



PLACENTAL GRADING ON USG AND IT'S CORRELATION WITH FOETAL OUTCOME

Obstetrics & Gynaecology

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ABSTRACT

Aims & Objectives: To determine the placental grading on USG and it's correlation with foetal outcome **Materials & Methods:** Present study is hospital based observational, comparative prospective study which was conducted in Department of Obstetrics and Gynaecology, SMS Medical College & Hospitals, Jaipur from April 2021 to February 2022 on 200 antenatal cases. They were divided in two groups of normal cases (Group A) and High risk cases (Group B) with 100 cases in each group. **Result:** Grade I placenta were present in 10% of high risk group and 12% of normal group; grade II placenta were present in 39% of the high risk group and 55% of the normal group and grade III placenta were present in 48% of the high risk group and 31% of the normal group. In our subgroup of 20 preterm hypertensive patients, 65% had grade III placenta as compared with 11.2% of the normal cases. In both the term diabetic and term Rh-sensitized subgroups (1 and 5 in number respectively) there was a strong shift towards grade I placenta. Grade III placenta was not found in diabetic subgroup and was present only in 16.6 % of the Rh-sensitized subgroup. 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 accelerated being higher than in normal pregnancy of similar gestational age. **Conclusion:** Placental grading on USG can play an important role in assessment of foetal well being in both normal as well as high risk cases. Presence of grade III placenta requires close monitoring with the continuation of pregnancy.

KEYWORDS

Calcification; IUGR; Placenta; Pregnancy

INTRODUCTION:

Placental grading refers to an ultrasound grading system of the placenta based on its maturity. This primarily affects the extent of calcifications. With the advent of sonography, it became possible to evaluate calcium content in the placenta in-utero. A sonographic classification system for grading placenta in-utero according to it's maturation was developed by Grannum et al.¹

The grading system is as follows²:

Grade 0: <18 weeks

- Uniform echogenicity
- Smooth chorionic plate

Grade I: 18-29 weeks

- Occasional parenchymal calcification/hyperechoic areas
- Subtle indentations of chorionic plate

Grade II: 30-38 weeks

- Occasional basal calcification/hyperechoic areas
- Deeper indentations of the chorionic plate (does not reach up to the basal plate)
- Seen as comma type densities at the chorionic plate

Grade III: ≥ 39 weeks

- Significant basal plate calcification
- Chorionic plate interrupted by indentations (frequently calcified) that reach up to the basal plate: cotyledons
- An early progression to a grade iii placenta is of concern and is termed as hyper mature placenta and sometimes associated with placental insufficiency.

Proper growth, maturation and functioning of placenta is a must for the proper growth and development of the foetus in-utero. Morphological changes of the placenta can be documented with gray-scale serial ultrasound examination as pregnancy advances and it can help in predicting the neonatal outcome in normal and high risk pregnancies.

We studied the association of placental grade and calcification at various gestational ages and their correlation with perinatal outcome including birth weight, APGAR score, development of Respiratory Distress Syndrome and neonatal death.

MATERIAL AND METHODS:

Present study is hospital based observational, comparative prospective study which was conducted in Department of Obstetrics and Gynaecology, SMS Medical College & Hospitals, Jaipur from April 2021 to February 2022 on 200 antenatal cases.

After taking written informed consent, all antenatal women after 28 weeks of gestation, attending our OPD (Outpatient Department) were included in the study and followed till pregnancy outcome.

Selected cases were divided into two equal groups:

Group A (Normal cases):

This group comprised of 100 patients with singleton pregnancies, having no medical or obstetrical complications in the current pregnancy.

Group B (High risk cases):

This group comprised of 100 patients with singleton pregnancies, having medical or obstetrical complications like pregnancy induced hypertension, IUGR, diabetes mellitus, Rh negative pregnancy, antepartum haemorrhage and postdatism in current pregnancy. After a careful history taking and a thorough clinical examination, the cases were subjected to transabdominal ultrasonographic examination to document placental maturity and foetal profile.

Placental grading was done according to the Grannum's classification. After delivery -birth weight, Apgar score, development of Respiratory distress syndrome and perinatal mortality was noted and correlated with placental grading.

RESULTS:

Table 1: Distribution of cases according to risk factors

Risk factors	No. of cases	%
Hypertension	35	35
IUGR	20	20
Rh negative	20	20
APH	07	7
Postdatism	15	15
Diabetes mellitus	03	3
Total	100	100

Table 1 showing distribution of cases according to risk factors. Risk factors are HT, IUGR, Rh negative, APH, Postdatism, Diabetes mellitus. Maximum cases among high risk cases (35%) belonged to hypertensive group.

Table 2: Correlation of placental grading with gestational age in normal and high risk cases.

Placental grade	Normal cases			High risk cases		
	Gestational age in weeks (% distribution of cases)			Gestational age in weeks (% distribution of cases)		
	28-31	32-37	>37	28-31	32-37	>37
0	02(14.3)	00	0	01(6.7)	02(3.3)	00
I	07(50)	05(9)	00	05(33.3)	05(8.4)	00
II	05(35.7)	35(62.5)	15(50)	06(40)	23(38.3)	10(40)
III	00(0)	16(28.5)	15(50)	03(20)	30(50)	15(60)
Total	14(100)	56(100)	30(100)	15(100)	60(100)	25(100)

The above table shows that as pregnancy advances, so does placental maturity. Placental maturity increases with gestational age in both normal and high risk cases, but in high risk cases placenta matures earlier. In normal cases, at term grade I placenta was present in none of the cases(0%), grade II was present in 15 cases(50%) and grade III also in 15 cases(50%). Among high risk cases, placental grade I was present in none of the cases(0%), grade II was seen in 10 cases(40%) and grade III in 15 cases(60%). In preterm high risk cases (28-31 weeks) grade III placenta was present in 3 cases(20%) but it was not found in low risk or normal cases.

Table 3: Placental grading in different high risk cases

Risk factors	Gestational age in weeks	Placental grade				
		0	I	II	III	Total
Hypertension (35)	28-31	00	01	02	2	5
	32-37	00	00	04	11	15
	>37	00	00	03	12	15
Rh negative (20)	28-31	01	02	00	00	03
	32-37	01	02	07	02	12
	>37	00	00	04	01	05
IUGR(20)	28-31	00	02	01	02	05
	32-37	00	00	07	03	10
	>37	00	00	02	03	05
DM(05)	28-31	00	00	00	00	00
	32-37	00	02	00	00	02
	>37	00	00	01	00	01

There was strong correlation between accelerated placental maturation and specific disease states, particularly hypertension and IUGR. A similar finding was reported by Jeacock⁷, who compared preterm pre-eclamptic patients with normal preterm gravidas and found a higher concentration of calcium in the placentas of patients with toxemia.

There were 20 cases of Rh-negative women among whom 3 cases were between 28-31 weeks, 12 cases between 32-37 weeks and 5 cases after 37 weeks out of which in term cases 12 had grade II placenta and 5 had grade III placenta. It was noted that there was delayed placental maturation in pregnancies complicated by diabetes or Rh sensitization.

Table 4: Correlation of placental grading with perinatal deaths and development of RDS

Grade	Perinatal mortality		RDS +ve	
	Still birth	Neonatal death	Low risk	High risk
0	00	00	00	01
I	02	02	00	02
II	06	00	02	06
III	02	06	00	00
Total	10	08	02	08

It was found during this study that none of the cases with grade III placental maturity developed RDS in both normal and high risk cases, making 100% correlation with pulmonary maturity.

Table 5: Early maturation of placenta (Grade III before 37 weeks and maternal and foetal complications)

GA	No.	Foetal complications				Maternal Complications	
		IUGR	Foetal Distress	Still Birth	Neonatal Death	HTN	Abrupton
29-30	02	02	00	00	00	00	00

31-32	01	00	00	00	00	01	00
33-34	04	00	03	00	01	00	00
35-36	16	03	06	00	01	06	01
Total	23	05	09	00	02	07	01

It is observed that if placenta matures early i.e. grade III placenta before 37 weeks, maternal complications were present in 8 cases and foetal complications were present in 16 cases in the form of IUGR, FD, and neonatal death.

DISCUSSION:

For some years now, ultrasound has taken its place in the daily practice of prenatal care by obstetricians. Initially it was used as a method to assess gestational age and placental localization. Because of improvement of the technical equipment it also became possible to observe foetal behavior in vivo.

Placental calcification is the deposition of calcium-phosphate minerals in placental tissue. It is seen in patients with and without placental pathology (Tindall and Scott, 1965)

The association of placental grading by sonography with the assessment of foetal lung maturity was established by Grannum et al.⁴ in 1979. Agarwal and Jain (2000)⁵ suggested that the placental grading advanced with the gestational age in both low and high risk pregnancies but in cases with hypertension and IUGR, placental maturity was accelerated being higher than normal pregnancy of similar gestational age. Placentae of newborn infants who are small-for-gestational age (SGA) show more ischemic lesions (fibrin and calcium depositions, infarcts) than those in placentae of neonates who are appropriate for gestational age (AGA). Cases of diabetes mellitus showed delayed maturity of placenta and lower grades were found even in patients approaching term.⁶ Placental maturity showed a direct correlation with pulmonary maturity. Respiratory distress syndrome never developed when placenta was grade III. In normal pregnancy, grade III placenta are frequently seen after 34 weeks of gestation. In contrast, a grade III placenta in the preterm pregnancies may have clinical significance.

In particular, preterm pregnancies complicated by intrauterine growth restriction showed a high incidence of grade III placenta(21.7%) , and preterm pregnancies complicated by hypertension showed a 30.4% incidence of grade III placenta. We conclude that certain conditions in pregnancy such as intrauterine growth restriction, hypertension predispose to accelerated placental maturation.⁷ These findings are further evidence that placental grading can play an important role in assessment of foetal well being along with oligohydroamnios, foetal weight , foetal movements, foetal breathing motions, and foetal tone. This study provided some basic information regarding placental grading by USG both in normal and high risk pregnancies. Though this was a cross sectional study, yet this work strived to depict a precise picture on sonographic placental grading and its relationship with high risk pregnancies and foetal outcome. From the study it is clear that accurate sonographic image of placenta can provide information earlier regarding its maturity and foetal outcome. Further research in this area is vital if progress is to be made in utilizing the placenta as part of the assessment of foetal health.

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Declarations

Conflict of interest:

The authors declare that they have no conflict of interest and there is no violation of human rights.

Ethical Approval:

The study received approval from the institutional ethics committee.

Informed consent:

Written informed consent was obtained from the study participants.

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