ORIGINAL RESEARCH PAPER

Obstetrics & Gynaecology

FOETAL KIDNEY LENGTH AN ADDITIONAL PARAMETER FOR DETERMINATION OF GESTATIONAL AGE

KEY WORDS:

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ABSTRACT

One of the commonest problems that an obstetrician faces frequently is estimation of fetal maturity. An accurate estimation of gestational age is fundamental to the management of all pregnancies, especially prolonged pregnancy and other high risk pregnancies. In some cases early termination is necessary as soon as fetus becomes mature eg. preeclampsia, IUGR, diabetes. Accurate estimation of GA is also necessary in antenatal testing like chorionic villus sampling and successful planning of appropriate therapy or intervention.

INTRODUCTION:

An accurate estimation of gestational age is fundamental to the management of all pregnancies, especially prolonged pregnancy and other high risk pregnancies. In some cases early termination is necessary as soon as fetus becomes mature eg. preeclampsia, IUGR, diabetes. Accurate estimation of GA is also necessary in antenatal testing like chorionic villus sampling and successful planning of appropriate therapy or intervention.

The duration of pregnancy is 9 calendar months + 7 days/40 weeks/280 days which is calculated from the 1st day of last menstrual period in women with 28 days cycle.

Unfortunately, sometimes calculation of EDD based on LMP becomes very difficult when

a) The menstrual cycle is irregular.
b) Patient fails to remember LMP/reports inaccurately.
c) Pregnancy occurs during lactational amenorrhoea.
d) If patient had bled in early pregnancy.

Ultrasonicmeasurementoffetalbiometry(BPD,FL,CRL)are considered to be reliable in first and early 2nd trimester. Currently there is no single fetal measurement for accurate estimation of gestational age in the 3rd trimester especially in women who booked late and unsure about LMPs.

Several longitudinal studies have been performed in the west concerning sonographic measurement of fetal kidney length. Initially these were done for diagnosis of renal malformation in utero and later on they were to find out the correlation between fetal kidney length and gestational age. Hence this study is to establish this linear correlation.

AIMS OF THE STUDY

1. To obtain the measurement of foetal kidney length in the patients enrolled in the study.
2. To evaluate the application and accuracy of foetal kidney length measurement in determining the gestational age of the foetus in 3rd trimester in patients with known and unknown dates.
3. To compare its accuracy with that of other selective foetal biometric indices (BPD, FL, AC).

MATERIALS AND METHODS

Period of study-- June 2015 to Dec 2015 at Coimbatore Medical college& Hospital, Coimbatore. 150 singleton pregnant women in third trimester without any complications were chosen for the study.Informed consent for my study was obtained, ethical committee clearance was obtained.

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Study Design – Prospective study

Inclusion criteria

Primi / Multiparous women with known dates / unknown dates of last menstrual period.Singleton Pregnancy.

Exclusion criteria

Gross maternal obesity.

Medical complications – Diabetes / Hypertension. Obstetric complications –oligo/ Polyhydramnios. Fetal anomalies, IUGR, Multiple pregnancies.

Examination method

A thorough history regarding the regularity of cycles, earliest scan, urine pregnancy test, earliest estimation of uterine size, date of quickening was obtained to confirm the gestational age.

The registered women were subjected to routine antenatal examination along with sonographic evaluation. The antenatal examination included weight, height of the patient, blood pressure, systemic and obstetric examination. Symphysiofundal height was measured after emptying the bladder by palpation and gestational age was clinically assessed. Consent for doing USG was obtained.

Routine USG was done in all cases enrolled in the study transabdominally with a real time USG and biometric indices like BPD,FL,AC measured. External renal diameter of right and left kidney was measured and gestational age was assessed clinically and by USG. The patients were followed until delivery.

In Group 1 – Patients with known dates, gestational age was assessed by clinical data and compared with gestational age by kidney length measurement.

In Group 2 – Patients with unknown dates, gestational age was assessed by clinical information like uterine size, earliest scan, date of quickening and after birth the maturity of fetus and compared with gestational age by kidney length measurement and accuracy assessed.

RESULTS AND ANALYSIS

In our study 150 women in the 3rd trimester were included and antenatal USG was taken for kidney length and other biometric indices and labour outcome of those women were followed. The results were analyzed with respect to the age of the patients, parity, right and left kidney , mode of delivery.

Table 1: Age distribution

Age of patients (in yrs)	No of cases	Study group in %
19	11	7.3%
20 – 29	123	82%
30 – 34	12	8%
35	4	2.7%

This table shows the age distribution of patients in this study.

82% of women were between 20-29 years of age. Only 2.7% were above 35 years.

7.3% of women belonged to the teenage group.

This study showed that the age of antenatal women showed no

significant bearing in the assessment of renal length and its correlation to gestational age.

Table 2: DISTRIBUTION OF NO. OF CASES IN EACH GA

GESTATIONAL AGE(WEEKS)	NUMBER OF CASES	PERCENTAGE OF THE STUDY GROUP(%)
28	15	10
30	14	9.3
31	4	2.6
32	17	11.3
33	2	1.3
34	18	12
35	16	10.6
36	30	20
37	17	11.3
38	8	5.3
39	7	4.6
40	2	1.3

This table (table 4) shows that 20% of women belonged to 36 weeks of gestation.

1.3% of women belonged to 40 and 33 weeks of gestation. 10% of women belonged to 28 weeks of gestation.

This distribution of number of cases in each gestational age was chosen randomly.

Table 3: CHANGES IN FOETAL KIDNEY LENGTH WITH GA IN THE STUDY

GESTATIONAL AGE(WEEKS)	MEAN KIDNEY LENGTH(mm)
28	26.9
30	29.0
31	31.4
32	32.0
33	33.0
34	34.2
35	35.1
36	35.9
37	36.9
38	37.0
39	39.3
40	40.5

"Rule of thumb" - Kidney length in mm approximates gestational age in weeks. This table (table 5) shows the kidney length in mm for each gestational age in this study.

Table 4: Mean foetal kidney (left plus right) length at various gestational age.

Gestational age (weeks)	Left kidney In mm	Right kidney In mm	Left plus right(mean kidney length(mm)) Mean	Left plus right(meankidney length(mm)) Confidence interval(95%)
31	31.2	31.6	31.4	29.2-33.7
32	31	33	32	31.7-32.2
33	33	33	33	29.5-36.5
34	34.1	34.3	34.2	33.9-34.5
35	35.1	35.1	35.1	34.6-35.6
36	36.1	35.7	35.9	35.7-36.1
37	36.5	37.3	36.9	36.6-37.2
38	37	37	37	36.2-37.9
39	39.3	39.3	39.3	38.4-40.1
40	39.8	41.2	40.5	39.2-41.9

Both kidneys right and left were measured. It showed that the right and left kidney size are almost same and average kidney size also showed same gestational age. Mean kidney length increased linearly with increase in gestational age.

Table 5: Association between gestational age and BPD, FL, AC, KL in the study group

Gestational age (weeks)	Mean BPD (in weeks) (x±SD)	Mean FL (in weeks)(x±SD)	Mean AC (in weeks)(x±SD)	Mean KL (in weeks)(x±SD)
28	27.08±1.40	26.80±1.22	26.65±1.36	26.98±1.06
30	29.14±1.31	28.90±1.18	28.63±1.45	29.03±1.32
32	30.89±1.44	31.47±1.70	30.31±1.99	30.80±1.53
34	32.96±1.39	32.85±1.10	32.38±1.56	32.51±1.38
36	34.71±1.36	34.77±1.29	34.40±1.47	34.26±1.41
38	36.25±1.17	35.97±0.83	35.81±1.33	36.25±1.70

This table shows the mean BPD, FL, AC, KL in the antenatal women of each gestational age.

This table shows that KL correlates well with FL, BPD, and AC in the estimation of gestational age.

Table 6: Distribution of mode of delivery

Mode of delivery	No of cases	% of study group
Delivered by labour natural	85	57
Delivered by instrumental	14	9
Delivered by LSCS	51	34

The antenatal women in this study were followed till delivery and the maturity of fetus was confirmed after birth of the baby.

This table shows the mode of delivery of the study group which is not related to kidney size. 56% of women delivered by labour natural.

SUMMARY

In this study we have analyzed 150 antenatal women with no obstetrics / medical risk factors and estimated their fetal kidney length and found a linear correlation with gestational age.

The study group was analyzed and distributed according to age, parity, known / unknown LMP.

82% of the study group were between 20-29yrs of age. 53% were multiparous.

83% of the study group were sure of dates.

The patients were followed till delivery and the gestational age was assessed after birth by the maturity of fetus and compared with GA by kidney length.

Both kidneys right and left were measured . It showed that the right and left kidney length were almost the for the same gestational age .

Our study shows that the age, parity, sides of kidney show no significant bearing in the assessment of renal length and its correlation to gestational age.

CONCLUSION

Diagnostic USG is a non-invasive, safe and useful investigative method to clear the different dilemmas in obstetrics, particularly it is very much helpful in estimating the gestational age of the fetus. It is relatively simple, easy to perform and can be repeated and has shown to be free from risk to the mother and fetus.

Fetal kidney length fulfills the need of the hour, it is an investigational tool that will accurately predict the estimated date of confinement without being affected by the discrepancy of late trimester or by growth retardation of fetus. In India where routine early antenatal registration is not a very common phenomenon, particularly in the rural area and where illiteracy makes it difficult to elicit proper menstrual history, it is very imperative that accurate dating is available. Fetal kidney is easy to identify and to reproduce.

In our study patients with known and unknown dates of LMP were taken and their kidney measurements were recorded and gestational age assessed prenatelly the maturities of the fetus

were confirmed after birth.

Our study shows that the age, parity, sex of the infant, sides of kidney shows no significant bearing in the assessment of renal length and its correlation to gestational age.

In our study it has shown that fetal kidney length dates pregnancy within ± 9.17 days unlike other biometry which dates pregnancy within ± 15 to 21 days.

Still more studies are required to determine the accuracy of correlation between renal length and other biometric indices.

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