



## Research Article

# Spinal Versus General Anesthesia in an Elective Cesarean Section Due to Major Placenta Previa

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## Abstract

**Background and Objective:** Placenta previa is a prominent complication of pregnancy. There is increase in rate of placenta previa and accreta secondary to increase rate of cesarean section. This study aimed to compare the effects of spinal versus general anesthesia on the maternal aspects regarding morbidities and mortalities and the neonatal outcomes. **Materials and Methods:** This is randomized controlled study was carried out at Sohag University hospital. Women with major placenta previa (3rd or 4th degree) and delivered by caesarean section were included. The 1st group received spinal anaesthesia while second group received general anaesthesia. Both group were compared as regard operative time, estimated blood loss, amount of blood transfusion, hypotension in addition to neonatal outcomes. **Results:** Eighty patients were included. Forty patients received spinal anesthesia and the same number received general anesthesia. Operative time was statistically significant more prolonged in general anaesthesia than spinal group ( $104.7 \pm 23.5$  vs.  $93.2 \pm 20.4$ , p-value is 0.021), estimated blood loss ( $2086 \pm 549$  vs.  $1835 \pm 477$ , p-value is 0.032) and amount of blood transfusion ( $3.2 \pm 0.65$  vs.  $2.7 \pm 0.57$ , p-value is 0.039) were increased in general anaesthesia, in contrast to hypotension that observed more frequently in spinal group (70%) compared to 42.5. Neonatal outcomes were comparable in both groups apart from Apgar score at 1 min which was better in spinal group. **Conclusion:** Spinal anesthesia is comparable to general anesthesia in elective caesarean section of placenta previa major degree with better maternal and neonatal outcomes. However all measures should be taken to manage expected hypotension.

**Key words:** General anesthesia, spinal anesthesia, caesarean section, placenta previa, complication of pregnancy

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**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

Placenta previa is a prominent complication of pregnancy in which the placenta implanted in the lower part of the uterus partially or completely covers the cervix<sup>1</sup>. Placenta previa especially when associated with placenta accreta are associated with increased maternal hemorrhage and increased maternal mortality or severe morbidity<sup>2,3</sup>. There is increase in rate of placenta previa and accreta secondary to increase rate of caesarean section<sup>4,5</sup>.

In such cases many anesthesiologists prefer to give general anesthesia than spinal anesthesia fearing of the risk of severe hemorrhage and shock<sup>6</sup>. General anesthesia can be deleterious to both uterus and baby due to uterine relaxation caused by inhalational anaesthetics<sup>7</sup>. Also the time consumed to dissect tissues to reach the uterus "induction delivery" interval is very harmful on the baby as there is more time the anaesthetics reach the baby causing both central nervous system and respiratory depression<sup>8</sup>.

In cases of placenta previa/accreta the situation is more difficult as the obstetrician want more time to dissect the bladder deeply downward till the cervico-vaginal junction and it is preferred to perform this step before opening of the uterus and delivery of the fetus which markedly decrease blood loss<sup>9</sup>.

There is few studies addressing this subject in addition to they are either retrospective<sup>10</sup> or including small number of cases which make statistical analysis less conclusive<sup>10,11</sup>.

The current study aimed to compare the effects of regional versus general anesthesia on the maternal aspects regarding morbidities and mortalities and the neonatal outcomes.

## MATERIALS AND METHODS

**Type of study:** This randomized controlled study was carried out in the Department of Obstetrics and Gynecology at Sohag University, in collaboration with the Department of Anaesthesia and Pediatrics from May 2017 to April 2018. The study was approved by the institutional research ethical committee of the Faculty of Medicine, Sohag University (NO. 127, 2017) Egypt. All women with diagnosis of major placenta previa (3rd or 4th degree) and delivered by caesarean section included in this study. Written informed consent was provided by all mothers included in the study.

**Patients selection:** Placenta previa was diagnosed via transvaginal ultrasonography. It is defined as placenta that the

distance from lower margin of placenta to internal os less than 5 cm. Placenta previa is classified as types 1-4 with 1 and 2 as minor and 3 and 4 as major<sup>12</sup>.

In this study, exclusion criteria include women with minor degree placenta previa (1st and 2nd degree), women in active attack of bleeding, abruption placenta, major congenital anomalies of the fetus, severe maternal anemia (HB level < 8 g dL<sup>-1</sup>) or patients refusal.

The patients were randomized (using opaque envelopes) into two groups. The 1st group received spinal anesthesia and second group received general anesthesia. All operation was done by a senior obstetrician with senior anesthetist.

**Anesthetic technique:** After careful airway assessment, two large bore intravenous cannulas to run at least 1000 cc of intravenous fluids, two units of cross matched blood were prepared. Spinal "intrathecal" anesthesia via a 22 or 24 gauge needle with the use of 2-2.5 mL of 0.5% Bupivacaine<sup>®</sup>. In addition 200 µg intrathecal morphine<sup>®</sup> for postoperative analgesia.

General anesthesia were done via the standard anaesthetics like Propofol 1%<sup>®</sup>, Atracurium<sup>®</sup> 25 mg or Succinylcholine<sup>®</sup> 1 mg kg<sup>-1</sup> if airway problems were suspected, maintenance of general anesthesia with Isoflurane<sup>®</sup>, intravenous bolus of 4 mg morphine<sup>®</sup> was added after delivery of the baby in addition to the usual maintenance fluids and blood if needed, at the end of surgery reversal of muscle relaxants was done via Epistigmine<sup>®</sup> 0.05 mg kg<sup>-1</sup>.

Preoperative data were collected regarding age, gestation of pregnancy previous CS, number and gender of living children, in addition to the type of placenta previa, hemoglobin and hematocrit values.

Intraoperative data were also collected as the basic hemodynamic parameters as pulse, blood pressure, urine output, also estimated the blood loss, number of cross matched blood was needed, hysterectomy was done or not, amount of blood given to the patient, if anesthesia was turned to GA due inadequate or failed spinal anaesthesia or due to further maneuvers done as internal iliac ligation and hysterectomy. The blood loss was by visually estimated by abdominal swab count and blood in the suctioning apparatus. Hypotension was defined as systolic blood pressure < 90 mmHg.

**Neonatal assessment:** The assessment of the neonates was made by pediatrician who was present in the operating

room. Information about the newborn (existence of meconium, first and 5th min Apgar scores, resuscitation record and need for intubation of the baby in the delivery room, gender, weight, indication for admission in the neonatal intensive care and duration of admission) were recorded.

**Statistical analysis:** Data analysis was done using SPSS 11.0 Computer based statistical software. The results were statistically analyzed using independent sample student's t-test to compare numerical value and chi-square test or Fisher exact test to compare categorical data. The p-value < 0.05 was considered statistically significant.

## RESULTS

The study included 80 patients. About 40 patients received spinal anesthesia and 40 patients received general anesthesia. From the 40th cases of spinal anesthesia 5 cases turned to general anesthesia, 4 of them due to prolonged operative time and one due to inadequate spinal anesthesia (Fig. 1).

Both groups were comparable as regard Age ( $28.2 \pm 6.1$  in spinal group vs.  $27.6 \pm 6.3$  in general group), gestational age ( $36.7 \pm 1.3$  vs.  $36.9 \pm 1.8$ ). Number of previous deliveries ( $3.2 \pm 1.7$  vs.  $3.4 \pm 1.8$ ), Number of previous caesarean section ( $2.6 \pm 1.2$  vs.  $2.5 \pm 1.3$ ), pre-operative hemoglobin ( $10.9 \pm 1.7$  vs.  $10.7 \pm 1.8$ ) and pre-operative Haematocrite value ( $32.3 \pm 3.2$  vs.  $31.7 \pm 2.9$ ) as shown in Table 1.

Operative time was statistically significant more prolonged in general anaesthesia than spinal group ( $104.7 \pm 23.5$  vs.  $93.2 \pm 20.4$ , p-value is 0.021). The estimated blood loss was increased with significant difference in general anaesthesia when compared to spinal anaesthesia ( $2086 \pm 549$  vs.  $1835 \pm 477$ , p-value is 0.032). Also there was statistically significant difference as regard amount of blood transfusion in favor to spinal anaesthesia ( $2.7 \pm 0.57$  in spinal group versus  $3.2 \pm 0.65$  in general group, p-value 0.039). In contrast to hypotension that observed more frequently in spinal group (70%) compared to 42.5% in general anaesthesia (Table 2).

As regard neonatal outcomes, there was statistically significant difference between two groups in APGAR score at 1 min ( $7.55 \pm 2.37$  in spinal group versus  $6.05 \pm 2.95$  in general anaesthesia, p-value 0.014). However both groups were comparable as regard Apgar score at 5 min, cord pH and neonatal admission (Table 3).

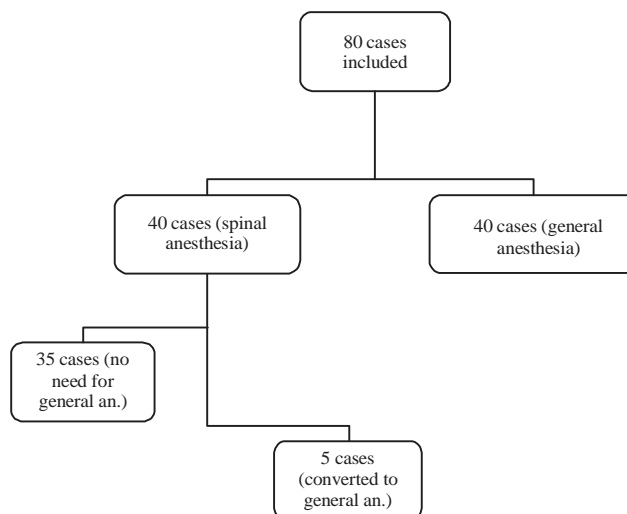


Fig. 1: Algorithm for all cases in the study

Table 1: Characteristics of patients in both groups

Parameters	Spinal anesthesia	General anesthesia	p-value
Age	$28.2 \pm 6.1$	$27.6 \pm 6.3$	0.58*
Gestational age	$36.7 \pm 1.3$	$36.9 \pm 1.8$	0.12*
No. of previous deliveries	$3.2 \pm 1.7$	$3.4 \pm 1.8$	0.42*
No. of previous CS	$2.6 \pm 1.2$	$2.5 \pm 1.3$	0.49*
Pre-operative HB	$10.9 \pm 1.7$	$10.7 \pm 1.8$	0.39*
Pre-operative HCT	$32.3 \pm 3.2$	$31.7 \pm 2.9$	0.43*

\*Using independent sample test and p-value < 0.05, considered significant

Table 2: Maternal and operative outcomes in both groups

Parameters	Spinal anesthesia	General anesthesia	p-value
Operative time (min)	$93.2 \pm 20.4$	$104.7 \pm 23.5$	0.021*
Estimated blood loss (mL)	$1835.0 \pm 477$	$2086.0 \pm 549$	0.032*
Amount of blood transfusion (unit)	$2.7 \pm 0.57$	$3.2 \pm 0.65$	0.039*
Hypotension	28.0 (70%)	17.0 (42.5%)	0.013 <sup>#</sup>

\*Using independent sample test, <sup>#</sup>Using chi-square test and p-value < 0.05, considered significant

Table 3: Neonatal outcomes in both groups

Parameters	Spinal anesthesia	General anesthesia	p-value
Apgar score after 1 min	$7.55 \pm 2.37$	$6.05 \pm 2.95$	0.014*
Apgar score at 5 min	$9.00 \pm 1.35$	$8.6 \pm 1.87$	0.28*
Cord pH	$7.33 \pm 0.25$	$7.31 \pm 0.22$	0.51*
Neonatal admission	3.00 (7.5%)	5.00 (12.5%)	0.46**

\*Using independent sample test, \*\*using fisher exact test and p-value < 0.05, considered significant

## DISCUSSION

There is increase in the rate of both placenta previa and accreta. This is could be explained to dramatic increase in caesarean section rate both in developed and developing countries<sup>5,13,14</sup>.

The choice which type of anesthesia and anesthetic management is of extreme importance. Different factors affect decision, the horrible bleeding and fear of hypotension in addition to unpredictable operative time may favor general anesthesia. However, there were an effect of prolonged general anesthesia on fetus, putting in mind most of cases are repeat caesarean section and need of good of dissection of urinary bladder before extraction of fetus<sup>8,9</sup>. In addition to the uterine relaxant effect of general anesthesia may increase blood loss<sup>7</sup>.

The study included 80 patients, 40 patients received spinal anesthesia and 40 patients received general anesthesia. In this study, comparison of spinal and general anesthesia were done. Both groups were comparable as regard age, gestational age, parity, number of previous caesarean section, pre-operative hemoglobin level and pre-operative Haematocrit value. The operative time was significantly shorter in spinal group than general anesthesia group. This could be explained by dissection of bladder flap before opening of uterus in nearly all cases of spinal anesthesia group where the dissection was easy without active bleeding and bloody field while in general anesthesia group there was urgency to deliver the fetus thus delaying this step after delivery of the fetus in most of cases<sup>8,9</sup>.

The estimated blood loss was significantly less in the spinal anesthesia group than general anesthesia and the need of blood transfusion also was less in spinal group with statistically significant difference. It was explained by the same elucidation of ability to dissect bladder flap in cases of spinal anesthesia before delivery of the fetus which decrease the blood loss. In addition to the myometrial relaxant effect of most general anesthetic drugs which increase blood loss<sup>7</sup>. This agreed with Adigun *et al.*<sup>10</sup> in their retrospective study. Also this agreed with Hong JY *et al.*<sup>11</sup>.

In contrast to hypotension which was significantly more frequent in spinal anesthesia group than general anesthesia group. This was expected and explained by sympathetic block by regional anesthesia in addition to intraoperative hemorrhage. Fortunately, there were no recorded cases of cardiac arrest due to hypovolemia in both groups. This agreed with Saygi Al *et al.*<sup>15</sup>. As regard neonatal outcome, there was no significant difference between both groups in Apgar score at 5 min, cord pH and neonatal admission. However there was statistically significant difference in Apgar score at 1 min with better score in spinal anesthesia than general anesthesia. This may be explained by effect of neonatal central nervous system and respiratory depressive effect of general anaesthetic drugs<sup>8</sup>. This agreed

with Abdallah M *et al.*<sup>16</sup> as regard Apgar score at 1 min. However, they also found significant difference at 5 min.

As regard the need for admission to NICU there were an increase number of admission in general anesthesia group (5 cases) compared to only (3 cases) in regional anesthesia group. However, this not statically significant differences. This agrees well with Saygi *et al.*<sup>15</sup>, which compared of maternal and fetal outcomes among patients undergoing cesarean section under general or spinal anesthesia and they found that the NICU admission rates were similar in the two groups (10 and 12%, respectively;  $p = 0.749$ ). Furthermore in a study by Hong *et al.*<sup>11</sup>, in small number of patients also confirm current result, they found no neonatal outcome differences between spinal anesthesia (13 patients) or general anesthesia (12 patients) in mothers with placenta previa totalis.

No doubt that caesarean section for major placenta previa/accreta is serious operation which needs good cooperation between obstetrician and anesthetist about type of anesthesia in addition to good counseling of parturient women. The results favor spinal anesthesia in elective caesarean section with no active antepartum hemorrhage. Intraoperative hypotensive episodes could be prevented and managed by good pre-operative intravenous fluid and intraoperative ephedrine<sup>17</sup> with careful monitoring by senior anesthetist. The current study recommended that spinal anesthesia could be good option in cases of elective cesarean section of placenta previa major degree. However there was limitation in the study as it did not address ideal anesthetic management of cases in active bleeding nor urgent cases.

## CONCLUSION

The spinal anesthesia could be used in cases of elective cesarean section of placenta previa major degree with better maternal and neonatal outcomes when compared with general anesthesia with taking all measure to manage expected hypotension.

## SIGNIFICANCE STATEMENT

This study discovered the spinal anesthesia could be used in cases of elective caesarean section of placenta previa major degree that can be beneficial for anesthetist in adding option otherwise general anesthesia. Spinal anesthesia has better maternal and neonatal outcomes with taking all measures to manage expected hypotension. this study will help the researchers and clinician to find best anesthetic choice for cases with placenta previa major degree.

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