Original paper

Association between Abnormal Yolk Sac and Spontaneous Miscarriage. A Cohort Study.

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Abstract

Background: The yolk sac is essential in early life of the embryo because it is the first route of exchange between the embryo and the mother.
Aim of the study: To determine the association of the spontaneous miscarriage with the abnormal morphology and size of the yolk sac.
Methods: A cohort study was conducted among 85 pregnant women with gestational age ranged between 7-12 weeks, transvaginal ultrasonography was done for all patients at first time. The gestational age was calculated according to the last menstrual period (LMP), crown–rump lengths (CRL), mean gestational sac diameters (MGSD). We divided the sample into two groups, 27 women had abnormal yolk sac represented the 1st group (study) and 53 women had normal sonographic appearance of the yolk sac represented the 2nd group (control). We followed the women until the 20th weeks of pregnancy and compared the spontaneous miscarriage rate between the two groups.
Results: Most of the embryos had a yolk sac with a regular shape (80%), whereas the remaining embryos had a yolk sac with an irregular shape (15%), calcified 2.5%. and 2.5% echogenic. about one third of the women with abnormal yolk sac (cohort group) had miscarriage in front of 10.9 % of the control group and the association was significant (p value = 0.013). Significant association between spontaneous miscarriage and abnormal large diameter yolk sac.
Conclusion: Abnormal yolk sac increases significantly the risk of spontaneous miscarriage
Key words: Spontaneous miscarriage, yolk sac, Transvaginal sonography.

Introduction

In early weeks of pregnancy, the nourishment is provided to the embryo by a tiny yolk sac. A few weeks later, the placenta will be formed and will take over the transfer of nutrients to the embryo, so yolk sac is essential for the life of the embryo [(1)]. Normally, the yolk sac is a round structure, the center is anechoic surrounded by well-defined echogenic wall [(2)] and it is considered having an irregular shape when the margins are wrinkled or the walls are indented or both,and it is large when it's diameter exceed to 5 mm.[(3)] Many studies concluded that these abnormal appearance of yolk sac might increase the risk of spontaneous abortion [(4,5)] while other study said that normal course of pregnancy are not affected by the presence of some sonographic parameters like irregular shape or echogenic yolk sac [(3)]. This cohort study aimed to determine the association between spontaneous miscarriage in women with gestational age ranged between 7-12 wks and had a yolk sac with abnormal morphology and size.

Materials and Methods

A cohort study was conducted between January and June 2019 among 85 pregnant women aged 18-42 years with gestational age ranged between 7-12 weeks calculated according to the last menstrual period, 5

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women were missed, those women attended the Karbala gynecological and obstetrics teaching hospital, the sampling was convenient. Written informed consent was obtained from all patients. To rule out illnesses which could affect our study, detailed medical history was taken and thorough general and physical examination was done. History of previous abortion, parity, history of the menstrual cycle in the last 3 months before the conception, symptoms of the current pregnancy indicating threatened miscarriage, such as vaginal bleeding lower abdominal pain was taken. gynecological and obstetric examination was done. Transvaginal sonography (GE voluson E6 IC5-9-D) was done for all patients at first time. Yolk sac was considered normal when the inner to inner diameter 2-5 mm, round shape, echogenic rim and anechoic center of sac and lastly absence of calcification[3]. The gestational age of a viable fetus was calculated according to the last menstrual period (LMP), crown–rump lengths (CRL), mean gestational sac diameters (MGSD), The MGSD was calculated in millimeters as the average of three orthogonal planes measured from the inner sac wall/chorionic fluid interface. The CRL was measured to the nearest millimeter from the outer ends of the embryo (greatest length). [6] Inclusion criteria ladies with proved positive pregnancy test, known last menstrual period and multiple pregnancy. Exclusion criteria: vaginal bleeding in first trimester, in vitro fertilization, induction of ovulation, patient with chronic diseases like hypertension or diabetes. Then we divided the sample into two groups, 1st group (27 women) was the study group which had abnormal yolk sac and the 2nd group (53 women) with normal yolk sac was the control group. Then we followed the women to the 2oth week of pregnancy, repeated the ultrasonography and then compared the spontaneous miscarriage rate between the two groups. Statistical Package for Social Sciences (SPSS version 20) was used for data entry and statistical analysis. Tables and graphs were used to express frequency data. Chi-square test of independence was used for Statistical association to determine independent risk factors for abortion. A p-value equal to or less than 0.05 was considered statistically significant.

Results

Among total of 85 ladies with proved positive pregnancy test and known last menstrual period (LMP), aged 18-40 years, only 80 patients participated in the study and 5 women were missed. 80% of the sample (64 women) had regular yolk sac shape, 15% (12) had irregular shape and 5% (4) either calcified or echogenic characteristic) as shown in figure (1).

Figure (2) revealed that 65 (81%) women had 2-5 mm diameter yolk sac, 14 women had more than 5mm and only one woman had yolk diameter less than 2mm.

Figure (3) explained that 4 of 12 women had irregular shape of yolk sac, one of the two calcified yolk sac and 6 of 15 women had small or large yolk sac diameter had abortion while no one of the two women with echogenic characteristic yolk sac had abortion.

There was a statistically significant association between the first trimester spontaneous miscarriage and yolk sac diameter (p = 0. 030), it was found miscarriage more in the women who had small or large yolk sac diameter**.** Women aged less than 25 years old and had irregular shape yolk sac had miscarriage more than the women who had regular shape yolk sac or aged more than 25 years old respectively but the difference was not significant. There was a significant increase of miscarriage (p= 0.013) in those women who had previous history of abortion. (Table 1)

Table (2) showed that about one third of the women who had abnormal yolk sac (cohort group) had abortion in front of 10.9 % of the women in the control group who had

normal yolk sac and the association was significant (p value = 0.013).

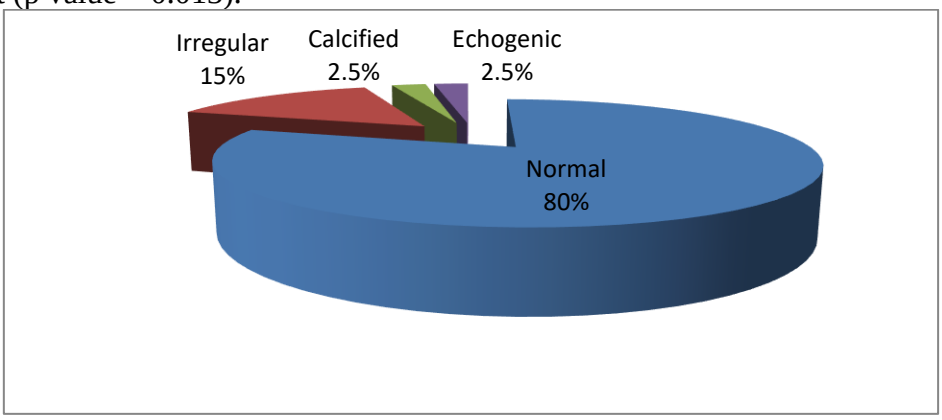

Figure 1. Distribution of the sample by yolk sac shape, calcification and echogenicity

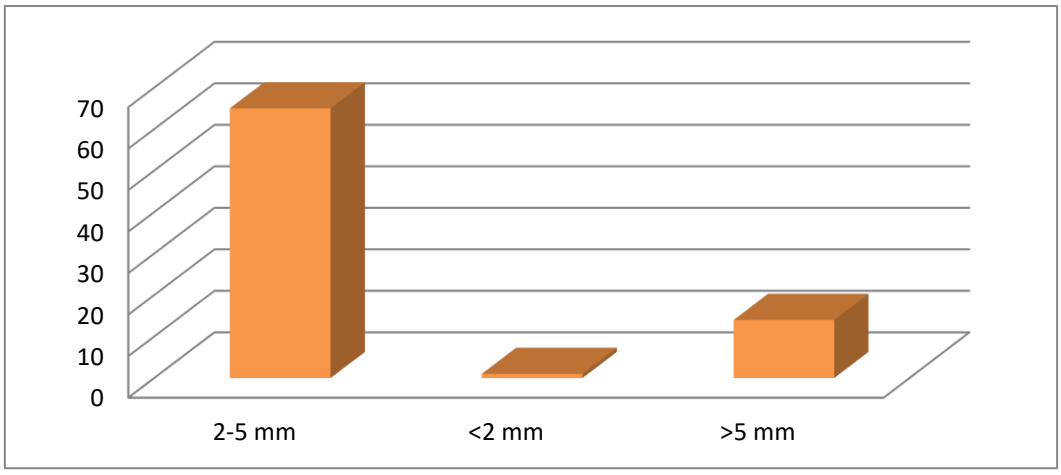

Figure 2. Distribution of the sample by the diameter of yolk sac.

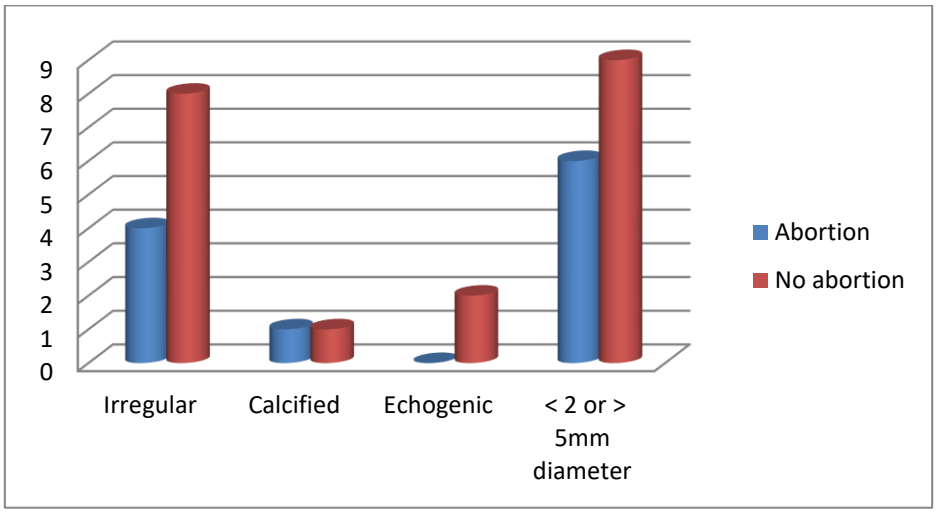

Figure 3. Association between miscarriage and abnormal characteristics of yolk sac.

Table 1. Association between the incidence of the abortion and yolk sac diameter, age and previous history of abortion .

Variables		Abortion				Total No.	P value
		No		Yes			
		No.	%	No.	%		
Yolk sac diameter	2 – 5 mm	56	86.2	9	13.8	65	0.030
	<2and >5mm	9	60	6	40	15	
Yolk sac shape	Regular	57	83.8	11	16.2	68	
	Irregular	8	66.7	4	33.3	12	0.157
Age in years	<25	17	73.9	6	26.1	23	0.233
	> 25	48	84.2	9	15.8	57	
Previous history of abortion	No	52	88.1	7	11.9	59	0.013
	Yes	13	61.9	8	38.1	21	
Total		65	81.2	15	18.8	80	

Table 2. Association between the incidence of the abortion and yolk sac abnormality.

Groups	No abortion		Abortion		Total		P value
	No. %		No. %		No.	%	
Control group	47	88.7	6	11.3	53	100	0.021
Cohort group	18	66.7	9	33.3	27	100	
Total	65	81.2	15	18.8	80	100	

Discussion

In the current study, 80% of the women in the sample had normal yolk sac (2-5 mm diameter, round shape, echogenic rim and anechoic center of sac and lastly absence of calcification). Risk of abortion was increased in women who had yolk sac diameter larger than 5mm and the association was significant (p value = 0.03), in our study only one woman had yolk sac diameter smaller than 2mm, in agreement with other studies concluded that small or large yolk sac diameter increases risk of miscarriage [5,7]. As shown in Figure (3) and Table (1) miscarriage was more in the women who had an irregular shape yolk sac although the association was not significant (p value = 0.157), in contrast to other study which found that irregular shape was not related to an increased risk of spontaneous miscarriage [3] and other study found that the irregular shape of the yolk sac increases the risk of spontaneous miscarriage.[8] In the current study the maternal age was not related to increase the risk of miscarriage (may be because of small sample size) in contrast to other study, in which maternal age was the strongest known risk factor of miscarriage[9]. Miscarriage was more in women had previous history of abortion (p = 0.013). Several studies have looked at the association between the history of previous miscarriage and the future risk of other miscarriage. [10,11] Over all the women in the sample 27 women had abnormal yolk sac visualized at 1st trimester sonography and 33.3 % of them had spontaneous miscarriage in front of 11.3% of those women who had normal yolk sac, the association was significant (p = 0.021), same results was found by other studies.[4,12]

Conclusions

There was a significant association between 1st trimester spontaneous miscarriage and abnormal yolk sac. spontaneous miscarriage was increased significantly in the women had yolk sac diameter greater than 5mm and had history of previous miscarriage.

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