

A Study on Estimation of Blood Loss During Third Stage of Labour in Relation to Total Blood Volume in A Tertiary Care Hospital, Niloufer, Hyderabad

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ABSTRACT

Introduction: Statistics of pregnancy mortality surveillance system of CDC 11.3% of maternal deaths are taking place every year due to loss of blood during process of delivery. Effective management of pregnancy from conception to post partum period can reduce maternal deaths. Objective of the study was to evaluate the amount of blood loss in third stage of labour in relation to total blood volume.

Materials and methods: 200 cases of normal pregnant women who came to Niloufer Hospital were included in the study. Percentage of blood volume lost was calculated by using formula.

Results: Wide variations in percentage of blood loss were observed from 0.5% to 10% of total blood volume.

Conclusions: In the same amount of blood loss during delivery, the Patients with lesser blood volume developed features of PPH than the patients with high blood volume. Improvement of socio-economic status is essential.

Keywords: APH, PPH, CDC, PCV, TB

amount of blood loss during third stage of delivery in relation to total blood volume.

MATERIALS AND METHODS

200 Cases of normal pregnant women who came to Niloufer Hospital for delivery were booked for estimation of blood loss during delivery. Normal cases include all the patients except patients with anemia, pregnancy induced hypertension and APH.

200 normal pregnant women were booked for estimation of blood loss. At the time of clinical examination, weight of the patient and Hb% through Sahli's method were taken. PCV was estimated through microcapillary method.

After delivery of the patient, blood loss was collected in a basin and then measured in a 100 ml of graduated jar. Data of 200 patients were compiled in excel sheet and by using the following parameters data was analyzed. Blood loss with reference to total blood volume, age, Body weight of mother, Baby weight and parity were estimated. Estimation of blood loss by collection and optical density method³ was done and both compared. The percentage total blood volume lost was calculated by using the formula:

$0.036x \text{ Observed hematocrit} \times \text{estimated blood loss} / \text{Body weight}$

Data of 200 patients compiled in excel sheet by using the following parameters and data was analyzed. Blood loss with reference to total blood volume, age, body weight of the mother, baby weight and parity were analyzed.

Blood volume ranging from 3500-5000 ml showed decrease in blood loss and decrease in percentage of total blood volume lost., 7.2% to 3.63%. Blood loss through alkaline hematin method showed almost double the amount of blood loss when compared to measured.

Body weight ranging from 40 to 60 kg showed a direct increase in total blood volume from 3627.77 ml to 5212.64 ml. Baby weight ranging from 2-4 kg also showed an increase in total blood volume 3936.44 to 4692.17.

INTRODUCTION

Third stage of labour is always a time of anxiety which no obstetrician ever wholly outlives. No where else in obstetrics is expert judgement, cool and organized thinking and action at a greater premium.

The amount of blood loss immediately and after delivery remains a clinical problem for three reasons:

1. Severe bleeding may occur suddenly and unexpectedly and transfer normal delivery in to a catastrophe.
2. Postpartum hemorrhage forms a leading cause of maternal death.
3. There is always need for finding new techniques, safe and effective ways of preventing and treating obstetric hemorrhage.

PPH is defined in obstetric text books as a loss of volume of blood be it 500ml/1000ml. This concept can be misleading because certain blood loss in a patient with large blood volume might be insignificant, whereas the same blood loss in a patient with small blood volume might be highly significant. It would seem to be more pertinent to evaluate and record blood loss at delivery as a percentage of estimated blood volume.

It is recommended that PPH be defined as a loss of blood at delivery of greater than 15% of total blood volume.^{1,2} The present study is conducted in a tertiary care hospital to evaluate the amount of blood loss during third stage of labour in terms of percentage of total blood volume. To evaluate the

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Blood loss and percentage of total blood volume lost are more in abnormal cases when compared to normal deliveries.

Estimated blood volume was compared to direct estimation of blood volume by Statzer⁵ as shown in the table. It was found to be closely related with above studies except patient who were anemic. There is an inverse relationship of hematocrit (PCV) to blood volume.

DISCUSSIONS

In obstetric text books, PPH has been defined as loss of blood 500ml or more. According to George Nelson², this concept can be misleading. Since certain blood volume might be highly insignificant whereas the same blood loss in a patient with small blood volume may be highly significant. So it is better to evaluate and record blood loss at delivery as percentage of estimated blood volume and PPH has been defined as a loss of 15% of total blood volume.

Abraham Shulman criteria¹ of PPH:

1. 10% of TBVL –No apparent clinical signs
2. 20% of TBVL-definite clinical signs
3. 30% of TBVL-collapse

William E. Lucas⁴ classification of PPH:

Class I-Loss of 15% of Total blood volume (TBV)

Class II-20-25% of TBV

Class III-30-35% of TBVL

Class IV-40-45% of TBVL

In the present study, blood loss was showed wide variations 0.5 to 10%. More than 10% was considered as obstetric hemorrhage. When blood loss was approximately same, .e., 190 ml in two groups of patients, blood volume of 3000-3500 and 5000-5500 ml the percentage of total blood volume lost was 5.7% and 3.363%. With increasing blood volume, the percentage of total blood volume lost is decreased. This is to show that patient with lesser blood volume develops features of hemorrhage with less amount of blood loss than a patient with higher blood volume with the same amount of blood

loss.⁵⁻⁷

In the present study like Abraham Shulman, 10% of TBV norm has been taken to classify as PPH as the the patients recruited for the study belong to low socio-economic group with low blood volume. In the present study, up to 10% of TBVL no apparent clinical signs, 10-20% of TBVL with slight clinical changes like increased pulse rate and slight falling in BP. More than 25% showed marked changes in PR, BP and pallor.⁸

As total blood volume of a patient with normal pregnancy has to be calculated to know the percentage of total blood volume lost the relation of the total blood volume to various factors has been noted. Estimated blood volume was compared to direct estimation of blood volume by Statzer as shown in table-4. According to Lund Donovan⁷ hematocrit varies inversely with plasma volume with no changes in blood cell volume. In this study also hematocrit was noted to be inversely related to blood volume as shown in table -4. F.F Hytten and DB Paintor⁶ explained that increase in blood volume forms part of adoptive mechanism and shows increase in plasma is related to size of the baby. Thus increase of birth weight of the baby is related to increase of plasma volume. In this study also showed similar results as shown in table-2. According to Lund and Donovan increase in plasma volume is proportional to gain in mother’s weight after 24 weeks of gestation. Similar results were observed in the present study as shown in table-2.^{9,10}

Since there is considerable variation between patients in amount of blood loss and it seemed worth to enquire for the possible cause. There was undoubtedly many factors that affect blood loss in even apparently normal women. No obvious effects due to age, race and antenatal care etc., were noted by Newton. Same thing was noted in the present study. According to Michel Newton operative delivery by use of forceps did not shown increase of blood loss. It might be due to episiotomy that is always required. Similar observations were made in the present study also. Previous studies

S. No	Mother’s blood volume (ml)	No of cases	Blood loss-measured	Blood loss-alkaline method	% Of total blood volume lost-measured	% Of total blood volume lost-alkaline method
1	3000-3500	18	91.44	194.01	2.7	5.75
2	3501-4000	66	120.43	272.67	2.6	7.2
3	4001-4500	57	111.40	263.46	2.39	6.51
4	4501-5000	36	103.9	240.53	2.4	5.1
5	5001-5500	16	83.75	190.12	1.72	3.63

Chi square value=1.6653; P=0.999772; Not significant at 0.05

Table-1: Relation of blood volume to blood loss and percentage of total blood volume lost

S. No	Mother’s body weight in kgs	No of cases	Blood volume-TBV (ml)	S.No	Baby weight in kgs	No of cases	Blood volume-TBV (ml)
1	40-45	31	3627.77	1	2-2.5	64	3936.44
2	46-50	80	3932.76	2	2.6-3	108	4323.17
3	51-55	46	4401.40	3	3.1-3.5	20	4468.81
4	56-60	28	4821.92	4	3.6-4	8	4692.17
5	60+	16	5212.64				

Table-2: relation of blood volume to mother’s body weight and baby’s birth weight

S. No	Type of delivery	Blood volume- TBV (ml)	Blood loss ah meth- od ml	% Of TBV-ah method
1	Normal	4400	190	4.31
2	Abnormal			
	Instrumental	3943.73	346.99	8.9
	Post caesarian	4227.66	438.6	10.37
	Accelerated labour	42.98.36	379.6	8.83
	Malpresentation	3955.13	289.75	7.32

Table-3: Relation of blood loss and percentage of total blood volume lost in normal and abnormal cases

S. No	PCV	Direct blood volume statzer ml/kg	Estimated by formula george nelson ml/kg	Present study -pcv	Present study – estimated by formula ml/kg
1	36.6	68	76	37	75.4
2	39.4	77	71	39	71.5
3	31.2	97	91	31	90.02
4	32.0	99	87	32	87.2
5	37.6	77	74	37	75.2
6	34.7	76	81	34	82.07
7	32.9	81	85	33	84.5
8	29.1	73	96	29	96
9	NIL	NIL	NIL	27	103.3

Table-4: Comparison of direct blood volume and estimated by formula

noted height and weight of mother may show relation to blood loss but Michel Newton study, there was no information on relationship to age, physical type, nutritional status of mother, prolonged labour etc., in contrast to the present study showed an increase in loss of blood with increase in mother's weight post caesarian cases delivered vaginally those delivered after accelerating the labour etc., excessive blood loss as shown in the table-3.

CONCLUSIONS

200 cases were booked for the study. Blood loss during delivery was measured both qualitatively and by using Alkalinehematin method. Total blood volume and percentage of blood loss were calculated by using the formula.

Wide variations in blood loss ranging from 0.5 to 10% in normal cases were observed. Efforts to improve socio-economic status of the patients and early intervention can reduce blood loss to tolerable obstetric hemorrhage levels. Greater than 10% of blood loss patients can be recognized early and timely intervention of stopping of blood loss and replacement will benefit the mother. Patients with high blood volume can withstand better with certain amount of blood loss than a patient with low blood volume. Loss of blood is more in abnormal vaginal deliveries and increase of weight of mother and infant. Patients with high blood volume tolerate PPH better than patients with low blood volume.

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