

Full Length Research Paper

Comparison between Transcerebellar Diameter and other Biometric Measurement in Assessment of Gestational Age

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Abstract

The cerebellar lies in the posterior cranial fossa in the embryo it appears at the end of fifth week of pregnancy. it is easy to visualize sonographically. Measurement and demonstration of fetal cerebellum is a new unique parameter for assessment of gestational age. This is a cross section clinical observation study conducted in Damietta General hospital. This study includes 100 women pregnant women from 15/ 40 wks when these women attending our ultrasound unit for routine 2nd, 3rd trimester ultrasound. Transcerebellar diameter more accurate than other parameter in estimation of gestational age in pregnancy between 15/ 40 wks. Transcerebellar diameter more accurate than other parameter in estimation of gestational age in pregnancy between 15/ 40 wks.

Keywords: Transcerebellar, Biometric diameter, Gestational age.

Introduction

Determining an accurate GA has a substantial effect in prenatal medicine and early termination of pregnancy become urgent upon the immediate maturity of fetus in high risk pregnancy such as severe preeclampsia, severe fetal growth restriction, chronic hypertension, total placenta previa, Rh alloimmunization, and so forth. GA estimation is also crucial in implementing certain tests (amniocentesis, chorionic villus sampling) and when applying certain forms of fetal therapy (1). Last menstrual period (LMP) has been a reliable predictor in estimating GA, but many pregnant women cannot recall the exact date of their LMP. (2).

Suggested that 30% of women cannot recall the exact date of LMP. BPD, FL, AC, and HC can be utilized; however, these parameters might be inaccurate in late pregnancy, especially when a pregnant woman cannot recall her LMP. Furthermore, there is a substantial evidence that the standard derivation for these indices are widen as pregnancy progresses, and this will be even worse if the head is too low or an obvious plane cannot be obtained, which together will mislead the measurement of BPD and HC (3). Errors in determining the exact GA may interfere with critical management decisions, such as in preterm labor as well as growth disorders that is considered the leading cause of neonatal morbidity and mortality (4). Therefore, many researches have been conducted to determine a precise estimation of GA using ultrasonic measurements throughout the second and the third trimester (3). The internal organs of the cranium, particularly transverse cerebellar diameter, are less affected in fetuses with restricted growth due to placental insufficiency, thereby suggesting a cerebellar growth preservation mechanism in relation to other encephalic areas. Thus, ultrasound assessment of the transverse cerebellar diameter has been established as a more indicated method because of its precision in determining gestational age and fetal growth and it was found that TCD fetal ultrasound could be a predictive biometric parameter of gestational age independently of fetal gender in the last two trimesters of a pregnancy (5-6).

Patients and methods

This is a cross section clinical observation study conducted in Damietta General Hospital. This study includes 100 women pregnant women from 15/ 40 wks when these women attending our ultrasound unit for routine 2nd, 3rd trimester ultrasound.

Inclusion Criteria: Any healthy pregnant women from 15/ 40 wks reliable of gestational age by estimation of date of delivery, clinical assessment and ultra sound.

Exclusion Criteria:

- 1-Unknown or inaccurate date of last menstrual period.
2. Oligohydramnios.
3. Diabetic mother.
4. Pregnancy induced hypertension.
5. Multiple gestation.
6. Fetal chromosomal abnormalities
7. Intrauterine growth restriction.
8. Any other known maternal and fetal abnormality.
9. Multiple pregnancy.
10. Congenital malformation.

The following were taken:

1-Careful History taking to check for inclusion and exclusion criteria according to standardized research protocol.

2-Obstetric history including Gravidity, parity, Multiple pregnancies, Pregnancy induced hypertension and Gestational or pregestational diabetes

3-Past history including medical diseases (DM, Hypertension, Coagulopathies, cardiac and pulmonary diseases...), previous operations or others.

Statistical analysis

Comparison of maternal plasma concentrations of homocysteine with different Doppler scores was carried out using the Kruskal–Wallis test. The significance between the groups was evaluated by the Mann–Whitney U-test with Bonferroni correction. Spearman correlation analysis was performed for correlations of non-parametric variables.

Results

Table (1): Demographic data of studied groups

Variable	Dabigatran (n= 50)	Enoxaparin (n= 50)	P
Age (years)			0.4
Mean± SD	42.6±6.6	43.4±7.9	
BMI (Kg/m²)			0.48
Mean± SD	33.64±1.9	33.69±3.1	
Parity			0.16
Mean± SD	2.7±1.5	2±1.6	

This table shows that age, BMI and parity were nearly comparable between group treated with Dabigatran and group treated with Enoxaparin (age: 42.6±6.6 Vs 43.4±7.9 years, BMI: 33.64±1.9 Vs 33.69± 3.1 Kg/m² and parity: 2.7±1.5 Vs 2±1.6).

Table (2): Gestational age and Trans cerebella diameter measurement

	Range	Mean	±	SD
Weeks	15.0 - 41.0	29.28	±	7.21
BPD	16.0 - 40.0	29.85	±	6.92
FL	16.0 - 39.0	28.88	±	7.02
AC	16.0 - 40.0	29.02	±	7.08
TCD/mm	13.0 - 49.0	31.62	±	9.74

This table shows that Gestational age and Trans cerebella diameter measurement:

Table (3): Efficacy outcomes of studied groups

	Weeks	
	r	P-value
BPD	0.980	<0.001*
FL	0.993	<0.001*
AC	0.990	<0.001*
TCD/mm	0.915	<0.001*

This table shows that Correlation between gestational age and the ultrasonographic measured parameters

Table (4): Safety outcomes (bleeding) of studied groups

	BPD		FL		AC	
	r	P-value	r	P-value	r	P-value
FL	0.982	<0.001*				

AC	0.977	<0.001*	0.990	<0.001*		
TCD/mm	0.896	<0.001*	0.906	<0.001*	0.908	<0.001*

This table shows that Correlation between the ultrasonographic measured parameters

Table (5): Other safety outcomes of studied groups

	Unstandardized Coefficients		Standardized Coefficients	t	P-value
	B	Std. Error	Beta		
(Constant)	-0.230	0.222		-1.036	0.301
BPD	0.090	0.037	0.086	2.453	0.015*
FL	0.542	0.055	0.526	9.910	<0.001*
AC	0.334	0.049	0.327	6.766	<0.001*
TCD/mm	0.047	0.012	0.064	3.988	<0.001*

Dependent Variable: Weeks

This table shows that Regression model for fetal biometric parameters

Table 6: Differences in GA in the second trimester

GA (weeks)	TCD		BPD		AC		FL	
	No.	%	No.	%	No.	%	No.	%
+2	2	1.0	2	1.0	12	6.0	8	4.0
+1	22	11.0	10	5.0	74	37.0	86	43.0
0	106	53.0	84	42.0	66	33.0	80	40.0
-1	54	27.0	68	34.0	40	20.0	20	10.0
-2	16	8.0	32	16.0	4	2.0	2	1.0
-3	0	0	4	2.0	4	2.0	4	2.0
-4	0	0	0	0	0	0	0	0
Total	200	100	200	100	200	100	200	100

Table 7: Differences in GA in the third trimester

Differences in GA (weeks)	TCD		BPD		AC		FL	
	No.	%	No.	%	No.	%	No.	%
+2	2	1.0	2	1.0	6	3.0	4	2.0
+1	4	2.0	4	2.0	16	8.0	10	5.0
0	64	32.0	62	31.0	42	21.0	38	19.0
-1	38	19.0	16	8.0	52	26.0	26	13.0
-2	36	18.0	60	30.0	38	19.0	52	26.0
-3	34	17.0	36	18.0	38	19.0	44	22.0
-4	22	11.0	20	10.0	8	4.0	26	13.0
Total	200	100	200	100	200	100	200	100

Discussion

This study was carried out as a prospective study to compare between transcerebeller diameter and other biometric measurement in assessment of gestational age. This study included 200 pregnant women from 15/ 40 weekss when these women attending our

ultrasound unit for routine 2nd, 3rd trimester ultrasound. Regarding ultrasonographic measurement of the studied population; the gestational age of the study population ranged between 15 and 41 weeks with mean of 29.28 ± 7.21 weeks. Trans cerebellar diameter ranged between 13 and 49 mm with mean of 31.62 ± 9.74 mm.

In these study found that TCD from 15th to 24th week of gestation in millimeters is equivalent to the gestation age in weeks. However, after 24 weeks the TCD in millimeters exceeds gestational age in weeks. Measurement of TCD in mm up to 24 weeks is equal to gestational age and the results of their prospective study provides normative data of fetal cerebellar growth throughout gestation. The results of present study and previously published studies on TCD show that additional small improvements in accurate gestational dating can be achieved by incorporating the results of TCD with some combination of other fetal biometric parameters, including biparietal diameter, abdominal circumference, and femur length. Nevertheless, the best combination of biometric measurements remains to be determined.

- *Determining an accurate GA has a substantial effect in prenatal medicine.*
- *BPD, FL, AC, and HC can be utilized; however, these parameters might be inaccurate in late pregnancy, especially when a pregnant woman cannot recall her LMP. Errors in determining the exact GA may interfere with critical management decisions, such as in preterm labor as well as growth disorders that is considered the leading cause of neonatal morbidity and mortality.*
- *TCD fetal ultrasound could be a predictive biometric parameter of gestational age independently of fetal gender in the last two trimesters of a pregnancy.*

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