ORIGINAL STUDY

THE ANALYSIS OF THE RETROPLACENTAL VASCULAR SECTOR IN PREECLAMPSIA

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ABSTRACT

The objective of the study was to analyze the blood flow in the retroplacental arteries in pregnancies complicated by preeclampsia. The group of study included 65 pregnant women who were hospitalized and gave birth at the Clinic of Obstetrics – Gynecology of the Emergency Clinic Hospital of the county of Constanta during the period January 2001 – July 2011, divided into two subgroups, A and B, according to the blood pressure values measured during hospitalization. The velocimetry at the level of the retroplacental arteries was analyzed comparatively in the two subgroups. The pregnant women with preeclampsia from Subgroup A presented an increased vascular resistance in retroplacental arteries (average RI = 0.532248±0.098483) in comparison to pregnant women from Subgroup B with a physiological evolution (average RI = 0.519674±0.059594). The S/D ratio represents the most accurate index which shows the increase in resistance to flow in retroplacental arteries at pregnant women with preeclampsia (p=0,10294).Even though it was noticed an increase in resistance in the retroplacental sector at pregnant women with preeclampsia, due to technical difficulties regarding the accuracy of measuring the velocimetry indices, this has no statistic significance (p>0,05)

KEYWORDS: *placenta, retroplacental arteries, preeclampsia*

1. Introduction

Preeclampsia is a pathological condition characteristic to human species and is caused by abnormal placentation. The extra villous trophoblast does not succeed in invading the intramyometrial portion of the spiral retroplacental arterioles, and as a result these vessels remain with a shrunk caliber, responsive to vasopressor stimuli. The consequence of this abnormal placentation is the reduction of the blood flow towards the intervillous space. In preeclampsia there is an increase in the resistance to flow in uterine arteries. Velocimetry indices and especially the resistive index RI and S/D differ on the two uterine arteries, according to the degree of implication of each uterine artery in ensuring the

blood flow towards placenta [1]. The difference is even greater in the first half of gestation and it gradually fades away in the third semester of pregnancy. The difference of velocimetry pattern between the two vascular systems attended by the uterine arteries is more conspicuous if the measurements are made at the level of the arcuate arteries. The velocimetry of the retroplacental arteries would become thus more accurate in the genuine appreciation of the flow modifications in preeclampsia [2,3].

Against the velocimetry of the vascular arcuate system pleads its lack of homogeneity, as the caliber of these vessels modifies too much because of its radial branches which get detached and cross the myometer, the measurements losing thus their repeatability [4, 5].

The study analyzes blood flows in the retroplacental arteries under the conditions of pregnancies complicated with preeclampsia.

2. Material and methods

The group of study included 65 pregnant women who were hospitalized and gave birth at the Clinic of Obstetrics – Gynecology of the Emergency Clinic Hospital of the county of Constanta during the period January 2001 – July 2011, divided into two subgroups, A and B, according to the blood pressure values measured during hospitalization. Subgroup A included a number of 33 hypertensive pregnant women and subgroup B was made up of a number of 32 pregnant women with a physiological evolution of the pregnancy. The velocimetry at the level of the retroplacental arteries was analyzed comparatively in the two subgroups.

Criteria of including the patients into the study:
-Gestational age of approximately 38-40 weeks (±7 days)

-Echographic examination recently made in the clinic or outpatient, at most 7 days antepartum

The identification of the retroplacental myometrial vessels was made using Power or Color Doppler. We watched the velocimetric profile but, because of impurities in catching the signal, the measurements were performed mostly manually.

3. Results and discussions

Vascular resistance in increased in the retroplacental arteries of the subgroup of hypertensive pregnant women (average RI = 0.532248 ± 0.098483, average PI = 0.73733 ± 0.179577, average S/D = 2.232588 ± 0.484626) compared to the retroplacental arteries of the subgroup of pregnant women with normal blood pressure (average RI = 0.519674 ± 0.059594, average PI = 0.706836 ± 0.104033, average S/D = $2.110627\pm 0. 0.241187$), according to the analysis of all indices of blood flow measured (Table I, Chart 1).

Over half of the RI values of the retroplacental arteries are higher than 0,55 compared to 40% of the values obtained from the subgroup of the pregnant women with normal blood pressure (Table II and Chart 2). Although there is an increase in the resistance to flux in the retroplacental arteries at pregnant women with preeclampsia, this is not statistically relevant (p>0,05).

The S/D ratio is the most accurate index which shows flow resistance in arcuate retroplacental arteries at pregnant women with preeclampsia (p=0,10294). The specialty literature mentions the possibility of increased resistance in arcuate retroplacental arteries at pregnant women with preeclampsia [6-8] but data do not confirm the importance of analyzing the flow in this vascular site, where practically occur the most significant structural vascular modifications under the effect of trophoblastic invasion [9].

Table I . *Statistic analysis of the indices of blood flow in the retroplacental arteries corresponding to the two subgroups*

Statistic parameter	RI		PI		S/D	
	Subgroup A	Subgroup B	Subgroup A	Subgroup B	Subgroup A	Subgroup B
Mean	0.532248	0.519674	0.73733	0.706836	2.232588	2.110627
Standard Error	0.017144	0.010535	0.03126	0.018391	0.084363	0.042636
Median	0.55552	0.531665	0.76916	0.724185	2.24982	2.135275
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	0.098483	0.059594	0.179577	0.104033	0.484626	0.241187
Kurtosis	0.034926	0.567646	0.184818	0.228311	2.084408	-0.11746
Skewness	-0.49345	-1.00249	-0.12495	-0.803	0.946437	-0.47111
Range	0.409425	0.243528	0.761948	0.429002	2.168865	0.985581
Minimum	0.314995	0.36646	0.37388	0.44867	1.459843	1.57844
Maximum	0.72442	0.609988	1.135828	0.877672	3.628708	2.564021
Count	33	32	33	32	33	32
Confidence Level(95.0%)	0.034921	0.021486	0.063675	0.037508	0.171841	0.086957
p	0.268628		0.203646		0.102942	
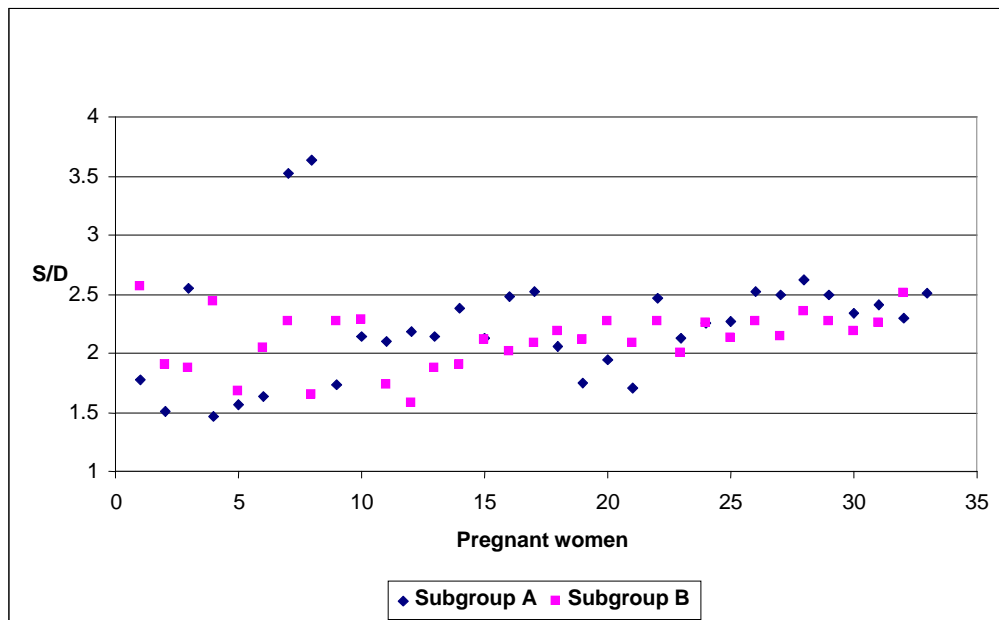
Figure 1. *S/D in retroplacental arteries*

Table II . *Distribution of the number of pregnant women according to the RI values in the retroplacental artery*

A. RI	Subgroup A	Subgroup B
<0,4	4	2
0,40-0,44	4	2
0,45-0,49	1	4
0,50-0,54	7	11
0,55-0,59	10	11
0,60-0,64	5	2
0,65-0,69	0	0
≥0,70	2	0
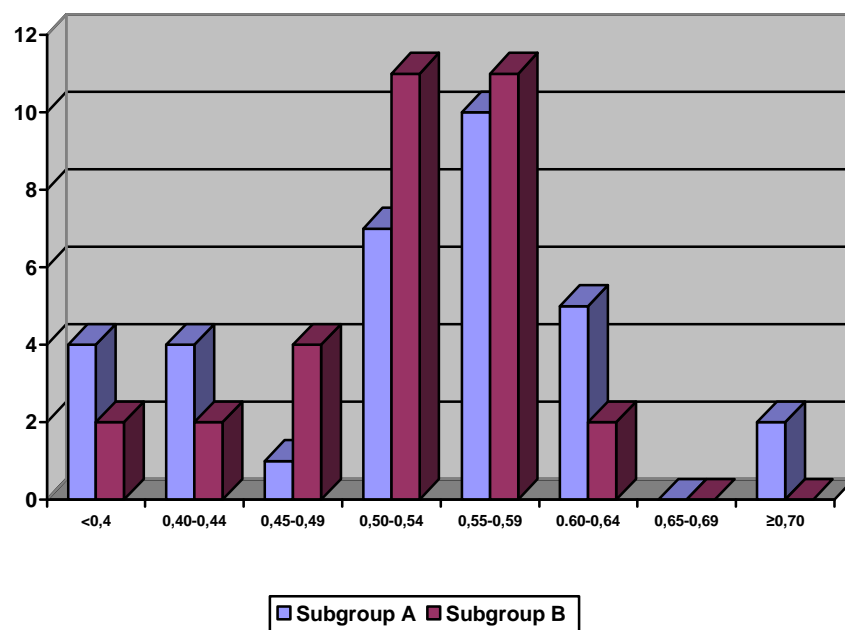
Figure 2. *Comparative distribution of the pregnant women from the two subgroups according to the RI values in retroplacental arteries*

4. Conclusions

There are still disputes regarding the measurement accuracy of the velocimetric indices and their correlation to the clinic and prognostic signification, especially when hypertension and preeclampsia are concerned.

Technical difficulties in performing these measurements, such as the Doppler gate of 1 mm which can encompass in the tissue sample even two spiral retroplacental arterioles, correct isolation of the vessel of small dimensions, purity of Doppler signal, low circulation speeds, would be the explanation for the lack of statistic signification of the difference between these resistance indices in the analyzed subgroups.

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