Identifying Risk Factors of Severe Primary Post-Partum Hemorrhage

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Primary Postpartum hemorrhage (PPH) is one of the leading causes of major maternal mortality and morbidity. Severe cases of PPH can be associated with significant surgical intervention, blood transfusion, intensive care admission and death. Identifying risk factors for PPH is difficult as cases can still occur without obvious roots. Preventing Severe cases of PPH can be more challenging.

Objective: To explore the risk factors of severe PPH in our hospital. We aimed to address demographic factors, pregnancy related factors and labor characteristics.

Method: This is a retrospective case control study of severe PPH in the Obstetrics and Gynecology unit at Bahrain Defense Force Hospital, Teaching and Research Centre. We reviewed medical records of obstetric patients over a 24-month period. Demographic and obstetric risk factors were analyzed into two group of PPH≤ 1500ml and PPH > 1500 ml. The data were analyzed using StatDirect software. A P-value of less than 0.05 was considered statistically significant.

Results: We identified 71 cases of PPH with 13 cases in the severe category group. Severe PPH was more than doubled in cases with previous caesarean (54% vs 22%). There was no effect of maternal age, body mass index, previous medical history on severe cases of PPH. The two Polyhydramnios cases in the study ended in a severe PPH. There was no effect from any other pregnancy or labor characteristic on severe PPH rate.

Conclusion: Our analysis found previous caesarean birth and polyhydramnios as contributing risk factors for severe PPH.

Key words: Severe PPH, Maternal Morbidity, Maternal Mortality

BACKGROUND and OBJECTIVES

Primary Postpartum haemorrhage is the most frequent cause of obstetric hemorrhage[1]. As PPH is a major factor of maternal mortality, identifying risks of severe PPH has significant importance. Primary PPH generally is defined as blood loss of more than 500 ml following vaginal delivery and more than 1000 ml after caesarean delivery within 24 hours of delivery[1]. Causes of PPH in general terms are referred to as the 4 TS, which includes Tone, Trauma, Tissue and Thrombin. Active management of third stage has considerable reduction in PPH as one in five cases of primary PPH occurs without risk factors[2].

Risk factors include maternal age, parity, body mass index (BMI), infertility treatment (IVF), multiple pregnancy, previous history of PPH, previous surgeries, fetal weight, polyhydramnios, Stillbirth, placentae praevia, placental abruption, spontaneous rupture of membrane (SROM), Chorioamnionitis, mode of delivery, prolonged second stage of labour, genital tract trauma, induction of labour (IOL), maternal anemia, gestational diabetes mellitus (GDM), coagulation disorders, uterine fibroid[3]. Often PPH is difficult to predict, however recognizing the risk factors improve the delivery plans and maternal outcome[4,1]. Predicting severe cases is even more challenging but convey a higher advantage with introducing pre-emptive measures.

The diagnosis of severe postpartum haemorrhage depends on the obstetrician's subjective estimate of blood loss and varies according to mode of delivery. A temporal trend in severe PPH, was described in the literature when PPH occur plus receipt of a blood transfusion, hysterectomy, and/or surgical repair of the uterus[5]. In a French population-based study, severe PPH was defined by at least one of these criteria: peripartum haemoglobin drop superior or equal to 4 g/dL, conservative surgical procedure, embolization, transfusion, hysterectomy, transfer to intensive care or death[6]. Severe cases of PPH can be classified based on the volume of blood transfusion. Maneschi group classified severe cases when the bleeding required transfusion of ≥4 blood units[7]. For the purpose of this analysis, severe PPH was investigated when the estimated blood loss exceeded 1500 ml.

Our objective is to identify risk factors for severe PPH among the women who delivered in our hospital.

METHODOLOGY

A retrospective case control study of postpartum haemorrhage was performed from 1st of January 2015 to 31st of December 2016. Records were obtained for all women who delivered vaginally or Caesarean sections after 24 weeks of gestation. All incomplete records were excluded from the analysis. Ethical approval was obtained from the local ethical and research committee.

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We divided the PPH cases into two groups; one group with blood loss of less than or equal to 1500 ml and second group with blood loss of more than 1500 ml. We identified all possible risk factors for PPH which include; maternal age, parity, BMI, infertility treatment (IVF), multiple pregnancy, previous history of PPH, previous uterine surgeries, maternal anemia, hypertension, gestational diabetes mellitus, coagulation disorders, uterine fibroid, foetal weight, polyhydramnios, stillborn, placentae praevia, placental abruption, SROM, Chorioamnionitis, induction of labour(IOL), mode of delivery, prolonged second stage of labour, genital tract trauma, episiotomy, uterine atony and retained products of conception(RPOC).

In our study anaemia was identified when Hb level was 10.5g/dl or less during delivery. Coagulation disorders included acquired and inherited Thrombophilias and bleeding disorders. We assessed chorioamnionitis as individuals with rupture of membranes along with fever, tachycardia, uterine tenderness, foul discharge vaginally and increased white blood cell (WBC)count. Polyhydramnios was defined as maximum vertical pocket of 8 cms or more. Labour augmentation was considered when Syntocinon infusion was used. Prolonged second stage of labor was identified when the second stage take longer than 1 hour for multiparous and longer than 2 hours for nulliparous without epidural. In cases of epidural use, the prolonged second stage for nulliparous would be 3 hours and 2 hours for multiparous. With regard to duration of third stage of labour, it was considered as less than 30 minutes.

Data was analyzed using Stats Direct statistical package (version: 3.2.10 Merseyside UK 2020). Two-sided Unpaired t test was used to compare normally distributed continuous variables between the two groups. Chi-square in crosstabs was used to compare percentage of risk factors presentation in each group. Fisher- Freeman-Halton exact in crosstabs was used to compare percentage of risk factors between the groups when one out of four cells have expectation less than 5. P values of less than 0.05 were considered statistically significant.

RESULT

During the study period of the 8449 births, 76 cases of primary PPH were found with an incidence rate of 8.9 per 1000 birth. 5 cases with incomplete record were excluded. Out of the 71 cases in the analysis, 13 cases were labelled as severe PPH with blood loss more than 1500ml with incidence of 18% of PPH cases **(Table 1).**

Patient characteristics: We noted that the group with severe PPH confined older patients, but the difference did not reach statistical significance (33.5 vs 29.9 with P value of 0.08). There was no difference in BMI or previous parity between the groups (P=0.67and 0.86). Nearly half of the patients in the severe bleeding group had previous caesarean birth compared to 22% in the other group (P= 0.04). There was no difference in Gestational DM, HTN, Anaemia, previous surgery and uterine fibroid between the groups. Of note previous history of PPH was identified in one case who had PPH of ≤ than 1500ml.

Pregnancy Characteristics: There was no difference in fetal weight and gestational age at delivery between the groups (P= 0.49 and 0.24). Two cases of polyhydramnios led to severe PPH with P value of 0.03. There was no difference in cases of placenta previa, abruption and Chorioamnionitis between the groups. We noted higher incidence of antepartum haemorrhage (APH) in the group with the PPH of ≤ than 1500 ml but the difference was not statistically significant 13.8% vs 7.7% with P value of >0.99 (Table 2).

Table1: Patient Characteristics

	PPH ≤ 1500 N 58	PPH >1500 N 13	P value
Maternal age years mean ±SD	**29.9± 6.4**	**33.5± 6.9**	**P=0.08***
Maternal BMI kg/m^2 mean ±SD	**32± 7.3**	**31± 7.2**	**P=0.67***
Parity mean ±SD	**1.9± 2.2**	**2.9± 2.4**	**P=0.86***
Previous LSCS	**13/58 (22%)**	**7/13 (54%)**	**P=0.04*****
Gestational DM	**13/58 (22%)**	**3/13 (23%)**	**P>0.99*****
Gestational HTN	**7/58 (12%)**	**1/13 (7.7%)**	**P>0.99*****
Anaemia	**8/58 (13.8%)**	**2/13 (15.4%)**	**P>0.99*****
Coagulation disorder	**0/58 (0%)**	**1/13 (7.7%)**	**P=0.18*****
Bariatric surgery	**2/58 (3.5%)**	**0/13 (0%)**	**P>0.99*****
Previous surgery	**5/58 (8.6%)**	**3/13 (23%)**	**P=0.16*****
Uterine fibroid	**2/58 (3.5%)**	**0/13 (0%)**	**P>0.99*****
Previous PPH	**1/58 (1.7%)**	**0/13 (0%)**	**P>0.99*****
* two-sided Unpaired t test *** Fisher-Freeman-Halton exact			

Table2: Pregnancy Characteristics

	PPH ≤ 1500 N 58	PPH >1500 N 13	P value
IVF treatment	**2/58 (3.5%)**	**1/13 (7.7%)**	**P=0.46*****
Gestational age weeks mean ±SD	**38± 1.9**	**37± 3.5**	**P=0.24***
Fetal weight Kgs mean ±SD	**3.2± 0.6**	**3.1± 0.7**	**P=0.49***
Polyhydramnious	**0/58 (0%)**	**2/13 (15.4%)**	**P=0.03*****
Stillborn	**2/58 (3.5%)**	**0/13 (0%)**	**P>0.99*****
Placenta previa	**10/58 (17%)**	**2/13 (15.4%)**	**P>0.99*****
APH	**8/58 (13.8%)**	**1/13 (7.7%)**	**P>0.99*****
Placental abruption	**2/58 (3.5%)**	**0/13 (0%)**	**P>0.99*****
Chorioamnionitis	**2/58 (3.5%)**	**0/13 (0%)**	**P>0.99*****
* two-sided Unpaired t test *** Fisher-Freeman-Halton exact			

Table 3: Labor Characteristics

	PPH ≤ 1500 N 58	PPH >1500 N 13	P value
IOL	**11/58(19%)**	**5/13 (38.5%)**	**P=0.15*** **
Labor augmentation	**26/58 (44.8%)**	**4/13 (30.8%)**	**P=0.54*** **
SROM	**6/58 (10.3%)**	**0/13 (0%)**	**P=0.58*** **
Long 2nd stage of labor	**5/58 (8.6%)**	**0/13 (0%)**	**P=0.58*** **
Caesarean delivery	**ELCS 5 EMCS 17 22/58 (37.9%)**	**ELCS 2 EMCS 5 7/13 (53.8%)**	**P=0.36*** **
Episiotomy	**24/58 (41.4%)**	**4/13 (30.8%)**	**P=0.49*** **
Trauma	**32/58 (55%)**	**10/13 (77%)**	**P=0.15** **
Uterine atony	**31/58 (53.5%)**	**5/13 (38%)**	**P=0.33** **
RPOC	**6/58 (10.3%)**	**1/13 (7.7%)**	**P>0.99*** **

Labor Characteristics: There was no difference in the incidence of IOL, labor augmentation and SROM between the groups (P=0.15, P=0.54 and P= 0.58). Although we had 5 cases with long 2nd stage of labor in the group with PPH of ≤ 1500 ml the difference was not significant (P=0.58). There was no difference in Episiotomy, Trauma, uterine atony and RPOC between the groups. More cases had caesarean section in the severe PPH group but the difference was not significant (53.8 % vs 37.9 % with P= 0.36) (Table 3).

DISCUSSION

Post-partum hemorrhage is a concerning issue as it can cause a severe drop in blood pressure and may lead to shock and death if not managed efficiently. It remains an important cause of maternal morbidity and mortality both in industrialized and non-industrialized countries[8-10]. Some women are at a greater risk of PPH than others. The incidence of PPH in our study was 8.9 in 1000 birth.18% of the PPH cases were in the severe type. Our study incidence is lower than previously reported figures. A Japanese prospective cohort study involving 1068 vaginal deliveries of singleton pregnancies found the incidence of PPH to be about 8.7% and that of severe PPH type to be 2.1%[4]. It is important to remember that PPH can still occur without any evident risk factors[11].

In our study we divided the risk factors into patient characteristics, pregnancy characteristics and labor characteristics. Advanced maternal age was identified as a risk factor for PPH as it would be associated with increased co morbidities, obstetric complications and interventions[12]. Our study showed older patients in the severe PPH group but this difference was not statistically significant. A cohort study conducted in California between 2008 and 2012 addressing the effect of maternal BMI on PPH concluded that obesity was not found to be a strong risk factor for PPH[13]. Our study confirmed no link of BMI to severe PPH as well.

Labour induction/augmentation and prior caesarean section were significantly associated with PPH[3]. we noted in our analysis that previous caesarean section increases the risk of severe PPH. This could be related to increased complications with repeated procedure or shorter interval between pregnancies. Our analysis also showed no effect to number of previous parity and history of PPH on severe PPH. These findings were substantiated by another study which also found that these factors were not significantly associated with PPH[14].

A retrospective descriptive cohort study conducted at a tertiary hospital in Zimbabwe of 4567 deliveries found that pregnancy induced hypertension followed by prolonged labour are an identifiable risk factors for developing PPH[15]. Furthermore, women with pre-eclampsia have a 1.53fold increased risk of PPH[16]. Preventive measures to combat PPH was rigorously undertaken in our labor room protocol, hence the risk of severe PPH was not demonstrated in our study. In a cohort study of 6011 Italian women, it was inferred that low hemoglobin is an adjustable risk factor for PPH[17]. Furthermore, mild factor XI deficiency was noted to be associated with an increased risk of PPH following caesarean deliveries[18]. However, our study did not find any increased risk of severe PPH with coagulation disorders. Our labor room involved hematologist at a very early stage in the presence of coagulation disorders and consequently reduces severe PPH rate.

A study involving uncomplicated singleton vaginal deliveries of 898 women at 37 weeks or more concluded that in the presence of 3 factors namely; IVF treatment, infant weight of more than 3014gms and instrumental delivery, uterine constrictors must be given promptly and bleeding must be controlled immediately[19]. Embryo transfer was considered as a risk factor for severe PPH and also for blood transfusion[20]. A retrospective cohort study from Thailand which included 19,429 patients deduced that the strongest risk factor for PPH was prolonged 3rd stage of labour, retained placenta, lacerations of the birth passage and placenta previa[21]. Another study conducted in a latin- american Population revealed that immediate PPH is related to complications of 2nd and 3rd stages of labour[22]. Prolonged active labour (duration more than 12 hrs) was associated with severe PPH[23]. In a population- based case control study, Oxytocin during labour appears to be an independent risk factor for severe PPH[24]. Surprisingly, our data did not show increase in severe PPH with labor intervention and mode of delivery.

Furthermore, there was no increase risk with trauma, uterine atony and retained products of conception. This was startling as literature quotes uterine atony as the most common cause of PPH and it is accountable for up to 75-90% of PPH[25,26,27]. Our analysis was addressing severe cases of PPH, and possible explanation for no increase in those cases with uterine atony is the fast and organized management of PPH. A population based retrospective cohort study concluded that close observation of all women following birth is essential to identify and manage postpartum haemorrhage and reduce morbidity[28].

CONCLUSION

Our analysis found previous caesarean birth and polyhydramnios as a contributing risk factors for severe PPH.

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