Multiple Foetal Parameters in Third Trimester Gestational Age Estimation

Dr. Manisha Bakliwal (Jain)

Department of Ob&Gyn,
Shadan Institute of Medical Sciences

***Abstract*-**In a country like India where most women present late in third trimester and may not keep menstrual record properly, a method was needed which can help to estimate gestational age in third trimester. So this study was done on 100 pregnant women ranging from 28 to 42 weeks of gestation, attending the OPD of SIMS, Hyderabad, A.P, India, during the period July 2009 to Sep 2010. Patients with high risk factors affecting the growth of baby were excluded from the study. These women were subjected to single exposure of ultrasonography estimation of gestational age using multiple foetal parameters like BPD, FL, HC. Then a comparison was madebetween the actual gestational age (assessed by Dubowitz score within 24hrs of birth) with mean gestational age by ultrasonography. The foetal parameters taken for the study in determination of gestational age were compared for accuracy and reliability with each other by linear regression analysis[1]. In this study 96% of cases had a difference of 2 weeks from actual age. Hence this study validates the concept of use of multiple foetal growth parameters to improve the accuracy and precision of foetal dating in third trimester of pregnancy.

Index Terms- AC, BPD, Dubowitz Score, EDD, FL, Gestational age

I. INTRODUCTION

Knowledge of gestational age is critically important in clinical obstetrics, primarily because it can significantly affect the obstetricmanagement decision and neonatal outcome. By defining an acceptable time frame of 28-42 weeks for normal delivery, this knowledge should preclude the possibility of iatrogenic premature delivery in patients undergoing elective caesarean section. In patients with premature labor, knowledge of the gestational age will influence the use of tocolytic agents, the use of steroids to induce foetal lung maturity, the timing of amniocentesis for calculating lung maturity and the type of institute in which delivery should take place (eg; primary vs a tertiary care centre). Precise knowledge of gestational age should also help the obatetrician to avoid a pregnancy of post dates and its attendant risks to thr foetus[2].

II. MATERIAL AND METHODS

In this prospective study of ultrasonographic estimation of gestational age by multiple foetal growth parameters in third trimester, 100 pregnant women wre subjected to sonographic estimation of gestational age, using Biparietal diameter, Femur length and Abdominal circumference as foetal growth parameters[3] .

These were the patients who were either seen at antenatal clinics or admitted in labour room of SIMS. These women were registered in the study after taking historyand after general and obstetric examination to exclude complications which can adversely affect foetal growth , like hypertension, pre-eclampsia, diabetes mellitus, multiple pregnancies, hydrocephalus etc;

A real time 2D ultrasound unit with a 3-5 MH convex sector transducer was used.

III. RESULTS

In the present study total of 100 pregnant women in their third trimester were recruited and were subjected to ultrasonography to determine gestational age. The actual gestational age was calculated by Dubowitz or New Ballard score within 24hrs of birth[4,5] . comparision was made between actual gestational age and ultrasonographically derived gestational age.

These cases were divided into three groups depending upon gestational age (Table I)

TABLE - I

S.No	Gestational Age (weeks)	No. Of Cases
1.	28 – 32	21
2.	33 – 36	40
3.	37 -- 42	39

Mean gestational age was derived from all three parameters BPD, FL, AC and its difference from actual gestational age was derived and expressed in nearest round figures in all the three groups which is tabulated as such in table II

TABLE-- II

MEAN DIFFERENCE IN WEEKS BETWEEN MEAN GESTATIONAL AGE

AND ACTUAL GESTATIONAL AGE ACCORDING TO GROUPS

Difference From Age	Group -- I		Group -- II		Group -- III	
in weeks	No of cases	%	No of cases	%	No of cases	%
0	9	42.8	15	37.5	6	15.4
+1	9	42.8	16	40.0	20	51.3
+2	3	14.3	9	22.5	9	23.0
+3	---	---	---	---	4	10.2

Then the mean difference in weeks between mean gestational age and actual gestational age for all groups taken together is tabulated as such in Table III

TABLE III

MEAN DIFFERENCE IN WEKS BETWEEN MEAN GESTATIONAL AGE

AND ACTUAL GESTATIONAL AGE FOR ALL GROUPS

Mean difference from AGA (Weeks)	No Of Cases	Percentage
0	30	30%
+1	45	45%
+2	21	21%
+3	04	4%

Thus in our study, in 30% of patients the Mean gestational age coincided with actual gestational age with a difference f one week in 45% and 2 weeks in 25%. Thus using multiple parameters, total 965 of cases had a difference within 2 weeks from gestational age.

Then the Mean, standard deviation and Standard erroe for each parameter 9 BPD,FL,& AC) was taken, in which FL & AC have got least mean and less amount ofvariations as compared to BPD[6] .

The results of correlation coefficient between the selected parameters are highly interrelated and statistically significant (P< 0.001) .

IV. DISCUSSION

In present study 100 pregnant women ranging from 28-42 weeks of gestational age were subjected to sonographic estimation of gestational age usinfg multiple fetal growth parameters. These patients were selected after excluding any maternal or fetal factors affecting the foetal growth. Then the gestational ageof the newborns was assessed by Dubowitz score within 24hrs.

A comparision was made between Dubowitz actual gestational age and sonographically derived gestational age fom multiple foetal growth parameters, which revealed 96% cases within a difference of 2 weeks from actual age.

Previous articles evaluate accuracy of gestational age by ultrasound with gestational age by LMP or Delivery dates, but in present study gestational age from ultrasound was compared with actual gestational age obtained after birth by Dubowitz score which include eleven physical and ten neurological criteria and whose accuracy has been confirmed by different studies like Gandy G.M[7].

Our study confirms that BPD cannot relied upon for determination of gestational age after 26 weeks, though before 26 weeks BPD is a relaiable parameter and statistically significant.with single USG examination and even multiple USG examination do not improve reliability after 34 weeks as in accordance with previous studies done by Sabbagha et al[8]. , who also shows similar result. Though Stuart Campbel & Berman [9] show 84% accuracy of BPD.

In our study 92% patients had a difference of +2weeks in late 3rd trimester when FL alone was used in accordance with Eagley et al. , Shale, S.Yageland Hill & Coworkers studies who also showed stronger correlation[10,11,13].

Our study shows AC better than BPD and almost equal to FL in determining gestational age. Hence AC and FL are most acceptable indicators of gestational age after 34 weeks as shown by Hdlock et al., studies[14].

Using all four parameters (BPD,HC,AC,FL) Hadlock shows 96% of predicted ages were within 2 weeks of true menstrual age[15]. Once again in our study similar results were obtained. In our study also, using multiple parameters (BPD,FL.AC) 96% of cases had a difference of 2 weeks from actual gestational age.

V. CONCLUSION

The perinatal mortality and morbidity can be reduced by properly estimating gestational age. In our country where most of the women may nort keep menstrual record properly and who present late in third trimester for the first time USG assessed gestational age by multiple foetal growth parameters can be of immense value.

In present study total 96% (30% coincided, 45% had a difference of +1week, 21% differbce of +2weeks) cases had difference within 2 weeks. Hence its use not only increases the accuracy of foetal age determination by single examination but also gives observer choice to include only those parameters where technically satisfactory measurements have been obtained. These parameters (BPD,AC,FL) are also useful for foetal weight estimation.

Hence this study validates the concept of using multiplr parameters to improve the accuracy and precision of foetal dating in third trimester and provides a tool for better care and management of the mother and foetus in Indian condition.

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AUTHORS

First Author –Dr. manisha Bakliwal (Jain), Assistant professor(Ob& Gyn), SIMS, Hyderabad, A.P, India
Email id: jainmanisha1912@gmail.com
Mobile number: +917382464641.