

In The Name Of God

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**Comparison of hemoglobin decline after cesarean in spinal
and general anesthesia during 2007 in Amiralmomenin Hospital**

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Comparison of hemoglobin decline after cesarean in spinal and general anesthesia during 2007 in Amiralmomenin Hospital

OBJECTIVE: To compare hemoglobin decline after cesarean in spinal and general anesthesia.

METHODS: The comparisons were made in up to 164 women who underwent cesarean section during 2007 in Amiralmomenin Hospital. Hemoglobin and hematocrit were recorded before and after surgery.

RESULTS: The mean amount of hemoglobin reduction (\pm standard deviation) were 0.93 ± 0.89 and 1.06 ± 0.79 g/dL in general and spinal anesthesia, respectively ($P=0.322$). The mean amount of hematocrit reduction (\pm standard deviation) were 2.61 ± 2.87 and 2.5 ± 2.66 percent in general and spinal anesthesia, respectively ($P=0.859$).

CONCLUSION: These methods for anesthesia are compatible regarding their effect on hemoglobin reduction after cesarean section.

Keywords: Cesarean, General, Hemoglobin, Spinal

Introduction

Postpartum hemorrhage (PPH) is the leading cause of maternal mortality. All women who carry a pregnancy beyond 20 weeks' gestation are at risk for PPH and its sequelae. Although maternal mortality rates have declined greatly in the developed world, PPH remains a leading cause of maternal mortality elsewhere.

The direct pregnancy-related maternal mortality rate in the United States is approximately 7-10 women per 100,000 live births. National statistics suggest that approximately 8% of these deaths are caused by PPH (Berg, 1996). In industrialized countries, PPH usually ranks in the top 3 causes of maternal mortality, along with embolism and hypertension. In the developing world, several countries have maternal mortality rates in excess of 1000 women per 100,000 live births, and World Health Organization statistics suggest that 25% of maternal deaths are due to PPH, accounting for more than 100,000 maternal deaths per year (Abouzahr, 1998).

Some reports are available that showed some differences between anesthesia method and PPH. But there are few reports from Iran about this matter. Accordingly, current study was conducted to compare hemoglobin decline after cesarean in spinal and general anesthesia during 2007 in Amirmomenin Hospital.

Review of Literatures

The term cesarean delivery is defined as the delivery of a fetus through a surgical incision through the abdominal wall (laparotomy) and uterine wall (hysterotomy). In the United States, cesarean delivery has become the most common surgical procedure. By the early 1990s, almost 25% of all live births were from cesarean deliveries. In the last decade, acceptance has been growing for allowing women to have a vaginal delivery after having had a prior cesarean delivery.

History of the Procedure: The exact origin of the term cesarean is unclear. The term cesarean may have arisen in the Middle Ages from the Latin verb *caedere* (to cut). Children of such births were referred to as *caesones*. The term also may originate with an eighth century BC Roman law, *lex regis*. Later called *lex cesarea*, this law mandated a postmortem operative delivery so that both the mother and child could be buried separately.

Although many references to abdominal delivery are made in many cultures, many of the ancient medical writers (eg, Galen, Hippocrates, Soranus) do not describe such a procedure.

In 1581, François Rousset wrote about cesarean deliveries. He describes 14 such procedures from information he received from letters, but he never actually witnessed such a procedure. By the mid 17th century, more reports by obstetricians about this operation began to appear. Early

descriptions of such procedures reveal that abdominal delivery was performed in rare circumstances.

The ability of obstetricians to perform the procedure was limited by anesthesia and infection control. In 1846, the anesthetic agent diethyl ether was introduced at Massachusetts General Hospital. Queen Victoria delivered Leopold (1853) and Beatrice (1857) by cesarean delivery with the administration of chloroform. However, despite the increased potential for abdominal procedures provided by anesthesia, mortality from the procedure from infectious morbidity remained high following cesarean delivery.

Surgical technique also was a limiting factor for the acceptability of the procedure. Initially, maternal mortality from blood loss also was high because surgeons were reluctant to close the uterine incision. Some advocated hysterectomy at the time of cesarean delivery to control bleeding and decrease infection. In 1882, Max Sanger, from Leipzig, described the value of suturing the uterine wall with silver wire (developed by 19th century gynecologist J. Marion Sims) and silk in a 2-step closure. His report documented the survival of 8 of 17 mothers delivered by American surgeons.

Although the introduction of internal sutures decreased hemorrhagic morbidity, infectious morbidity from peritonitis remained substantial. In 1907, the extraperitoneal approach was first described by Frank and

modified in 1909 by Latzko. This approach appeared to decrease the risk of peritonitis, and, in 1912, Krönig described that this approach also allowed access to the thinner lower uterine segment. Krönig described a vertical median uterine incision with delivery aided by forceps. Then, the lower segment was covered with peritoneum.

This technique was modified further and introduced in the United States by Beck (1919) and DeLee (1922). Finally, in 1926, Kerr described a low transverse incision in the lower uterine segment, the most commonly used uterine incision throughout the world today. With the discovery of penicillin by Alexander Fleming in 1928 (purified in 1940), the need for an extraperitoneal procedure essentially was eliminated.

Problem: A cesarean delivery is performed for a vast array of indications. As such, no single reason exists for an obstetrician to recommend and perform a cesarean delivery.

Frequency: From 1910-1928, the cesarean delivery rate at Chicago Lying-in Hospital increased from 0.6% to 3%. In 1965, the cesarean delivery rate in the United States was 4.5%. In 1980, the cesarean delivery rate was 16.5%, and it peaked at 24.7% in 1988. Since then, the rate has decreased slightly and was 22.7% (949,000 procedures in 4.18 million births) in 1990.

The cesarean delivery rate also has increased throughout the world, but it still is substantially lower than that in America. In 1985, the cesarean

delivery rate in America was 22.7%; this compares to 19% in Canada, 13% in Denmark, 10% in England, and 7% in Japan.

Why the rate of cesarean delivery has increased so dramatically in the United States is not entirely clear. The following is a list of some of the reasons that may account for the increase.

- Repeat cesarean delivery: In 1988, when the cesarean delivery rate peaked at 24.7%, 36.3% (351,000) of all cesarean deliveries were repeat procedures. Reports concerning the safety of allowing vaginal birth after a cesarean delivery have been presented since the 1960s. Despite this, by 1987, less than 10% of women with a prior cesarean delivery were attempting a vaginal delivery.
- Delay in childbirth and reduced parity: In the last 2 decades, an increase in the percentage of births to women older than 30, 35, and even 40 years has occurred. The risk of having a cesarean delivery is higher in nulliparous patients, and, with increasing maternal age, the risk for cesarean delivery is increased secondary to medical complications such as diabetes (including gestational) and preeclampsia.
- Decrease in the rate of vaginal breech delivery: By 1985, almost 85% of all breech presentations (3% of term fetuses) were delivered by cesarean. At this time, the debate regarding the safety

of a vaginal breech delivery is being investigated in a randomized controlled trial.

- **Decreased perinatal mortality with cesarean delivery:** This is an extremely complex issue to fully discuss in this setting. Perinatal outcome is greatly influenced by gestational age at delivery, by the presence of congenital abnormalities and growth abnormalities, and by the indication for delivery itself. Improvement in perinatal outcome has been greatly enhanced by improved technology available to neonatologists and by improvements in prenatal care (eg, identification of patients at high risk, ultrasound, and increased usage of antenatal steroids in those at risk for preterm delivery). Unfortunately, despite the dramatic rise in the rate of cesarean delivery, the overall rate of cerebral palsy has not decreased dramatically.
- **Nonreassuring fetal heart rate testing:** More than 15% of all cesarean deliveries are for this indication. Again, although it is believed that a cesarean delivery for a fetus with an abnormal fetal heart rate pattern could be protected from future adverse problems, the overall rate of cerebral palsy has not decreased dramatically. At this time, the use of fetal pulse oximetry is gaining acceptance and may become more widely available. Fetal pulse oximetry is a useful aid in assessing fetal oxygen status and has been shown to

decrease the need for cesarean delivery in the setting of a nonreassuring fetal heart rate pattern.

- **Fear of malpractice litigation:** Unfortunately, many obstetricians admit that their practice of medicine has become more defensive. Given the fear of inquiry regarding how a particular patient's labor was managed, many obstetricians may have a lower threshold to perform a cesarean delivery.

Clinical: A cesarean delivery is performed for many reasons. Therefore, trying to present a single clinical situation is extremely difficult and limiting.

INDICATIONS

A cesarean delivery is recommended to prevent maternal and/or fetal morbidity when a contraindication to allowing labor is present or when a completion of a vaginal delivery is anticipated to be unsafe or lengthy. Some indications are for maternal benefit alone, some are for fetal benefit alone, and some are for both maternal and fetal benefit.

Maternal indications

Relatively few indications for a cesarean delivery solely benefit the mother.

- **Women with an abdominal cerclage in place:** Those mothers with an incompetent cervix in whom vaginal cervical cerclages have

failed but who wish to have more children should have a cesarean delivery.

- Obstructive lesions in the lower genital tract: Cesarean delivery would be performed in the setting of obstructive lesions in the lower genital tract, including malignancies and large vulvovaginal condyloma.
- Women with prior vaginal colporrhaphy and major anal involvement from inflammatory bowel disease: These patients would be candidates for an outright cesarean delivery.

Fetal indications

Fetal indications for cesarean delivery include those in which neonatal morbidity and mortality could be decreased by the prevention of trauma, infection, and prolonged acidemia.

- Malpresentation: A fetus in a nonvertex presentation is at increased risk for trauma, cord prolapse, and head entrapment. Malpresentation includes preterm breech presentations and nonfrank breech term fetuses. A randomized controlled trial assessing the safety of term breech deliveries has been completed and is awaiting publication. Furthermore, in twin gestations, a second twin in a nonvertex presentation is a relative indication for an outright cesarean delivery, as are higher order multiples (triplets or greater).

- Congenital anomalies: A cesarean delivery is recommended for several congenital anomalies; these include fetal neural tube defects, some cases of hydrocephalus, and some skeletal dysplasias. Whether or not an outright cesarean delivery should be performed in the setting of a fetal abdominal wall defect (ie, gastroschisis and omphalocele) remains controversial.
- Nonreassuring fetal heart rate: In the setting of a nonremediable and nonreassuring pattern remote from delivery, a cesarean delivery is recommended to prevent a mixed metabolic or metabolic acidemia that could potentially cause significant morbidity and mortality.
- Genital herpes infections: Mothers with an active vaginal herpes infection (especially with primary outbreak) are candidates for cesarean delivery. Neonatal infection with herpes can lead to significant morbidity and mortality, especially with a primary outbreak. With recurrent outbreaks, the risk to the neonate is reduced by the presence of maternal antibodies. Unfortunately, not all women with active viral shedding can be detected upon admission to labor and delivery.
- Human immunodeficiency virus infections: Treatment of women with the human immunodeficiency virus has undergone tremendous change in the past few years. Women with a low CD4

count and high viral titers should be offered cesarean delivery at 38 weeks (or earlier if they go into labor). In women who are being treated with antiretrovirals, cesarean delivery (prior to labor or without prolonged rupture of membranes) appears to further lower the risk for neonatal transmission.

Maternal and fetal indications

Indications for cesarean delivery that benefit both the mother and the fetus include abnormal placentation, abnormal labor due to cephalopelvic disproportion, and those situations in which labor is contraindicated.

- **Abnormal placentation:** In the presence of a placenta previa (ie, the placenta covering the internal cervical os), attempting vaginal delivery places both the mother and the fetus at risk for hemorrhagic complications.
- **Abnormal labor due to cephalopelvic disproportion:** Cephalopelvic disproportion can be suspected on the basis of possible macrosomia or an arrest of labor despite augmentation. Continuing to attempt a vaginal delivery in this setting increases the risk of hemorrhagic and metabolic consequences from a uterine rupture, increases the chance of infectious complications to both mother and fetus from prolonged rupture of membranes, and increases the risk of maternal trauma and fetal trauma (eg, Erb or Klumpke palsy and metabolic acidosis) from a shoulder dystocia.

- **Contraindications to labor:** In women who have a uterine scar (prior myomectomy in which the uterine cavity was entered or cesarean delivery in which the upper contractile portion of the uterus was incised), a cesarean delivery should be performed to prevent the risk of uterine rupture.

CONTRAINDICATIONS

Contraindications: Few contraindications exist to performing a cesarean delivery. If the fetus is alive and of viable gestational age, then cesarean delivery can be performed in the appropriate setting. In some instances, a cesarean delivery should be avoided. Rarely, maternal status may be compromised (eg, with severe pulmonary disease) such that an operation may jeopardize maternal survival. In such difficult situations, a care plan outlining when and if to intervene should be made with the family in the setting of a multidisciplinary meeting. Furthermore, a cesarean delivery may not be recommended if the fetus has a known karyotypic abnormality (trisomy 13 or 18) or known congenital anomaly that may lead to death (anencephaly).

WORKUP

Lab Studies:

- When patients are admitted for labor and delivery, most have blood for a CBC count and type and screen drawn when an intravenous line is started (a basic requirement for patients when they are

admitted to the labor floor). If a patient has a hemoglobin level within the reference range, has had an uncomplicated pregnancy, and is anticipated to have a vaginal delivery, the use of having blood submitted to the lab for a routine CBC count and type and screen currently is being scrutinized from a cost-benefit standpoint. In many centers, blood is drawn and simply held in case the patient's course changes. Namely, if the decision is made to perform a cesarean delivery for an abnormal labor course, nonreassuring fetal testing, or abnormal bleeding, then the blood work is submitted.

- The following are several situations in which a CBC count and type and screen always will be submitted upon admission to labor and delivery:
 - If a patient is admitted for a planned cesarean delivery
 - A grand multipara
 - History of postpartum hemorrhage
 - History of a bleeding disorder
- On occasion, a coagulation profile is ordered. In patients with thrombocytopenia, a history of a bleeding disorder, or preeclampsia, coagulation studies (prothrombin time and activated partial thromboplastin time) may be ordered to assist the attending

anesthesiologist in determining the safety of attempting regional anesthesia with an epidural or spinal procedure.

- On occasion, a patient has a specimen crossmatched, with blood available. The most common situation is a patient who has had several prior laparotomies (including several prior cesarean deliveries) or one who develops a coagulopathy from either severe preeclampsia or significant hemorrhage.

TREATMENT

Medical therapy: As stated, many indications exist for performing a cesarean delivery. In those women who are having a scheduled procedure (ie, an elective or indicated repeat, for malpresentation, placental abnormalities), the decision has already been made that the alternate of "medical therapy," ie, a vaginal delivery, is least optimal. For other patients admitted to labor and delivery, the anticipation is for a vaginal delivery. Every patient admitted in this circumstance is admitted with the thought of a successful vaginal delivery. However, if the patient's situation should change, a cesarean delivery is performed because it is believed that outcome for the fetus and/or mother may be better.

If a patient is diagnosed with a fetal malpresentation (ie, breech or transverse lie) after 36 weeks, the option for an external cephalic version is offered to try to convert the fetus to a vertex lie, thus allowing an attempt at a vaginal delivery. An external cephalic version usually is

attempted at 36-38 weeks. The patient usually is observed in close proximity to the labor and delivery unit or in the labor and delivery unit itself. The patient has been asked to not eat for 8 hours prior to the procedure. An ultrasound is performed to confirm fetal presentation. If the fetus is still in a nonvertex presentation, an intravenous line is started and the baby is monitored with an external fetal heart rate monitor.

If fetal heart rate testing is reassuring, the version is attempted. An external cephalic version involves trying to externally manipulate the fetus into a vertex presentation. Usually, this is accomplished with ultrasound guidance to ascertain fetal lie. An attempt is made to manipulate the fetus through either a "forward roll" or "backward roll." The overall chance of success is approximately 40%. Some practitioners administer an epidural to the patient prior to the attempted version, and others may give the patient a dose of subcutaneous terbutaline (a beta-mimetic used for tocolysis) just prior to the attempt.

Factors that influence the success of an attempted version include multiparity, a posterior placenta, and normal amniotic fluid with a normally grown fetus. Also, to be a candidate, a patient must be eligible for an attempted vaginal delivery. Relative contraindications include poor fetal growth or the presence of congenital anomalies. Risks of an external cephalic version include rupture of membranes, labor, fetal injury, and the

need for an emergent cesarean delivery due to possible disruption of the placenta.

If the version is successful, the patient is placed on a fetal monitor. If fetal heart rate testing is reassuring, either the patient is discharged to await spontaneous labor or she is induced if the fetus is of an appropriate gestational age and/or the patient has a favorable cervix.

Surgical therapy:

Preoperative details: If patients are admitted for an elective cesarean delivery, they are asked to not eat for at least 8 hours prior to arriving.

Upon admission, an intravenous line is started and blood for a CBC count and type and screen is drawn. If a difficult procedure is anticipated, crossmatch blood to be available for the start of the procedure. Intravenous fluid consists of either lactated Ringer solution or saline with 5% dextrose. The patient is placed on an external fetal monitor, and the patient is evaluated by the operating physician and an anesthesiologist.

The anesthesiologist reviews regional anesthetic procedures and offers a spinal or an epidural agent if potential exists for a prolonged case, such as in a patient with multiple prior laparotomies. The patient is evaluated for general anesthesia in case an emergency should arise where establishment of an airway becomes necessary.

A blood pressure cuff is placed, and monitors also are placed that allow the patient's blood pressure, pulse, and oxygen saturation to be monitored