

# DETERMINATION OF GESTATIONAL AGE BY ULTRASONIC PLACENTAL MEASUREMENT

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## SUMMARY

One hundred and two women carrying uncomplicated pregnancy of 32-40 weeks of gestation, and with a known L.M.P. were taken up for this study. Placental diameter and placental thickness was measured in insitu placenta by ultrasonography. The placental diameter increased with advancing pregnancy whereas, the placental thickness decreased with increase in gestational age. Regression equation for the prediction of gestational age showed that the placental thickness is a better predictor than the placental diameter. In 75% of cases a single ultrasonographic measurement of placental thickness can predict gestational age within  $\pm 14$  days in the last eight weeks of pregnancy.

## Introduction

Placental growth and maturation with advancing pregnancy is essential for the healthy growth and development of fetus, and a correlation between physical measurement of placenta and gestational age is not a very illogical expectation. Placenta can be located accurately by ultrasonography (Gottesfeld et al, 1966). This fact provides with an excellent opportunity to measure the insitu placenta in pregnancy. The present study was undertaken with a view to find out if a correlation exists between gestational age and placental diameter and thickness and if such a correlation exists then whether these parameters can be used for predict-

ing gestational age with a fair degree of reliability in the last eight weeks of pregnancy.

## Material and Methods

One hundred and two women with uncomplicated pregnancy between 32 to 40 weeks of gestation were taken up for this study. Only cases who were unequivocal about their L.M.P. were included in this study.

*Placental Ultrasonography* All ultrasound examinations were performed on I.G.E. RT-3000 real time scanner with a 3.5 megahertz linear probe. The Placenta was visualised and defined in its entire length before any measurements were made. The placental thickness was taken as the mean of five measurements of maximum thickness. Placental diameter

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Accepted for publication on 13/10/1989

was measured in segments from its one end to the other. Identifiable fetal landmarks served as the joining points between the segments. The summed up segmental measurements provided the placental diameter.

The regression equations for the prediction of gestational age in days was derived by the method of least squares.

All the statistical analysis was performed on the main frame computer EC-1045 with SPSS software package.

### Results

A total number of 102 cases were studied. Table I shows the mean values of placental thickness, placental diameter and gestational age in days.

TABLE - I  
SHOWING MEAN VALUES OF  
DIFFERENT PARAMETERS

| Parameters               | Mean $\pm$ SD      |
|--------------------------|--------------------|
| Gestational age (days)   | 255.18 $\pm$ 16.04 |
| Placental thickness (mm) | 36.18 $\pm$ 9.19   |
| Placental diameter (mm)  | 211.27 $\pm$ 70.57 |

TABLE - II  
SHOWING CORRELATION BETWEEN PLACENTAL  
THICKNESS, PLACENTAL DIAMETER AND GESTATIONAL AGE

|                     | Placental thickness | Placental diameter | Gestational age |
|---------------------|---------------------|--------------------|-----------------|
| Placental thickness | 1                   | -0.257             | -0.514          |
| Placental diameter  | -0.257              | 1                  | 0.349           |
| Gestational age     | -0.514              | 0.349              | 1               |

TABLE - III  
REGRESSION EQUATIONS FOR PREDICTING GESTATIONAL AGE

| Parameter                | Regression coefficient | Regression equations                         |
|--------------------------|------------------------|--|
| Placental Thickness (PT) | -0.92                  | Gestational age (days)<br>= 288.19 - 0.92 PT |
| Placental Diameter (PD)  | 0.08                   | Gestational age (days)<br>= 237.26 + 0.08 PD |

A study of correlation coefficient between placental thickness, placental diameter and gestational age in days shows that as the gestational age increases there is an increase in the placental diameter whereas the placental thickness decreases with advancing gestational age (Table II).

Linear regression equations for predicting gestational age were derived (Table III). The regression equations show that for each mm of decline in the thickness of placenta the increase in pregnancy is by 0.92 day; and for each mm increment in the diameter of placenta the pregnancy advances by 0.08 days.

The results of residual analysis is shown in Table IV. The gestational age predicted is within  $\pm$  14 days of observed value in 75% cases, when the gestational age is predicted by placental thickness, whereas, is in 58% of cases when the gestational age prediction is by placental diameter.

### Discussion

Ultrasonographic measurement of placental diameter and thickness for its

corelation with gestational age has not been attempted before. Quantitative data on the dimensions of the full term freshly delivered placenta have been given by a large number of investigators. These accounts have been extensively reviewed by Boyd and Hamilton (1970) in their monumental work 'The Human Placenta'. According to these authors, though relatively restricted in amount, for the sixth to tenth months, there is continuing increase in the diameters and thickness of the placenta.

Grannum et al (1979) in their ultrasonographic study of placenta have shown that there is gradual decrease in the thickness of placenta as the placenta matures. Bleker et al (1977) have shown that the surface area of placenta increases linearly. The difference in the ultrasonographic actual observations in the thickness of placenta is due to the fact that the surface area insitu placenta is larger than a freshly delivered specimen of corresponding gestational age. However, our observations regarding the correlation of gestational age with placental diameter and thickness is in consonance with the above investigators.

Finally, a residual analysis was done in 10% randomly selected cases to find out

whether a single ultrasonographic measurement of placenta can be useful in determining the gestational age with a fair degree of reliability in the last eight weeks of pregnancy. The results of our analysis (Table IV) show that the predicted values derived on the observed gestational age. Furthermore, the values predicted by regression equation based on placental thickness is more reliable than that predicted placental diameter. No data is available on this aspect for comparison.

TABLE - IV  
SHOWING RESULTS OF  
RESIDUAL ANALYSIS  
(ON 10% OF TOTAL CASES)

| Parameter           | Gestational age within $\pm 14$<br>days of observed value |
|---------------------|---|
| Placental thickness | 75%   |
| Placental diameter  | 58%   |

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