The Risk of Post-Partum Hemorrhage after Cesarean Section with General versus Spinal/Epidural Anesthesia

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Abstract

Blood loss of over 40 percent of total blood volume (approx. 2800 ml) is typically considered a 'life danger.' It seems rational to introduce PPH protocols at an average blood loss far below this level, as the aim of management is to prevent hemorrhage from rising to the point that it is life-threatening

Objectives

Caesarean anesthetic treatment, which involves general anesthesia and spinal / epidural anesthesia, was seldom examined for the risks associated with postpartum hemorrhage and was focused on only a small number of cases from single hospital data sets. The function of different types of anesthesia in postpartum hemorrhage therefore needs to be further explained.

Patients and methods

This is a retrospective study on patients complicated by postpartum hemorrhage after cesarean section with history of type of anesthesia used; general or spinal or epidural to improve outcome of cesarean section. We included all women complicated by postpartum hemorrhage after cesarean section and collect data about the anesthesia used during cesarean section and also recorded other risk factors for postpartum hemorrhage if recorded in files in antenatal care sheet and the intraoperative circumstances as recorded in the operative sheet of the patient. Heart rates and blood pressures of patients of both groups were measured before delivery and at 1 min interval for 15 min after injection of oxytocin. Uterine contractility was assessed for both groups at 1,2,4,6,8,10 and 15 min after oxytocin injection.

Results

Our results showed that the age of the studied group ranged from 18 to 40 years with mean 23.97 years. Regarding parity 44.5% of them had one child and 36.7% of them had two, 42.3% of the studied group had general anesthesia and 57.7% of them had spinal. Also 82.2% of the cases were previous and 17.8% of them were emergent.

Conclusion

Anesthetic techniques might be affected by the possibility of bleeding or concern. We found that women who have undergone general anesthesia have a higher risk of postpartum hemorrhage compared with women who have received epidural, spinal anesthesia.

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Introduction

PPH rates are likely to vary widely, depending on the patterns of practice and the characteristics of both provider and patient. For instance, PPH rates are likely to impact cesarean rates, which vary widely across regions. PPH has historically been described as blood loss in excess of 500 ml following a vaginal birth and in excess of 1000 ml following a cesarean delivery [1,2].

Blood loss of over 40 percent of total blood volume (approx. 2800 ml) is typically considered a 'life danger'. It seems rational to introduce PPH protocols at an average blood loss far below this level, as the aim of management is to prevent hemorrhage from rising to the point that it is life-threatening [3,4].

When anesthesia is needed for examination and/or surgery, and the hemodynamic stability is compromised, general anesthesia is typically indicated. Wherever practicable, hemodynamic compromise and coagulopathy should be treated before surgery, while surgical supervision may sometimes be needed to allow for successful resuscitation. Regional anesthesia may be contraindicated by maternal reasons [5].

Aim of the work

Evaluate PPH in general anesthesia and to compare the risk of post-partum hemorrhage (PPH) for patients who will undergo cesarean delivery (Cs) with general versus spinal/epidural anesthesia.

Patients and Methods

This is retrospective study of all patients who have undergone elective caesarean section in Emergency Unit of Obstetrics and Gynecology Department, Study duration from January 2018 to August 2019 at the Obstetrics and Gynecology Department, Tanta University. Egypt We collected data from files of operative sheet of the patients to detect number of patients who developed postpartum hemorrhage. We took 3937 cases who underwent CS; about 76 of them developed postpartum hemorrhage and were divided into two groups: 59 cases received general anesthesia and 17 cases received spinal anesthesia.

All postpartum hemorrhagic patients were analyzed as regard: Age, parity, type of anesthesia, time of operation,

occurrence of primary postpartum hemorrhage, amount of blood loss, blood transfusion.

Exclusion criteria

- Contraindications to spinal anesthesia
- Preterm labor
- Cases with uterine fibroid
- Hypertension or cardiac diseases

Methods

- Heart rates and blood pressures of patients of both groups were measured before delivery and at 1 min interval for 15 min after oxytocin injection.
- assessed uterine contraction for both groups at 1,2,4,6,8,10 and 15 min after oxytocin injection.
- Hemoglobin concentration before surgery and on first post-operative day was recorded for all patients.
- The total volume of crystalloid solutions infused during operation and duration of operation were determined.

Statistical analysis

For Windows version 8, the data were reviewed and analyzed using Epi-Info version and SPP [6].

Results

1. Table 1: shows that no statistical significance difference between both group in age and parity.
2. Table 2: shows that there was statistical significance difference between general group and spinal group in number of cases who developed postpartum hemorrhage, as there is significant high value in patients who underwent general anesthesia.
3. Table 3: shows no statistical significance difference between two group as regard the indications of cesarean section.
4. Table 4: shows that no statistical significance difference between studied group in number of cases with prolonged labor, over distended uterus. But there were statistical significance differences between them in number of cases with placenta accreta, placenta previa without hemorrhage and placental abruption.
5. Table 5: shows no statistical significance difference between both group in fetal weight.

Variable	General (n=1664)		Spinal (n=2273)		t	P
Age (weeks):						
Mean ± SD	24.05 ± 3.30		23.91 ± 3.40		1.27	0.20 N.S
Range	18 – 40		18 – 39			
Variable	No	%	No	%	χ ²	P
Parity:						
G0	196	11.8	271	11.9		0.77 N.S
G1	727	43.7	1024	45.1		
G2	630	37.9	816	35.9		
G3	99	5.9	146	6.4	2.55	
G4	12	0.7	15	0.69		
G5	0	0	1	0.01		

Table 1: Comparison between general anesthesia and spinal anesthesia group in demographic data.

* SD: Standard deviation.

Variable	General (n=1664)		Spinal (n=2273)		χ ²	P
	No	%	No	%		
Post-partum Hg:						
No	1605	96.5	2256	99.3	39.72	<0.001**
Yes	59	3.5	17	0.7		

Table 2: Rate of occurrence of postpartum hemorrhage in both studied groups (general and spinal groups).

Variable	General (n=1664)		Spinal (n=2273)		χ ²	P
	No	%	No	%		
Previous	1365	82	1870	82.3	0.04	0.85 N.S
Emergent	299	18	403	17.7		

Table 3: Comparison between general anesthesia and spinal anesthesia group as regard the indications of CS.

Variable	General (n=1664)		Spinal (n=2273)		χ ²	P
	No	%	No	%		
Placenta accreta:						
No	1656	99.5	2271	99.9	5.85	0.02*
Yes	8	0.5	2	0.1		
Prolonged labour:						
No	1494	89.8	2027	89.2	0.37	0.54 N.S
Yes	170	10.2	246	10.8		
Over Distended uterus:						
No	1612	96.9	2199	96.7	0.05	0.82
Yes	52	3.1	74	3.3		
Placenta previa without Hg.:						
No	1634	98.2	2207	97.1	4.89	0.03*
Yes	30	1.8	66	2.9		
Placental abruption:						
No	1599	96.1	2258	99.3	50.86	<0.001**
Yes	65	3.9	15	0.7		
Post-partum Hg:						
No	1605	96.5	2256	99.3	39.72	<0.001**
Yes	59	3.5	17	0.7		

Table 4: Comparison between general anesthesia and spinal anesthesia group as regard the occurrence of complications.

Variable	General (n=1664)	Spinal (n=2273)	t	p
Fetal Weight (Kg):				
Mean ± SD	2.94 ± 0.38	2.92 ± 0.39	1.31	0.19 N.S
Range	2 – 4.5	2 – 4		

Table 5: Comparison between general anesthesia and spinal anesthesia group in Fetal weight.

Discussion

CS anesthetic procedure requiring general anesthesia and spinal / epidural anesthesia has been thoroughly examined for PPH risks and based on a limited number of cases from single hospital datasets [7,8].

The aim of our study was to compare the risk of post-partum hemorrhage (PPH) for patients who will undergo cesarean delivery (Cs) with general versus spinal/epidural anesthesia. This study was conducted on 3937 patients complicated by postpartum hemorrhage after cesarean section with history of type of anesthesia used; general or spinal or epidural.

The patients were subjected to measurement of heart rates and blood pressures, assessment of uterine contractility, recording hemoglobin concentration and determination of the total volume of crystalloid solutions infused during operation and duration of operation.

The vast majority of studies failed to demonstrate a clear impact of aging on PPH rate. Older mothers had the highest percentage for cesarean delivery, Previa placenta, preserved placenta tissue, macrosomia, uterine separation, and medical complications more common. Increasing maternal age has been consistently identified as a significant risk factor for PPH in all obstetric hysterectomy registers [9].

Thus, all the above mentioned facts emphasize the importance of not deferring pregnancy to an older age to prevent exposure of the mothers to the risk of pregnancy in old age. Regarding parity, 44.5% of the studied group was primigravida and 36.7% of them was multipara did not demonstrate any relation between multi parity and PPH. This observation was used multivariable logistic regression analysis. Kramer et al. reported that, primiparity was a significant risk factor (OR 1.4, 95% CI 1.2-1.7). An Egyptian prospective cohort study, Prata et al. reported an association of primiparous with PPH during the first four hours after vaginal delivery (OR1.15, 95% CI 0.74-1.79) [10,11].

Al-Zirqi et al. concluded that primiparous were more at risk as they were predisposed to prolonged labor, operative vaginal deliveries, perineal trauma and uterine atony. Thus, they should have more attention during labor as they constitute potential candidate for CS on mother request in future pregnancies as a result of traumatic experience at childbirth [12].

Our results showed that there was no statistically significant difference between patients who received general anesthesia and patients who received spinal anesthesia in age, parity, number of cases with prolonged labor or overdistended uterus. But there were statistical significant differences between them in number of cases having placenta accreta, placental previa without hemorrhage and placental abruption. There was statistically significant difference between patients who received general anesthesia and patients who received spinal anesthesia in number of cases having postpartum hemorrhage. There was no statistically significant difference between patients who received general anesthesia and patients who received spinal anesthesia in fetal weight.

They claimed that general anesthesia was associated with higher levels of PPH than spinal/epidural anesthesia, with adjusted ORs ranging from 2.79 to 4.81 and Al-Zirqi et al. indicating that general anesthesia had significantly higher rates of PPH than spinal/epidural anesthesia, with an average adjusted OR of 2.94. In particular, rises in the frequency of myometrial contraction and depression in amplitude were observed at lower concentrations of local anesthetics, although both amplitude and frequency were depressed until eventually removed as concentrations increased [13-16].

Mechanisms that may explain the increased risk of PPH associated with general anesthetics could be the result of platelet function suppression and hemostasis. The halothane, sevoflurane, and nitrous oxide inhalation anesthetics tend to impair platelet function at commonly used concentrations in a reversible and dose-manner. Sevoflurane has also been shown to change bleeding [17,18].

PPH is a clinical situation where information, communication, and resource availability and use all play prominent roles. Patients with major risk factors for serious hemorrhage may have prolonged surgery, elevated intraoperative complications, severe blood loss and multiple transfusions [19,20].

Spinal / epidural anesthesia has been relatively contraindicated for women at risk of significant hemorrhage due to hemodynamic instability issues and need to resuscitate an awake patient. To facilitate the preparation of rapid blood transfusion and potential complications, including hysterectomy, general anesthesia with a safe airway is still needed [21].

Nevertheless, spinal / epidural anesthesia was not associated with increased blood loss and CS patients at elevated risk of PPH should not be contraindicated [22].

Conclusion

The choice of anesthetic techniques may be affected by the possibility of bleeding or concern. We found that women who have undergone general anesthesia have a greater chance of postpartum hemorrhage compared with women who have undergone epidural, spinal anesthesia.

We recommend using spinal or epidural anesthesia for those having high risk factors for post-partum hemorrhage, this is better than using general anesthesia for those cases. We recommend making careful follow up for risk cases receiving general anesthesia to protect them from cesarean post-partum hemorrhage.

References

- ACOG Practice Bulletin (2006) Clinical management guidelines for obstetrician-gynecologists number 76, October 2006: postpartum hemorrhage. *Obstet Gynecol* 108:1039-1047.
- Oyelese Y, Ananth CV (2010) Postpartum Hemorrhage: Epidemiology, Risk Factors, and Causes. *Clin obstet gynecol* 53: 147-156.
- Mousa HA, Alfirevic Z (2007) Treatment for primary postpartum hemorrhage. *Cochrane Database Syst Rev* 1:CD003249.
- Toledo P, McCarthy RJ, Hewlett BJ (2007) the accuracy of blood loss estimation after simulated vaginal delivery. *Anesth Analg* 105:1736-1740.
- Walfish M, Neuman A, Wlody D (2009) Maternal Haemorrhage. *British Journal of Anaesthesia* 103: i47-56.
- Dean F (2006) Statistical methods in scientific researches. *European Journal of Scientific Research* 14.
- Rath W, Hackethal A, Bohlmann MK (2012) Second-line treatment of postpartum haemorrhage. *Arch Gynecol Obstet* 286:549-56112.
- Gai MY, Wu LF, Su QF, Tatsumoto K (2004) Clinical observation of blood loss reduced by tranexamic acid during and after caesarian section: a multi-center, randomized trial. *Eur J Obstet Gynecol Reprod Biol* 112:154-157.
- Magann EF, Evans S, Hutchinson M (2005) Postpartum hemorrhage after cesarean delivery: An analysis of risk factors. *South Med J* 98: 681-5.
- Al-Ziriqui I, Vangen S, Forsen L, stray Pedersen B (2008) Prevalence and risk factors of severe obstetric hemorrhage. *BJOG* 115:1265-72.
- Markova V, S rensen JL, Holm C, Norgaard A, Langhoff-Roos J (2012) Evaluation of multi-professional obstetric skills training for postpartum hemorrhage. *Acta Obstet Gynecol S+cand* 91:346-52.
- Kramer MS, Dahhou M, Vallerand D, Liston R, Joseph KS (2011) Risk factors for postpartum hemorrhage: can we explain the recent temporal increase? *J Obstet Gynaecol Can* 33: 810-9.
- Prata N, Hamza S, Bell S, Karosek D, Vahidnia F, et al. (2011) Inability to predict postpartum hemorrhage: insight from Egyptian intervention data. *BMC Pregnancy and childbirth* 11:97.
- Chang C, Wang I, Chen Y (2011) Anesthetic management as a risk factor for postpartum hemorrhage after cesarean deliveries. *Am J Obstet Gynecol* 205: 462-7.
- Thind AS, Tumer RJ (2008) In vitro effects of propofol on gravid human myometrium. *Anaesth Intensive Care* 36: 802-6.
- Fauza DO, Kohane DS, Beeuwkes EB (2003) Local anesthetics inhibit uterine activity in vitro: Possible application on preterm labor prevention and treatment. *Fetal Diagn Ther* 18: 292-6.
- Karsli B, Kaya T, Cetin A (1999) Effects of intravenous anesthetic agents on pregnant myometrium. *Pol J Pharmacol* 51: 505-10.
- Berlet T, Krah A, Borner U (2003) Desflurane inhibits platelet function in vitro similar to halothane. *Eur J Anaesthesiol* 20: 878-83.
- Fourcade O, Simon MF, Litt L (2004) Propofol inhibits human platelet aggregation induced by proinflammatory lipid mediators. *Anesth Analg* 99: 393-8.
- LaPlatney DR, O'Leary JA (1970) Anesthetic considerations in cesarean hysterectomy. *ANesth ANalg* 49: 328-30.
- Gallos G, Rectai I, Smiley RM (2009) The role of the anesthesiologist in management of obstetric hemorrhage. *Semin Perinatol* 33:116-2.
- Frederiksen MC, Glassenberg R, Stika CS (1999) Placenta previa: A 22-year analysis. *Am J Obstet Gynecol* 180: 1432-7.

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