

Determination of Mean Fetal Cerebellar Diameter in Pregnant Patients of Consanguineous and Non Consanguineous Marriages

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Abstract: Many fetal biometric parameters are extensively utilized for the estimation of fetal gestational age. We sought to analyze the difference in the mean fetal Transcerebellar diameter in second trimester among the consanguineous and non-consanguineous marriages in Indian population in this retrospective cross sectional study. Study was carried out in the Department of Radiology, Sree Balaji Medical College and Hospital, Chennai, from June 2017 – June 2018. A total of 1067 patients in their second trimester (18 – 24 weeks of gestation) were included in this study (740 Non consanguineous and 327 consanguineous marriages). Transcerebellar diameter was measured on ultrasound as the maximum diameter between the cerebellar hemispheres on axial section. Mean TCD was 20.8 mm in consanguineous marriages and 21.0 mm in non consanguineous marriages. There is no significant difference in mean TCD in Consanguineous marriages and non consanguineous marriages.

Keywords: Cerebellum, Diameter, Consanguineous Marriages.

INTRODUCTION

Gestational age assessment is the critical parameter in evaluating foetal development and the management of pregnancy [1]. Uncertain gestational age is associated with high incidence of perinatal mortality like preterm delivery, low birth weight and post maturity.

An age old accepted method for estimating date of delivery, namely Naegele's rule depends only on date of LMP, has some problems as some of women don't recall the LMP accurately [2]. Some authors consider first trimester CRL measurement is more reliable than LMP which raises the clinical value [3].

First trimester screening is also essential to detect fetal anomalies and is more accurate, significantly in estimation of fetal gestational age than second trimester fetal biometry [4].

Ultrasonography estimation of GA by using various foetal biometric parameters such as BPD, FL, AC and HC assumed prominent role in management of pregnancy. There are some drawbacks with these parameters as BPD after 26 weeks becomes unreliable in conditions altering the shape of skull [3, 7]. Femur length is shortened in cases of dwarfism or skeletal anomalies making it unreliable parameter in estimating GA.

TCD, a new parameter for determining gestational age was developed [6,7]. Cerebellum is located in the posterior cranial fossa surrounded by the dense petrous ridges and the occipital bone making it withstand the deformation caused by extrinsic pressure.

As early as 10-11 weeks the foetal cerebellum can be visualized by Ultrasonography. It grows with a linear correlation with gestational age from second trimester onwards. Since it is surrounded by dense petrous bone and the occipital bone, TCD is least affected by external factors and allows its use for assessing GA even in third trimester [6]. Pathological alteration in fetal growth pathway due to macrosomia or IUGR does not seem to affect TCD even changes in vault development due to external pressure didn't alter TCD [8-10]. With these advantages of TCD over other parameters, this study was conducted to evaluate the accuracy of TCD in estimation of gestational age and to compare it with both consanguineous and non-consanguineous group patients [11].

MATERIALS AND METHODS

A total of 1067 pregnant patients in their second trimester (18 – 24 weeks of gestation) were included in this study with history of non consanguineous marriage in 740 patients and

consanguineous marriages in 327 patients. The Study was conducted from June 2017 till June 2018 for the pregnant women referred for second trimester ultrasonography to our Department Of Radiology, Sree Balaji Medical College And Hospital, Chennai, after getting their written informed consent. Transcerebellar diameter was measured on ultrasound as the maximum diameter between the cerebellar hemispheres on axial section.

Sonographic estimation of fetal gestational age is mandatory for obstetrical decision making in management of delivery. Many fetal biometric parameters are extensively utilized for the estimation of fetal gestational age but we emphasize on the transcerebellar diameter (TCD) in second trimester

among our patients with the history of both consanguineous and non-consanguineous marriages and its efficacy and reliability.

Trans-cerebellar diameter was obtained by the following methods. The landmarks of the thalamus and the cavum pellucidum and third ventricle were identified. Then by slightly rotating the transducer below the thalamic plane, the trans cerebellar plane is identified by obtaining an oblique view through posterior fossa that included visualization of midline thalamus, the characteristic butterfly like appearance of the cerebellar hemispheres and cisterna magna, just posterior to the cerebellum. These examinations were performed with low frequency 3.5 MHZ transducer [7].

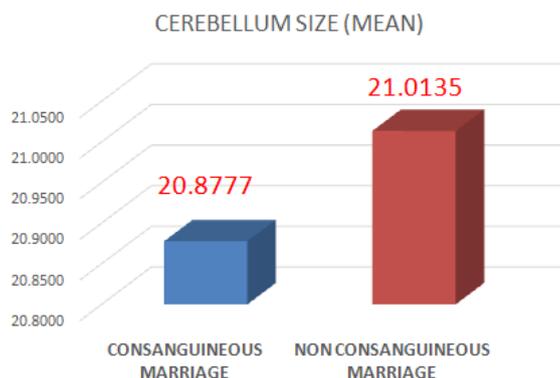


Transcerebellar diameter was measured on ultrasound as the maximum diameter between the cerebellar hemispheres on axial section. Other parameters such as BPD, HC, AC and FL were also measured according to previously described standard planes. GA based on individual parameters was compared with GA by LMP. Institute Ethical committee permission was obtained.

STATISTICAL ANALYSIS

The measured values were analyzed statistically using Microsoft Excel Statistical package. The measured values were used to compare the results between the two groups of patients that we have taken for this study. Normograms were derived by taking 25th, 50th and 75th percentile values in all patients. The mean TCD values between the two groups are compared for any significant difference. The comparative statistical analysis was given below.

Type of marriages		Cerebellum size		
Consanguineous marriage	Mean	20.8777		
	Std. Deviation	1.95745		
	Percentiles	25	20.0000	
		50	21.0000	
75		22.0000		
Non consanguineous marriage	N	Valid	740	
		Missing	0	
	Mean	21.0135		
	Std. Deviation	1.92549		
	Percentiles	25	20.0000	
		50	21.0000	
		75	22.0000	



RESULTS AND DISCUSSION

A thorough knowledge about the frequent problems that an obstetrician encounters is required for better management and timing of delivery in obstetric care [1]. The commonest complications are pregnancy induced hypertension, diabetes and Rh disease. The solutions that are acknowledged are the accurate estimation of gestational age and the adequacy foetal weight.

Prior to modern imaging the following mostly outdated methods (12) are used

- Estimation of uterine size in the first and second trimester
- Average duration of pregnancy 266 days from conception and 280 days from date of last menstrual period in women with 28 days cycles
- Naegele's rule: To add 7 days to the first day of last menstrual period and to count back 3 months.
- Mac Donald rule: The height of the fundus is measured by a flexible tape and duration of pregnancy calculated from: Height of fundus(in cms) $\times 2/7 = \text{duration of pregnancy in lunar months}$ (or) Height of fundus(in cms) $\times 8/7 = \text{duration of pregnancy in weeks}$.
- The state of the cervix.

With the evolution of advanced imaging, real time ultrasonography is utilized in foetal biometry. Standard biometric parameters for GA assessment such as CRL in the first trimester and BPD, HC, AC and FL in the second trimester are now available. But they are having their inherent limitations beyond the first and second trimesters, like BPD and HC measurements in third trimester due to moulding of skull. Likewise femoral length is not reliable in cases of dwarfism or achondroplasia.

The transcerebellar diameter is developed as an alternative parameter in foetal biometry. Since, cerebellum lies in the posterior cranial fossa covered by thick tentorium and bony calvarium; it is more resistant to deformation by extrinsic pressure. Foetal cerebellum is sonographically visualized as early as 10-11 weeks. TCD is least affected by factors affecting foetal growth allowing it to determine accurate gestational age even in

third trimester [7] and cases of intrauterine growth restriction [8].

Our results also showed that TCD is not affected by the consanguinity of marriage as the MEAN TCD WAS 20.8 mm in consanguineous marriages and 21.0 mm in non consanguineous marriages and there was no significant difference.

CONCLUSION

Our study showed that TCD is an accurate predictor of gestational age in the second trimester. The correlation between the LMP derived gestational age and the gestational age by TCD seems to decrease from second to third trimester. Even in the third trimester TCD is fairly accurate and better predictor of gestational age in comparison to the other ultrasound parameters such as BPD, HC, AC, FL. FL, though accurate, cannot be used as a single parameter for estimation of gestational age as it is the parameter that is most affected by IUGR.

TCD is the parameter that is least affected by IUGR. Therefore it can be used as a single parameter for the estimation of gestational age. Several scientific studies have shown that consanguinity leads to increased incidence of genetic and congenital anomalies [13, 14]. Our results also showed that TCD is not affected by the consanguinity of marriage at this period of gestation as the MEAN TCD WAS 20.8 mm in consanguineous marriages and 21.0 mm in non consanguineous marriages and there was no significant difference.

REFERENCES

1. Kalish RB, Chervenak FA. Sonographic determination of gestational age. *The Ultrasound Review of Obstetrics & Gynecology*. 2005;5(4):254-58
2. Dewhurst CJ, Beazley JM, Campbell S. Assessment of foetal maturity and dysmaturity. *American Journal of Obstetrics and Gynaecology*. 1972; 113:141-49.

3. Gottlieb AG, Galan HL. Non-traditional Sonographic pearls in estimating gestational age. *Semin. Perinatol.* 154-160 (2008).
4. Whitworth M, Bricker L, Neilson JP, Dowswell T. Ultrasound for fetal assessment in early pregnancy. *The Cochrane database of systematic reviews.* 2010(4):CD007058.
5. Goel P, Singla M, Ghai R, Jain S, Budhiraja V, Babu CSR. The transverse cerebellar diameter -A marker for estimation of gestational age. *Journal of Anatomical Society of India.* 2010;59(2):158–61.
6. Birnholz JC. Newborn cerebellar size. *Paediatrics.* 1982;70(2):284-87.
7. Hashimoto K, Shimizu T, Shimoya K, Kanzaki T, Clapp JF, Murata Y. Foetal [5] cerebellum: us appearance with advancing gestational age 1. *Radiology.* 2001; 221(1):70-74.
8. Davies MW, Swaminathan M, Betheras FR. Measurement of transverse cerebellar diameter in preterm Neonates and it's use in assessment of gestational age. *Australian Radiology.* 2001;45(3):309-12.
9. Chavez MR, Ananth CV, Smulian JC. Fetal transcerebellar diameter measurement for prediction of gestational age at the extremes of fetal growth. *J. Ultrasound. Med.* 26, 1167-1171 (2007).
10. Ahmed MA Accuracy of fetal transcerebellar diameter nomogram in the prediction of gestational age in singleton gestation at the second and the third trimesters of singleton pregnancy. *J. Evid. Based. Womens. Health. J. Soc.* 4, 184-188 (2014).
11. Shawky RM, Elsayed SM, Zaki ME, El-Din SM, Kamal FM. Consanguinity and its relevance to clinical genetics. *Egyptian Journal of Medical Human Genetics.* 2013;14(2).
12. Dutta DC. *Text Book of Obstetrics.* Fourth edition. 1998,66-77
13. Kushki AM. The effect of Consanguineous Marriages on Congenital Malformation, *Journal of Research in Medical Sciences.* 2005, 10(5): 298-301
14. Bittles AH. A community genetics perspective on consanguineous marriage. *Public Health Genomics.* 2008;11(6):324-30.