

Yolk Sac Diameter: A Prognostic Factor of First Trimester Pregnancy Outcome

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Abstract

Introduction: It is estimated that approximately 30-40% of implanted pregnancies results in spontaneous abortion during first trimester. Yolk sac shape and size can evaluate the first trimester pregnancy outcome, gross change in yolk sac shape and size indicates significant dysfunction of maternofetal transport system leading to missed abortion

Aim: The study was aimed to evaluate the usefulness of yolk sac diameter in predicting the first trimester pregnancy outcome

Methods: This observational study was conducted in the Department of Obstetrics and Gynaecology, SMS Medical College Jaipur, it included 300 pregnant women between 6 weeks to 9 weeks of gestational age attending antenatal OPD. Transvaginal sonography was done to determine yolk sac diameter and these pregnant women were followed till 12 weeks of pregnancy for outcome, if pregnancy continues beyond 12 weeks of gestational age classified as normal outcome.

Results: Out of 300 total cases, 269 had normal appearance yolk sac Out of 269 (89.67%) normal

appearance yolk sac, 267 (99.26%) had good pregnancy outcome and 2 (0.74%) had abortion. Out of 31 (10.33%) abnormal appearance yolk sac, 20 (64.52%) had good pregnancy outcome and 11 (35.48%) had abortion. Out of 300 cases, 266(88.67%)cases yolk sac diameter was 2-5mm ,6 (2.00%) cases yolk sac diameter was less than 2mm and 28 (9.33%) cases yolk sac diameter was more than 5mm. Out of 266 cases (2-5 mm diameter), 262 (98.50%) had good pregnancy outcome and 4 (1.50%) had abortion. In 28 cases (>5 mm diameter), 20 (71.43%) had good pregnancy outcome and 8 (28.57%) had abortion. In 6 cases (<2 mm diameter), 5 (83.33%) had good pregnancy outcome and 1 (16.67%) had abortion.

Conclusion: The finding of this study showed that yolk sac diameter is an important factor for predicting pregnancy outcome. It has been observed that larger or small yolk sac diameter on ultrasonography have a greater incidence of adverse first trimester outcome.

Keywords: Ultrasonography, Yolk sac, Abortion.

Introduction

The yolk sac is the first extra embryonic structure that becomes sonographically visible within the gestational sac and acts as the primary route of exchange between the human embryo and the mother before the placental circulation is established. It provides nutritional, metabolic, endocrine, immunologic, and hematopoietic functions during organogenesis in embryonic life, and is considered to reach its highest level of functional activity between the 4th and 7th week of embryonic development.¹ The yolk sac is a critical landmark that identifies a true gestational sac.²

Sonography shows the yolk sac as a round structure that is made up of an anechoic center bordered by a regular well-defined echogenic rim. The diameter of yolk sac is usually 3-4 mm and increases in size upto 10th -11th week of gestation, afterward it gradually decreases.³ Yolk sac is considered as an important structure which can help us to know about the state of the embryo.

AIM

This study was aimed to evaluate the usefulness of yolk sac diameter in predicting the first trimester pregnancy outcome

Material and Method

This observational study was conducted in the Department of Obstetrics and Gynecology, Zenana Hospital, SMS Medical College, Jaipur from May 2019 to August 2020. It included 300 pregnant women with gestational age ranging from 6 weeks to 9 weeks, who were attending antenatal clinic in obstetrics and gynaecology department. A written and informed consent was taken. Women with symptomatology of threatened abortion, chronic illness like diabetes mellitus, hypertension and autoimmune diseases or women with drug abuse and smoking were excluded

from the study. All pregnant women had ultrasonography evaluation using M-mode scanning. Gestational age was determined by USG measurement of crown-rump-length (CRL) and yolk sac size was determined by placing the calipers on the inner limits of the longer diameter. Women with normal appearing yolk sac and normal yolk sac diameter (between 2-5 mm) were followed at 12 weeks of gestational age for outcome. Those women with abnormal appearing yolk sac and abnormal yolk sac diameter, below 2mm or above 5mm were followed after 2 weeks and after that they were followed at 12 weeks of gestational age by ultrasonography for outcome. The data was compiled, compared and statistical analysis was done

Statistical Analysis

Linear variables were summarised as mean and standard deviation and were analysed using unpaired 't' test. Nominal/categorical variables were described as proportional and were analysed using chi-square test / fisher's exact test. p-value <0.05 was taken as significant (MEDCALC 16.4 version software was used for all statistical analysis).

Results

Total 300 cases were enrolled in this study of these 287 (95.67%) had uneventful pregnancy outcome and 13(4.33%) had abortion. 151 women (50.33%) were between 20-25 years age group and 149 (49.67%) were from 26-30 years age group. Mean age of cases was 25.40 ± 3.04 years, 250 women (83.33%) were Hindu and 50 (16.67%) were Muslim, 187 women (62.33%) were primigravida and 113 (37.67%) were multigravida.

Table 1: Distribution of Cases According to Yolk Sac Appearance Status of Women

Yolk Sac Appearance	No.	%
Normal	269	89.67
Abnormal	31	10.33
Total	300	100.00

Table 2: Distribution of Cases According to Yolk Sac Diameter (mm)

Yolk Sac Diameter (mm)	No.	%
<2	6	2.00
2 - 5	266	88.67
>5	28	9.33
Total	300	100.00

Table 3: Distribution of Cases According to Pregnancy Outcome in Correlation with Yolk Sac Appearance

Yolk Sac Appearance	Survival		Abortion		Total	
	No.	%	No.	%	No.	%
Normal	267	99.26	2	0.74	269	89.67
Abnormal	20	64.52	11	35.48	31	10.33
Total	287	95.67	13	4.33	300	100.00

p-value = 0.001

Table 4: Distribution of Cases According to Pregnancy Outcome in Correlation with Yolk Sac Diameter

Yolk Sac Diameter (mm)	Survival		Abortion		Total	
	No.	%	No.	%	No.	%
<2	5	83.33	1	16.67	6	2.00
2 – 5	262	98.50	4	1.50	266	86.67
>5	20	71.43	8	28.57	28	9.33
Total	287	95.67	13	4.33	300	100.00

p-value = 0.001

Discussion

Yolk sac is the first structure of the gestational sac, which must be present when the mean gestational sac diameter is 13 mm or smaller in size. It is recommended in a patient at risk for poor pregnancy outcome to assess the yolk sac measurement prior to 12 weeks of gestation by transvaginal ultrasonography and repeat the assessment 2 weeks later when a discrepancy is detected in first trimester of pregnancy.⁴

Yolk sac identified by transvaginal ultrasound between 4th and 5th week of gestation prior to appearance of fetal pole and embryonic heart. The initial diameter is around 3-4 mm and gradually it increases at the rate of 0.1 mm per day and finally undergoes atresia by 10th to 11th week of pregnancy. In this study we evaluated yolk sac diameter (2-5 mm) and yolk sac appearance and found its relationship with first trimester abortion.

As per table 4, it was seen that 98.50% of women with yolk sac diameter 2-5 mm, had a positive first trimester outcome. Women with an abnormal yolk sac (i.e below 2 mm or above 5mm) had a first trimester abortion rate of 45.24%. Thus it was seen that the association between yolk sac diameter and pregnancy outcome was statistically significant.

Similar association was seen in Adiga P et al⁵ who found that pregnancy outcome depending upon size of yolk sac. The pregnancy outcome was optimum when the sac diameter ranged between 2 to 5 mm. The live pregnancy rate increased to 99.2% (250/252) with this yolk sac diameter range. However when the yolk sac diameter fell outside of this range live pregnancy rates were significantly decreased (for < 2 mm - 50%, > 5 mm - 66.6%).

Figueras F et al⁶ conducted a study to find the relation between yolk sac volume and risk of spontaneous abortion. They found that yolk sac volume outside the 5th to 95th percentile were associated with significant occurrence of retrochorial haematoma and subsequent pregnancy loss.

Abnormal yolk sac shape also associated with abnormal pregnancy outcome. Normal yolk sac appear as circular structure with an anechogenic centre surrounding by uniform well defined echogenic wall. Gross change in yolk sac appearance like irregular margin, ovoid shaped, calcified yolk sac, echogenic yolk sac, small or large yolk sac, therefore could indicate significant dysfunction of maternofetal transport system leading to abortion.

In this study 99.26% of normal yolk sac had a positive first trimester outcome while 35.48% of those with an abnormal yolk sac had abortion

Similar association was seen in Bamniya J et al⁷ who found that pregnant women with large gestational sac had normal fetal and maternal outcome while patients with small gestational sac had more incidence of missed or spontaneous abortion (14.28%).

Sheikh S et al⁸ also found association between yolk sac appearance and maternal outcome was statistically significant

Conclusion

It can be concluded from this study that yolk sac diameter can be an important factor for predicting pregnancy outcome. It has been observed that larger or small yolk sac diameter on ultrasonography reduced the success of pregnancy and may lead to adverse outcome

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