

DOPPLER VELOCIMETRY OF DECIDUAL SPIRAL ARTERIES FEATURES IN EARLY PREGNANCY BLEEDING

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ABSTRACT

Objective: To evaluate the decidual spiral arteries Doppler velocimetry in early pregnancy bleeding.

Design: Descriptive observational.

Methods: All patients who admitted to Hasan Sadikin Hospital Bandung with early pregnancy bleeding and fulfilled the inclusion criteria were evaluated using ultrasonography during the period of November 2002 until January 2003. The systolic-diastolic ratio, resistance index, and pulsatility index of decidual spiral arteries were calculated. The patients were observed until 20 weeks pregnancy and the spontaneous abortion were recorded. Statistical analysis was used to determine the relationship between Doppler velocimetry of decidual spiral arteries with pregnancy outcome.

Results: There were 31 cases consisted mostly with primigravida enrolled into this study. There were 9 pregnancy cases (29.1%) ended with spontaneous abortion and 22 pregnancy cases (70.9%) survived more than 20 weeks. The mean ages were 27.1 (3.8) in the group with spontaneous abortion and 30.0 (7.2) in the group without spontaneous abortion. The mean gestational ages were 8.6 (1.7) weeks in the group with spontaneous abortion and 9.2 (1.5) weeks in the group without spontaneous abortion. Systolic-diastolic ratio of 1.26 (0.13), resistance index of 0.18 (0.13), and pulsatility index of 0.17 (0.14) were reported among the successful gestations. Systolic-diastolic ratio of 2.71 (0.80), resistance index of 0.57 (0.13), and pulsatility index of 0.75 (0.32) were reported among spontaneous abortion cases and significantly higher than the successful gestations. The cut off point of systolic-diastolic ratio was ≥ 1.7 , resistance index was ≥ 0.4 , and pulsatility index was ≥ 0.45 , with a sensitivity of 100%, specificity of 100%, and accuracy of 100%, respectively, in the prediction of spontaneous abortion.

Conclusion: The systolic-diastolic ratio, resistance index, and pulsatility index of decidual spiral arteries in early pregnancy bleeding were significantly higher in pregnancies ended with spontaneous abortion than in the successful ones. This abnormally higher resistance of decidual spiral arteries could predict subsequent spontaneous abortion.

Key word: Doppler velocimetry, early pregnancy, bleeding, decidual spiral arteries

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INTRODUCTION

Early pregnancy bleeding is the most common pathological symptom of early pregnancy failure. Of all early pregnancy bleeding, 15-20% will end with miscarriages or spontaneous abortion. The causes of early pregnancy bleeding are various. Further development of diagnostic methods in order to be able to predict the spontaneous abortion are needed.^{1,2}

At present, ultrasound is considered to be the best diagnostic method for detecting early pregnancy failure. The application of color Doppler has enabled functional hemodynamic examinations to be performed virtually after implantation.^{1,2,3}

Several early ultrasound signs that give a prognosis of the outcome of a pregnancy have been studied recently. The Doppler ultrasonographic features of uteroplacental circulation, especially spiral arteries, are considered to be one of pregnancy outcome predictors. Spiral arteries are a continuation of the radial arteries and supply most of the midpoint and all the superficial third of the decidua.^{3,4}

The aim of this study is to evaluate the decidual spiral arteries Doppler velocimetry in early pregnancy bleeding.

METHODS

A descriptive observational study was performed among 31 early pregnancies bleeding who were admitted to Hasan Sadikin Hospital Bandung during the period of November 2002 until January 2003. The inclusion criteria were early pregnancy bleeding with gestational ages between 7 to 12 weeks pregnancy with living fetuses. Patients with incomplete data were excluded from the study.

Transabdominal Doppler ultrasound was performed to all patients who fulfilled the inclusion criteria at the Ultrasound Unit, Department of Obstetrics and Gynecology, Padjadjaran University/ Hasan Sadikin Hospital Bandung. The fetal biometry was measured, and then, the systolic-diastolic ratio, resistance index, and pulsatility index of decidual spiral arteries were calculated. The patients were observed until 20 weeks of pregnancy and the spontaneous abortion were recorded.

The T and Mann-Whitney test were used as statistical analysis to determine the relationship between Doppler velocimetry of decidual spiral arteries with pregnancy outcome.

RESULTS

Table 1. Characteristics of Study Subjects

Characteristics	Spontaneous Abortion		Significance
	Yes (n=9)	No (n=22)	
1. Age (years)			
\bar{x} (SD)	27.1(3.8)	30.0(7.2)	t = 1.00
Median	28	29.5	p = 0.315
Range	20 – 32	19 – 41	
2. Gestational age (weeks)			
\bar{x} (SD)	8.6(1.7)	9.2(1.5)	t = 1.08
Median	8	9	p = 0.290
Range	7 – 11	7 – 12	
3. Parity			
1	4	11	$Z_{M-W} = 0.29$
2	4	9	p = 0.772
≥ 3	1	2	

There were 31 cases consisted mostly with primigravida enrolled into this study (Table 1). There were 9 cases (29.1%) ended with spontaneous abortion and 22 cases (70.9%) survived more than 20 weeks. The mean ages were 27.1 (3.8) in the group with spontaneous abortion and 30.0 (7.2) in the group without spontaneous abortion, with the ages ranged 30 – 32 years in the group of spontaneous abortion and 19 – 41 years in the group without spontaneous abortion. The mean gestational ages were 8.6 (1.7) weeks in the group with spontaneous abortion and 9.2 (1.5) weeks in the group without spontaneous abortion, with the gestational ages ranged 7 – 11 weeks in the group with spontaneous abortion and 7 – 12 weeks in the group without spontaneous abortion. According to t and Mann-Withney tests of age, gestational age, and parity, there were no significant correlation between two groups, therefore the data could be compared.

Table 2. Doppler Velocimetry of Decidual Spiral Arteries

Variables	Spontaneous Abortion		Z_{M-W}	p value
	Yes (n=9)	No (n=22)		
1. Systolic-diastolic ratio				
\bar{x} (SD)	2.71(0.80)	1.26(0.13)	4.354	< 0.001
Median	2.7	1.2		
Range	1.7 – 3.5	1 – 1.6		
2. Resistance index				
\bar{x} (SD)	0.57(0.13)	0.18(0.13)	4.333	< 0.001
Median	0.55	0.16		
Range	0.4 – 0.7	0.03 – 0.35		
3. Pulsatility index				
\bar{x} (SD)	0.75(0.32)	0.17(0.14)	4.320	< 0.001
Median	0.53	0.17		
Range	0.48 – 1.21	0.02 – 0.41		

From Table 2, the mean of systolic-diastolic ratio was higher in the group with spontaneous abortion, which were 2.71 (0.80) compared to 1.26 (0.13) in the group without spontaneous abortion. It was highly statistically significant ($Z_{M-W} = 4.353$; $p < 0.001$). The mean resistance index was 0.57 (0.13) in the group with spontaneous abortion and higher than those in the other group, which was 0.18 (0.13). This difference was also highly significant ($Z_{M-W} = 4.333$; $p < 0.001$). The mean pulsatility index was higher in the group with spontaneous abortion, which was 0.75 (0.32) compared to 0.17 (0.14) in the group without spontaneous abortion. It was also highly significant respectively ($Z_{M-W} = 4.320$; $p < 0.001$).

Table 3. Cut off Point of Systolic-diastolic Ratio, Resistance Index, Pulsatility Index in the Prediction of Spontaneous Abortion

Characteristics	Spontaneous Abortion		Significance
	Yes (n=9)	No (n=22)	
1. Systolic-diastolic ratio			
a. > 1.6	9	4	Sensitivity 100%
≤ 1.6	0	18	Specificity 81.8%
			Accuracy 87%
b. > 1.7	9	0	Sensitivity 100%
≤ 1.7	0	22	Specificity 100%
			Accuracy 100%
Cut off point of systolic-diastolic ratio ≥ 1.7			
2. Resistance index			
a. > 0.35	9	4	Sensitivity 100%
≤ 0.35	0	18	Specificity 81.8%
			Accuracy 87%
b. > 0.4	9	0	Sensitivity 100%
≤ 0.4	0	22	Specificity 100%
			Accuracy 100%
Cut off point of resistance index ≥ 0.4			
3. Pulsatility index			
a. > 0.4	9	4	Sensitivity 100%
≤ 0.4	0	18	Specificity 81.8%
			Accuracy 87%
b. > 0.45	9	0	Sensitivity 100%
≤ 0.45	0	22	Specificity 100%
			Accuracy 100%
Cut off point of pulsatility index ≥ 0.45			

From Table 3, the cut off point of systolic-diastolic ratio was ≥ 1.7 , resistance index was ≥ 0.4 , and pulsatility index was ≥ 0.45 , with a sensitivity of 100%, specificity of 100%, and accuracy of 100%, respectively, in the prediction of spontaneous abortion.

DISCUSSION

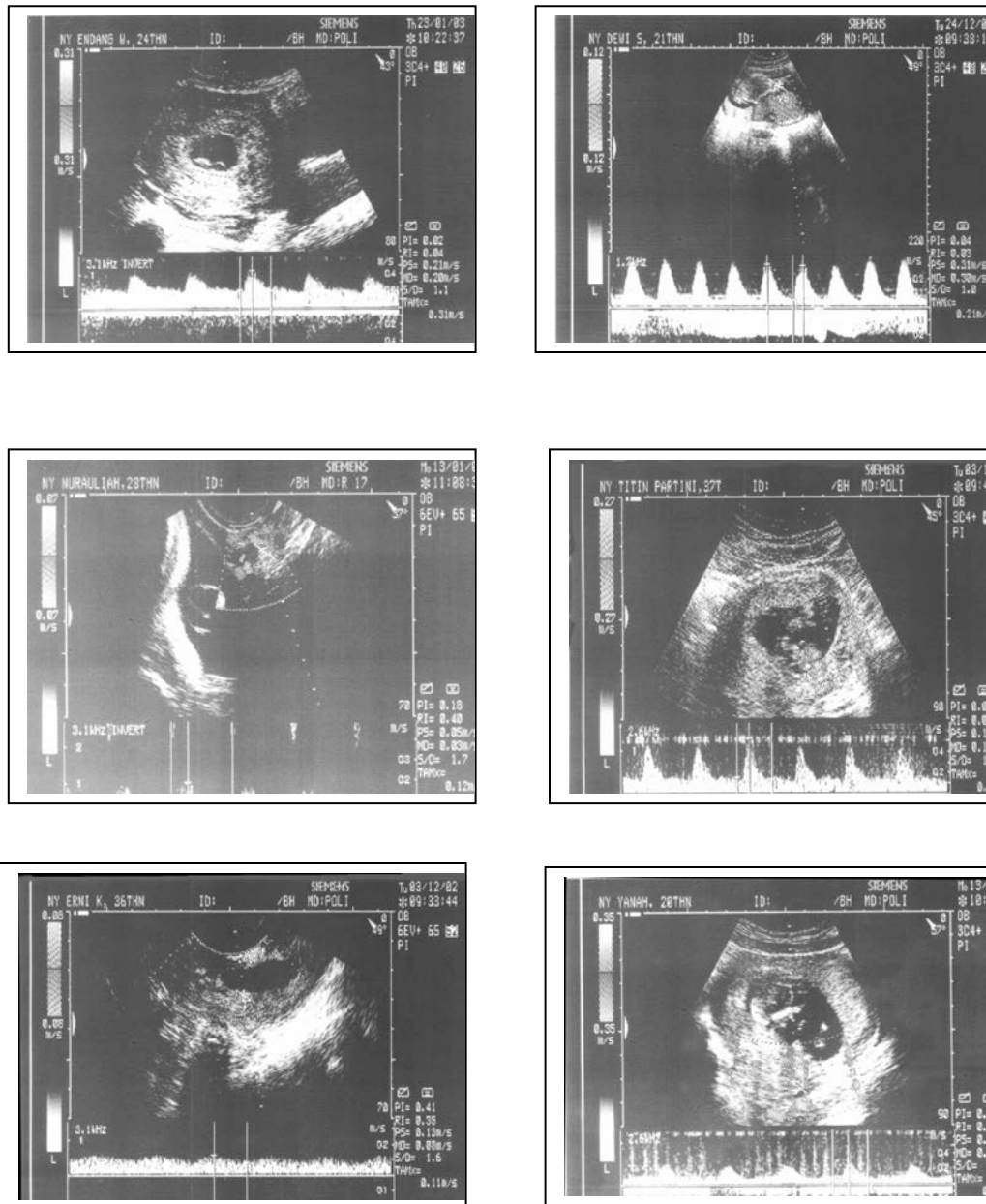


Figure 1. Figures of Ultrasound Doppler Velocimetry of Decidual Spiral Arteries Features in Early Pregnancy Bleeding.

This study had evaluated the decidual spiral arteries Doppler velocimetry in early pregnancy bleeding (Figure 1). During this study, there were 31 cases enrolled into this study with the characteristic of age, gestational age, and parity that could be compared between the two groups.

Table 2 demonstrates that high resistance of decidual spiral arteries were found in the spontaneous abortion group. A very significant correlation was shown between Doppler velocimetry of decidual spiral arteries with spontaneous abortion. Other studies showed the same result with our findings, eventhough they used the resistance index alone.^{5,6} Using all resistance indexes in decidual spiral arteries, there was no different results between systolic-diastolic ratio, resistance index, and pulsatility index in our study.

The subsequent spontaneous abortion could be predicted using Doppler velocimetry of decidual spiral arteries. With the cut off point of ≥ 1.7 for systolic-diastolic ratio, ≥ 0.4 for resistance index, and ≥ 0.45 for pulsatility index. The sensitivity, specificity, and accuracy were 100%, 100%, and 100%, respectively. Previous study showed a sensitivity of 89%, specificity of 86%, negative predictive value of 97%, and positive predictive value of 61% using resistance index with cut off point of ≥ 0.55 .⁵ The lower cut off point of resistance index in our study showed a higher sensitivity, specificity, and accuracy.

CONCLUSION

The systolic-diastolic ratio, resistance index, and pulsatility index of decidual spiral arteries in early pregnancy bleeding were significantly higher in pregnancies ended with spontaneous abortion than in the successful ones. This abnormally higher resistance of decidual spiral arteries could predict subsequent spontaneous abortion.

REFERENCES

1. Kupesic S, Matijevic R, Kurjak A. Early pregnancy loss. In: Kurjak A, Chervenak FA, Carrera JM, editors. *The embryo as a patient*. New York: The Parthenon Publishing Group, 2001: 70-80
2. Kurjak A, Aksamija A. Threatened abortion: new insights by color Doppler, three and four-dimensional ultrasound. In: Chervenak FA, Kurjak A, Papp Z, editors. *The fetus as a patient*. New York: The Parthenon Publishing Group, 2002: 23-42.
3. Brizot ML, Watanabe LC, Izzo CPM, Pereira PP, Miyadahira S, Zugaib M. Ultrasound features in predicting early pregnancy loss. In: Kurjak A, Chervenak FA, Carrera JM, editors. *The embryo as a patient*. New York: The Parthenon Publishing Group, 2001: 143-9.
4. Bajo J, Haya J, Perez-Medina T. U.S. prediction of miscarriage. In: Carrera JM, Cabero L, Baraibar R. *The Perinatal Medicine of the New Millennium*. World Association of Perinatal Medicine, 5th World Congress of Perinatal Medicine. Barcelona, 2001.
5. Jaffe R, Dorgan A, Abramowics JS, et al. Color Doppler imaging of the uteroplacental circulation in the first trimester: value in predicting pregnancy failure or complication. *Am J Roengenol*. 1995; 164:1255-8.
6. Frates MC, Doubilet PM, Brown DL, et al. Role of Doppler ultrasonography in the prediction of pregnancy outcome in women with recurrent spontaneous abortion. *J Ultrasound Med*. 1996; 15:557-62.