

Dating of pregnancy by CRL : who should do it?

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Background

In substantial number of pregnancies LMP can not be used because the date is incorrect or not known, women have just stopped using oral contraceptives, or report having irregular prolonged menstrual bleeding. Moreover, even when LMP is known and cycle was reported as regular, there may be subtle variations in GA due to early or delayed ovulation, fertilization or nidation. Early pregnancy bleeding, as well, leads to considerable confusion.

Embryological studies have observed uniform development of the human embryo with small differences in size and age at different stages. However, disparities in growth may occur at an early stage of pregnancy due chromosomal or structural abnormalities.

Human Embryo grows at a rate of 1- 1.3 mm/day. A cut off value for CRL growth of 0.2 mm/day is always associated with miscarriage.

CRL can be used for dating pregnancy between 10 and 14⁺¹ weeks, and the best results are obtained between 10 and 12 weeks. BPD is the preferred method for dating pregnancy up to 23⁺⁶ weeks. After 24 weeks, reliable LMP, if available, does better than ultrasound measurements.

CRL learning curve

10 trainee sonographers were taken as our study sample. The scan background was similar among all of them.

CRL learning curve was the longest among the ones for other first trimester markers (table 1). Moreover, those on consistent daily training, obviously, obtained the accreditation earlier than those on inconsistent or interrupted training.

CRL Reliability

The primary results of our study has shown that the reliability of CRL in dating pregnancy is highly sonographer dependant. Some sonographers has shown persistent good results while others have shown persistent significant variation (P < 0.05) at their estimated date by CRL and the actual date of confinement.

Image magnification	The fetus is as large as possible, to clearly demonstrate the entire CRL with a visible pocket of fluid at either end. The image should fill A) 60–98% of the screen.
End points of crown and rump	The parietal bone (crown) and skin inferior to the tip of the sacrum (rump) are the points which provide the longest measurement of the fetus and should be clearly defined. A pocket of fluid should be visible between these points and the uterine wall. A) Clearly defined crown B) Clearly defined rump C) Pocket of fluid at the crown D) Pocket of fluid at the rump
Mid-line sagittal section/rotation	The following features should be seen: A) The mid-sagittal view of the face displaying the following: 1) the echogenic tip of the nose 2) the rectangular shape of the palate 3) the translucent diencephalon B) the head should be in line with the full length of the body displaying: 1) full length of the body 2) full length of the spine, displayed as lines of echoes
Flexion	The following features should be seen: A) A pocket of fluid, at least equivalent in size to the width of the palate, should be visible between the fetal chin and chest B) The palate angle should be 300–600 relative to the horizontal C) The nasal tip should be level or above the anterior abdominal wall D) The fetal cervical spine should not be extended
Caliper placement	Intersection of the cross of the linear calipers should be placed on the outer border of crown and rump at the points at which an imaginary tangents which are vertical to the fetal axis touch the crown and the rump.



Figure -2 Use of modified CRL tool for non-horizontal fetus



Figure 3 Standard CRL measurement using modified CRL tool

Sonographer	CRL	TR	DV	NT
A	35 days	10 days	25 days	28 days
B	21 days	26 days	15 days	15 days
C	Not obtained	2 months	Not obtained	Not obtained
D	6 months	30 days	38 days	3 months
E	55 days	25 days	50 days	25 days
F	Not obtained	3 months	Not obtained	Not obtained
G	28 days	10 days	20 days	18 days
H	8 months	2 months	3 months	6 months
I	32 days	10 days	19 days	21 days
J	20 days	10 days	15 days	15 days

Table 1: The learning curves of 10 sonographers at a university hospital

Conclusion

CRL is a reliable measurement for estimation of the gestational Age and the expected date of delivery. However, it is highly Operator dependant. Hence, we recommend that the FMF to Impose a separate accreditation for CRL, as that for NT, and Only CRL accredited to be allowed to date pregnancy using CRL

The use of the modified tool of CRL measurement, helped to Improve the precision of caliper placement for CRL measurement as well and hence, it is accuracy in estimating the gestational age.

References:

- 1- FASP manual for sonographers – 2012
- 2- B. O. VERBURG*††, E. A. P. STEEGERS‡, M. DE RIDDER†, R. J. M. SNIJDERS*, E. SMITH. New charts for ultrasound dating of pregnancy and assessment of fetal growth: longitudinal data from a population-based cohort study ;Ultrasound Obstet Gynecol 2008; 31: 388–396

Modified image guidance tool for CRL measurement

