

Determination of Placental thickness using two dimensional sonography and its relation with gestational age

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Abstract

Introduction: An abnormal placental size has been linked to increased perinatal complications, including IUD and IUGR. Location, size, shape and architecture of placenta are easily ascertained with 2 dimensional technologies. Here we are making an effort to directly relate the thickness of placenta with gestational age which may ultimately give some idea about perinatal complications. The method is simple, rapid making it practical for routine for ante natal care and high risk cases.


Keywords: placental thickness, USG IUGR, IUD.

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INTRODUCTION

Placenta is an important organ of pregnancy and is solely responsible for intra uterine welfare of fetus. It is short lived highly vascularized organ that is indispensable for the growth and maturation of the developing fetus. With usg, the placenta can be easily visualized and presumably completely safe throughout pregnancy¹. Usg is now the standard technique in diagnosing iugr. Abdominal circumference is the single most sensitive parameter to detect iugr². The present study was conducted to assess the relationship of placental thickness with gestational age on two dimensional usg.

Aim

To study variation in placental size with gestational age on ultra sonography.

MATERIAL AND METHODS

The present study was carried out randomly on 100 pregnant women in 2nd and 3rd trimester (13 weeks to 40 weeks) in the department of radiology and department of obstetrics and gynecology.

Methodology

Informed consent of pregnant women along with detailed history was taken and the information was kept confidential.

Women with singleton pregnancy without uterine and placental anomalies were included in the study. Women having fetus with abnormalities of skull and/or abnormal femur length (skeletal dysplasia) were excluded from the study.

Scanning technique

All ultrasound examinations were performed with sonosite m turbo machine equipped with 3.5 MHz transducer. The antenatal scan was done by single observer to eliminate interobserver variations. All the scans were done by using Tran's abdominal approach. The patients were scanned with a full bladder in a supine position. The abdominal wall was liberally smeared with

coupling gel to secure absence of air gap between the skin surface and transducer.

Fetal measurement

The measurement of fetalbiparietal diameter (BPD) and femur length (FL) were obtained from 13 weeks of gestation whereas abdominal circumference (AC) was measured from 18 weeks of gestation. Femur length (FL) was obtained by measuring its ossified shaft (diaphysis). An acoustic shadow of femur was casted and the FL was measured. Abdominal circumference (AC) was measured in transverse plane perpendicular to the fetal spine at the level of stomach and the umbilical vein.

Diagnosis of IUGR

FL/AC ratio (expressed as femur length/abdominal circumference $\times 100$) was determined to diagnose IUGR. The normal value for this ratio ranges from 22+/-2% in second half of pregnancy i.e. from 21 to 42 weeks ^{3, 4} (hadlock *et al*, lan Donald). Patients with FL/AC > 23.5 were taken as IUGR ^{3, 5} (lan Donald, padubidri and anand *et al.*).

Placental Measurement

The placental thickness was measured at the level of cord insertion in transverse section of placenta. The results were then discussed with other comparable studies. After discussing the result final conclusions of the present study were made.

OBSERVATION AND RESULT

Placental thickness and gestational Age

The mean value of placental thickness in millimeters at different gestational age in weeks is shown in table 1. It was observed that there was increase in placental diameter with increasing gestational age.

Table 1: Showing mean value of placental thickness in millimeters at different gestational in weeks

Gestational Age in weeks	Mean placental thickness in mm
13	14
14	14.5
15	15.8
16	15.6
17	17
18	17.4
19	19.2
20	21.6
21	20.75
22	23
23	22.5
24	25.2
25	25
26	25
27	26.7
28	28.6
29	29.3
30	30.5
31	29

32	32.3
33	31.8
34	35
35	35.2
36	35
37	37
38	36.5
39	38
40	37

The mean value of placental diameter increased from 14mm at 13 weeks of gestation to 37mm at 40 weeks of gestation.

Femur length (FL) and gestational Age

The mean value of femur length in millimeters at different gestational age in weeks is shown in table 2. It was observed that there was increase in femur length with increasing gestational age.

Table 2: Showing means value of femur length in millimeters at different gestational age in weeks

Gestational age in weeks	Femur length(mm)
13	9
14	13.5
15	17
16	20
17	22
18	25.8
19	29.25
20	32.8
21	35.75
22	38.5
23	40
24	42.8
25	45.5
26	47.28
27	50.25
28	52
29	55
30	57.5
31	59.75
32	60.66
33	63.4
34	65
35	67.75
36	68
37	72
38	74.5
39	77
40	76.5

Abdominal circumference (AC) and gestational Age

The mean value of abdominal circumference in millimeters at different gestational ages in weeks is shown in table 3. It was observed that that there was increase in abdominal circumference with increasing gestational age.

Table 3: Showing means value of abdominal circumference in millimeters at different gestational age in weeks

Gestational age in weeks	Abdominal circumference in mm
13	
14	
15	
16	
17	
18	127.2
19	129.75
20	150
21	163.2
22	169.5
23	182.5
24	191.6
25	200.5
26	210.71
27	221
28	230
29	242
30	252.5
31	260.25
32	272.6
33	284.4
34	288
35	303
36	309
37	324.2
38	328
39	341
40	350

The mean value of abdominal circumference increased from 127.2mm at 18 weeks of gestation to 350mm at 40 weeks of gestation. In present study, 5 cases of IUGR pregnancy were found sonographically one case each at 32, 35 and 37 weeks of gestation and two cases at 39 weeks of gestation. The value of placental thickness, femur length and abdominal circumference in millimeters for IUGR pregnancy are shown in table 4

Table 4: Showing values of placental thickness, femur length and abdominal circumference in millimeters for iugr pregnancy

Gestational age in weeks	Placental thickness (mm)	Femur length (mm)	Abdominal circumference(mm)
32	22	62	255
35	27	69	282
37	26	73	289
39	22	74	312
39	28	76	305

It was observed that compared with normal pregnancy, the values of placental thickness and abdominal circumference were comparatively less for IUGR pregnancy at the corresponding gestational age. Comparing and on analysis the p value for all the three parameters were calculated and it was less than 0.001,

which suggests that it is highly significant. That means there is a high degree and significant correlation between placental thickness, femur length and abdominal circumference in mm with gestational age in weeks.

DISCUSSION

Placental Thickness

The placental thickness in mm increases steadily with the increasing gestational Age in weeks in linear fashion and almost matches the gestational age from 13 to 39 weeks of gestation. The results of present study are consistent with the observation made by the authors of previous studies. Hoddick *et al* in 1985 found average placental thickness in mm to be roughly equivalent to gestational age in weeks and found that at no stage of pregnancy was the normal placenta thickness greater than 4cm in weeks. Tanawattancharoen. *et al* 2000 reported less variation in placental thickness at gestational age between 18 and 41 weeks. Elchalal U. *et al* in 2000 reported a linear increase in placental thickness with gestational age throughout pregnancy. The femur length increased progressively from 13th week to 40th week of gestation. The mean femur length at 13th week was 9mm and at 40th week its 76.5mm which are comparable to studies done by hadlock *et al* in 1982. Similarly the abdominal circumference increases with the gestational age in weeks and our results are comparable to studies done by hoffbaeur *et al* in 1979 and hadlock *et al* in 1982.

SUMMARY AND CONCLUSION

In the present study, the variation in placental thickness with gestational age on ultrasonography was studied in 100 pregnant women between 13th and 40th week of gestation.

1. The placental thickness in millimeters almost matches with the gestational age in weeks from 13 to 40 weeks. It can be used as additional parameters along with fetal parameters for estimating gestational age of fetus in instances when duration of pregnancy is not known or uncertain.
2. In the present study, 5 cases of intrauterine growth reduction (IUGR) pregnancy were found sonographically one case each at 32, 35, 37 weeks of gestation and two cases at 39 weeks of gestation.
3. The placental thickness was comparatively less in IUGR pregnancy.
4. Determination of placental thickness should be carried out on a regular basis during routine obstetrics scans as it may be helpful in diagnosis of abnormal placentas and can provide an insight into prenatal life which can be helpful in neonatal care and the findings can provide a record which obstetricians and pediatricians can use to plan the future of the mother and child.

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