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Research article

Yolk Sac Abnormalities – Is It a Reliable Indicator of Abortions? – A Prospective Study in the Population Residing in Rural Setup of Mangaluru, Karnataka, India

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ABSTRACT: **Objective:** This study was undertaken to determine if there were different abortion rates between normal and abnormal yolk sacs between 5-10 weeks of gestation, its association with pregnancy outcome and correlation with other parameters
Materials and Methods: In this study, the yolk sac characteristics of 95 consecutive pregnant women, of 5-6.5 weeks gestation, with normal body mass index (BMI) were prospectively evaluated. All patients underwent two-dimensional transvaginal ultrasonography, which was performed by the same sonographer. We considered the following yolk sac characteristics as normal for classification: diameter: 2-5 mm; round shape; absence of degenerative changes. Yolk sacs that had diameters smaller than 2 mm or larger than 5 mm; a shape that was not round (i.e., oval or distorted); the presence of degenerative changes. The outcome is statistically analyzed.
Results: A total of 100 cases were evaluated. Five cases were excluded. 81(85.3%) continued beyond 20 weeks and the rest 14(14.7%) ended in abortions. About 95.7% of the pregnancies showed the presence of a yolk sac, while in 4.3% of them a yolk sac was absent. Pregnancies with large yolk sac diameter ended with abortions. The sensitivity of predicting normal outcome with regular yolk sac is as high as 94.2%, while specificity is 34.5%.
Conclusions: Abnormalities of the yolk sac size or shape, and absence can be used as a reliable indicators of early pregnancy.

KEYWORDS: Normal Yolk Sac; Abnormal Yolk Sac; Spontaneous Abortion; Transvaginal Ultrasound.

Statement of Originality of work: The manuscript has been read and approved by all the authors, the requirements for authorship have been met, and that each author believes that the manuscript represents honest and original work.

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INTRODUCTION

Pregnancy is a dynamic process during which a lot of changes occur. Precise distinction between normal pregnancy and pregnancy loss in early gestation remains a clinical test, as approximately 30-40% of implanted pregnancies results in spontaneous abortion during first trimester[1]. This is best studied by one of the greatest discoveries – i.e. through ultrasound. But till date there is no standard method which can predict whether a pregnancy will progress successfully or end up in an abortion. In this quest, several predictors were put forward. One of them was regarding the yolk sac- shape and size. Yolk sac is the first recognizable structure inside the gestational sac, which is be detectable as a regularly rounded extra-amniotic structure when the sac reaches dimensions of 8 to 10 mm. It is the primary route of embryo-mother exchange during embryonic development. Before complete establishment of placental circulation, the yolk sac has nutritional, metabolic, immunologic, endocrine, and hematopoietic functions essential in early embryonic life[2]. As detected by sonography, the yolk sac is a round structure that is made up of an anechoic center bordered by a regular well-defined echogenic rim. The diameter of a yolk sac is usually 3-4 mm and increases in size up to the 10th or 11th week of gestation, after which it starts disappearing[3,4]. Sonographic evaluation of the yolk sac can be beneficial in confirmation of an intrauterine pregnancy and prediction of gestational outcome through assessment of its shape, size, and internal structure[5]. The lack of a yolk sac or a smaller than gestational age yolk sac diameter is indicative of pregnancies that may result in spontaneous abortion[6]. Pregnancies with a very large yolk sac are generally always associated with poor outcomes[7]. In contrast, few studies claimed that a pregnancy could have a completely normal course even in the presence of irregular shape or echogenic yolk sac[5]. Hence, the present study is an attempt to see if a normal yolk sac characteristics is actually a predictor of good pregnancy outcome and vice versa or not.

MATERIALS AND METHODS

A prospective study was conducted in the Department of Obstetrics and Gynecology, K.S.Hegde Charitable Hospital, Mangaluru for 2 years. 100 patients attending the OPD and inpatient wards between 5th-10th weeks of gestation willing to participate in this study. But 5 were excluded as they were abnormal pregnancies- ectopic, molar, twin gestation. These patients were subjected to Transvaginal ultrasound. The machine used was GE-LOGIC 400 PRO series with the transvaginal transducer being 7MHz. The presence or absence of yolk sac is noted and size of the yolk sac was measured. The shape was noted- regular or irregular margins, crenated margins. The patient was followed up to 20 weeks period of gestation, wherein it was noted whether it continued or ended up in an abortion. The values obtained were statistically evaluated and analyzed for the importance of the study in future.

RESULTS

The study showed that out of the 95 pregnancies, 81(85.3%) continued beyond 20 weeks and the rest 14(14.7%) ended in abortions. The mean yolk sac diameters for the 95 patients were distributed into the various gestational ages as represented in Table1. About 95.7% of the pregnancies (91 of 95) showed the presence of a yolk sac, while in 4.3% of them a yolk sac was not seen, as revealed in Graph 1. Out of the 91 pregnancies with presence of yolk sac, 84 (92.3%) had a regular shape and the remaining 7 (7.7%) had an irregular shape as shown in Graph 2. 80/84 (95.2%) of reviewed pregnancies with regular yolk sac had a favorable outcome at 20 weeks. But, despite having a regular shaped yolk sac, 4.8% (4/84) of pregnancies ended in abortions; One as inevitable and three as missed abortions. This is depicted in Table 2.

Table 1. Characteristics of Yolk sac.

Gestational Age(Weeks)	Mean Yolk Sac Diameter (mm)	Standard Deviation
5	2.16	0.24
6	2.75	0.32
7	3.7	0.49
8	3.75	0.38
9	3.93	0.74
10	4.6	0.48

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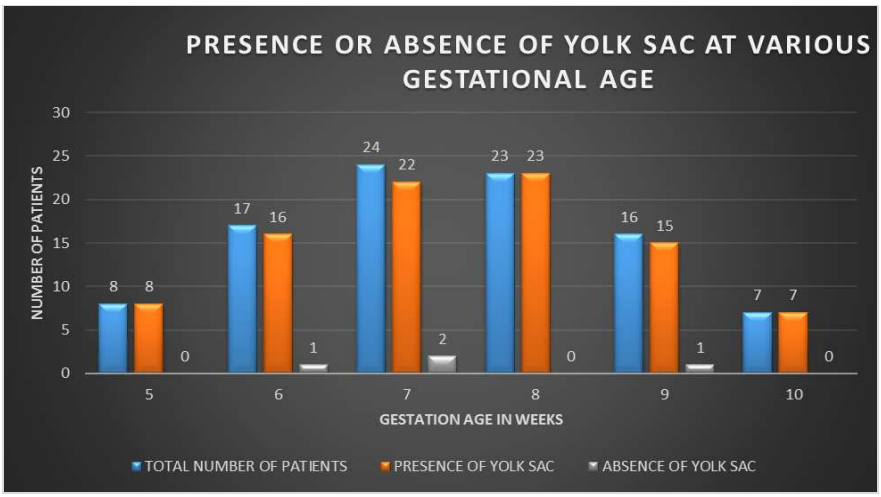
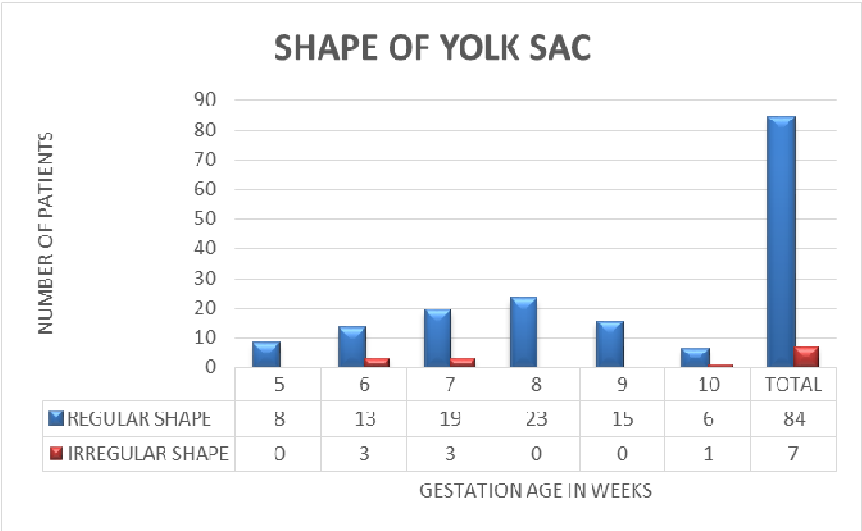
Table 2. Distribution of patients based on the shape of the Yolk sac at various gestational ages with their outcomes.

Gestational age [Weeks]	Regular	Outcome	Irregular	Outcome
5	8	8-Healthy	0	0
6	13	12-Healthy 1-Inevitable	3- Large	2-Incompl 1-Missed
7	19	7-Healthy	3-Large	3-Incompl
8	23	20-Healthy 3-Missed	0	0
9	15	15-Healthy	0	0
10	6	6-Healthy	1-Irregular	1-Missed Abortion



Graph 1. The presence or absence of Yolk sac at various gestational age.



Graph 2. The shape of Yolk sac in different gestational age.

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Of the 7 pregnancies with irregular yolk sac, 6 (85.7%) were large in size and one was irregular. They all ended in an unfavorable outcome. Five of them ended being an incomplete abortion while 2 had missed abortions. The largest diameter was 6.5mm. In the patients with absent yolk sac, one pregnancy (25%) continued beyond 20 weeks. The other three pregnancies ended as blighted ova (75%). As pregnancy with normal yolk sac advances in the first trimester, the frequency of complications reduces. The sensitivity of predicting normal outcome with regular yolk sac is as high as 94.2%, while specificity is 34.5%. In our study, the number of reviewed pregnancies with absent yolk sac was 4(4.3%). Out of the 4, 3 ended in blighted ova (75%), while one pregnancy continued with a favorable outcome at 20 weeks (25%) as highlighted in Table 3.

Table 3. Distribution of patients with absent Yolk sac at various gestational ages with their outcomes.

Gestational age [Weeks]	Number of absent yolk sac	Outcome
5	0	-
6	1	1-Blighted
7	2	1-Blighted 1-Healthy
8	0	-
9	1	1-Blighted
10	0	-

DISCUSSION

The yolk sac is the first structure to appear in the gestational sac when the mean gestational sac diameter is 13 mm or smaller in size[8]. The patient is counselled that they are at risk for poor pregnancy outcome and are advised to assess the yolk sac measurements prior to 12 weeks of gestation transvaginally and repeat the assessment one to two weeks later when a disagreement is detected in the first trimester [9]. However the studies have shown that there is a threefold increased risk of losses in the first trimester when the mean yolk sac diameter is equal or larger than 5 mm as visualized on ultrasound in early pregnancy[10]. If the yolk sac is large in size, it is a good predictor of poor pregnancy outcome [11,12]. Accordingly, our study findings also show that a yolk sac greater than 5mm (large yolk sac) between 6-7.5 weeks gestation was a good indicator and that it would end in abortions. The present study also revealed that none of the pregnancies with large yolk sac had a successful outcome. It also highlighted another finding - large yolk sacs in the abnormal yolk sacs and the rate of abortions is 85.7%(6 out of 7) which is higher than the previous study which had an abortion rate of 45.5%[1] This could be due to the fact that the study sample size was more than the present study with more number of other types of abnormal yolk sacs.

The absence of yolk sac is frequently associated with an abnormal outcome early in the pregnancy. As shown in the study that yolk sac being absent or small can predict poor pregnancy outcome during the first 12 weeks with a good accuracy[6]. The study found that absence of yolk sac had a 100% specificity for abnormal outcome prediction as compared to our study, which showed the specificity to be 75%[13].

The study presented a valid finding that one out of the four pregnancies with absent yolk sac had a favorable outcome as reported in earlier studies which showed that there may be a normal pregnancy outcome in 22% of patients without yolk sacs [14].

CONCLUSION

The study has established that the abnormal yolk sac characteristics may be associated with spontaneous abortion. Thus, it is apparent that among the yolk sac characteristics, a large-size yolk and abnormal shape are the most important elements for early pregnancy loss. The study also highlights the finding that an absent yolk sac may have a chance of having a favorable outcome. However it is stressed that an assessment of the significance of other standards needs further studies with larger numbers of study groups.

REFERENCES

1.Cepni I, Bese T, Os cal P, Budak E,IdiM,AksuMF, Significanceof yolk sac with vaginal sonography in the first trimester in the prediction of pregnancy outcome. Acta Obstetriciaet Gynacologca Scandenevia 1997; 76:969-972.

PBMS
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NLM Title: J Pharm Biomed Sci.

2.Lindsay DJ, Lovett IS, Lyons EA et al. Yolk sac diameter and shape at endovaginal US: predictors of pregnancy outcome in the first trimester. Radiology. 1992; 183:115-118.
3.Küçük T, Duru NK, Yenen MC, Dede M, Ergün A, Başer I. Yolk sac size and shape as predictors of poor pregnancy outcome. J Perinat Med. 1999; 27: 316-320.
4.Khaled S. Mousa, Amr Mohamed El- Helaly and Mahmoud Abd El-Aziz. The Value of Yolk Sac Diameter at Vaginal Ultrasonography as a Predictor of the First Trimester Pregnancy Outcome. Life Sci J. 2014; 11:236-240.
5.Tan S, Ipek A, Pektas MK, Arifoğlu M, Teber MA, Karaoğlanoğlu M. Irregular yolk sac shape: is it really associated with an increased risk of spontaneous abortion? J Ultrasound Med. 2011; 30:31-36.
6.Varelas FK, Prapas NM, Liang RI, Prapas IM, Makedos GA. Yolk sac size and embryonic heart rate as prognostic factors of first trimester pregnancy outcome. Eur J Obstet Gynecol Reprod Biol. 2008; 138:10-13.
7.Cho FN, Kan YY, Chen SN, Yang TL, Hsu PH. Very large yolk sac and bicornuate uterus in a live birth. J Chin Med Assoc. 2005; 68:535-537.
8.Tongsong T, Wanapirak C, Srisomboon J, Sirichotiyakul S, Polsrisuthikul T, Pongsatha S.Transvaginal ultrasound in threatened abortions with empty gestational sacs. Int J Gynaecol Obstet.1994; 46: 297-301.
9. Chama CM, Marupa JY, Obed JY. The value of the secondary yolk sac in predicting pregnancy outcome. J Obstet Gynaecol.2005; 25: 245-247.
10.Berdahl DM, Blaine J, Van Voorhis B, Dokras A. Detection of enlarged yolk sac on early ultrasound is associated with adverse pregnancy outcomes. Fertil Steril. 2010; 94: 1535-1537.
11.Malinowski W. Yolk sacs in twin pregnancy. Ginekol Pol. 2000; 71:815-818.
12.Błaszczyk K, Wojcieszyn M, Biernat M, Lukasik A, Wilk M, Poreba R. Predicting the risk of poor pregnancy outcome by ultrasound examination of yolk sac diameter. Ginekol Pol. 2000; 71: 699-703.
13.Nyberg DA, Mack LA, Laing FC, Patten RM. Distinguishing normal from abnormal gestational sac growth in early pregnancy. J Ultrasound Med 1987; 6:23-27.
14.Rowling SE, Coleman BG, Langer JE, Arger PH, Nisenbaum HL, Horii SC. First-trimester US parameters of failed pregnancy. Radiology. 1997; 203:211-217.

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