Arch Med Health Rev 2018; 2(2) : 33

Original Article
Published April - June 2018
ISSN: 2635-3946, eISSN: 2636-6304

The Impact of Anaesthetic Techniques on Blood Loss during Caesarean Section in a Tertiary Hospital in Abuja, Nigeria: A Randomized Prospective Study

Olumide A Akitoye [1*] and Godwin O Akaba[2]

1.Department of Anaesthesia, University of Abuja Teaching Hospital, Gwagwalada, FCT, Abuja, Nigeria.
2. Department of Obstetrics and Gynaecology, University of Abuja Teaching Hospital, Gwagwalada, FCT, Abuja, Nigeria.

OAA and GOA designed the study, extracted the data, analysed the data, and wrote the manuscript.

Reviewed by:
Princewill PI Nwajiobi-Princewill,
Department of Medical Microbiology,
National Hospital, Abuja, Nigeria.

Ojah Samuel,
Ministry of Defence Headquarters,
Abuja, Nigeria.

***Correspondence:**
Olumide A Akitoye,
1 Department of Anaesthesia,
University of Abuja Teaching Hospital,
Gwagwalada,
FCT, Abuja, Nigeria.

Phone: +2348037865302
Email: akitoyeo@gmail.com

Recieved: April 9th, 2018
Accepted: June 11th, 2018
Published online: June 22nd, 2018

ACCESS THIS ARTICLE ONLINE

Quick Response Code

Website

http://www.nmafctjournal.org

Abstract

Introduction: Caesarean section (CS), as a mode of delivery, is currently on the increase worldwide even for non-medical reasons. This procedure can be associated with a significant amount of blood loss. Haemorrhage as a leading cause of maternal morbidity and mortality is of global concern as it affects women worldwide.

Materials and Methods: A prospective, randomized study that assessed the impact of anaesthetic techniques on blood loss during CS. One hundred and forty patients scheduled for elective CS section at the University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria were randomized into either of two groups: 70 women in Group A (General Anaesthesia) and 70 women in Group B (Subarachnoid Anaesthesia). The age, height, weight, and the American Society of Anaesthesiologists states of the women were assessed. Subjects also had the heart rate (HR), and the mean arterial blood pressure (MABP) recorded perioperatively. Samples for complete blood count were taken preoperatively and 48hours postoperatively and the blood loss between the two groups was estimated. Statistical Package for Social Sciences version 23 was used to find the difference between measures of dispersion between the two groups. The significance level was set at P-value of < 0.05.

Results: Subjects in Group A maintained a higher mean HR and MABP than those in Group B, albeit, the difference was not statistically significant. Subjects in Group B had a shorter duration of surgery and a lower estimated blood loss compared to Group A, these were also not statistically significant.

Conclusion: The study had demonstrated that there is a likelihood of a greater blood loss with general anaesthesia than subarachnoid anaesthesia. However, future studies that with use more accurate methods of blood loss assessment during CS is advocated.

Keywords: Anaesthetic Techniques, Blood Loss, Caesarean Section

Introduction

Obstetric haemorrhage is a leading cause of maternal morbidity and mortality worldwide, with more impact in developing countries [1, 2]. Blood loss during caesarean section (CS) can be very significant and has been estimated to be about 500-1000mls [3]. It is estimated that the risk of postpartum death was 3.6 times higher after CS than after vaginal delivery [3]. Caesarean delivery has also been associated with a significantly increased risk of postpartum maternal death from complications of anaesthesia [3, 4]. The incidence of CS, both in the developing and developed world, has been on the increase [5].

The management of bleeding in CS is a shared responsibility between the obstetricians and the anaesthetists. Regional (mainly subarachnoid) and general anaesthesia are commonly used for CS, and both have their advantages and disadvantages. There have been many studies assessing blood loss during CS and also in comparison to vaginal deliveries, but there has been dearth of data on the impact of anaesthetic techniques on blood loss during CS [6, 7]. This study, therefore, assess the impact of anaesthetic techniques on the blood loss during CS among the women seen at the University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.

Materials and Methods:

Upon approval from the Research and Ethics Committee of the University of Abuja Teaching Hospital

Original Article
Published April - June 2018
ISSN: 2635-3946, eISSN: 2636-6304

(UATH), Gwagwalada, Abuja, Nigeria; 140 patients scheduled for an elective CS at the Obstetrics and Gynaecological department of the UATH were recruited into the study. Elective CS was defined as CS performed before the onset of labour. Written informed consent was obtained from all patients. Inclusion criteria were American Society of Anaesthesiologists (ASA) I and ASA II patients scheduled for an elective CS. Exclusion criteria were ASA III or greater, presence of factors associated with an increased risk of postpartum haemorrhage (PPH) such as anaemia (haemoglobin <7 g%), multiple gestation, antepartum haemorrhage (placenta praevia or placental abruption), abnormal placentation (accreta, increta, percreta), uterine fibroids, polyhydraminous, emergency CS, a history of uterine atony and postpartum bleeding. Women with a current or previous history of significant disease, including heart disease, liver, renal disorders, or a known coagulopathy or inadequate subarachnoid block requiring conversion to general anaesthesia after subarachnoid block were excluded. Also excluded were some conditions relating to contraindication for spinal anaesthesia e.g. history of severe sciatica or back surgery, coagulopathy, infection around the lumbar puncture site, aortic stenosis, or spinal deformity.

Simple randomization using a random number table was used to assign patients to receive either General anaesthesia (Group A, n = 70) or Subarachnoid block (Group B, n = 70). All the patients were reviewed by the anaesthetist (the corresponding author) preoperatively at 6 pm the night before surgery. The height and weight of the patients were measured preoperatively. All patients had a complete blood count both at the preoperative review and 48hours post-CS. Vital signs (heart rate, blood pressure, mean arterial pressure, and respiratory rate) of the patients were checked and noted at the preoperative review, before induction, 30 and 60mins post skin incision, and 24hours post caesarean section. After the delivery of the foetus, both groups received a 10IU intravenous bolus of oxytocin, and then 30 IU oxytocin in 500 mL lactated Ringer's solution that was infused at a rate of 125 mL/h. The total volume of fluid infused in each patient was also recorded. Surgery time was considered as the interval between skin incision and the time of the last stitch and was recorded.

Estimated blood loss was calculated using the following formula [11]: Estimated blood loss (EBL) = EBV X {Preop hematocrit - Postop haematocrit}/ Preop haematocrit, where EBV (estimated blood volume) in mL = patient's weight in kg X 70. Blood loss greater than 1000 mL during the procedure was defined as excessive bleeding. The primary outcome was the EBL during CS. Other outcomes were excessive bleeding (defined as an EBL >1000 mL), the need for blood transfusion, the use of additional uterotonic agents that may indicate an uterine atony.

An analysis was done with statistical software for social sciences version 23 to find the mean and standard deviation of the numerical variables. Observations were made within and between the two groups.

Results:
All patients enrolled in the study were studied and analysed as there was no attrition.

The characteristics of the women in Group A (n=70) and Group B (n=70) were as shown in Table 1. No marked statistical difference in maternal demographics was found between the groups.
The observed changes in the heart rate and the mean arterial pressure in the perioperative period are similar in both groups, though; the patients in Group B showed slightly lower values (see Figure 1 and 2). The mean heart rate for Group A was 94±4, while that of Group B was 90±4, P=0.74. Also, the mean arterial blood pressure for Group A was 82 ±4, while that of Group B was 75±3, P=0.77.
The surgical data were assessed in terms of the duration of surgery, the volume of crystalloid used, and the estimated blood loss. The mean duration of surgery for the Group A was 51.0±9.0 minutes as compared to that in Group B which was 48.0±7.0 minutes (P=0.93). Likewise, the volume of crystalloid used was similar with 2217.0±303.0 ml in Group A and 2423.0±333.0 ml in Group B and a P-value of 0.98. The mean estimated blood loss was mark also lower in the Group B (428.0±73.0ml) as compared to Group A (530.0±90.0ml), but this difference was not statistically significant (P=0.95). Table 2.

In this study, there was no incidence of excessive blood loss (with or without blood transfusion), and there was also no case that required additional uterotonic agents.

Discussion

Obstetric haemorrhage is a subject of great concern and is one of the major causes of maternal mortality worldwide [8]. Significant blood loss is associated with caesarean delivery and it is estimated that about twenty million CS are performed worldwide each year, and this rate is still increasing steadily [5]. Hence, the contribution of anaesthesia as it impacts on blood loss and the reduction of maternal morbidity and mortality cannot be overemphasized [4, 9]. The patients in the two groups were comparable in age, height, weight, and ASA classification. Heart rate and blood pressure have been known to be physiological markers of stress and especially reacts to blood loss. In this study, it was observed that the patients in the subarachnoid anaesthesia group (Group B) maintained slightly lower perioperative heart rate and mean arterial blood pressure than those in the general anaesthesia group (Group A). In the pathophysiology of shock secondary to haemorrhage, the degree of change in the heart rate is proportional to the amount of blood loss [10]. Hence, after removing pain as a confounding factor general anaesthesia seems to be associated with a higher amount of blood loss. Ashraf and Ramadani in a similar study also showed significantly lower mean blood pressure in the Epidural Analgesia (EA) group after injection of bolus local anaesthetic and after delivery of the foetus [11]. The authors also reported a significantly lower mean blood pressure in general anaesthesia group (after placental removal) compared to the EA group but did not show any significant difference in blood loss [11].

In this study, the difference in the duration of surgery in the two groups was not significant. The surgeons were blinded to the study as we believed that the longer the duration of surgery, the greater will be the amount of blood loss. Gungorduk et al in their study on the efficacy of intravenous tranexamic acid in reducing blood loss after elective caesarean section recorded a lower duration of surgery of 36.7±3.2min in the placebo group and 36.5±3.4min in the tranexamic acid group [12]. Our finding closely agrees with that of Ashraf and Ramadani who noted an average duration of surgery of 50.9±14.8min [11].

The estimation of blood loss during caesarean deliveries is inaccurate and subjective, due to the admixture with amniotic fluid [4]. Several methods of blood loss estimation are available ranging from visual estimation, gravimetric method, alkaline haematin method, calculation methods, and each has its shortcoming [11]. This study

Original Article
Published April - June 2018
ISSN: 2635-3946, eISSN: 2636-6304

employs the use of a calculation method to estimate the blood loss. In our study, we recorded a lower blood loss in Group B group than in Group B, but this difference was not significant (P=0.95). This we felt, is the resultant effect of the lower mean arterial blood pressure recorded in the subarachnoid group (Group B). Yalinkaya et al in a prospective trial including 200 low-risk women undergoing CS found no significant difference in the operative blood loss between the general anaesthesia and the subarachnoid group [13]. Heesen et al in a more detailed analysis found that compared with general anaesthesia; there was a significantly lower blood loss with epidural anaesthesia but not with spinal anaesthesia [14]. However, Aksoy et al in the study of low-risk patients undergoing elective CS found a significantly higher level of blood loss in patients who received general anaesthesia compared with patients who received spinal anaesthesia [9]. Furthermore, more patients that had general anaesthesia required blood transfusions than those that received spinal anaesthesia [9]. Studies by Kim et al and Lertakyamanee et al also showed similar findings [15, 16].

The limitation of the study includes the fact that an estimation of blood loss using the calculation method was used. Calculation method has been said to overestimate the amount of blood loss especially when the blood loss is in excess of 1000ml [11]. But, it is an alternative to visual estimation, which has been found to be unreliable, especially in developing countries [11]. Another limitation is that only general and subarachnoid anaesthesia were studied as these are the two techniques readily available for caesarean section in our own setting.

Conclusion

This study has demonstrated the likelihood of increased operative blood loss with general anaesthesia when compared to subarachnoid anaesthesia. It is therefore pertinent that the anaesthetist should be meticulous in the choice of technique for caesarean section bearing in mind the contribution of obstetric haemorrhage to maternal mortality. We also advocate for future studies that with use more accurate methods of blood loss assessment during caesarean section.

Acknowledgment

We wish to appreciate all the women that consented to participate in this study.

Table 1: Some demographic data of the study population

Variable	Group A n=70 mean±SD	Group B n=65 mean±SD	P-value
Age(year)	27.0±3.0	26.0±3.0	0.96
Height(cm)	161.0±6.0	162.0±6.0	0.78
Weight(kg)	68.0±3.0	68.0±3.0	0.68
ASA(I/II)	(55/10)*	(62/8)*	

Group A-General Anaesthesia
Group B- Subarachnoid Block
*ASA-American Society of Anaesthesiologists' Classification

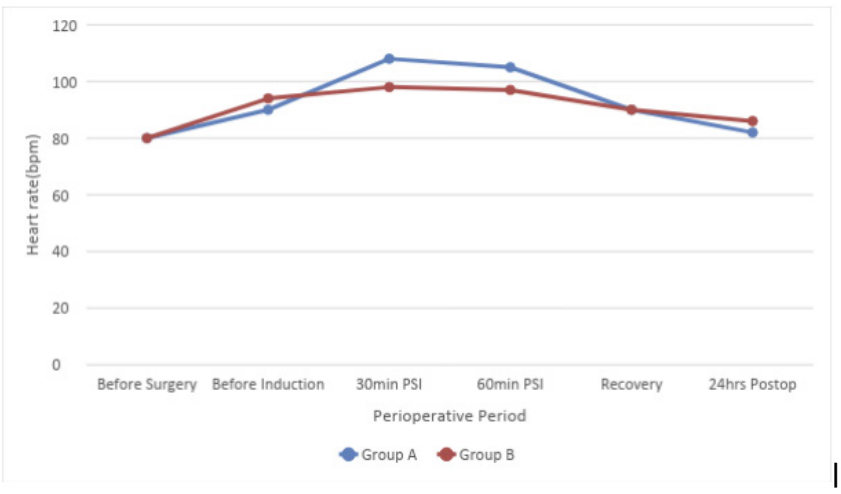

Figure 1:Perioperative heart rate
PSI: Post Skin Incision
Mean heart rate for Group A; 94±4, Group B;90±4, P=0.74

Table 2: Surgical data of the two groups

Variable	Group A mean±SD	Group B mean±SD	P-value
Duration of surgery(min)	51.0±9.0	48.0±7.0	0.93
Estimated Blood loss(ml)	530.0±90.0	428.0±73.0	0.95
Crystalloids(ml)	2217.0±303.0	2423.0±333.0	0.98

Group A-General Anaesthesia
Group B- Subarachnoid Block

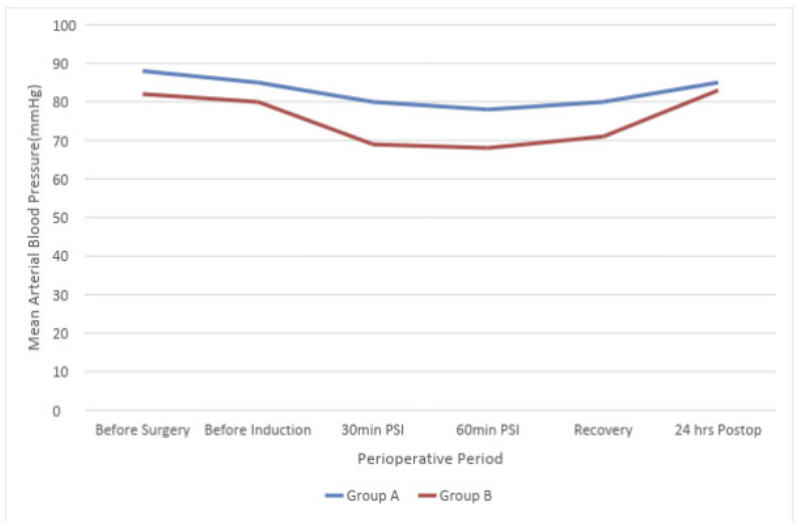

Figure 2: Perioperative mean arterial blood pressure
PSI: Post Skin Incision
Mean arterial blood pressure for Group A; 82 ±4, Group B; 75±3, P=0.77

Medical Education
Published April - June 2018
ISSN: 2635-3946, eISSN: 2636-6304

REFERENCES

1. Ujah IAO, Aisien OA, Mutihir JT, Vanderjagt DJ, Glew RH, Uguru VE. Factors Contributing to Maternal Mortality in North-Central Nigeria: A Seventeen-Year Review. Afr J Reprod Health. 2005;9(3):27.
2. Hartfield VJ. Maternal Mortality in Nigeria Compared with Earlier International Experience. Int J Gynecol Obstet. 1980;18(1):70–5.
3. Deneux-Tharaux C, Carmona E, Bouvier-Colle M-H, Bréart G. Postpartum Maternal Mortality and Cesarean Delivery. Obstet Gynecol. 2006;108(3, Part 1):541–8.
4. Enohumah KO, Imarengiaye CO. Factors associated with anaesthesia-related maternal mortality in a tertiary hospital in Nigeria. Acta Anaesthesiol Scand. 2006;50(2):206–10.
5. Betrán AP, Merialdi M, Lauer JA, Bing-Shun W, Thomas J, Van Look P, et al. Rates of caesarean section: analysis of global, regional and national estimates. Paediatr Perinat Epidemiol. 2007;21(2):98–113.
6. Khan FA, Khan M, Ali A, Chohan U. Estimation of blood loss during Caesarean section: an audit. J Pak Med Assoc. 2006;56(12):572–5.
7. Toledo P, McCarthy RJ, Hewlett BJ, Fitzgerald PC, Wong CA. The Accuracy of Blood Loss Estimation After Simulated Vaginal Delivery. Anesth Analg. 2007;105(6):1736–40.
8. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller A-B, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Heal. 2014;2(6):e323–33.
9. Aksoy H, Aksoy Ü, Yücel B, Özyurt SS, Açmaz G, Babayiğit MA, et al. Blood loss in elective cesarean section: is there a difference related to the type of anesthesia? A randomized prospective study. J Turkish Ger Gynecol Assoc. 2015;16(3):158–63.
10. Gutierrez G, Reines HD, Wulf-Gutierrez ME. Clinical review: Hemorrhagic shock. Crit Care. 2004;8(5):373.
11. Aly DH, Ramadani HM. Assessment of Blood Loss During Cesarean Section Under General Anesthesia and Epidural Analgesia Using Different Methods. Alexandria J Anaesth Intensive Care. 2006;(1).
12. Gungorduk K, Yıldırım G, Asıcıoğlu O, Gungorduk O, Sudolmus S, Ark C. Efficacy of Intravenous Tranexamic Acid in Reducing Blood Loss after Elective Cesarean Section: A Prospective, Randomized, Double-Blind, Placebo-Controlled Study. Am J Perinatol. 2011;28(3):233–40.
13. Yalinkaya A, Güzel AI, Kangal K, Uysal E, Erdem S. Spinal ve genel anestezi gulanan sezaryen doğumlarinda kan değerlerinin karşilaştirilmasi. Perinatoloji Dergisi. 2009;17;70-3.
14. Heesen M, Hofmann T, Klöhr S, Rossaint R, Van De Velde M, Deprest J, et al. Is general anaesthesia for caesarean section associated with postpartum haemorrhage? Systematic review and meta-analysis. Acta Anaesthesiol Scand. 2013;57(9):1092–102.
15. Kim JE, Lee JH, Kim EJ, Min MW, Ban JS, Lee SG. The effect of type of anesthesia on intra-and postoperative blood loss at elective cesarean section. Korean J Anesthesiol. 2012 ;62(2):125.
16. Lertakyamanee J, Chinachoti T, Tritrakarn T, Muangkasem J, Somboonnanonda A, Kolatat T. Comparison of general and regional anesthesia for cesarean section: success rate, blood loss and satisfaction from a randomized trial. J Med Assoc Thai. 1999;82(7):672–80.

Copyright Information

The copyright on any article in this journal is retained by the author(s). The author grants the journal the license to publish the article, and to identity itself as the original publisher. The journal will also be licensed under a Creative Commons Attribution 4.0 International License that permits use, distribution and reproduction in any medium, provided the original work is properly cited.