TRANSPLACENTAL HAEMORRHAGE IN ABORTIONS

by

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The passage of foetal cells in the maternal circulation have been demonstrated from the early weeks of gestation (Beer 1969). This passage of foetal cells increases as the period of gestation increases and is highest during labour suggesting that the placental barrier loses its integrity as pregnancy progresses. Cohen *et al,* (1964) reported a rising incidence from the end of the first trimester to 28.8% in the third trimester.

While the passage of foetal cells in the maternal circulation is very low in early pregnancy, any disturbance at the chorio-decidual space increases this incidence, (Pilkington *et al,* 1966). Knox (1961 and 1968) corroborated this and found subsequent development of rhesus immunization. In the search of the possibility of the prevention of erythroblastosis foetalis, abortions have been implicated as a mechanism for Rh sensitization. It is imperative, therefore, to identify those patients at risk, as this disturbance could on occasions give rise to the rare but possible risk of sensitization of Rh-ve women against the D antigen.

With the legalisation of abortions and with the rising incidence of induced abortions, this investigation was undertaken to see the place of abortions and surgical interference in the causation of transplacental passage of foetal erythrocytes and on the magnitude of the haemorrhage.

This study consisted of 133 slides from 77 women taken from the O.P.D. and wards of the Lady Hardinge Medical College, New Delhi. These included:

Controls whose pregnancies continued uninterrupted, 35 cases.

Cases of threatened abortion who bled, but whose pregnancies continued, 8 cases.

Those with spontaneous abortion, 5 cases.

Cases of inevitable or incomplete abortion. These required surgical evacuation, 29 cases.

The period of gestation varied from 6-26 weeks. Venous blood was collected in double oxalate prior to the abortion or surgical procedure and soon after the abortion was completed. A B O and Rh grouping were done. The Rh grouping showed that 61 cases were Rh + ve and 16 Rh — ve. Antibody titres were done when necessary.

A quantitative estimation of foetal erythrocytes in maternal blood was done by Feldaus modification of Kleihauer-Betkes' techniques (Clayton *et al,* 1963). Thin blood slides were fixed for 5 minutes in 80% ethyl alcohol and washed in Sorenson's phosphate buffer Ph 6.7 M/150 and immersed in a preheated jar

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Paper read at the 16th All India Conference at New Delhi in March, 1972.

Received for publication on 29-1-1973.

of citric acid phosphate buffer Ph 3.20 to 50°C and allowed to cool to 37°C in a waterbath. After 15 minutes they were washed again in Sorenson's phosphate buffer Ph. 6.7 M/150 and studied under the microscope.

Counting was done under high power and foetal cells appeared dark and refractile against eluted ghost adult cells.

Haemorrhage was calculated by Kleihauer's formula. Transplacental haemorrhage = Percentage of the ratio of the foetal cells/adult cells × 50 (Grobbelaar and Dunning, 1969).

Among 42 women who had vaginal bleeding, evidence of transplacental haemorrhage was found in 13 (30.9%). In cases of threatened abortion with minimal disturbance, the incidence was 1 in 8 (12.5%). This figure was only slightly higher than 11.4% in the control series, and much lower than 40% found in the preabortal state of those who subsequently aborted spontaneously. In these cases of spontaneous abortion, 50% were in the 2nd trimester and 75% showed evidence of postabortal transplacental haemorrhage which was small in amount.

TABLE I
Controls

	Smears	+ve for foetal cells	Percentage
1st trimester			
Rh +ve	14	0	0
Rh —ve	7	1	14.2%
Total	21	1	4.7%
2nd trimester			
Rh +ve	17	1	5.8%
Rh —ve	9	3	33.3%
Total	26	4	15.3%
Total number of patients			
Rh +ve	24	1	4.1%
Rh —ve	11	3	27.2%
Total	35	4	11.4%

In this study, out of 35 control cases 11.4% showed foetal cells in the maternal circulation. Of these 4.7% were in the first trimester, comparable to 4% found by Walsh *et al*, (1970) and 15.3% in the second, with the majority occurring in Rh — ve cases. Here among 11 cases, 14.2% otherwise normal Rh — ve women showed signs of foeto-maternal haemorrhage in the first trimester and 33.3% in the second trimester as against 0 and 5.8% among Rh + ve cases. Rh — ve women hence showed signs of greater inadequacy of the placental barrier.

In 29 cases of inevitable or incomplete abortion where the disturbance was maximum, foetomaternal haemorrhage occurred in 10 (34.4%). It was moderate in amount, and varied from 1 to 2 per 1000 maternal erythrocytes and again it was more in Rh — ve women, all of whom showed foetal cells in their circulation. Only one case showed a large haemorrhage of 10/1000 maternal cells.

Among 27 post-curettage cases, only 4 (14.8%) showed no foetal cells as against 23 (85.2%) who had varying degrees of haemorrhage. Of these 39.1%

TABLE II

Preabortal Findings

Foetal RBC per 1000 maternal erythrocytes	Control		Threatened Ab.		Spontaneous Ab.		Curetted		Percentage
	Rh +ve	Rh —ve	Rh +ve	Rh —ve	Rh +ve	Rh —ve	Rh +ve	Rh —ve	
0	23	8	6	1	2	1	19	0	
1	1	1	-	-	-	-	6	2	27.6%
2-4	-	2	1	-	2	-	-	1	3.4%
5-9	-	-	-	-	-	-	-	-	
10	-	-	-	-	-	-	1	-	3.4%
More than 10, Not eluted	-	-	-	-	1	-	-	-	
Total	24	11	7	1	4	1	26	3	
Positive for foetal cells	1	3	1	-	2	-	7	3	
Percentage	4.1%	27.2%	19.5%	-	40%	-	26.9%	100%	
Grand Total	35		8		5		29		
Positive for foetal cells	4		1		2		10		
	11.4%		12.5%		40%		34.4%		

TABLE III

Postabortal Findings

Foetal RBC per 1000 maternal erythrocytes	Spontaneous Ab.		Curetted		Total in curetted patients	Percentage in curetted patients	
	Rh +ve	Rh —ve	Rh +ve	Rh —ve			
0	-	-	4	0	4	14.8%	
1	-	-	8	1	9	39.1%	
2-4	2	-	9	1	10	43.4%	60.8%
5-9	-	-	2	-	2	8.7%	
10	-	-	-	-	-	-	
More than 10	-	-	1	1	2	8.7%	
Not eluted	1	1	-	-	-		
Total	4	-	24	3	27		
Positive for foetal cells	3	-	20	3			
Percentage	75%		83.3%	100%			
Grand Total	4		27				
+ve for FRC	3		23				
Percentage	75%		85.2%				

showed a haemorrhage of 1 per 1000 and 43.4% of 2-4 per 1000. In 17.4% it was severe and included 2 (8.7%) cases where the haemorrhage was massive. In 1, an Rh—ve patient, the maternal blood showed 30 foetal cells per 1000, 36 hours after curettage and 15 days later she still showed evidence of 6 per 1000 in her blood. However, on both occasions no antibodies were found. Again, no cells or antibodies were found 7 months later. Hence, once the process of abortion had progressed, the evidence of foeto-maternal haemorrhage rose from 40% pre-abortally to 75% in those who subsequently aborted and from 34.5% to 85.2% i.e. 2½ times more in those who had surgical interference. Moreover, unlike those with spontaneous abortion where haemorrhage was small to moderate, 60.8% of those who had surgical interference had larger amount of haemorrhage of 2 or more maternal red cells with 17.4% having severe to massive haemorrhage.

incidence in the first trimester was 4.7%. Rh—ve women showed signs of greater inadequacy of the placental barrier as 14.2% in the first trimester and 33.3% in the second trimester showed transplacental passage of foetal erythrocytes—figures much higher than that found in Rh+ve controls.

With the occurrence of any disturbance at the choriodecidual space there was a marked rise to 30.9%. The amount of transplacental haemorrhage was proportional to the disturbance, being minimal in cases with threatened abortion. Once the process of abortion had progressed the evidence of foetomaternal haemorrhage rose from 40% pre-abortally to 75% in those who subsequently aborted and from 34.5% to 85.2% i.e. 2½ times in those who had surgical interference. Gellen *et al,* (1965) found double the number following operations. However, as against those with spontaneous abortions where the haemorrhage was small,

TABLE IV
Postcurettage Findings

Total Cases	Foetal cells pre & post curettage	No foetal cells pre or post curettage	No foetal cells precurettage, but present post curettage
27	10	4	13
Percentage	37%	14.8%	48.6%

More important was the fact that 48.6% showed foetomaternal haemorrhage, post operatively where there was none before. Katz (1969) working on the same problem found 45.5% to be +ve after curettage.

Discussion

The transplacental passage of foetal cells into the maternal circulation is accepted as physiological. Walsh *et al,* (1970) found an incidence of 4% in early normal pregnancies and in this study the

with surgical interference the majority 60.8% showed a haemorrhage of 2-4/1000 or more maternal erythrocytes and of these 17.4% had severe or massive haemorrhage.

Hence, abortion itself can be responsible for occurrence of transplacental haemorrhage. When curretage is employed a significant passage of foetal cells in comparison to that found in normal pregnancies can occur. While in Rh + ve women the implications are not severe,

if spontaneous abortion occurs in an Rh—ve woman, she should be recognised as a high risk patient and adequately protected.

Curettage in Rh—ve patients carries a double risk. Due to an inherent placental pathology there was a higher incidence (14.2%) of transplacental haemorrhage even without interference. The added surgical trauma was responsible for further cells being thrown into the maternal circulation as in the case of one Rh—ve patient where the figure rose from 1/1000 pre-abortally to 30/1000, 36 hours after curettage.

The chances of sensitization in spontaneous abortion are not very high but when curettage is added a significant haemorrhage may occur and these women are certainly at risk. Bergstrom (1967) has shown that the rhesus antigen is present and is capable of giving rise to an antibody response from an early stage of pregnancy (38 days). Stratton (1943) demonstrated the Rh antigen on the RBC of a 48 mm. embryo and Chown (1955) from a 32 mm. foetus. Mollison (1968) regarded 0.02 ml. as the minimal potential immunising dose at a later stage in pregnancy. The British Medical Journal (1969) stated that if the minimum potential immunising dose of foetal blood is 0.5 ml. (equivalent to a foetal cell score of over 10) the risk of primary sensitisation must be very small and probably less than 1%. The quantity of foetal blood required to give an antibody reaction in early pregnancy is yet to be worked out. Mathews *et al*, (1969) have found potentially immunizing haemorrhage of 0.25 ml. in 3% of cases.

These findings suggest that any artificial interference of a pregnancy can result in transplacental haemorrhage. The use of immune gammaglobulin in these patients at risk is to be recommended, and to safeguard them, all Rh—ve patients should be given anti D gammaglobulin within 24-36 hours.

Acknowledgement

We thank Dr. S. Achaya, M.S., F.R.C.S., Principal and Medical Superintendent, Lady Hardinge Medical College & Hospital New Delhi for permission to publish this paper.

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