Original Article

Appropriateness of Routine Cross Matching and Blood Transfusion Practice in Caesarean Section for Low Risk Postpartum Haemorrhage Pregnancies at Ad-din Women's Medical College Hospital, Moghbazar, Dhaka

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Abstract:

Haemorrhage from obstetric cause is the most common cause of maternal mortality in the developing world. Prevention of mortality from haemorrhage will necessarily involve prompt blood transfusion among other life saving measures. Routine cross matching of blood preparation for elective caesarean section cause expensive waste of resources and increased work load of blood bank staffs.

Objective: To evaluate appropriateness of the blood ordering practice, transfusion and routine cross matching for elective caesarean section in low risk postpartum haemorrhage.

Method: This 6 month long prospective designed observational study was conducted among all the 108 pregnant women having normal hemostasis profile who underwent caesarean section (Emergency and Elective) at the department of Obstetric and Gynecology (OBGYN) of Ad-din Women's Medical College Hospital, Dhaka, Bangladesh. Females with abnormal bleeding profile or on anti-coagulant therapy were excluded. Other excluding criteria are gestational age <28 weeks, grand multipara, multiple pregnancies, history of previous 3 or more CS, fetal birth weight more than 4 kg, high risk PPH causes and patient with co-morbidities. To waive seasonal biasness the study was conducted from July through December 2019.

Result: In our study all 108 patients who underwent caesarean section for low risk PPH pregnancies had done routine cross matching before operation (elective or emergency). Among them only 5 patients needed blood transfusion. So incidence of PPH needed blood transfusion was 4.6%.Only one patient needed 2 unit of PRC .Among the 5 patients needed transfusion ,4 underwent emergency and 1 underwent elective caesarean section.

Transfusion utilization indices including cross match to transfusion ratio (C/T), Transfusion probability (%T), and tansfusion index (Ti) were 18,4.6% and 0.05; respectively. Total cost of cross matching was 81000 taka, but the actual transmission cost was 1320 taka.

Conclusion: Routine 1 unit of cross matched PRC for low risk PPH caesarean section was seemingly shown inappropriate and over ordering. It led to unnecessary expenses and time consuming.

Keyword: Caesarean Section (CS), blood typing, blood transfusion, cross-matching.

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Introduction:

Globally postpartum harmorrhage (PPH) is a leading cause of maternal mortality.[2] The global prevalence of PPH is 6 %.[1] And highest burden is experienced in low income countries.[3] Prevention of mortality from haemorrhage will necessarily involve Prompt blood transfusion among other life saving measures. Risk factors of PPH are abnormal placentation (placenta previa, abruptio placenta, placenta accreta),uterine over distension (Multiple pregnancies, polyhydramnios, macrosomia), grand multiparity, having history of PPH, Prolong labour, pregnancy with uterine fibroid ,receiving

tocolytic drugs, delivery by caesarean section and severe anaemia[2,3] although the safety of caesarean section has improved, it is still associated with greater rates of maternal morbidity than vaginal delivery.[4,5] CS delivery is associated with severe maternal morbidity including including obstetric haemorrhage, hysterectomy, anaemia, blood transfusion and infection.[6,7] Because caesarean section itself is one of the risk factor of PPH. It is possible that pregnancies undergoing caesarean section tend to have greater amount of intra operative blood loss and have higher chance to receive blood transfusion even in the cases who have no other risk factor.[8,9] Decision concerning blood transfusion in the surgical cases depends on many factors; the type of operation ,the extent and speed of blood loss and the presence of concomitant clinical condition (age of the patient, heart disease and respiratory disorders).[10,11] For all low risk PPH pregnancies undergoing caesarean section in department of obstetrics and gynaecology, one unit of PRBC have been routinely preoperative cross matched. From the observation, our routine is not only different from the standard but also possibly unnecessary and over ordered.

In addition, because of the limitation of blood components in blood bank, all blood components should be preserved for the necessary call that need blood transfusion. Therefore appropriateness of blood preparation for each surgery is important for saving time, expenses and workload and also decreases in transmission of infection for the personals during blood preparation. Caesarean section has been identified as a common indication for blood transfusion in obstetric practice and its performance is often delayed by non availability of blood in our centre. according to all this reason, this study is to evaluate the appropriateness of the blood ordering practice and transfusion for caesarean section in low risk PPH cases.

Materials and Methods:

Study Type: Observational

Study Design: Prospective

Study Design: 6 months (to waive out seasonal bias, it was conducted from January to June 2021)

Study Place: Department of Obstetrics and Gynaecology (OBG) of Ad-din Women's Medical College Hospital, Dhaka ,Bangladesh.

Study Subjects: Pregnant women who underwent CS; female with abnormal bleeding profile or anti coagulant therapy were excluded, other excluding criteria are gestational age <28 weeks, grand multipara, multiple pregnancies, H/O previous 3 or more CS, fetal birth weight >4 kg, high risk PPH cases and patients with co-morbidities.

Sampling and Design: Non randomized purposive sampling (All cases were studied)

Sample size: 108 pregnant women preselected for CS.

Study parameter:

- Females with normal haemostasis profile were included in the study, while those with abnormal bleeding profile or on anticoagulant therapy were excluded.
- The parameter included age of woman, parity, gestational age, type of the CS whether elective or emergency and indication of CS.
- Pre operative Hb was estimated and blood group was checked. blood units arranged and cross matched pre operatively, units of blood transfused intra – operatively or post operatively were also counted as well.
- Blood arranged refers to blood grouping, cross matching and hold order to blood bank. Post operative Hb were done at 48 hours post CS.
- Transfusion utilization indices including crossmatch to transfusion ratio (C/T ratio), Transfusion probability percentage (%T), and transfusion index (Ti) were calculated (figure 1). C/T ratio less than 2%, T more than 30%, and Ti more than 0.5 and appropriate blood preparation. (10 to 12)
- **Cross match to transfusion rate (c/t ratio)=**
$$\frac{Number\ of\ units\ crossmatch}{Number\ of\ units\ transformed}$$
- **Transfusion Probability (%T) =**
$$\frac{Number\ of\ patients\ transfered \times 100}{Number\ of\ patients\ crossmatch}$$
- **Transfusion index (Ti)=**
$$\frac{Number\ of\ units\ transfered}{Number\ of\ patients\ crossmatch}$$

Data Management:

The collected data, utilizing a preselected open and closed ended questionnaire, were entered into an IBM PC using the statistical software package 'SPSS-V.22' (Statistical program for social sciences)

Analysis Plan:

All the discrete values were analyzed using proportional statistics, like, Chi-Sq tests, while the continuous variables where analyzed using t-test / correlations as and whenever deemed necessary.

Results:

Mean age of the women included in the study was 26.5+/-6.27 years ranging from 18 to 35 years. 64.8% cases were between para 1-3. 75.9% cases were at term pregnancy (37-40 weeks).

Table -I

Age Distribution of CS (N=108)

Age	Frequency	Percent
18-25 years	55	50.59
26a-35 years	46	42.6
>35 years	5	4.6
Total	108	100

Table I shows that majority (50.9%) of the patients were between age 18-25 years.

Among the indication of CS ,fetal distress was the leading indication for CS, accounting for about 22.2%.

Among all 44.4% women underwent emergency CS, whereas 54.6% underwent elective CS. Most frequent blood group to be found was B positive (32.4%) followed by O positive(32.4%),A positive(24.1%),AB positive (4.6%),A negative(0.9%).

Table II

Indication of CS (N=108)

Indication of CS	Frequency	Percentage
Foetal Distress	24	22.2
Previous CS 1	15	13.8
CPD (Cephalo- pelvic disproportion)	12	11
Previous CS-2	11	10.1
CDMR (Caesarean Delivery on Maternal Request)	8	7.4

The average preoperative haemoglobin was 12.23+/-1.13 gm/dl ranging from 9.6 gm/dl to 15.6 gm/dl. The average postoperative haemoglobin was 10.74+/-1.49 gm/dl. In majority (34%) cases, drop in haemoglobin was <0.5gm/dl and maximum Hb% drop were 0.6-1 gm/dl and >2 gm/dl in 6 cases each. Average drop in haemoglobin at emergency surgery was 1.58+/-0.96 gm/dl whereas at elective surgery it was 1.36+/-0.96 gm/dl.

While drop in haemoglobin was minimum as less as <0.5% gm/dl in majority (34%) cases, the maximum drop of 0.6-1 gm/dl was and >2 gm/dl in 6 cases each.

Table II shows that among the indication of CS, fetal distress was the leading indication for CS, accounting for about 22.2%.

Table III

Post-operative Hb conc among post-operative patients.

Hb (Post Operative)	Frequency	Percentage
<8 g/dL	0	0
9-11 g/dL	21	19.4
12-13 g/dL	85	78.7
>13 g/dL	2	1.8

Table III shows that preoperative Hb was 9-11gm/dl in 19.4% cases,12-13 gm/dl in 78.7% cases and >13 gm/dl 1.8% of cases.

Table IV

Pre operative Blood Transfusion.

Units of blood transfused	Frequency	percentage
No	102	94.4
1	5	4.6
2	1	0.9
>2	0	0

Table IV : shows that 102 cases (94.4 %) required no blood transfusion ,5 cases (4.6%) required one unit of blood, 1 case (0.9%) required 2 unit of blood transfusion.

Table-V

Indication of CS requiring blood transfusion

Indication	Number	percentage
Emergency	4	80%
Elective	1	20%

Table V shows out 5 patients requiring transfusion 4 (80%) needed in Emergency CS, and 1 (20%) needed in elective CS.

Table VI

Post operative Hb drop.

Post-operative Hb drop	Frequency	Percentage
<0.5	34	31.4
0.6-1	13	12
1.1-1.5	10	9.2
1.6-2	6	5.5
>2	6	5.5

Table VI shows that post operative Hb drop was <0.5 in 34 cases (31.4%), 0.6-1 in 13 cases (12%),1.1-1.5 in 10 cases (9.2%),1.6-2 in 6 cases (5.5%) and >2 in 6 cases (5.5%).

Transfusion utilization indices were calculated for evaluation of the appropriateness of routinize cross-match in the cesarean section for low-risk PPH. Crossmatch to transfusion ratio (C/T Ratio)

Transfusion probability (%T) and transfusion index (T1) were 18,4.6 and 0.05, respectively as shown in the table.

As all 108 patients did mandatory cross-matching before undergoing the caesarian section (elective or emergency). At present the cost of cross-matching per unit is taka 750. to sum up, the total cost of 108 units of the cross-matched

PRC in the study was 81000 taka but the actual cost of transfusion was only 5820 taka. Surprisingly the total cost of routinely cross-matching was 14 times greater than the actual cost of transfusion.

Table VII shows Transfusion utilization indices including cross match to transfusion ratio (C/T), Transfusion probability (%T), and transfusion index (Ti) were 18,4.6% and 0.05; respectively

Table VII

Transfusion utilization indices

Transfusion utilization indies	Calculated Data	References for appropriate preparation
Crossmatch to Transfusion	18	<2
Ratio (C/T Ratio)		
Transfusion Probability (%T)	4.6%	>30%
Transfusion Index (Ti)	0.05	>0.5

Table VIII

Cost of each blood preparation

Blood preparation	Cost/Case (Taka)	Total Cost for 5 cases, 6 units (Taka)
Blood transfusion	970	5820

Table VIII Shows total cost of 6 units of blood transfusion was 5820.

Table IX

Cost of Blood transfusion

Cross matching	Cost/case (Taka)	Total cost for 108 cases (Taka)
1 unit PRC	750	81000

Table IX shows total Cost of 108 cross matching is 81000 taka.

Discussion:

In our study all 108 patients who underwent caesarean section for low risk PPH pregnancies had done routine cross matching before operation (elective or emergency). Among them only 5 patients needed blood transfusion. So incidence of PPH needed blood transfusion was 4.6%. Only one patient needed 2 unit of PRC. Among the 5 patients needed transfusion, 4 underwent emergency and 1 underwent elective caesarean section.

Transfusion utilization indices including cross match to transfusion ratio (C/T), Transfusion probability (%T), and transfusion index (Ti) were 18,4.6% and 0.05; respectively.

If we compare the results of our study with the standard references.

Routine cross match PRC for caesarean section in low risk PPH was seemingly inappropriate and over ordering. These results were compatible with the results of the previous studies.

In the previous studies there were various transfusion rates reported. Although improvement in surgical techniques could decrease blood loss and blood transfusion at the time of caesarean section. Requirement of blood transfusion was still significant ,specially in high risk cases.[13] From total 1056 deliveries

,327 pregnancies (31%) underwent caesarean section. While total of 654 units of blood were reserved, only 89 units (13.6%) were transfused. Majority of the patients did not need blood transfusion.81% of those were transfused in emergency caesarean section. There was no calculated C/T ratio for proper use of cross matched reported.[14] Comparing to the present study ,it reported higher blood transfusion rate.

The participants that were all caesarean section cases without classifying as low or high risk PPH pregnancies might be the reason. It still showed that most of the patients did not need blood transfusion.

The retro-spective study in Thailand evaluating blood transfusion rate in all operation showed that transfusion rate for 478 caesarean section cases was 3.3%. Caesarean section seemed to loss less blood than other operations where as over cross matching was ordered.[15] Their results were compatible with ours. From 23,486 women underwent caesarean section in the prospective observational study in 19 universities, transfusion rate was 3.2 % in primary caesarean section while there was 2.2% in repeated caesarean section[16].Moreover transfusion rate declined significantly from 22% in 1976 to 4 and 5 % in 1996 and 2006,respectively because of improvement in surgical technique. Most of patients receiving blood transfusion were high risk for PPH pregnancies.[13].Another study in 2286 women in Thailand informed that C/T ratio in caesarean section was 5.7.The incidence of blood transfusion was only 2.6% of the 2170 patients, who were not cross matched [17].The results including low transfusion rate, high C/T ratio and cost saving from decrease in routine cross match were compatible with these in our study.

Although the previous studies reported retrospective data about transfusion rate in all caesarean section causes without determining the risk of PPH or classifying patients in specific groups, such as elective or emergency cases.[18-20] The results were still similar. Firstly blood transfusion rate was quite low because of improvement of surgical techniques, secondly blood transfusion was given mostly in high risk PPH cases. From this study, we found low incidence of PPH and transfusion rate. Additionally the total cost of routine cross matching was many times greater than the actual cost of transfusion with these reason, the routine 1 unit PRC in our department might be changed for only tying and screening without cross matching .The limitation of the study was a small sample size. For further research the appropriateness of blood preparation in high risk PPH should be studied.

Conclusion:

Routine 1 unit of cross matched PRC for low risk PPH caesarean section was seemingly shown inappropriate and over ordering. It led to unnecessary expenses and time consuming.

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