative haemoglobin level was 10.4±1.1g/dl vs. 9.4±1.5g/dl respectively). There was also a significant difference between both groups as regard to the absolute drop in haemoglobin (g/dl) as p 0.002, there was less drop in spinal group compared to the general group (the mean absolute drop in haemoglobin level was 0.91±0.66g/dl vs. 1.29±0.95 g/dl respectively).

In this study, there was no significant difference between both groups as regard preoperative haematocrit values ($p=0.352$), the mean preoperative haematocrit values were 35.1±3.5% in spinal group vs. 34.6±3.8% inthe general group.

As regard to the postoperative haematocrit values, there were significant differences between both groups ($p<0.001$); there was less drop in haematocrit values in spinal anaesthesia group than generalanaesthesia group (the mean haematocrit values was 32±3.2% vs. 30.1±4 respectively). There was no significant difference betweenboth groups as regard to the absolute drop in haematocrit values (%) as $p=0.133$.

The findings of the current investigation are consistent with those of a previous study conducted by Ezzatalsadat et al.(18), which found that the mean haemoglobin loss in the spinal group was considerably lower than in the general group ($p=0.017$). The mean loss of haematocrit in the spinal group was substantially lower than the general group ($p=0.035$).

Another study, conducted by Marzouni et al.(19), found that the amount of drop in hemoglobin and haematocrit levels following caesarean section in parturients experiencing general anaesthesia was significantly larger than that of those undergoing spinal anesthesia. The study found a drop in hemoglobin and haematocrit levels in the general anaesthesia group (0.8±0.03g/dl and 4.4±2.2%, respectively) and in the spinal anaesthesia group 0.67±0.1g/dl and4±0.6% ($p=0.002$ and CI=95%).

Regarding to the amount of estimated blood loss, a statistical significance betweenthe two groups was found ($p=0.035$) in which spinal anaesthesia group had less estimated blood loss than general anaesthesia group. The amount of estimated blood loss in spinal group declared a mean value of 411.6±238.3 ml vs. 501±329.7 ml in general anaesthesia group.

This conclusion agrees with the result of **Jeong et al.**[20] who showed that women underwent caesarean section under spinal anaesthesia had lost blood less than those under general anaesthesia (1.160±710 ml vs. 1.230±650 ml respectively).

This study showed that the parturient who received spinal anaesthesia had asignificant longer time interval to firstanalgesic request. The mean time interval for the first analgesic request was longer in spinal group than general group (2.4±1.8 hours vs1.7± 1.2 respectively). There was a significant difference (p=0.002).

The results of the present study confirm those found in a previous randomized controlled trial conducted by Lada and Adriana(21), who stated that the time till first request for postoperative analgesia was longer with spinal anaesthesia than general anaesthesia, as the mean time till first analgesic request with spinal anaesthesia group (n=35) was 159 minutes while the general anaesthesia group was 119 minutes.

This study showed that there was statisticallysignificant effect of spinal anaesthesia versus general anaesthesia in term of shorter mean time interval tonormal intestinal sound (6±1.3 vs. 7.1±1.5 hours). This is consistent with the findings of the Saygi et al.(22) study, which comprised 100 patients separated into two groups of 50 each, known as the general anaesthesia and spinal anaesthesia groups, based on the route of anesthesia administration. The study found that the starting time for bowel sounds (22.08±7.48vs. 18.75±9.2; p= 0.049) was substantially longer in the general anaesthesia group than in the spinal anaesthesia group.

In this study, there was no significant difference between both groups as regard to the incidence of postoperative nausea(p=0.247). However, it was slightly more frequent in general group than spinal group(14% vs. 8.6% respectively).

As regard to the incidence of postoperativevomiting, this study showed no significant difference between both groups (p=1.000). In this study, there was no significant difference between both groups as regard to the incidence of postoperative headache (p=0.098). However, it was slightly more frequent in the spinal group than general group (24.7% vs 15.1% respectively).

As regard to the incidence of postoperativeshivering, it was more frequent in spinal group than general group (47.3% vs. 31.2% respectively) withsignificant difference (p=0.024). A prospective observational study doneby **Luggya et al.**[23] showed that 22 out of 270 patients undergoing caesarean section under spinal anaesthesia developed postoperative shivering giving prevalence of 8.15% with intraoperative hypotension and hypothermia as main associated factors. This study noted that postoperative shivering can be effectively controlled by 25 mg intravenous pethedine.

In this study there was statistically significantdifference between the study groups as regards themean of Apgar score at 1 minute (6.8±1.3 in the spinalgroup vs. 6±1.2 in the general group(P<0.001) and significant difference between them as regards the mean of Apgar score at 5 minute (8.6±0.6 in spinal group vs. 8.3±1.2 in general group. P=0.01).

This conclusion agrees with that of **Mekonnen and Deska** [24] who stated that the first and fifth Apgar score were better in neonates delivered under spinal anaesthesia as compared to general anaesthesia. The present work also agrees that done by **Hogan et al.** [25] which showed that there significantly increased risks of low apgar scoreif the delivery was performed under general anaesthesia rather than spinal anaesthesia.

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