"Partial Exchange Transfusion – A Forgotten Aspect of Critical Care !!!"

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Summary

A prospective study was carried in the Department of Obstetrics and Gynaecology, Baroda, where partial exchange transfusions were given to 14 patients of severe anaemia with either full term pregnancy or in the immediate postpartum period. Patients who had signs of imminent failure or who had failure were included. Partial exchange transfusion using whole blood 700cc was given to all over a period of 30 min. maintaining a deficit of 150-200cc. Average drop in pulse rate of 12/min, pulse pressure 10mm Hg, decreased breathlessness and correction of cardiac failure was observed within 24 hours, in all patients.

Haematological response in form of rise in Hb, about 1gm.% and PCV 6% were noted which is superior to infusing whole blood to the patient with inherent risk of circulatory overload. No complications of the procedures were noted in our study.

Therefore partial exchange transfusion has been proven to be of unquestionable supremacy in tiding over the immediate crisis and to bring back the patient from the brink of death.

Introduction

Despite of the improvement in peripheral health services, we still receive patients with severe anaemia in term and in labour. Severe anaemia contributes 20% to maternal mortality today (Menon 1968). Considering the morbidity associated with this condition, the objective of giving partial exchange transfusion with whole blood or packed cell volume is to improve the oxygen carrying capacity of blood and enable the patient to withstand the stress of labour and minimum loss of blood associated with delivery.

Materials & Method

This prospective study was carried out in the year 1997 from January to December. Fourteen patients with severe anaemia admitted to the labour room at full term pregnancy or in the immediate postpartum period were included.

Detailed history with reference to antenatal care taken, symptoms and labour details were recorded. General & systemic examination with obstetric examination was carried out to assess the severity of anaemia, cardiac status, complications of anaemia coexisting and fetal well being. Investigations were done to know the type and severity of anaemia. Patients having other medical diseases were not included. Partial exchange transfusion using whole blood averaging 700 ml/exchange was practiced.

The procedure included inserting a wide bore cannula in the antecubital vein and removing blood in ACD bag. Once >150 cc blood was removed, then by maintaining this constant deficit, whole blood was transfused from another vein.

Diuretics were given to all, digoxin was not given, prophylactic antibiotics were given to all.

Post transfusion a record of pulse, BP, RR, symptomatic improvement, rise in Hb and PCV were maintained immediately and after 3 days (72 hrs.)

Haematinic therapy depending upon the deficiency was begun post transfusion.

Analysis and Discussion

Table I : Out of total 14 patients 8(57.14%) had fullterm pregnancy of which 2(14.29%) had cardiac failure. Three of the six patients admitted (Total 6-42.85%) were received in a stage of cardiac failure. Cardiac failure is of more common occurrence in the post partum period. All patients were below 35 yrs.of age. Parity >2 was seen in 10(71.4%) patients.

Table II : Partial exchange transfusion patients had failure or imminent failure on admission. 12(85.7%) patients had pulse rate 120/min. In an attempt to maintain tissue perfusion firstly the stroke volume then heart rate is increased. Breathlessness was present on admission in all patients as their respiratory rate was >20/min. 3(21.4%) patients had rate more than 40/mn. Basal crepitation and sign of pulmonary oedema were seen in 5(35.7%) patients, who had cardiac failure associated. All patients had oedema of varying severity.

Average pulse pressure on admission was 56 mm Hg.

Table III : Two patients had haemoglobin <3gm.% and PCV<10%, both had cardiac failure. 12(86%) patients had haemoglobin between 3-5gm.% and PCV between 14-20%. If anaemic patients are not treated, those with imminent failure will develop overt failure and subsequently die.

Maximum PCV observed was 19% in cases of severe anaemia.

Table I
Patient Profile –1

	No.	%	Imminent Failure	Failure
1. Antenatal (full term)	08		06	02
Postpartum	06		03	03
II. Age distribution (Yrs.)				
25-30	10	(71.4)		
31-35	04	(28.6)		
>35	00			
III. Parity				
1.	01	(7.1)		
2.	03	(21.4)		
>2	10	(71.4)		

Table II
Patient Profile – II

	No.	%
1. Pulse on Admission (/min)		
Less than 120	12	(85.7)
More than 120	02	(14.2)
II. Respiratory Rate (/min)		
Less than 40	11	(78.6)
More than 40	03	(21.4)
III. Symptoms of Breathlessness		
Present	14	(100)
Absent	00	
IV. Cardiac Status		
Imminent failure	09	(64.3)
Failure	05	(35.7)
V. Oedema	14	(100)
VI. Average pulse pressure (mm Hg)	56	

Table III: Investigations (HB, PCV) on admission

		No.	%
1. Hb (gm%)			
	<3	02	(14.3)
	3.1 – 4	09	(64.2)
	4.1 – 5	03	(21.4)
II. PCV (%)			
	10	02	(14.3)
	11-15	09	(64.2)
	>15	03	(21.4)

Both patients who had Hb <3gm.% had PCV <10% on admission and had cardiac failure. Plasma volume is higher in cases of failure compared to those who are not in failure while PCV remains same for both.

Table IV: The table mentions the details of partial exchange transfusion performed. All patients were infused with 700 ml of whole blood in about 25-30 min with simultaneous removal of blood to maintain a deficit of about 150-200 cc at the end.

Table IV: Details of Partial Exchange Performed

1. Average amount of whole Blood transfused	700 ml
2. Volume deficit maintained	150-200 ml
3. Duration	25-30 min
4. Average amount of blood removal	850ml.

The deficit kept allows the patient to tolerate increase in the circulatory volume post transfusion because of plasma load infused. Diuretic was given before the procedure (Inj. Lasix 40 mg IV).

Table V: Post Transfusion Analysis

1. Improvement in breathlessness (No.)	14
2. Average drop in pulse rte (/min)	12
3. Pulse pressure average (mmHg)	46
4. Increase in immediate Hb. (gm%)	1
5. Average rise in PCV in 24 hrs (%)	6
6. Average increase of Hb after 3 days (%)	2
7. Average increase in PCV after 3 days (%)	8
8. Complications of procedure	Nil
9. Cardiac failure corrected (No.)	5

Table V: This table reflects the response of heart to partial exchange transfusion and other circulatory changes. In 100% patients the breathlessness improved and a fall in respiratory rate was noted. Average drop in pulse rate attained was 12/min. This drop was more significantly observed in cases with lower Hb & PCV values. Similarly average pulse pressure dropped to 10mmHg and cardiac failure was corrected in all. The circulatory improvements are seen secondary to improvement in cardiac output, decreased pulmonary resistnce, improved renal circulation and circulatory redistribution.

Immediate rise in Hb and PCV within 24 hrs was 1 gm% and 6% respectively. After 72 hrs. the same was 2 gm.% & 8%. The haematological response is also superior to direct blood transfusion avoiding circulatory load.

Table VI : Comparing the obstetric outcome, maternal mortality was seen only in 2 of our patients, both of whom had presented to us in the post partum period, 1 with irreversible shock and the second patient had severe hypoxic encephalopathy. No perinatal mortality was observed.

Table VI: Obstetric Outcome

	No.	%
FTND	08	(100)
Maternal Mortality	02	(14.28)
Perinatal Mortality	00	

Summary & Conclusion

- All the patients in our study group improved with partial exchange transfusion. The mortality rate was 14.28% which is significantly less than those observed in patients of CCF-23%.
- Immediate improvement in oxygen carrying capacity was noted.
- No adverse reactions were seen, like severe jaundice/cardiac arrest/air embolism/citrate toxicity.

Limitations:

Ideally literature mentions that –

- PCV should be used, but due to nonavailability of facilities we were not allowed to do so.
- Amount of blood used should ideally be 1200-1500 cc but we were able to manage only 2 bottles (700 cc) of whole blood.
- Nonavailability of donors and facilities led to inevitable delay of 4-6 hrs between patient admission to time of transfusion.

Acknowledgement

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References

1. Menon K.K; Proe. Nutr. Soc. Ind; 2, 1, 1968.