Uterine Artery Doppler screening in 1st & 2nd trimester as a "continuum" for Low Birth Weight in an Indian urban population propose a new method



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Introduction: The aim of antenatal care is to prevent perinatal mortality & morbidity and improve outcomes for mother & baby. LBW & Maternal PE are two most adverse events that have very poor predictability antenatally and can take both the parents and the Obstetrician by surprise. Hence, screening for LBW & PE is very important. Mothers die of PE and have long term complications like cardiac functional diseases, hypertension etc in later life. In utero environment is very important for fetuses as exposure to hostile in utero conditions increases their life time risk of developing diabetes, hypertension in early adulthood.

Objectives - To develop gestational age specific normograms for uterine artery PI in 1st & 2nd trimesters - To examine the association of Uterine artery Doppler in 1st & 2nd trimesters as a "continuum" with LBW & maternal preeclampsia (PE)

Methods: This is a retrospective study of 22,890 examinations at BFMC, Bangalore from 2005 to 2014. Of these 8561 were in 1st trimester and 14,329 in 2nd trimester. The right and left sided uterine arteries were sampled at their crossing of the iliac vessels and mean PI was calculated. The 95th Centile for every week was then calculated and plotted with gestational age to create normal curves for upper limits of uterine artery PI.

- 3465 singleton pregnancies scanned in both 1st & 2nd trimesters with completed outcomes
- pregnancies were followed up for birth weight, gestational age at delivery and development of pre-eclampsia in the mother
- 52 pregnancies were terminated for fetal anomaly; 13 had spontaneous abortions were excluded
- 20 pregnancies in which there was an unexplained IUD or non FGR related IUD were also excluded.



Uterine Artery Mean PI - 95th centile

2nd trim - 14,329 95th centile - 1.56 (18 - 23w) (GA specific 95% PI)

2nd Trimester 95th percentile PI

1st trim - 8,561 95th centile - 2,59 (11 -14w) (GA specific 95% PI)

1st Trimester 95th percentile PI

The conventional way of screening by looking at the abnormal 1st & 2nd trimester uterine artery PI was compared to a novel method of looking at the uterine artery PI in the 1st & 2nd trimesters as a "continuum".

New proposed Method: We reanalysed the same data by reclassifying into 4 groups based on the PI in both first and second trimesters as a continuum.

Group 1: 3020 cases were found to have normal PI in first and second trimesters (89.3%). 89 (3%)had LBW, of which about 33 (37%) required early delivery before 34 weeks. There were 2 mothers who developed PE

Group 2: Increased PI seen in first trimester normalizing in the second trimester was found in 136 pregnancies (4%). Of these 8 (6 %) had LBW. Of this again 3 (37%) required an early delivery & only 1 mother developed PE.

Group 3: Where the first trimester PI was below the 95th centile but did not progressively reduce in the second trimester to remain below the 95th centile. Total number of cases was 137(4%). 35 cases(25.5%) had LBW. 6 women out of 11 women who developed PE were in this group. 5 out of 12 IUDs were in this group.

Group 4: consisted of women who started off with PI more than 95th centile in first trimester continuing to be high in second trimester. This group had 55 (1.62%) cases. In this group, 20 (36.3%) had LBW and 9 (45%) required early delivery less than 34 weeks. 2 mothers had PE & required termination of pregnancy. 7 babies(13%) were growth restricted, of which 3 died in utero and 4 had to be terminated, 2 of whom had PE.

Conclusions:

- Developed gestational age specific PI for Indian mothers
- We propose using 1st & 2nd trimester UAD as a continuum for screening for LBW and probably for PE as this
 - · will reduce the false positives generated by using single measurements
 - · Give better prediction rates
 - · Limit use of interventions like Aspirin in the group that needs it the most

Conventional Method (table 1): For a screen positive of 6% in the traditional groups, the no. of LBW requiring delivery before 34 weeks were more in abnormal first and second trimester groups as compared to the normal first and second trimester groups. Also there were 4 terminations due to FGR in the abnormal first and second trimester groups.

	LB	W < 3rd cent	ile	Mat PE < 34w	FGR			
	Total	≤ 34w	> 34w		IUD	ToP - FGR	NND - FGR	
Normal 3192 (94.	124 (3.8%)	51 (41%)	73 (59%)	8 (0.25%)	9 (0.28%)	0	4 (0.12%)	
Abnorma 188 (5.5	28 (14.89%)	12 (42.8%)	16 (57.2%)	3 (1.59%)	3 (1.59%)	4 (2.12%)	0	
Normal : 3183 (94	97 (3%)	36 (37.1%)	61 (62.8%)	3 (0.09%)	4 (0.12%)	0	2 (0.06%)	
Abnormal 197 (5.8	53 (26.9%)	25 (47.1%)	28 (52.8%)	8 (4%)	8 (4%)	4 (2%)	0	

Total no of singleton pregnancies who had 1T and 2T scans with completed Outcomes- 3465 ToP (FA) - 52; SA - 13; Unexplained/ non FGR IUDs - 20; n - 3380

		LBW < 3 rd centile			Mat PE <34w	FGR		
		Total	<u><</u> 34w	> 34w	N - 11	IUD = 12	ToP = 4	NND = 4
Α	Normal 1T; normal 2T 3020 (89.3%)	89 (2.94%)	33 (37%)	56 (63%)	2 (0.06%)	4 (0.13%)	0	2 (0.06%)
В	Abnormal 1T;normal 2T 136 (4%)	8 (5.8%)	3 (37.5%)	5 (62.5%)	1 (0.73%)	0	0	0
С	Normal 1T;Abnormal 2T 137 (4%)	35 (25.5%)	18 (51.5%)	17 (48.5%)	6 (4.38%)	5 (3.7%)	0	2 (1.46%)
D	Abnormal 1T; Abnormal 2T 55 (1.62%)	20 (36.3%)	9 (45%)	11 (55%)	2 (3.63%)	3 (5.45%)	4 (7.27%)	0

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