Placental Grading and its Correlation with Foetal outcome

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Summary : Placental grading by ultrasonography was carried out in 125 normal and 125 high risk pregnancy cases after 28 weeks. After delivery Apgar score, birth weight, development of RDS and neonatal outcome were correlated with placental grading. In general it was found that the placental grading advanced with the gestational age in both low risk and high risk cases, but in hypertensive and IUGR cases placental maturity was accelerted being higher than in normal pregnancy of similar gestational age. Cases of diabetes and Rh incompatibility, however showed delayed maturity of placenta and lower grades were found even in cases approaching term. There was no definite relation of placental grading with birth weight and apgar score. Placental maturity showed a direct correlation with pulmonary maturity. Respiratory distress syndrome never developed when placental grade was III. Premature aging of placenta was an indication of decline in its function and was found to be associated with an increased incidence of maternal and foetal complications in the form of hypertension, IUGR, fetal demise, Abruptio placentae and perinatal mortality. Presence of grade III placenta requires close monitoing with the continuation of pregnancy.

Introduction

Assessment of foetal maturity and the optimal time for intervention still remains an engima for practicing obstetricians. The impact of the use of ultrasonography in the practice of obstetrics has been great. Maturational changes in placenta have been found to correlate with functional maturity of foetus by Grannum et al (1979), who classified all placentae into different grades according to their ultrasonographic appearance as follows:
Grade O: Placental body is homogeneous. The amniochorionic plate is even throughout.
Grade I : Placental body shows a few echogenic densities ranging from 2-4 mm in diameter. Chorionic plate shows small indentations.
Grade II : Chorionic plate shows marked indentations,creating comma-like densities which extend into the placental substance but do not reach the basal layer. The echogenic densities within the placental substance also increase in size and number. The basal layer becomes punctuated with linear echoes which are arranged with their long axis parallel to the basal layer.
Grade III : Swiss cheese pattern
Amniochorionic plate developes multiple indentations which extend all the way to the basal layer without a break. The echogenic densities within the placental substance become larger and irregular and appear close to the chorionic plate. The echogenic densities in the basal layer also persist and become larger, more dense and confluent. Sonolucent areas appear within the placental body giving it a swiss cheese appearance.

The present study was undertaken to find out the maturational changes in placenta at various gestational ages and their co-relation with perinatal outcome including birth weight, Apgar score, development of RDS and neonatal death.

Material and Method

A total 250 cases after 28 weeks of pregnancy were studied, 125 of them had no medical or obstetrical complication and were catagorised as normal group, while 125 cases having medical or obstetrical complication were catagorised as high risk group.

After a careful history taking and a thorough clinical examination, all the patients were subjected to ultrasonographic examination to study details of foetal and placental profile. Date of last menstrual period was correctly known in all the cases. Placental grading was done according to Grannum classification. Birth weight, Apgar score, development of RDS and perinatal mortality were recorded and correlated with placental grading.

Discussion

Table I: Table I showing Distribution of cases according to risk factors. Risk factors are HT, IUGR, Rh negative, APH, Postdatism, Diabetes mellitus, Maximum cases 32% belong to hypertensive group.

Table II:Correlation of Placental grading with gestational age in normal and high risk cases.

As pregnancy advanced placenta got more & more matured. As evident from table II placental maturity increases with gestational age in normal and high risk cases, but in high risk cases placenta maturates earlier. At term in normal cases grades I placenta was present - 3 cases, II - 22 cases, grade III - 22 cases and in high risk cases placental grade was I in nil, II - 12, III - 24 cases. In high risk cases between 28-31 weeks grade III placenta was present in 3 cases but it was not found in low risk cases.

Table III : Placental grading in different high risk cases.

In hypertensive and IUGR cases accelerated maturity might be a result of uteroplacental ischemia.

There were 5 cases of diabetes mellitus in presentt series, none of them showed grade III placenta even at term.

Table I

Distribution of Cases according to risk factors

Risk factors	No. of cases	Percentage
Hypertension	40	32
IUGR	25	20
Rh negative	25	20
APH	11	09
Postdatism	19	15
Diabetes mellitus	05	04
Total	125	100

Table II

Correlation of Placental grading with gestational age in normal and high risk cases

Placental Grade	Normal Cases (Gestational age in wks) % Distribution of cases			High risk Cases (Gestational age in wks. % Distribution of cases		
	28-31%	32-37%	>37(%)	28-31(%)	32-37(%)	>37%)
0	02(12.5)	00	00	02(9.5)	02(2.9)	00
I	08(50.0)	07(11.3)	03(6.4)	07(33.4)	06(8.9)	00
II	06(37.5)	39(62.9)	22(46.8)	09(42.9)	30(44.1)	12(33.3)
III	00	16(25.8)	22(46.8)	03(14.2)	30(44.1)	24(66.7)
Total	16(12.8)	62(49.6)	47(37.6)	21(16.8)	68(54.4)	36(28.8)

A lag in placental maturity in diabetes has been observed by other workers too (Grannum et al 1979).

There are 25 cases of Rh -ve women with pregnancy, 3 cases between 28-31 weeks, 16 cases between 32-37 weeks and 6 cases after 37 weeks. Of term cases 5 had grade II placenta & 1 had grade III placenta.

Table IV : Correlattion of Birth weight and Apgar score with placental grading in cases delivered within a week of USG.

As the ultrasonography machine is not located in our department, so it was not possible to repeat USG in patients as they came as emergency in labour room. This is the reason that the birth weight and apgar score was correlated only in those cases who delivered within a week of USG.

Table III

Placental grading in different high risk cases

Risk Factor	Gestational age in weeks	Placental Grade 0	1	II	III	Total
Hyertension (40)	28-31	0	03	04	01	08
	32-37	0	00	07	12	19
	>37	0	00	04	09	13
Rh -ve	28-31	01	02	00	00	03
(25)	32-37	02	03	08	03	16
	>37	0	00	05	01	06
IUGR	28-31	0	02	01	02	05
(25)	32-37	0	00	07	05	12
	>37	0	00	01	07	08
Diabetes Mellitus	28-31	0	00	00	00	00
(05)	32-37	0	03	00	00	03
	>37	0	00	02	00	02

Table IV

Correlation of Birth weight and Apgar score with placental grading in cases delivered within a week of USG.

Birth weight	Grade O	Grade I	Grade II	Grade III	Total
≤ 1.5 kg	0	0	02	01	03
> 1.5-2 kg	0	01	02	01	04
> 2-2.5 kg	0	03	12	10	25
> 2.5 kg	0	01	09	20	30
Apgar score					
0-3	0	1	03	04	08
4-6	0	1	03	06	10
7-10	0	3	19	22	44

It is observed that as placental maturity increases, the birth weight increases. In present series 62.5% cases with grade III placenta had <2.5 kg birth weight. But low birth weight <2 kg was also present with grade III in 28.5% cases.

It is seen that good apgar score was associated with higher grades i.e. II and III but low apgar score not necessarily associated with lower grade placenta. It is observed in this series that 4 babies with low apgar score had grade III placenta. Out of these, 2 babies could not be saved.

Table V : Correlation of placental grading with perinatal deaths and development of RDS. There were 18 perinatal deaths in present series and were associated with all placental grades.

It was found in this series that none of the cases with grade III placental maturity developed RDS, making 100% correlation with pulmonary maturity.

This correlates well with other studies.

Study	Year	Development of RDS
Grannum et al	1979	Nil
Petrucha et al	1982	Nil
Kazzi et al	1984	Nil
Gross et al	1985	Nil
Shah et al	1986	Nil
Roy et al	1994	Nil

Table VI: Early maturation of placenta (Grade III before 37 weeks) and maternal and foetal complications.

It is observed that if placenta maturates early i.e. grade III placenta before 37 weeks, maternal complication was

Table V

Correlattion of placental grading with perinatal deaths and development of RDS

Placental Grade	Perinatal mortality		RDS +ve	
	Still Birth	Neonatal Death	Low Risk	High Risk
0	0	00	00	02
I	02	02	00	02
II	06	00	02	06
III	02	06	00	00
Total	10	08	02	10

Table VI

Early maturattion of placenta (Grade III before 37 weeks) and maternal and foetal complications

Gestational age in weeks	No. of Cases	Foetal Complications				Maternal Complications	
		IUGR	FD	SB	Neon. death	Hypertension	Abruptio Placentae
29-30	02	02	-	-	-	-	-
31-32	01	-	-	-	-	01	-
33-34	04	-	03	-	-1	-	-
35-36	16	03	06	-	01	06	01
Total	23	05	09	-	02	07	01

present in 8 cases and foetal complication was present in 16 cases in the form of IUGR, FD, and neonatal death. Quinlan et al (1982) reported a high incidence 78% of perinatal problems in association with preterm appearance of grade III changes.

Conclusion

In general in both groups it was found that as pregnancy advances grade II and grade III placenta are more common. In hypertensive and IUGR cases placental maturity accelerates due to compromised uteroplacental circulation. But in diabetic and Rh-ve women lower grades of placenta were more common indicating tendency towards delayed maturation. In APH cases placental grading had no significant role in the diagnosis and management. Overall higher grades of placenta are associated with higher birth weight but this does not hold good for cases of HT and IUGR. Good apgar score were associated with higher grades but low apgar score was also found with grade III placenta. So there is no definite relationship between grading and apgar score. Presence of grade III placenta is definitely correlated with good pulmonary maturity as seen by absence of RDS in the babies. So the placental grading can be an alternative to L/S ratio especially in term pregnancy when the placental grade is III.There is no correlation of placental grading with perinatal mortality. Detection of higher grades early in 3rd terimester can alert the obstetrician for closer observation regading development of PIH, IUGR, Abruptio placentae, foetal distress and perinatal maturity. There is definite correlation of early maturation of placentae with foetal complications.

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