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EVALUATION OF GESTATIONAL AGE BY MEASUREMENT OF PLACENTAL THICKNESS ON USG IN SECOND AND THIRD TRIMESTER OF PREGNANCY

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Abstract

Purpose: Evaluation of gestational age by measurement of placental thickness with ultrasonography in second and third trimester of pregnancy.

Methods: This was a prospective observational study conducted in department of obstetrics and gynecology on 200 pregnant women in second and third trimester with singleton live fetus . All women were subjected to USG for estimation of gestational age by placental thickness (measured at the level of umbilical cord insertion).

Results: Mean age was 24.5±3.18yrs. Mean Placental thickness increase linearly with gestational age till 33 week thereafter decreases marginally from 34 to 40 weeks of gestation.strong correlation ($r=0.969, p<0.0001$) with gestational age. Linear regression analysis yielded mathematical equation for calculation of gestational age in second and third trimester as Y(Gestational Age) = 1.0573×placental thickness -1.1834, $R^2=0.9391$

Conclusion: Placental thickness on USG seems to be good parameter for calculation of gestational age of fetus in second and third trimester specially 13 to 33 weeks of gestation .

Keywords: Ultrasonography (USG), Placental thickness, Gestation age.

Introduction

Gestational age is estimated by last menstrual period. Many women are unaware of their last menstrual period due to irregular menses, conception in lactation amenorrhea and due to illiteracy[1]. The best possible ante partum care and successful labor outcome always revolve around the accurate knowledge of gestational age determination, and is an important component of antenatal care[2].

Generations of midwives and doctors have learned Naegele's rule, based on menstrual dates, to calculate gestational age. Naegele's rule assumes a 28-day-cycle with ovulation on day fourteen[3].

Women who do not recall last menstrual period and have irregular periods the use of ultrasonography helps in estimating the correct gestational age[4].

Ultrasonography has provided a safe and non-invasive method to evaluate the placenta and fetus. Ultrasonography is commonly used to estimate the gestational age by measuring the fetal dimensions like BPD,AC,HC and FL[5].

As of now, the first dating ultrasound is the most reliable method of assessment of gestational age[6].
In second trimester Biparietaldiameter , Femur length ,Abdominal circumference ,Head circumference are used for assessing the gestational age. Of these none of them is reliable in third trimester[6]

Placental thickness measured at the level of umbilical cord insertion can be used as an accurate sonographic indicator in assessment of gestational age in singleton pregnancies[7].

In our study we will use placental thickness as a new parameter to estimate gestational age.

Material and Methods

This was a prospective observational study conducted on Pregnant women with Known LMP with regular menstrual cycle, age group 18-35yr, with normal BMI at ≥13 wks of gestation ,with singleton live pregnancy attending ANC OPD were recruited for the study. Pregnant women with hypertensive disorders of pregnancy, diabetes mellitus ,other medical disorders, with fetal and placental anomalies were excluded from the study.

After recruitment detailed history and medical and physical examination was done . After obstetric examination all base line investigations were done .All women werethen subjected to detailed sonography forfoetal being. Thickness of placenta was measured at the level of umbilical cord insertion in every case. All parameters were measured by same observer and on the same machine.

Statistical Analysis

All the data were entered in Excel sheet and Data were analyzed statically using SPSS software. For the statistical significance using intra class correlation coefficient (r). Significance found by student t- test. A p value of <0.05 considered significant. Linear regression equations were formulated.

Observations and Discussion

Table 1: Relation of gestational age and mean placental thickness

Ges. Age week	N	Mean (mm)	Std. Deviation
13	4	13.25	1.893
14	2	14.50	0.707
15	2	15.00	1.414
16	6	15.83	0.983
17	11	17.09	0.539
18	4	17.50	1.291
19	10	20.10	2.558
20	10	20.50	0.972
21	8	21.63	1.768
22	10	22.50	1.581
23	10	23.00	1.155
24	5	24.60	1.140
25	8	25.38	1.768
26	7	27.00	1.633
27	7	27.43	1.718
28	6	28.67	2.160
29	3	29.00	1.000
30	5	29.20	1.643
31	3	31.33	0.577
32	10	32.80	2.098
33	8	33.00	1.927
34	8	33.25	1.282
35	17	33.94	1.713
36	10	34.40	1.955
37	12	35.83	1.850
38	7	35.00	2.449
39	4	35.75	0.957
40	3	37.00	1.732
Total	200	26.94	6.975

Our study result showed linear increase of placental thickness with gestational age till 33 week and thereafter there was decrease in placental thickness.

Similar results were reported by *P Mital et al*[8] and *Adititiwari et al*[9]*Anupamajain et al*[10]*Ashok verma et al*[11]

Table 2: Correlation analysis showing relationship between placental thickness and gestational age

Ges. Age	N	Mean (mm)	Std. Deviation	Correlation coefficient (r)	P-value
13-19	39	17.18	2.543	0.767	<0.0001
20-26	58	23.14	2.358	0.758	<0.0001
27-33	42	29.98	2.590	0.735	<0.0001
34-40	61	34.69	1.996	0.470	<0.0001
Total	200	26.94	6.975	0.969	<0.0001

(Correlation coefficient (r) = 0.969, p value =<0.0001)

All groups were showed positive correlation but correlation coefficient was less in 34-40 year group in comparison to other groups.

Similar results reported by *Maya menon et al*[12]*,AditiTiwari et al*[9]*, Anupamajain et al*[10]*,Karthikeyan T et al*[13]*,Hellman et al,*[16]*Ashok kumarverma et al,*[11]*Sujit pant et al,*[14]*and N Idayavani et al*[15.]

This study conclude placental thickness (mm) increase with increasing gestational age(in weeks) almost matching from 13 week to 33 week of gestation .The relationship between placental thickness with gestation age falls marginally and growth rate of placental thickness decreased after 34 week of gestation and thickness was lower by 1-3 mm.Both have significant positive correlation

Table 4: Linear regression analysis for predicting the gestational age based on placental thickness:

Variable In Mode	Unstandardized Coefficients		Standardized Coefficients	P value	R^2value (%)
	Beta	Std. Error	Beta		93.9
Constant	-1.183	0.533	-	0.027	
Placental thickness	1.057	0.019	0.969	0.0001	

Dependent variable: =>

1. Gestational age
2. R^2=93.9%
3. P value<0.0001

(coefficient r=0.969, p<0.0001, R^2=93.9%)

The equation for prediction based on regression analysis is given below.

Y (Gestational age) = 1.057 x Placental Thickness -1.183

By this equation the gestational age can be predicted from the measurement of the placental thickness.

Conclusion

From our study we concluded that ultra sonographic measurement of placental thickness at the point of insertation of umbilical cord can be used as an important and accurate parameter for estimation of gestational age in second and third trimester of pregnancy. Placental thickness (in mm) increase with increasing gestational age(in weeks) almost matching from 13 week to 33 week of gestation. The relationship falls marginally as the growth rate of placental thickness decreased after 34 week of gestation and thickness was lower by 1-3 mm. The limitation of our study is a small number of study population. However a larger study is required to substantiate our results.

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