

Ultrasonographic Fetal Gestational Age Determination by Biparietal Diameter.

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ABSTRACT

Background: Size and body proportions at birth predict short and long term outcomes. The main determinant of perinatal mortality is low birth weight. Several development indicators like Biparietal diameter (BPD), Head Circumference (HC) and Femur Length (FL) are used to predict the gestational age. **Aim:** This study was designed to compare the accuracy of predicting gestational age by the measurements of biparietal diameter in the second and third trimester. **Methods:** This was a cross sectional study of uncomplicated 234 pregnant women of between 17 and 38 weeks of gestation. **Results:** Biparietal diameter measurements were tabulated against corresponding menstrual age and mean biparietal diameter. **Conclusion:** Accurate gestational age assessment is also essential in the evaluation of fetal growth and the detection of intrauterine growth restriction.

Keywords: Biparietal diameter, Fetal age, Ultrasonography.

INTRODUCTION

Appropriate assessment of gestational age is quintessential in obstetric care. It has been documented by various workers that fetal biparietal diameter measurement in the determination of fetal gestational age before 30 weeks can provide accuracy but the precision decreases thereafter. It has also been documented that accurate measurement of fetal biparietal diameter can be difficult under certain conditions such as deeply engaged fetal head, direct occipito-anterior or occipito-posterior position, and in breech presentation^[1-5].

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MATERIAL AND METHODS

This was a cross sectional study of uncomplicated pregnant women between 17 and 38 weeks of gestation, who presented for routine obstetric ultrasound at FH medical college & hospital, between August 2015 to July 2016. Informed consent was obtained from the patients before inclusion in the study. Only singleton pregnancies were included. Exclusion criteria included pregnant women who had concomitant disease that could possibly affect fetal growth (e.g. diabetes mellitus, asthma, hypertension, renal disease, thyroid disease), complicated pregnancy (e.g. bleeding, pre-

eclampsia), foetal abnormality detected during the examination, women with a history of obstetric complications, intrauterine growth retardation and macrosomia.

The data collected included the gestational age, date of the last menstrual period and BPD. All BPD measurements were performed by the same investigator using GE Logiq S7 Expert ultrasound machine. Fetal biparietal diameter measurements were made from the outer edge of the closest parietal bone to the inner edge of the opposite parietal bone.

Statistical Analysis:

We used only sonographic gestational age because it assumes nearly identical growth in all fetuses and simply translates a measure of size into a gestational age using reference data.

In this study, collected data of measurement of the biparietal diameter was grouped by gestational age and mean biparietal diameter and SD were calculated.

RESULTS

For the purpose of statistical study, adjustments have been made to get the gestational age in complete figures as 21 wks 4 days to 22 wks 3 days = 22 wks. Biparietal diameter measurements were tabulated against corresponding menstrual age and mean biparietal diameter for every completed gestational age; standard deviation (SD) was calculated for every mean biparietal diameter on MS-Excel sheet. [Table 1] shows the data found in present study.

Table 1: Gestational Age, Sample Size, Mean BPD, SD of Study.

GA (wks)	n	BPD (mean) mm	SD	SEM
17	3	38.8	0.17	0.1
18	14	41.7	0.18	0.03
19	17	46	0.11	0.03
20	11	51.1	0.79	0.02
21	16	53.6	0.68	0.17
22	20	55.4	0.14	0.03
23	6	58.6	0.4	0.16
24	11	60.1	0.12	0.04
25	7	63.5	0.11	0.04
26	5	64.5	0.48	0.22
27	14	67.8	0.34	0.09
28	18	72	0.32	0.08
29	15	72.3	0.69	0.18
30	21	74	1.28	0.29
31	20	78.1	0.12	0.03
32	21	81.7	0.19	0.04
33	24	84	0.17	0.04
34	17	85.6	0.18	0.04
35	24	87.1	0.19	0.04
36	15	89.7	0.18	0.05

Mean BPD measurements for each gestational age of this study was compared with mean BPD of that Od Hadlock et al. No appreciable difference could be found.

DISCUSSION

The biparietal diameter has been described as a reliable method of determining gestational age. While the biparietal diameter was the first fetal parameter to be clinically utilized in the determination of fetal age in the second trimester, more recent studies have evaluated the use of several other biometric parameters including head circumference, abdominal circumference, femur length, foot length, tibial length, ear size, orbital

diameter, cerebellum diameter and others^[7]. The prediction of gestational age by biparietal diameter measurements before 30 weeks gestation can provide accuracy but its precision declines thereafter^[8]. It has been documented that proper measurement of biparietal diameter can often be difficult under the following conditions: deeply engaged fetal head, direct occipito-anterior and occipito-posterior positions and in breech presentation. Furthermore, with the aid of real time ultrasound, the femur length can easily be measured under the conditions in which biparietal diameter measurement is difficult.

[Table 2] shows the comparison between present study and other studies on BPD.

Table 2: Correlation of predicted GA based upon BPD

GA (Wks)	MEAN BPD (mm)				
	Hadlock et al ^[9] 1982	Shepard & Filly ^[10] 1982	Kurtz ^[11] et al	Sabbagha & Hughey ^[12]	Present Study
17	37	37	38	39	38.8
18	40	40	41	42	41.7
19	43	43	45	45	46.0
20	46	46	48	48	51.1
21	50	49	51	51	53.6
22	53	52	54	54	55.4
23	56	55	57	58	58.6
24	58	57	60	61	60.1
25	61	60	63	64	63.5
26	64	63	66	67	64.5
27	67	65	69	70	67.8
28	70	68	71	72	72.0
29	72	71	74	75	72.3
30	75	73	76	78	74.0
31	77	76	79	80	78.1
32	79	78	81	82	81.7
33	82	80	83	85	84.0
34	84	83	85	87	85.6
35	86	85	87	88	87.1
36	88	88	89	90	89.7

CONCLUSION

Accurate gestational age assessment is also essential in the evaluation of fetal growth and the detection of intrauterine growth restriction. There are various methods and techniques to determine gestational age but USG is most widely used, safe and accurate mode. Various parameters like biparietal diameter, head circumference, abdominal circumference, femur length, foot length and others are used for estimating the age of developing fetus.

REFERENCES

1. Cooperberg PL, Chow T, Kite V et al. Biparietal diameter: a comparison of real time and conventional B-scan techniques. JCU. 1976;4:421.
2. Adam AH, Robinson HP, Fleming JEE et al. A comparison of biparietal diameter measurements using a real time scanner and a conventional scanner equipped with a coded cephalometry system. Br J Obstet Gynecol. 1978;85:487.
3. Docker MF, Settatee RS. Comparison between linear array real time ultrasonic scanning and conventional compound scanning in the measurement of the fetal biparietal diameter. Br J Obstet Gynecol. 1977;84:924.
4. Vladimiroff JW, Eggink JH, Van Der Wal L. Clinical note- A comparative study between a linear array real time hand held scanner and a compound scanner in the measurement of the fetal biparietal diameter. Ultrasound Med Biol. 1981; 7:73.
5. Hughey M, Sabbagha RE. Cephalometry by real-time imaging: a critical evaluation. Am J Obstetgynecol. 1978; 131: 825.
6. Robin B. Kailash, Frank Chervenak. Sonographic Determination of Gestational Age. The ultrasound review of obstetrics and gynecology. 2005;4:254-258.
7. Gregory D, O'Brien, John T, Queenan, Stuart Campbell. Assessment of gestational age in the second trimester by real time ultrasound measurement of the femur length. Am.J. Obstet.Gynaecol. 1978;139-142.
8. Varma TR. Prediction of delivery date by ultrasound cephalometry. Br.J. Obstet. Gynaecol 1978; 80:316.
9. Hadlock FP, Deter RL, Harris RB, Park SK. Fetal biparietal diameter: rational choice of plane of section for sonographic measurement. Am J Roentgenol. 1982;138(5) 871-874.
10. Shepard M, Filly RA. A standardized plane for biparietal diameter measurement. Journal of ultrasound in medicine. 1982; 1(4): 145-150.
11. Kurtz AB, Wapner RJ, Kurtz RJ, Dershaw DD, Rubin CS, Cole BC, Goldberg BB. Analysis of biparietal diameter as an accurate indicator of gestational age. JCU. 1980; 8:319-326.
12. Sabbagha RE, Hughey M. Standardization of sonar cephalometry and gestational age. ObstetGynecol. 1978; 52: 402-406.

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