

ULTRASOUND - A NON INVASIVE WAY TO PREDICT RESPIRATORY DISTRESS SYNDROME

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SUMMARY

Antenatal prediction of the risk of Respiratory Distress Syndrome will help in preventing it where ever possible by delaying the delivery. In a prospective study on 101 mothers a comparison was made between the analysis of Amniotic fluid by Rapid surfactant test and Multiple Ultrasonic parameters obtained by a single scan late in pregnancy in evaluating the pulmonary function. The Rapid surfactant test accurately predicted a mature pulmonary function in 97 of these patients. Ultrasonic estimation of fetal weight and Placental Grading together predicted a mature pulmonary function in 42 mothers. Inclusion of additional parameters may improve the accuracy of prediction of a mature pulmonary function. Further Multiple Ultrasonic Parameters may be used as the first non-invasive step in the "Maturity Cascade" in evaluating the fetal pulmonary status.

INTRODUCTION

Respiratory Distress Syndrome is a major etiological factor responsible for morbidity and mortality in preterm infants. A critical knowledge about the pulmonary status of the fetus will help in predicting the risk of development of RDS. In management decisions in obstetrics which involves termination of pregnancy a knowledge about the risk of RDS may go a long way in preventing its development where ever possible

by postponing delivery.

In patients who are attending regular antenatal check ups and in whom gestational age is a certainty, it may not be very difficult to predict fetal maturity. But patients who report late in pregnancy for the first time or patients in whom pregnancy has to be terminated prematurely pose problems in assessment of fetal maturity. Analysis of amniotic fluid by various methods has remained so far the standard test for evaluating the pulmonary status of the fetus. But this involves the invasive procedure of amniocentesis which may not be safe or possible in all circum-

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stances.

In this prospective study on 101 pregnant mothers an attempt has been made to estimate fetal maturity by a combination of placental grading and estimated fetal weight (using Warsof's equation) obtained from a single ultrasonic scan. The results are compared with the results from Rapid Surfactant Test of amniotic fluid on the same patient.

MATERIAL AND METHODS

Mothers admitted for delivery at Safdarjang hospital, New Delhi were selected at random and subjected to an ultrasound scanning. Those who did not deliver within 48 hours of scanning were excluded from the study.

Fetal biparietal diameter and Abdominal circumference were measured by the standard technique and fetal weight was estimated using the table of estimated weight of Warsof et al (modified formula 1977).

Placental morphology was studied and pla-

centa was graded in to one of the four grades as per the classification of Grannum et al (1979).

Amniotic fluid was collected by transabdominal amniocentesis or by aspiration of forewaters (in patients with established labour) and the pulmonary status was evaluated by the Rapid Surfactant Test as described by Clements et al (1972)

OBSERVATIONS :

Out of 101 mothers in this study only 15 had grade III placenta.

The Warsof's formula predicted the fetal weight in this study group with an accuracy of + 92.84 Gms/Kg of actual birth weight (1 SD).

In 97 mothers the Rapid Surfactant test predicted a mature pulmonary function and none of these fetuses developed RDS. Of the four fetuses having a negative surfactant test only two fetuses developed RDS.

The correlation of placental grading, Actual birth weight and the results of Rapid surfactant

TABLE I

Actual Birth wt.	Placental Grading							
	Grade O		Grade I		Grade II		Grade III	
	*Shake +ve	Test -ve	*Shake +ve	Test -ve	*Shake +ve	Test -ve	*Shake +ve	Test -ve
2000 Gm & less	1	-	1	1	4	1	3	-
2001 Gm to 2500 GM	-	-	10	2@	13	-	4	-
2501 Gm to 3000 GM	-	-	22	-	21	-	5	-
3000 Gm & above	-	-	4	-	6	-	3	-

CORRELATION OF PLACENTAL GRADING, ACTUAL BIRTH WEIGHT & RESULTS OF SHAKE TEST

*Shake Test on the Rapid surfactant Test was considered

+ve when there was a persistant bubble at the end of 15 minutes in 1:1 dilution of Amniotic fluid.

@ These two fetuses developed RDS.

TABLE II

Estimated Fetal wt.	Grade O	Placental Grading		
		Grade I	Grade II	Grade III
2000 Gm & less	1	4	4	4
2001 Gms to 2500 Gms	-	11	18	4
2501 Gms to 3000 Gms	-	21	12	4
3000 Gms & above	-	4	11	3

CORRELATION OF PLACENTAL GRADING
AND

ESTIMATED FETAL WEIGHT

test are shown in Table 1. Table 2 shows the correlation of placental grading and estimated fetal weight by Warsof formula.

DISCUSSION :

Estimation of fetal pulmonary maturity by the non-invasive technique of Ultrasonography remains an ideal yet to be fully investigated.

Grannum et al (1979) proposed a method of Ultrasonic grading of placenta and reported that only a Grade III placenta is of clinical significance in predicting a mature pulmonary function. Following this others have confirmed and some have disputed this claim. (Petrucha et al 1982, Harman et al 1982, Quinlan et al 1982).

Using this criteria of placental grading alone in this study none of the fetuses with a grade III placenta developed RDS and all correlated with a positive Rapid Surfactant test. But only 15 of the 101 pregnant mothers in this study had a grade III placenta making this a low specificity parameter in predicting a mature pulmonary function.

None of the fetuses weighing more than 2500Gms at birth developed RDS and all these fetuses demonstrated a positive Rapid Surfactant Test. Since the fetal weight predicted by Warsof's formula has an accuracy of around + 100 Gms. Kg of birth weight, considering the 95% confi-

dence limit, a fetus estimated to weight 3000 Gm is unlikely to have an actual birth weight of less than 2500 Gms. Using 3000 Gms of estimated fetal weight as the cut off point for predicting mature fetus, 18 fetuses in this study qualified as mature. Among these 18 fetuses 15 had placental grading other than Grade III.

Thus using a combination of grade III placenta and an estimated fetal weight of more than 3000 Gms as criteria for predicting a mature pulmonary function, 30 out of 101 fetuses in this study were predicted to be having a mature pulmonary function.

Another observation of this study has been that none of the fetuses with a birth weight of more than 2000 Gms and a grade II placenta correlated with a negative Rapid Surfactant Test and developed RDS in the neonatal period. Considering this fact and taking into account 95% confidence limit of the accuracy of prediction by Warsof's formula, 12 fetuses in this study were found to have a grade II placenta and an estimated weight between 2400-3000 Gms. None of these fetuses correlated with a negative Rapid Surfactant Test and developed RDS in the neonatal period.

Thus by using the maturity criteria of 1) Grade III placenta, 2) An estimated fetal weight

of more than 3000 Gms and 3) A combination of Grade II placenta and estimated fetal weight of more than 2400 Gms, 42 out of 101 mothers in this study were predicted to have a mature fetus.

The present study did not have any pregnant mothers with gestational diabetes or Rh iso-immunization. Further study is needed to evaluate the accuracy of these maturity criteria in these high risk groups.

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SUMMARY

The present article is a prospective study of association of fetal growth with maternal nutrition and utilization of maternal care. Total 101 mothers delivered singleton live born babies in a tertiary care of obstetrics in Maharashtra, were evaluated for anthropometry, hemoglobin status, diabetes and maternal care received during pregnancy. Birth weight of their offspring was also recorded.

The mean gestational caloric intake, protein intake, and hemoglobin was 1657 Cal/day, 77 gm/day and 8.8 gm/dl respectively. The mean birth weight of offspring was 3873 gms. only. 101 mothers were of regular antenatal care. The mean duration and number of visits were 30.8 and 8.6 respectively.

The mean birth weight increased significantly as the maternal protein and caloric intake and hemoglobin levels increased. However, the association of birth-weight was relatively less significant with protein intake (p=0.001) as compared to that with caloric and hemoglobin (p=0.001 each). The importance of LBM delivery was negatively associated with all maternal parameters.

The differences in mean birth weight and proportions of LBM were also inversely significant (p<0.001 and p<0.01 respectively) in mothers receiving regular antenatal care than in drop-out or non attenders.

CONCLUSION

Among the greatest maternal factors likely to affect fetal growth (Kramer, 1987) which are modifiable in a positive direction over

after conception are maternal nutrition and hemoglobin status by proper antenatal care, often are beyond our control. Hence it is important to assess the influence of these modifiable factors on pregnancy and its outcome. Though various studies have been conducted in this respect, the influence of these factors, most of them are

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