

INCIDENCE OF TRANSPLACENTAL HAEMORRHAGE IN POST PARTUM WOMEN AND ITS RELATIONSHIP TO USE OF OBSTETRIC PROCEDURES

by

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The concept of transplacental haemorrhage was first postulated by Levine (1943). Chown (1954) for the first time demonstrated erythrocytes of foetal origin in maternal circulation by differential agglutination and tests for foetal haemoglobin.

Several studies have been made of foetal cells in the blood of women during pregnancy and after delivery. Most but not all, workers found incidence and size of transplacental bleeds greater towards the end of the pregnancy than in the earlier stages. (Cohen *et al*, 1964, Woodrow and Finn, 1966). Cohen *et al*, (1964) found foetal cells more often immediately postpartum (50.3%) than in the last trimester of pregnancy. Woodrow *et al*, (1965) found foetal cells in 59 out of 200 women immediately after delivery and thought that in 40 of these, "haemorrhage" occurred during delivery. It is generally accepted that only during labour there is increased incidence of leak large enough to cause severe sensitization. (McConnel, 1966; Bantidevi *et al*, 1968). Indirect evidence of relationship of transplacental haemorrhage to complicated deliveries was recorded by Knox *et al* (1961). These authors relate the development of Rhesus antibodies to such deliveries.

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Several workers including Wimhofer *et al*, (1962), Woodrow *et al*, (1965), Ziprusky *et al* (1963 I and II), have studied transplacental haemorrhage in women who had had normal deliveries and also in those women whose deliveries were assisted by use of obstetric procedures. These authors used Acid-elution technique of Kleihauer *et al* (1957) either in its original form or its modification as suggested by Ziprusky *et al* (1959).

This study deals with the incidence and magnitude of transplacental haemorrhage in postpartum women at Medical College Hospital, Aurangabad. The relationship of use of obstetric procedures such as, manual removal of placenta, forceps application and caesarean section to transplacental haemorrhage is also studied.

Material and Methods

In 512 postpartum women, blood was examined for presence of foetal cells by Ziprusky's (1959) modification of Kleihauer Acid elution technique. Cases with complications such as, accidental haemorrhage, placenta praevia, toxæmia of pregnancy etc. were excluded. Blood was collected within 24 hours of delivery with potassium and ammonium oxalate as an anticoagulant and diluted to one in three with normal saline. Smears were made of this saline suspension, dried and fixed in absolute ethyl alcohol for 2 minutes. After fixation and drying, slides were

washed for 90 seconds in citrate and phosphate buffer (.16M, K_2HPO_4 and .18M Citric acid with pH of 3.4 to 3.6 at 37°C). Slides were stained with May Cruenwald stain and washed until no stain was visible with naked eye. After drying these were examined under low power. Two smears were examined from each case and average number of foetal cells detected was recorded as "foetal cell score". Foetal cells with this technique appear as pink stained refractile cells in the field of adult erythrocyte ghosts (Fig. 1).

TABLE 1

Foetal Blood in Maternal Circulation with Two-Minute Scan Under Low Power

Number of foetal cells	Estimated amount of foetal blood in maternal circulation (ml.).
0	0.0 ml
1.	0.1 ml.
2.	0.2 to 0.3 ml
3-4	0.4 to 0.7 ml.
16 and over	2.0 to 3.0 ml. and over

(After Ziprusky et al 1959)

Based on foetal cell score and estimated quantity of foetal blood transplacental haemorrhage was classified into minimal, small, moderate and large bleeds, as is shown in Table II (after Ziprusky et al, 1959).

ABO and Rh. Blood grouping of mother and foetus were done by tube methods.

Results

Table III shows analysis of transplacental haemorrhage, which was detected in a group of 512 unselected postpartum women. Eighty-five (16.6%) of these showed presence of foetal cells in their blood. This group is further split into two.

1. Those women who had normal delivery. Four hundred and thirty-five women belonged to this group. Out of these 435 women, 62 (13.3%) showed presence of foetal cells in their blood.

2. Those women who had complicated deliveries and in whom obstetric procedures were used. Seventy-seven women belonged to this group. Twenty-three (30.1%) of these 77 showed transplacental bleeds.

Table IV shows incidence and magnitude of transplacental haemorrhage in 512 postpartum women. These are grouped into 3 groups.

- (a) Unselected women population.
- (b) Women who had normal deliveries, and
- (c) Women in whom obstetric procedures were employed.

TABLE II

Estimated Quantity of Foetal Blood and Type of Transplacental Haemorrhage

Foetal cell score	Estimated quantity of foetal blood	Type of transplacental haemorrhage
1-2 cells	0.1 to 2.0 ml.	Minimal
2-4 cells	0.4 ml.	Small
5-10 cells	0.8 to 1.6 ml.	Moderate
10-60 cells or over 60	1.6 ml. or over	Large and massive

TABLE III
Analysis of Transplacental Haemorrhage and Type of Pregnancy

Type of pregnancy & delivery	Total number of women examined	Foetal cells detected		Foetal cells not detected	
		No.	%	No.	%
Unselected	512	85	16.6	427	83.4
Normal deliveries	435	62	13.3	373	86.7
Deliveries in which obstetric procedures were used	77	23	30.1	54	69.9

TABLE IV
Incidence and Magnitude of Transplacental Haemorrhage and Type of Pregnancy

Type of pregnancy & delivery	Number of women tested	Number of women in whom foetal cells detected		Distribution of foetal cells detected							
				Minimal		Small		Moderate		Large	
		No.	%	No.	%	No.	%	No.	%	No.	%
Unselected	512	85	16.6	25	4.98	27	5.27	24	4.68	9	1.71
Normal delivery group	435	62	13.3	17	3.9	21	4.8	19	4.4	5	1.14
Women in whom obstetric procedures were used	77	23	30.1	8	10.3	6	7.8	5	6.5	4	5.2

Discussion

Knowledge concerning the transplacental passage of foetal cells is of critical importance for the understanding of immunological relationship between the mother and the child and specially for mechanism of Rh-isoimmunization. In this study Acid-elution technique was used for demonstration of foetal cells in maternal circulation. Acid elution technique though simple is not an easy one. It requires careful standardization for obtaining reproducible results. In different modifications of this technique, there are variations either in the fixative, or pH of the buffer or difference in method of estimation of number of foetal cells. These variations in technique, difference in time of collection of postpartum specimen,

ABO status of the mother and the foetus explain the considerable differences in incidence of transplacental haemorrhage reported by various workers.

In the present study, incidence of transplacental haemorrhage was found to be 16.6 per cent in a sample of 512 unselected postpartum women. This was further divided into normal delivery group. In this group foetal cells are found to be present in 13.3 per cent, while in the other group of women in whom obstetric procedures were used to assist delivery foetal cells were detected in 30.1 per cent (Table V).

Wimhofer, Schneider and Leidenberger (1962) studied 765 women soon after delivery and found foetal cells in 75.9 per cent of cases. Out of these 118 i.e. 15.4

TABLE V
Incidence and Magnitude of Transplacental Haemorrhage Detected in Blood of Women Soon After Delivery

Author	Number of women tested	Foetal cells not detected		Foetal cells detected		Distribution of foetal cells detected							
		No.	%	No.	%	Minimal	Small	Moderate	Large				
Winhofer et al (1962)													
Normal delivery group	635	164	25.8	471	74.2	404	63.6	-	-	67	10.6	-	-
Obstetric procedure	130	20	15.4	110	84.6	59	45.3	-	-	51	39.3	-	-
Total	765	184	24.1	581	75.9	463	60.5	-	-	118	15.4	-	-
Ziprusky (1963)													
I & II Normal delivery group	121	99	81.8	22	18.2	-	-	16	13.2	5	4.1	1	0.8
Obstetric procedures	165	130	78.8	35	21.2	-	-	14	8.5	8	4.8	13	7.9
Woodrow et al (1965)	200	141	70.5	59	29.5	-	-	41	20.5	12	6.0	5	2.5
Present series Normal delivery group	435	373	86.7	62	13.5	17	3.9	21	4.8	19	4.4	5	1.14
Obstetric Procedure group	77	54	69.9	23	30.1	8	10.3	6	7.8	5	6.5	4	5.2
Total	512	427	83.4	85	16.6	25	4.88	27	5.27	24	4.68	9	1.66

per cent showed evidence of having received more than 0.04 ml. of blood. This amount of blood was found in 10.6 per cent of cases i.e. in 67 out of 635 women who delivered normally, while in 39.3 per cent cases i.e. in 57 out of 130 women in whom obstetric procedures were used. These authors used original Kleihauer Acid-elution technique which is supposed to be more sensitive but less reliable than Ziprusky's modification of Acid-elution technique* (Kosmos *et al*, 1963).

Ziprusky *et al* (1963 I) studied women who had a normal pregnancy and delivery and also women with complicated pregnancies and deliveries. They found evidence of moderate and large transplacental haemorrhage strikingly higher in complicated delivery group; out of 87 women who had undergone caesarean section, 10 had transplacental haemorrhage of more than 1 ml. of foetal blood compared with only 1 of 121 women after a normal delivery (1963 II).

Liverpool group of workers studied different series of postpartum women for foetal cells. In one of the series they tested, 200 women after parturition (1965) and foetal cells were found in 59. In 42 there were a few cells, in 12 a moderate sized bleed of 0.25 ml. and in 5 there was foetal bleed of over 3 ml.

It is probable that labour and mode of delivery of placenta may be important factors in causing large transplacental haemorrhage. We found that the important factor in aetiology of transplacental haemorrhage was use of obstetric procedures, such as forceps application, manual removal of placenta, and caesarean section. It is also observed that use of obstetric procedures cause not only increase in the percentage of transplacental haemorrhage but also increase in the size

of foetal bleed. Thus, we found that moderate and large transplacental haemorrhage occurred in 4.5 per cent of cases in normal delivery group as against in 14.1 per cent of cases in the group of women in whom obstetric procedures were used. This is in close agreement with the results of Ziprusky *et al* (1963 I) who found moderate and large bleeds in 4.9 per cent of normal delivery and 12.7 per cent of women in whom obstetric procedures were used. Wimhofer *et al* (Loc cit.) found moderate and large transplacental haemorrhage in 39.3 per cent of cases in whom obstetric procedures were employed and in 10 per cent of women belonging to normal delivery group. Findings of Parikh *et al* (1971), however, are at variance. They found that obstetric interference did not contribute to the incidence of foetal cells when compared to the normal cases. Findings of Krishna *et al* (1973) indicate that there is greater transfusion of foetal cells into maternal blood in cases who had caesarean section and normal removal of placenta as compared to normal cases.

Though the different series cited above are not strictly comparable, these point to the use of obstetric procedures as one of the important factors that has a significant effect on incidence and magnitude of transplacental haemorrhage. It was also observed that incidence of transplacental haemorrhage was higher in ABO-compatible cases than in ABO-incompatible cases. However, in two groups of study i.e. normal pregnancy and deliveries where obstetric procedures were employed, the incidence of ABO incompatibility was not significantly different.

Summary and Conclusions

In 512 postpartum women blood was examined for presence of foetal cells by

Ziprusky's modification (1959) of Kleihauer Acid elution technique. Foetal cells were detected in 85 i.e. 16.6 per cent women. Out of 512 women 435 had normal pregnancy and delivery. Out of these 435 women 62 i.e. (13.3%) showed presence of foetal cells in their blood. Remaining 77 women had complicated deliveries in whom obstetric procedures were used to assist delivery. Twenty-three (30.1%) of these 77 women showed presence of foetal cells. Use of obstetric procedures was found to be an important factor in the aetiology of transplacental haemorrhage. It was found to increase not only the incidence but also the magnitude of transplacental haemorrhage.

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See Fig. on Art Paper I