

# PLACENTAL GRADING BY ULTRASOUND IN PREGNANCY COMPLICATED WITH HYPERTENSION AND ITS CORRELATION WITH FOETAL OUTCOME\*

By

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## SUMMARY

One hundred primigravidae, having gestation beyond 30 weeks with known LMP and BP  $\geq \frac{140}{90}$  mm of Hg constituted the study group and 40 normotensive women with the above criteria comprised the control group. They were studied for placental grading by ultrasound and the findings were correlated with foetal outcome. Grade I placenta was significantly less common in the study group as compared to controls ( $p < 0.01$ ). Grade III placenta was significantly more in patients of severe PIH as compared to mild PIH ( $p < 0.001$ ). Preterm babies were born when placenta was grade II and III in 12.5% and 18.8% of the cases respectively in patients of PIH as compared to none in the normotensive controls, indicating accelerated placental maturity in PIH. Foetal distress was significantly more with grade III placenta ( $p < 0.01$ ) as compared to grade I and II. Better prognosis as regards foetal distress, birth asphyxia, spontaneous labour and perinatal mortality was observed with grade I placenta. IUGR babies resulted in 7.1% of the cases of PIH with grade I and 23.2% with grade II and 31.3% with grade III placenta. These were not statistically different.

### Introduction

By ultrasound, placenta can be localized and its structure studied. The appearance of placenta can be correlated to its maturation. Grannum and Hobbins

(1982) found accelerated placental grading in intrauterine growth retardation, hypertension complicating pregnancy and postmaturity. This study was undertaken to study the grading of placenta in pregnancy complicated with hypertension and correlating the findings with foetal outcome.

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### Material and Methods

The study group comprised of 100 primigravidae with known last menstrual

period and gestation of  $\geq 30$  weeks with PIH i.e. B.P. recording of  $\geq 140/90$  mm of Hg with or without albuminuria. Forty normotensive patients with remaining above criteria constituted the control group.

Besides detailed history and routine antenatal examination, ultrasound examination of placental structure was done. It was graded according to the classification of Grannum *et al* (1979). Management of the patients were left entirely to the treating obstetricians. Results of ultrasound examination was not available to them. These patients were followed up during delivery and till discharge from the hospital. Observations on placental grading with last ultrasound reading within a week of delivery were correlated with foetal outcome.

### Observations and Results

Pattern of distribution of placental grading in both study and control groups is shown in Table I. Grade I placental changes were significantly less in the study as compared to control group ( $p < 0.01$ ). Grade II and Grade III placentae, together, were significantly more in patients of PIH as compared to controls ( $p < 0.01$ ).

### Placental grading and foetal distress (Table II):

The incidence of foetal distress was significantly more with grade III placenta as compared to grade I ( $p < 0.01$ ) and grade II ( $p < 0.01$ ). There was no statistical difference in the foetal distress between study and control groups in

TABLE I  
Placental Grading: Pattern of Distribution

	Grade I			Grade II		Grade III	
	Total	No.	%	No.	%	No.	%
Control group	40	*22	55	15	37.5	3	7.5
Study group	100	*28	28	56	56	16	16
Mild	80	27	33.7	47	58.8	**6	7.5
Severe	20	1	5	9	45	**10	50

\*  $X^2 = 9.14$   $p < 0.01$ .

\*\*  $X^2 = 21.50$   $p < 0.001$ .

TABLE II  
Placental Grading and Foetal Distress

	Grade I			Grade II			Grade III		
	Total	F.D.		Total	F.D.		Total	F.D.	
		No.	%		No.	%		No.	%
Control group (40)	22	1	4.5	15	2	13.3	3	—	—
Study group (100)	28	**4	14.3	56	*10	17.9	16	8	50
Mild (80)	27	3	11.1	47	3	6.4	6	1	16.7
Severe (20)	1	1	100	9	7	77.8	10	7	70

\*  $X^2 = 6.55$   $p < 0.01$ .

\*\*  $X^2 = 6.86$   $p < 0.01$ .

placental grade I ( $p < 0.5$ ) and grade II ( $p > 0.5$ ). Foetal distress was present in 50% of the cases with grade III placenta in the study group. None of the patients in the control group had grade III placenta.

*Placental grading and birth asphyxia*  
(Table III)

Birth asphyxia occurred only in the study group with grade II & III placental changes. No birth asphyxia was noticed in both the groups with grade I placenta.

*Placental grading and onset of labour*  
(Table IV)

Spontaneous labour was significantly less with grade III placenta as compared to grade I and II combined ( $p < 0.001$ ). Induced labour was significantly high with grade III placenta ( $p < 0.001$ ).

*Placental grading and foetal maturity at birth* (Table V)

Prior to 37 weeks, grade II and III placental changes were found in 12.5% and 18.8% of the cases respectively in the study group as compared to none in the control group. This indicated premature ageing of placenta in PIH as compared to normotensive patients. Preterm appearance of grade III placenta was present in 30% of the cases of severe PIH as compared to none in mild PIH. Preterm appearance of grade II and III placenta together was significantly high in severe PIH as compared to mild PIH ( $p < 0.001$ ).

*Placental grading and foetal growth*  
(Table VI)

Babies were categorised using growth curve drawn by Ghosh *et al* (1971). The incidence of AGA (average for gestational age) babies was significantly more

TABLE III  
*Placental Grading and Birth Asphyxia*

	Grade I			Grade II			Grade III		
	T	B.A.		T	B.A.		T	B.A.	
		No.	%		No.	%		No.	%
Control	22	—	—	15	—	—	3	—	—
Study	28	—	—	56	3	5.4	16	4	25

T = Total.

TABLE IV  
*Placental Grading and Onset of Labour*

Groups	T	Grade I		T	Grade II		T	Grade III	
		Spon.	Ind.		Spon.	Ind.		Spon.	Ind.
Control	22	22	—	15	14	1	3	2	1
Study	28	27	1	56	16	40	16	8	8
Total	50	*49	1	71	*30	41	19	*10	9

\*  $X^2 = 22.87$  ( $p < .001$ ).

T = Total Spon. = Spontaneous Ind. = Induced.

TABLE V  
Placental Grading and Fetal Maturity at Birth

	T	Grade I		T	Grade II		T	Grade III	
		<37 wks	>37 wks		<37 wks	>37 wks		<37 wks	>37 wks
		Control group (40)	22		1	21		15	—
Study group (100)	28	4 (14.3%)	24 (85.7%)	56	7 (12.5%)	49 (87.5%)	16	3 (18.7%)	13 (81.3%)
Mild	27	4 (14.8%)	23 (85.2%)	47	3 (6.4%)	44 (93.6%)	6	—	6 (100%)
Severe	1	—	1 (100%)	9	*4 (44.4%)	5 (55.6%)	10	*3 (30%)	7 (70%)

\*  $X^2 = 11.37$  ( $p < 0.001$ ).

TABLE VI  
Placental Grading and Foetal Growth

	T	Grade I			T	Grade II			T	Grade III		
		IUGR	AGA	LGA		IUGR	AGA	LGA		IUGR	AGA	LGA
Control group (40)	22	—	20	2	15	1	12	2	3	—	3	—
Study group (100)	28	2	25 **45	1	56	13	40 **52	3	16	5	10 *13	1
Mild (80)	27	2	24	1	47	9	35	3	6	—	5	1
Severe (20)	1	—	1	—	9	4	5	—	10	5	5	—

\*  $X^2 = 4.78$   $p < 0.05$ .

\*\*  $X^2 = 5.18$   $p < 0.05$ .

with grade I placenta than with grade II ( $p < 0.05$ ) or with grade III ( $p < 0.05$ ) in the entire series. IUGR was seen with grade I placenta in 4% of the cases, with grade II placenta in 19.7% and with Grade III placenta in 26.3% of the cases. The difference was however not statistically significant.

#### Placental grading and perinatal mortality (Table VII)

There was no perinatal mortality associated with grade I placenta. It was 3.6% with grade II and 12.5% with grade III placenta. Incidence of perinatal mortality in grade III placenta was not significantly

TABLE VII  
Placental Grading and Perinatal Mortality

	Grade I			Grade II			Grade III		
	T	P.N.M.		T	P.N.M.		T	P.N.M.	
		No.	%		No.	%		No.	%
Control group	22	—	—	15	—	—	3	—	—
Study group	28	—	—	56	2	3.6	16	2	12.5

P.N.M. = Perinatal mortality.

higher than in grade II. Two of the deaths with grade II placenta were due to prematurity with birth asphyxia and septicæmia. With grade III placenta, 2 deaths were caused by intrauterine death due to severe IUGR and fresh stillbirth due to accidental haemorrhage.

*Placental grading and perinatal morbidity (Table VIII)*

TABLE VIII  
Placental Grading and Perinatal Morbidity

	Grade I			Grade II			Grade III		
	Total	P.N. Morb		Total	P.N. Morb		Total	P.N. Morb	
		No.	%		No.	%		No.	%
Control group	22	—	—	15	—	—	3	—	—
Study group	28	2	7.14	56	—	—	16	1	6.25

P.N. Morb: Perinatal morbidity.

Perinatal morbidity occurred in the study group only, 7.14% with grade I and 6.25% with grade III placenta.

*Discussion*

Grade I placenta was significantly less common in the study group as compared

to control group ( $p < 0.01$ ). The birth of preterm babies resulting from mothers with grade II & III placental grades indicated acceleration of placental maturity in PIH since none in the control group with preterm deliveries showed grade II or III changes. Further, preterm appearance of grade II and III placenta was significantly high in severe PIH as compared to mild PIH ( $p < 0.001$ ). The babies

who showed grade II and III changes though born preterm fared well and showed borderline term maturity.

At term, in normal patients Grannum and Hobbins (1979) found 40% of grade I placenta, about 40% grade II placenta and 15-20% grade III placenta. Normal term pregnancies showed grade III changes to

be lowest, varying between 7-20% (Grannum *et al*, 1979, Quinlan and Cruz, 1982 and Tabsch, 1983). Exception to this observation included patients with chronic hypertension, PIH and IUGR. Grade III placental changes were shown to precede PIH by 1-6 weeks (Quinlan *et al*, 1982). Finding of grade III placenta before 36 weeks indicated close foetal monitoring.

Foetal distress was significantly more with grade III placenta ( $p < 0.01$ ). Birth asphyxia occurred only in those with placental grading II or III. Spontaneous labour was significantly more with grade I and II placenta combined as compared to grade III ( $p < 0.001$ ). Though IUGR babies resulted in PIH cases in 7.1% with grade I, 23.2% with grade II and 31.3% with grade III, the difference was not significant statistically. Preterm appearance of grade III placenta was associated with increased incidence of IUGR in severe PIH as compared to mild PIH ( $p < 0.05$ ). This was true for grade II also ( $p < 0.01$ ). Fisher *et al* (1976) and Petrucha *et al* (1982) showed that premature senescence of placenta was associated with IUGR. Perinatal deaths occurred in patients with grade II and III placenta with an incidence of 3.6% and 12.5% respectively as compared to none in grade I placenta. Quinlan *et al* (1982) and Tabsch (1983) reported that

preterm appearance of grade III placenta was associated with adverse perinatal outcome.

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