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ACCURACY OF LAST MENSTRUAL PERIOD AND ULTRASONOGRAPHY IN PREDICTING DELIVERY DATE: A RETROSPECTIVE ANALYSIS

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ABSTRACT
Introduction: Adequate and optimal management of pregnancy is largely dependent on accurate estimation of gestational age. Accurate estimation of gestational age is vital from clinical point of view, since correct interpretation of various screening tests and laboratory tests during the course of pregnancy is largely governed by knowledge of precise duration of gestation at the time of analysis of tests. The present study was planned to analyze last menstrual period (LMP) using Naegele's rule and ultrasonography (USG) in predicting fairly accurate delivery date.
Materials and Methods: The present study was a retrospective case control study done by analyzing the medical records of 82 pregnant subjects to grasp information on estimated date of delivery (EDD) by LMP and USG methods and then it was compared with actual date of delivery.
Results: Out of 82 patients, 27 patients data showed that LMP was better predictor of delivery date with mean difference in estimated delivery date being 7.45±3.5, while 33 patients showed USG as better predictor in whom mean difference between estimated delivery date and actual delivery date was 7.25±3.9. After analyzing these data with the help of student "t" test, no statistically significant difference in means was found. (p>0.05).
Conclusion: Both USG and LMP are almost equally accurate in predicting delivery date.

KEYWORDS : Pregnancy, last menstrual period, Naegele's rule, ultrasonography, delivery date.

Introduction:
Adequate and optimal management of pregnancy is largely dependent on accurate estimation of gestational age.[1] Determination of date of delivery is the chief onus of the attending obstetrician. This is important for mother, since this helps mother to get an idea when to expect the delivery of her baby. This also helps the healthcare providers to demarcate the periodic points during the course of pregnancy, wherein various screening interventions targeted towards early detection of neonatal congenital malformations, decision regarding method of labor induction in case of preterm and post-term pregnancies.[2] Moreover, accurate estimation of gestational age is vital from clinical point of view, since correct interpretation of various screening tests and laboratory tests during the course of pregnancy is largely governed by knowledge of precise duration of gestation at the time of analysis of tests.[3] This also helps in effective accomplishment of therapeutic interventions in some intricate conditions.[4]

Conventionally, estimated delivery date is calculated on the basis of first day of last menstrual period (LMP), using Naegele's rule.[5] It is based on the assumption that last menstrual cycle is of 28 days, with ovulation occurring at 14th day and conception happening within a span of 3-4 days. However, these assumptions do not hold true in majority of the cases, since it has been reported that there is potential recall bias regarding LMP or is misattributed due to sporadic mid cycle bleeding or irregular menses, etc.[6] Still, this method is widely practiced in developing countries like India, due to its superior economic feasibility and ease to execute it. However, it has been reported in literature that accuracy of LMP method is inversely related to length of recall of LMP.[7] It is logical finding that such recall bias adversely affects the preciseness of LMP.[8] Moreover, LMP method cannot be used in case of conception following cessation of oral contraceptive use.[2]

Ultrasonography (USG) is almost universally accessible, precise, non-invasive and safe recommended investigation for determination of estimated delivery date/gestational age.[9] It is done by ultrasonographic evaluation of fetal biometric measurements, out of which 1st trimester evaluation of crown rump length is known to provide most precise approximates.[9] However actual span of pregnancy is not measured by USG and it is mainly based on fetal biometric variation, comeuppance to the gestational age and not the actual variability.[6] Still ,1st trimester USG attributes have been found to be a better predictor of delivery date than LMP.[1,10]

However, USG is still economically not feasible in most parts of the country. Existing literature supports both LMP and USG as better predictors of delivery date in various clinical studies.[1,10,11] Hence, the present study was planned to analyze LMP and USG in predicting fairly accurate delivery date.

Material and Methods:
The present study is retrospective case control study carried out at Ace women's hospital, Nagpur, Maharashtra, India. Medical records of 82 pregnant subjects were analyzed for estimated delivery date from USG and LMP methods.

Inclusion criteria:
All pregnant subjects, wherein both USG and LMP methods were used to derive estimated delivery date.

Exclusion criteria:
Following cases were excluded from analysis:
- Uncertain Last Menstrual Period (menstrual cycle beyond 24-34days)
- Non viable pregnancy
- Women with Elective LSCS or induction of labor
- Premature deliveries
- Multiple Gestation
- Pregnancy - 4mths of Hormonal contraception.

Due care was taken not to disclose the identity of study subjects. All the data was expressed as mean. Student's t test was applied to compare the approximated delivery date by LMP and USG. P<0.05 was taken as statistically significant. Methodology adopted for the present study is shown in figure 1.
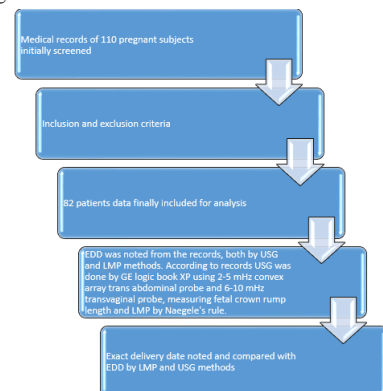

Medical records of 110 pregnant subjects initially screened

Inclusion and exclusion criteria

82 patients data finally included for analysis

EDD was noted from the records, both by USG and LMP methods. According to records USG was done by GE logic book XP using 2-5 mHz convex array trans abdominal probe and 6-10 mHz transvaginal probe, measuring fetal crown rump length and LMP by Naegele's rule.

Exact delivery date noted and compared with EDD by LMP and USG methods

Figure 1: showing methodology adopted for the present study.

Results:
Out of 82 patients, 27 patients data showed that LMP was better predictor of delivery date with mean difference in estimated delivery date being 7.45±3.5, while 33 patients showed USG as better predictor in whom mean difference between estimated delivery date and actual delivery date was 7.25±3.9. After analyzing these data with the help of student "t" test, no statistically significant difference in means was found. (p>0.05) [table 1].

Table 1: showing mean differences between estimated delivery dates and actual delivery date by LMP and USG method and comparison between the two.

Methods	Mean ± SD	p-value
USG	7.25±3.9	>0.05
LMP	7.35±3.5	

In women with regular cycles, EDD calculated by LMP method was same as USG estimation in 35 subjects (43%). LMP estimated EDD was later than USG estimation in 23 subjects (28%). LMP estimated EDD was earlier than USG estimation in 24 cases (29.2%). [table 2]

Table 2: showing EDD comparison by LMP and USG methods.

EDD comparison	N (%)
LMP=USG	35(43%)
LMP<USG	24(29.2%)
LMP>USG	23(28.2%)

Out of total 82 patients, 58 patients delivered within a gap of 1 week from EDD calculation by USG method and 49 patients delivered within a gap of 1 week by LMP method. Out of which, gestational age and actual delivery date were associated in 42 subjects. 12 subjects delivered beyond 1 week from EDD calculated by USG and LMP methods.

The mean duration of pregnancy by LMP and USG method was 271 and 270 days, respectively. The median duration of pregnancy by LMP and USG method was 272 and 271 days, respectively. [table 3].

Table 3: showing mean and median of duration of pregnancy by both the methods.

Parameter	LMP (days)	USG (in days)
Mean	270.8	270.1
Median	272	271

Discussion:
It is not unusual to encounter a variation of ± 2 days, in ovulation in a regular 28 days menstrual cycle. Thus, it is quite logical to anticipate that conception usually follows in 4-5 days after ovulation.[10] USG has been found to be of vital importance in such cases by many authors; but its exactitude decreases as term progresses due to increase in range of normal values with this increase in periodicity.[12] Thus, it is logical to assume that USG estimates will be fairly accurate when done in 1st trimester as compared to 2nd trimester. It is now very well recognized almost universally that gestational age can be determined with acceptable level of accuracy by measuring crown rump length of fetus in 1st trimester.[12] EDD can be reckoned using crown rump length measurement technique with short error of range of ± 4.7 days.[13] This is particularly important, to avoid premature delivery induction interventions.

In the present study, 70% of the subjects delivered within a week of EDD calculated by USG method. 60% of the subjects delivered within a week of EDD calculated by LMP method. Both, LMP and USG methods were found to be equally good in 43% of the subjects. This is in contrast to the findings of other such study, wherein both the techniques were found to be equally effective in 20% of the subjects.[14] Although the findings of delivery rates within a week of EDD by both the methods were corroborated with that of other such study.[15] In the present study, both the methods were found to be almost equally accurate in predicting the delivery date. However, studies have reported the accuracy of USG to be better than that of LMP method.[14,15,16]

Irrespective of accuracy of the estimation technique used, precise prediction of delivery date is practically not possible beyond a certain time period. This is attributed to enormous physiological alteration during the course of pregnancy. Error in methodology adopted and deviation in labor onset time are the 2 parameters, which are always considered while computing prediction error. However, in actual clinical practice, even the segregation of these cogs is very tedious.[17] There are some reports that suggest increasing accuracy of LMP method in estimating delivery date using Naegele's rule by using 282 days instead of 280 days.[18] However, core evidence in literature refutes this claim.[17,19]

The mean and median values of duration of pregnancy in the present study are in corroboration with findings of other such studies.[1,19] In the present study, post term pregnancies were reduced from 15% estimated by LMP method to 1.8%, estimated by USG method. Similar findings of reduction in post term pregnancies have been reported in literature when EDD was computed using USG method.[1,19]

The present study had certain limitations. Due to retrospective study design, chances of bias cannot be ruled out. Lastly, error margin calculation would have given more weightage to the existing observations.

Conclusion:
The present study showed that both USG and LMP are almost equally effective in predicting fairly precise delivery date. Although USG showed advantage in reducing the occurrence of post term pregnancy.

Conflicts of interest: None declared by the authors.

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