The Role of Ultrasound in First Trimester Pregnancy in Prediction of Miscarriages

Fatma Çetin Pelit, Hatice Yılmaz, Necdet Süer

¹S.B. Göztepe Eğitim ve Araştırma Hastanesi Kadın Hastalıkları ve Doğum Anabilim Dalı, İstanbul, Türkiye

Abstract

Objective: This study was aimed to predict the abortion by using transvaginal ultrasonography.

Methods: 86 pregnant women at 6th-7th weeks of gestation according to the crown-rump lenght were looked through gestastational sac dimension, fetal heart rate, yolc sac diameter-morphology, decidual reaction dimensin. Pregnant women were followed up to 12th weeks of gestation. Data of normal pregnancy and pregnancy resulting with abortion were prospectively compared by using Statistical Package for Social Sciences for Windows 15.0 software.

Results: Six (6.97%) of 86 patient were resulted with abortion. Mean gestastational sac dimension, fetal heart rate, yolc sac diameter-morphology, decidual reaction dimensin were respectively 16.58±6.66, 4.69±1.89, 112.5±38.43, 7.48±0.71 in pregnancy resulting with abortion.

Conclusion: To determine the prognosis of pregnancy gestastational sac dimension, fetal heart rate, yolc sac diameter-morphology are effective but decidual reaction dimensin is not.

Keywords: Abortion, transvaginal ultrasound.

İlk trimester gebelik kayıplarını öngörmede ultrasonografinin yeri

Amaç: Bu çalışmada transvajinal ultrasonografi kullanımı ile abortusların öngörülmesi amaçlandı.

Yöntem: Baş-popo mesafesine göre 6 ve 7 haftalık 86 gebede gestasyonel kese boyutuna, fetal kalp hızına, yolk sac boyutuna ve kalitesine desidual reaksiyon kalınlığına bakıldı. Gebeler 12. haftaya kadar takip edildi. Abort yapan olguların sonuçları prospektif olarak Statistical Package for Social Sciences for Windows 15.0 programı kullanılarak abortus yapmayan olgularla karşılaştırıldı.

Bulgular: Seksenaltı olgunun 6'sı (%6.97) abort ile sonuçlandı. Abort yapan olguların ortalama gestasyonel kese çapı 16.58± 6.66, yolk sac boyutu 4.69±1.89, embriyo kalp atım hızı 112.5±38.43, desidual reaksiyon kalınlığı 7.48±0.71 olarak bulundu.

Sonuç: Yolk sac boyutu ve morfolojisinin, embriyo kalp atım hızının, gestasyonel kese boyutunun gebelik prognozunu belirlemede etkin olduğu bulunmuş ancak desidual reaksiyon kalınlığının etkisiz olduğu saptanmıştır.

Anahtar Sözcükler: Abortus, transvajinal ultrasonografi.

Introduction

Despite the developments in modern medicine, reasons of abortions are usually not known. The most important reason of abortions is chromosomal anomalies. Also infections, teratogenic medicines and radiation are among the most important abortion reasons. The rate of abortion after implantation period is about 30-40%.[1] Even under the best con-

ditions, 10-15% of all pregnancies result with abortion. The purpose of this study is to detect the cases which have high abortion risk by checking gestational sac length, CRL, yolk sac diameter and morphology, embryonic heart rate and desidual reaction thickness in women who are at their 6th and 7th gestational week according to CRL measured by TV USG.

Correspondence: Fatma Çetin Pelit, Mustafa Mazhar Bey Cad. Işık Ap. No:38 D:9 Selamiçeşme Göztepe, İstanbul, Türkiye
e-mail: fcetin7@gmail.com

Method

By taking ethical board approval no 54/C on 10.02.09, the study was performed on 95 pregnants who were between 18 and 40 years old and at their 6th and 7th gestational weeks according to CRL measurements by TV USG and applied to the Merdivenköy Gynecology and Obstetrics Clinic of S.B. Göztepe Training and Research Hospital in between 01.07.2009 and 01.04.2010. Those who had chronic disease, abortion history, uterine anomaly (such as myoma, uterus septus or endometrial polyp) that would cause abortion, multiple pregnancy having babies with anomaly or genetic disease history and those who had abortion risk at first follow-up were excluded from the study.

The study was initiated by including 95 cases between 18 and 40 years old who met the study criteria by taking their approvals. However, 3 cases terminated their pregnancy voluntarily. Six cases were not available. Therefore, these cases were also excluded and the study was carried on with 86 cases.

The ages, last menstrual period dates, gravida, parity and abortion numbers of pregnants were recorded. Pregnants at their 6th and 7th weeks according to their CRLs measured by TV USG were included into the study. The evaluation, the examination and the follow-up were done by the same physician every time via Logic A5 ultrasonography device.

After pregnants taken into the study urinated, they were taken to transvaginal ultrasonographic examination in dorsolitomoty position. It was checked whether gestational sac was regular in the pregnants who were included into the study. Cases with irregular gestational sac or subchorionic hemorrhage were excluded from the study. Then, anterior-posterior and longitudinal diameters were measured at sagittal plane in order to determine the gestational sac size. Transverse diameter of gestational sac was measured at coronal plane. The average of these three values was taken. Ultrasonographic age according to average gestational sac diameter was recorded. Yolk sac morphology was examined meticulously and it was checked whether it was regular and included calcification. Transverse diameter of yolk sac was measured inwardly on sagittal plane and its length was recorded as millimeter.

Hyperechogenic halo around gestational sac was measured through the widest point for desidual reaction thickness and recorded. Then, embryonic heart rate was evaluated. Cases without hearth rate were excluded from the study. Embryonic heart rate was calculated by M-mode ultrasonography and recorded. Data were recorded and pregnants included into the study were again called on for re-check at the end of 12th week. Parameters of cases that had abortion (Table 1) in this period were compared with the cases that were pregnant. Data of the study were collected at Excel 2000 and Statistical Package for Social Sciences (SPSS) for Windows 15.0 was used for statistical analyses. While study data were being evaluated, definitive statistical methods (average, standard deviation and frequency) were used as well as Chi-Square test for non-parametric data in inter-group and intra-group comparisons. Results were evaluated by 95% confidence interval and $p<0.05$ significancy level.

Table 1. Data of cases who had abortion.

AGE	CRL	GS	YS	EHR	DRT	GS-CRL
24	11.8	20.5	5.95	60	7.5	8.7
28	4.3	9.0	6.6	120	6.8	4.7
35	5.1	18.0	5.3	100	7.2	12.9
32	5.7	15.3	1.9	85	8.0	9.6
29	8.8	26.7	3.7	160	8.6	17.9
33	8.9	10.0	Echogenic band	150	6.8	1.1

Results

The average age of cases was 24.82±4.06. Six of 86 cases had abortion. Average GS diameter of cases with abortion was found as 16.58±6.66 while it was found as 23.69±4.23 in those who had not abortion. Statistically significant difference was seen when these two groups were compared (p=0.001). Average yolk sac measurement of cases with abortion was found as 4.69±1.89. This average was 3.97±0.76 in those who had no abortion. Yolk sac was followed up as echogenic band in one case and embryonic heart rate was not followed up one week later in this case. Statistically significant difference was found between these two groups. When embryonic heart rates of cases (pulse/minute) were compared, average embryonic heart rate was found as 112.5±38.43 in cases who had abortion and as 138.56±15.14 in cases who had no abortion.

Statistically significant difference was found between these two groups. Desidual reaction thickness of cases was measured and the averages of cases who had abortion and who had no abortion were compared and they were found 7.48±0.71 and 7.86±0.95, respectively. When they were compared statistically, no significant difference was observed (p=0.897) (Table 2).

Table 2. Statistics of cases who had abortion and who had no abortion.

	Abortion average ± SD	Viability average ± SD	P
AGE	30.16±3.97	24.42±3.8	0.012*
CRL	7.43±2.87	8.61±3.42	0.163
GS	16.58±6.66	23.69±4.23	0.001*
YS	4.69±1.89	3.97±0.76	0.002*
EHR	112.5±38.43	138.56±15.14	0*
DRT	7.48±0.71	7.86±0.95	0.897
GS-CRLL	9.15±5.92	15.07±2.89	0.002*

*p<0.05

Discussion

Ultrasonography has an essential role in determining the progress of pregnancy and predicting prognosis. GS, CRL, yolk sac and embryonic heart rate are evaluated at first trimester by ultrasonography. In this study where we aimed to determine the importance of the ultrasonographic diagnoses on predicting the prognosis of pregnancy, parameters of 86 pregnants given above were scanned at 6th and 7th weeks according to CRL and results were compared with different studies. Width, length and depth of gestational sac were measured as millimeter inwardly by high resolution transvaginal ultrasonography. Average value of three diameters was taken. It was seen in the study that finding low gestational sac diameters of cases who had abortion and who had no abortion according to the gestational week was significant in predicting abortion. Similarly, in the study of Oh et al., average gestational sac diameters were measured on 28th–35th and 36th–42nd days of the last menstrual dates of 67 pregnants by transvaginal ultrasonography and 32 pregnants gave labor while 35 pregnants had abortion. No difference was found between sac diameters of cases who had abortion and had no abortion on 28th–35th days. However, the difference was found between GS diameters of these cases on 36th-42nd days. GS diameters of cases who had abortion was found low compared to those who had no abortion.[2]

In our study, average yolk sac diameter was found bigger and statistically significant in cases who had abortion compared to those who had no abortion. In the study, it was concluded that calculating yolk sac diameter during early period of pregnancy and evaluating its morphology would be beneficial in predicting abortion.

In the study of Stampone et al., 101 pregnants were evaluated during early period of pregnancy and yolk sac was not followed up in 8 of 16 pregnants resulted with abortion and they were evaluated as unembryonic, and it was seen that yolk sac was normal in 5 of other 8 cases while the volume of yolk sac increased in three cases.[3] On the other hand, it was found in the study performed by Lindsay et al. that pregnancy prognosis was found worse in cases who had yolk sac volume higher than normal, and it was observed that prognosis was better in pregnants with normal or smaller yolk sac.[4]

On the contrary to that study, 219 pregnants who were at their first trimester were included into the study of Varelas et al. and twelve of 219 pregnants resulted with abortion. It was concluded that yolk sac with low volume was related with negative obstetric outcome.[4]

In the study performed by Cho et al., 154 pregnants at their 6th-10th weeks were included into the study and 43 of them resulted badly. In one of 13 patients who had visible yolk sac and abortion, there was irregular shaped yolk sac. While normal yolk sac was detected in another patient, 11 pregnants had relative wide yolk sac.[6]

In the study, the heart rate calculated by transvaginal ultrasonography M-Mode was lower (112 pulse/min) in cases who had abortion than those who had no abortion (p=0). All cases with 85 pulse/min heart rate resulted with abortion. In light of this finding which is statistically significant, it can be suggested to count embryonic heart rate. Therefore, counting embryonic heart rate at early pregnancy by transvaginal ultrasonography is beneficial in predicting pregnancy prognosis.

In the study of Achiron et al., 629 pregnants were followed up beginning from their early preg-

nancy period and 580 of them were kept in the study until to the end of 13th weeks and 23 of 580 pregnancies resulted with abortion. Average heart rate in 8 of the cases resulted with abortion was similar to the embryonic heart rate in pregnants who had no abortion. It was seen that average heart rate in 15 pregnants was out of 95% confidence interval.[7] Doubilet et al. evaluated 1,185 single pregnancy cases in their study. All cases were examined by transvaginal ultrasonography at averagely week 6.2 and embryonic heart rates of cases were counted. Average heart rate was found as 110 pulse/min. The embryonic heart rates of all cases were counted again by transvaginal ultrasonography at averagely week.[8] Average heart rate was found as 159 pulse/min. In 122 cases who had abortion, the heart rate was <110 pulse/min.[3]

Schats et al. counted heart rates of 47 cases with IVF pregnancy by transvaginal ultrasonography and the heart rate was observed at 25th day in all cases.[8]

In the study performed by Thedor et al., 2,164 pregnants were evaluated by transvaginal ultrasonography at their 6th-8th weeks and their heart rate was counted. Average heart rate was found as 125±15 pulse/min. in cases who had no abortion while it was found as 85 pulse/min. in cases who had abortion. They found relation between abortion and having 85 pulse/min.[9] The heart rates of two cases who had abortion were found below 85 pulse/min. in this study. In the study, desidual reaction thicknesses of cases who had abortion and who had no abortion were compared and no significant difference was found statistically.

Bajo et al. measured trophoblastic thickness on embryonic implantation region in women who were between 5th and 12th gestational week and it was found that trophoblastic thickness was 3 mm more according to the gestational age in 15% of cases.[10]

Conclusion

It was concluded that calculating yolk sac diameter and its morphology, gestational sac diameter and embryonic heart rate at 6th and 7th gestational weeks was significant in predicting gestational prognosis and it was found that the desidual reaction thickness was insignificant in predicting gestational prognosis. It was also found that embryonic heart rate below 85, small gestational sac according to gestational week, yolk sac diameter above 6 mm or the existence of calcification in yolk sac had a relation with bad prognosis.

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