

UTERINE ARTERY DOPPLER FLOW INDICES IN PREGNANT WOMEN DURING THE 11 WEEKS + 0 DAYS AND 13 WEEKS + 6 DAYS GESTATIONAL AGES: A STUDY OF 118 PATIENTS

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ABSTRACT. Uterine artery Doppler flow studies during the 11th and 14th weeks of pregnancy are important in the prediction of preeclampsia and IUGR in pregnant women and also in the prevention thereof.

Our study of the Doppler flow indices of the uterine arteries involves 118 patients examined in our clinic, with pregnancies ranging from 11 weeks + 0 days to 13 weeks + 6 days.

There were 59 patients from 11 weeks + 0 days to 11 weeks + 6 days (50%), 23 from 12 weeks + 0 days to 12 weeks + 6 days (19.49%), and 36 from 13 weeks + 0 days to 13 weeks + 6 days (30.51%). The values of the Doppler indices were: PI 1.69 ± 0.75 , 1.79 ± 0.78 , 1.57 ± 0.68 , and 1.61 ± 0.75 and RI 0.72 ± 0.14 , 0.73 ± 0.14 , 0.70 ± 0.13 , and 0.71 ± 0.14 for the entire group and for the three intervals respectively. There were 42 (35.59%), 25 (21.19%), and 51 (43.22%) patients with bilateral, unilateral and absent uterine artery notching, respectively. The Doppler indices for the three aforementioned groups were: 2.11 ± 0.74 , 1.68 ± 0.73 , and 1.35 ± 0.59 for the PI and 0.78 ± 0.11 , 0.72 ± 0.13 , and 0.67 ± 0.14 for the RI, respectively.

The mean uterine artery PI and RI vary from 11 weeks + 0 days-11 weeks + 6 days to 13 weeks + 0 days-13 weeks + 6 days. They also decrease from pregnant patients with bilateral uterine artery notching to those without notching. Our results are similar to those in literature.

KEYWORDS: pregnancy, gestational age, uterine artery notching, Doppler indices, pulsatility index, resistivity index, preeclampsia, IUGR

INTRODUCTION

The study of Doppler flow of maternal uterine arteries has provided a tool where the physiology of the maternal-fetal unit can be relatively easily evaluated (Scission et al, 2009). The relationship between abnormal uterine artery Doppler indices and blood flow, preeclampsia, IUGR and adverse pregnancy outcomes are already well-established (Barbieri et al, 2010). Maternal hypertensive disorders are often associated with inadequate blood supply to the placenta (Barbieri et al, 2010). An increased risk of maternal and fetal complications, some of them life threatening, have already been reported in women showing an increased resistance to the blood flow in the uterine arteries during pregnancy. Abnormal uterine artery Doppler findings have shown a significant correlation with the risk of adverse perinatal outcomes such as SGA and postpartum fetal admission to NICU (Ghi et al, 2009). Pregnancies that are to result in normal term deliveries show increased diastolic blood flow velocity and loss of the early diastolic notch by 22 weeks of gestation if it exists before that gestational age, while pregnancies that show persistent high resistance waveforms and early diastolic notches are at risk of preterm delivery, due to pre-eclampsia, abruption, and IUGR (Toal et al, 2008).

Doppler velocimetry of uterine arteries at the first and second trimesters of gestation and its relation with preeclampsia prediction have been intensely studied and the relation between changes in pulsatility index (PI) at 11 to 13 weeks + 6 days to 21 to 24 weeks + 6 days and the occurrence of preeclampsia has been assessed and reported (Plasencia et al, 2008). Another study has observed an association between resistance index (RI) and the presence of early preeclampsia (before 37 weeks of gestation). Greater RI in patients who developed preeclampsia in the first trimester of gestation than in healthy patients have also been observed (Melchiorre et al, 2008).

MATERIALS AND METHODS

We assessed the uterine artery Doppler flow indices in 118 pregnant patients within the 11 weeks + 0 days and 13 weeks + 6 days gestational ages in our clinic by using a Sonoscape SSI-6000 and a General Electric Logiq e ultrasound devices. The Doppler flow was analyzed with a 2 mm window and an insonation angle of less than 30 degrees, according to existing guidelines.

RESULTS

There were 59 patients from 11 weeks + 0 days to 11 weeks + 6 days (50%), 23 from 12 weeks + 0 days

to 12 weeks + 6 days (19.49%), and 36 from 13 weeks + 0 days to 13 weeks + 6 days (30.51%). The values of the Doppler indices were: PI 1.69 ± 0.75 , 1.79 ± 0.78 , 1.57 ± 0.68 , and 1.61 ± 0.75 and RI 0.72 ± 0.14 , 0.73 ± 0.14 , 0.70 ± 0.13 , and 0.71 ± 0.14 for the entire group and for the three intervals respectively.

There were 42 (35.59%), 25 (21.19%), and 51 (43.22%) patients with bilateral, unilateral and absent uterine artery notching, respectively. The Doppler

indices for the three aforementioned groups were: 2.11 ± 0.74 , 1.68 ± 0.73 , and 1.35 ± 0.59 for the PI and 0.78 ± 0.11 , 0.72 ± 0.13 , and 0.67 ± 0.14 for the RI, respectively. Tables 1 and 2 present the mean, standard deviations and the 5th and 95th percentiles for the pulsatility and resistivity indices, while figures 1 and 2 present the means and the standard deviations thereof. Figure three presents the mean PI and RI in the three gestational age groups.

Table 1. Mean PI \pm SD, 5th and 95th percentiles

Group	PI	5 th	95 th
All (n=118)	1.69 ± 0.75	0.68	2.98
11 weeks + 0 days to 11 weeks + 6 days (n=59)	1.79 ± 0.78	0.62	3.16
12 weeks + 0 days to 12 weeks + 6 days (n=23)	1.57 ± 0.68	0.72	2.64
13 weeks + 0 days to 13 weeks + 6 days (n=36)	1.61 ± 0.75	0.74	2.81
Bilateral uterine artery notching (n=42)	2.11 ± 0.74	1.30	2.81
Unilateral uterine artery notching (n=25)	1.68 ± 0.73	0.81	2.21
Absent uterine artery notching (n=51)	1.35 ± 0.59	0.73	2.38

Table 2. Mean RI \pm SD, 5th and 95th percentiles

Group	RI	5 th	95 th
All (n=118)	0.72 ± 0.14	0.48	0.91
11 weeks + 0 days to 11 weeks + 6 days (n=59)	0.73 ± 0.14	0.48	0.91
12 weeks + 0 days to 12 weeks + 6 days (n=23)	0.70 ± 0.13	0.51	0.93
13 weeks + 0 days to 13 weeks + 6 days (n=36)	0.71 ± 0.14	0.49	0.91
Bilateral uterine artery notching (n=42)	0.78 ± 0.11	0.66	0.92
Unilateral uterine artery notching (n=25)	0.72 ± 0.13	0.54	0.84
Absent uterine artery notching (n=51)	0.67 ± 0.14	0.50	0.84

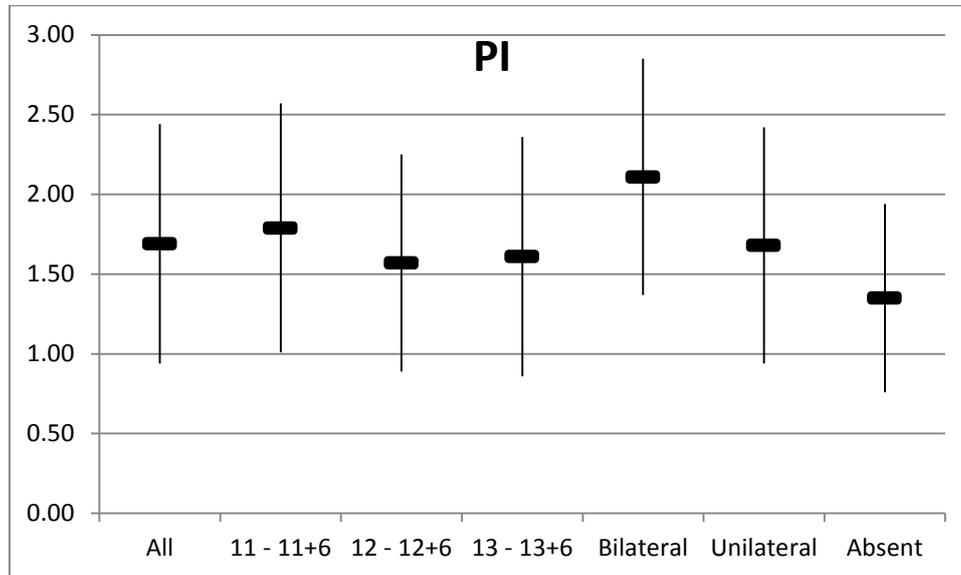


Figure 1. Mean PI \pm DS

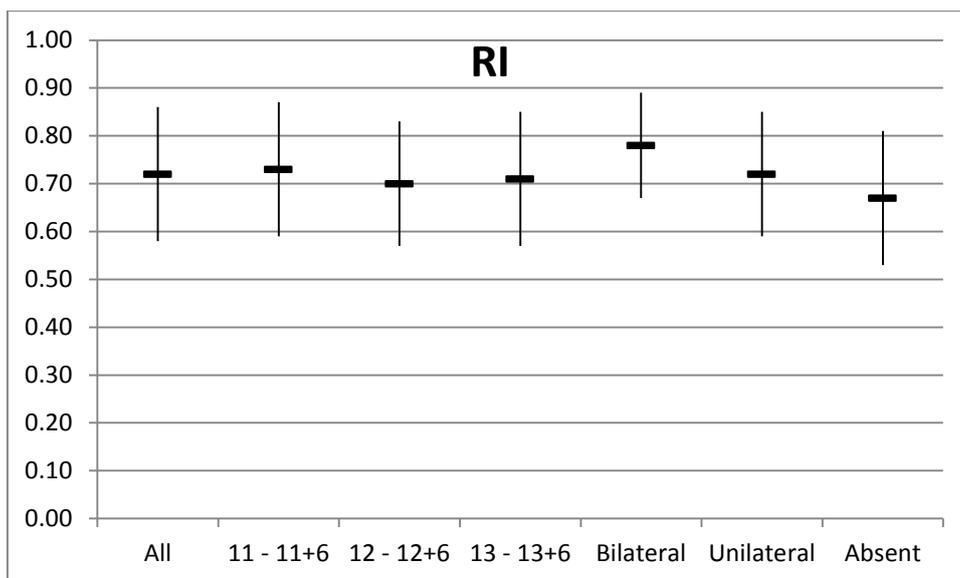


Figure 2. Mean RI±DS

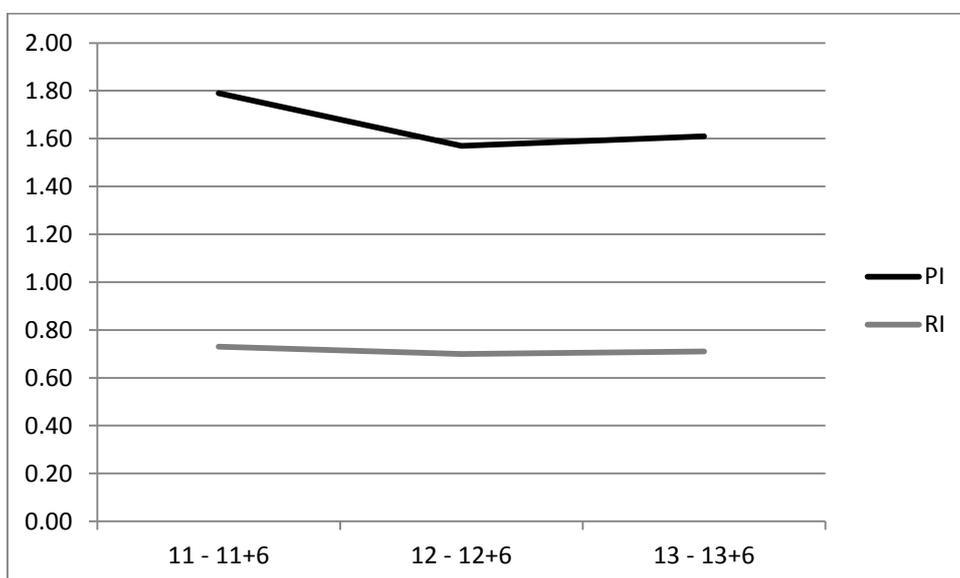


Figure 3. Mean PI and RI if the three gestational age groups

Table 3 and figure 4 present the frequency of different types of uterine artery notching among the three gestational age groups (more than half of the cases with bilateral or unilateral notching are in the 11 weeks + 0 days to 11 weeks + 6 days interval), while

table 4 and figure 5 present the distribution of types of uterine artery notching among the three gestational age groups (the frequency of both types of notching is highest in the 11 weeks + 0 days to 11 weeks + 6 days interval).

Table 3. Distribution of frequency of different types of uterine artery notching among the three gestational age groups

Notching	11 weeks + 0 days to 11 weeks + 6 days (n=59)	12 weeks + 0 days to 12 weeks + 6 days (n=23)	13 weeks + 0 days to 13 weeks + 6 days (n=36)
Bilateral (n=42)	24 (57.14%)	6 (14.29%)	12 (28.57%)
Unilateral (n=25)	15 (60%)	4 (16%)	6 (24%)
Absent (n=51)	20 (39.22%)	13 (25.49%)	18 (35.29%)

Table 4. Distribution of types of uterine artery notching among the three gestational age groups

Notching	Bilateral (n=42)	Unilateral (n=25)	Absent (n=51)
11 weeks + 0 days to 11 weeks + 6 days (n=59)	24 (40.68%)	15 (25.42%)	20 (33.90%)
12 weeks + 0 days to 12 weeks + 6 days (n=23)	6 (26.09%)	4 (17.39%)	13 (56.52%)
13 weeks + 0 days to 13 weeks + 6 days (n=36)	12 (33.33%)	6 (16.67%)	18 (50%)

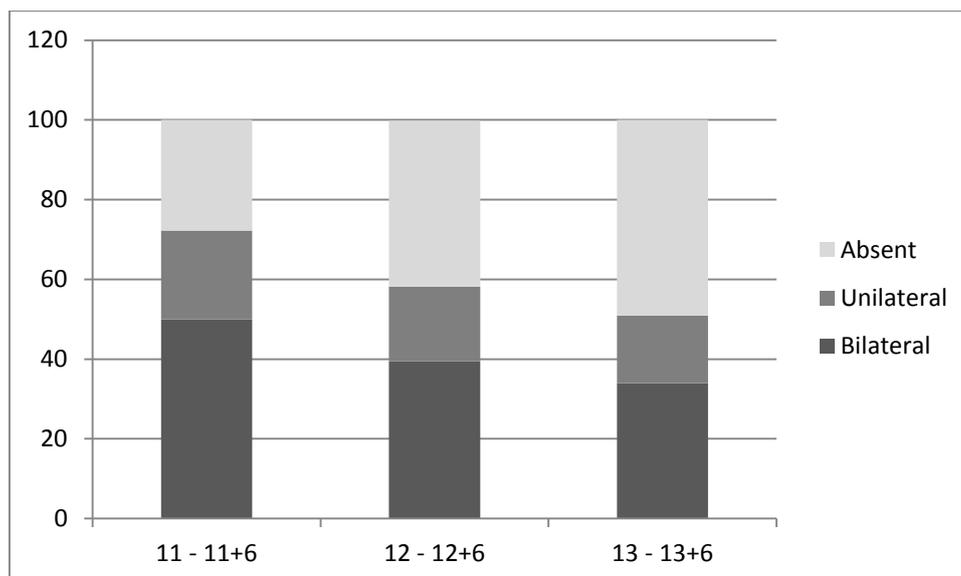


Figure 4. Distribution of frequency of different types of uterine artery notching among the three gestational age groups

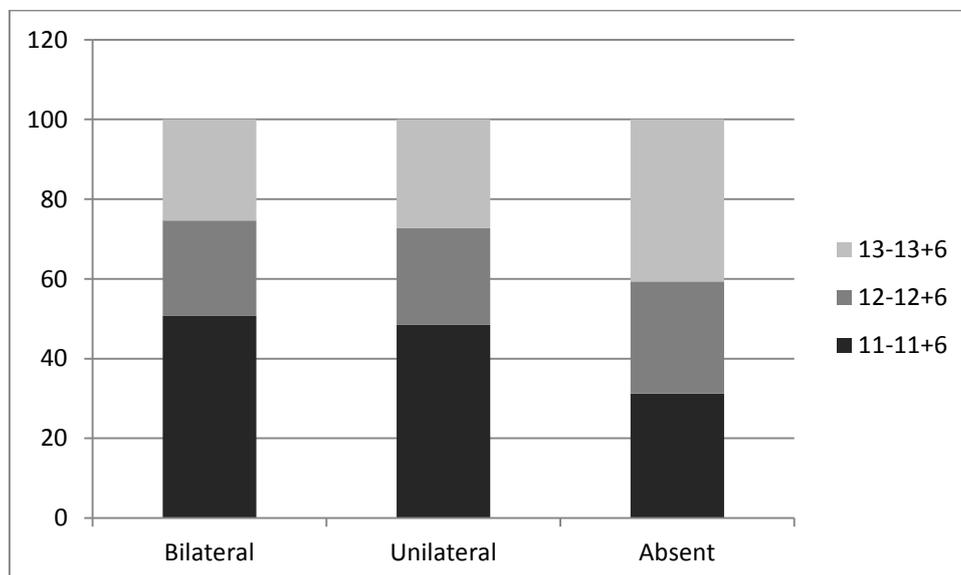


Figure 5. Distribution of types of uterine artery notching among the three gestational age groups

DISCUSSION, CONCLUSIONS

The mean uterine artery PI and RI vary and the frequency of bilateral and unilateral uterine artery notching decrease from 11 weeks + 0 days-11 weeks + 6 days to 13 weeks + 0 days-13 weeks + 6 days. They also decrease from pregnant patients with bilateral uterine artery notching to those without notching.

The frequency of bilateral uterine artery notching in our study is 35.59%,

The results in our study are similar to those in literature:

-mean PI 1.79, 1.68, and 1.58 at 11, 12, and 13 weeks respectively (Gómez et al, 2008),

-PI 2.32 ± 0.79 and RI 0.83 ± 0.07 with notching, 1.61 ± 0.78 and 0.71 ± 0.16 without notching (da Costa et al, 2010).

Our aim is to screen, as much as possible, all pregnant patients between 11 and 14 weeks of pregnancy who are referring to our clinic of pregnancy by uterine artery Doppler ultrasound in order to discover bilateral notching as soon as possible for specific prophylactic treatment to be started.

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