ORIGINAL RESEARCH PAPER

Obstetrics & Gynaecology

YOLK SAC MEASUREMENTS AND EMBRYONIC HEART RATE IN PREDICTING FIRST TRIMESTER PREGNANCY OUTCOME

KEY WORDS: Yolk sac, embryonic heart rate, Gestational sac, first trimester

Dr. Girdhari Lal Palsania Resident doctor, Department of Obstetrics & Gynaecology, JLN Medical College, Ajmer.

Dr. Purnima Pachori* Senior Professor and Head of Department, Department of Obstetrics & Gynaecology, JLN Medical College, Ajmer. *Corresponding Author

Dr. Dharmendra Assistant Professor, Department of Obstetrics & Gynaecology, JLN Medical College, Ajmer

ABSTRACT

BACKGROUND: Yolk sac is the first ultrasonographically visible extra embryonic structure within the gestational sac. In Early pregnancy, threatened and spontaneous abortions is the most common complication. As per some studies, enlarged or small yolk sac predicts poor pregnancy outcome. Whereas other studies, they conclude normal outcome. **OBJECTIVE:** This study is conducted to assess the correlation of patient's first trimester outcome (Normal continuation of pregnancy / Miscarriage) with the yolk sac size and the embryonic heart rate at 6-12 wks gestation and to evaluate the association of patient's age, consanguinity, menstrual history, parity and medical illness with first trimester outcome and to evaluate the other sonographic parameters like Crown Rump Length and mean sac diameter with first trimester outcome. **MATERIALS AND METHODS :** This prospective study was conducted at Rajkiya Mahila Chikitsalaya, JLN Medical College, Ajmer during Sep 2018 to Oct 2019. Antenatal women was included in the study belonging to first trimester. Women attending routine antenatal check up in the out-patient department was subjected to scan. Only those antenatal women who will <30 years and of singleton pregnancy was included in the study. The study was including both primigravida and multigravida. No socio-economic categorization was made. Patient with history of intake of teratogenic drugs, without embryonic heart rate, an embryonic pregnancy, subchorionic haemorrhage and inconsistency between gestational sac size and CRL was excluded from the study. **RESULTS:** In our study Gestational sac mean size was 32.12 and significantly correlates with the first trimester outcome (p=0.007**). It was 33.10 mm mean in the normal pregnancies and mean of 26.61mm in miscarriage group. Embryonic heart rate has found significant correlation with the first trimester outcome (p=0.048*). The ultrasonographic estimation of gestational age has found significant correlation with pregnancy outcome (p<0.001**). In our study Crown rump length inversely associated with miscarriage (p=0.044*). **CONCLUSION:** Yolk sac size and characteristics are important determinants of outcome of pregnancy. This should be monitored in early pregnancy to assess the outcome of pregnancy. The present study indicates that the yolk sac size and the embryonic heart rate is a reliable, cost effective and beneficial in predicting first trimester pregnancy outcome especially in patients who conceive following IVF.

INTRODUCTION

It is estimated that approximately 30–40% of implanted pregnancies result in spontaneous abortion during the first trimester[1]. Most of these losses usually happen very early, while the rate of spontaneous abortions after demonstration of embryonic heart activity reaches 2–5%[2]. With the widespread use of endovaginal sonography during the first trimester, we are able to study accurately the developing process of early pregnancy. We can easily demonstrate embryonic heart activity during the sixth postmenstrual week, and consequently calculate the embryonic heart rate. Several previous studies have associated severe embryonic bradycardia with subsequent fetal loss[3,4]. Yolk sac is the first sonographically evident embryonic structure within the gestational sac. It is usually visible between the fifth and twelfth week of pregnancy as a round anechoic area; rarely it can be identified until the end of pregnancy. Recent studies have investigated the size, structure and function of the yolk sac[5,6], but there is very few information available concerning its prognostic value[6]. The aim of this study is firstly to evaluate the embryonic heart rate and yolk sac size during the first trimester and secondly to examine whether these parameters could serve as prognostic markers for first trimester pregnancy outcome.

This prospective study was conducted at Rajkiya Mahila Chikitsalaya, JLN Medical College, Ajmer. 120 antenatal women (Age<30 year) with single gestation and live embryo with gestational age between 6-12 weeks were included in the study with gestational age between 6-12 weeks first trimester. Women attending routine antenatal check up in the out-patient department were subjected to TVS scan. The study included both primigravida and multigravida. No socio-economic categorization was made. Patient with history of intake of teratogenic drugs, without embryonic heart rate, an embryonic pregnancy, subchorionic haemorrhage and inconsistency between gestational sac size and CRL were excluded from the study.

Exclusion Criteria:

1.Pregnancy from infertility treatment.
2.Cases without embryonic heart rate, anembryonic pregnancy, subchorionic haemorrhage and inconsistency between gestational sac size and CRL.
3.Women who has used any abortive or teratogenic drugs.

METHODS

A detailed history was elicited with special reference to the last menstrual period, its regularity and other associated risk factors like diabetes mellitus, hypertension, hypothyroidism, cardiac disease and bronchial asthma. Then a thorough general, physical, systematic and obstetric examination was carried out. After obtaining informed consent the women between less than 10 weeks of gestation were subjected to transvaginal ultrasound.

A first ultrasound scan: between 5 and 6 weeks of gestation according to their first antenatal care visit that included the following:

- Gestational sacs,
- The yolk sac diameter (YSD),
- Crow- rump length (CRL) measurement,
- Fetal heart rate measurements.

Follow up scan: was done every two weeks where (gestational sac diameter, yolk sac diameter, crown rump length and fetal heart rate) were measured every time until the pregnancy reached 12 weeks.

Statistical Analysis

Descriptive analysis was done to find the mean and standard deviation. Analysis of variance (ANOVA) was performed to compare various groups. A "p" value of 0.005 or less considered as statistically significant.

RESULTS

In our study 120 first trimester pregnant cases, who attended RMC, Ajmer was included as per criteria and data collected. The first trimester pregnancy outcome was evaluated by miscarriage or normal continuation of pregnancy.

Age at the time of pregnancy and first Sonogram correlates with the first trimester pregnancy outcome (One way ANOVA p=0.028*). Mean age was 23.73 years with minimum 16 years and maximum of 36 years. Regarding parity, primi to multipara women were included. In parity analysis Primi para were 84 cases. Among primi, 9 had miscarriage other 75 had normal pregnancy. As the number of previous abortions increases the chances of miscarriage also increases (Pearson Chi-square test p=0.043*).

Table – 1 : Pregnancy Outcome With Various Parameters

			Pregnancy outcome		Total
			Normal	Miscarriage	
Marital status	Non-consanguinous	Count	89	11	100
		% within Pregnancy outcome	89.00%	11.00%	100.00%
	Consanguinous	Count	13	7	20
		% within Pregnancy outcome	65.00%	35.00%	100.00%
Total		Count	102	18	120
		% within Pregnancy outcome	85.00%	15.00%	100.00%
Menstrual cycle	Regular	Count	92	14	106
		% within Menstrual cycle	86.80%	13.20%	100.00%
	Irregular	Count	10	4	14
		% within Menstrual cycle	71.40%	28.60%	100.00%
Total		Count	102	18	120
		% within Menstrual cycle	85.00%	15.00%	100.00%
Medical Illness	No	Count	93	15	108
		%within Medical Illness	86.10%	13.90%	100.00%
		% within Follow up	91.20%	83.30%	90.00%
	Yes	Count	9	3	12
		%within Medical Illness	75.00%	25.00%	100.00%
		% within Follow up	8.80%	16.70%	10.00%
Total		Count	102	18	120
		%within Medical Illness	85.00%	15.00%	100.00%
		% within Follow up	100.00%	100.00%	100.00%

The above table shows that Non consanguineous marriage was among 100 cases and third degree consanguineous marriage in 20 patients. In the normal outcome patients, non-consanguinous marriage is in 89 cases (89%) and consanguinous marriage is in 13 cases (65%). Among eighteen miscarriage cases 11 (11%) were non consanguinous marriage, 7 (35%) were consanguinous marriage. (Pearson Chi-Square test p=0.006).

Menstrual cycle was regular in 106 cases and 14 had irregular cycles. Among 102 normal pregnancy outcome patients 92 (90.2% of normal outcome) had regular menstrual cycle, 10 (9.8% of normal outcome) had irregular periods. Among eighteen miscarriage cases 14 (77.8% of miscarriage) had regular menstrual cycle, 4 (22.2% of miscarriage) had irregular menstrual cycle. Menstrual cycle does not correlate with pregnancy outcome in our study (Pearson Chi-Square test p=0.13).

In our study 108 cases were without medical illnesses and about 12 cases with associated one of the medical illness. Medical illnesses were Systemic hypertension, polycystic ovary disease (PCOD), Diabetes Mellitus, Bronchial Asthma, Anemia and Hypothyroidism. Among cases without medical illness 93 (86.1%) had normal pregnancy, 15 (13.9%) had miscarriage. Nine normal pregnancy outcomes with 3 miscarriages were in cases with Medical illness. Medical illness doesn't has correlation with pregnancy outcome (Pearson Chi- Square test p=0.306).

Table – 2: Pregnancy Outcome

Parameter	Pregnancy outcome	N	Mean Age (years)	Std. Deviation	Std. Error Mean
Age in years	Normal	102	23.41	3.697	0.366
	Miscarriage	18	25.5	3.451	0.813
No. of years married	Normal	102	1.911	1.7105	0.1694
	Miscarriage	18	2.917	1.857	0.4377
Yolk sac (mm)	Normal	102	4.804	0.7304	0.0723
	Miscarriage	18	5.389	0.6764	0.1594
Embryonic Heart Rate	Normal	102	155.88	14.298	1.416
	Miscarriage	18	147.44	26.203	6.176
Gestational Age (weeks)	Normal	102	8.638	1.1649	0.1153
	Miscarriage	18	7.222	1.1909	0.2807
Crown Rump Length (mm)	Normal	102	25.21	9.508	0.941
	Miscarriage	18	20.56	4.176	0.984
Gestational Sac size (mm)	Normal	102	33.1	9.33	0.924
	Miscarriage	18	26.61	8.465	1.995

In our study the mean age, mean of marriage duration, mean of Yolk sac diameter, mean of Embryonic heart rate, mean of Gestational age, mean of Crown Rump Length (mm), mean of Gestational Sac diameter were 23.41, 1.911, 4.804, 155.88, 8.638, 25.21, 33.10 respectively in normal pregnancy outcome and 25.50, 2.917, 5.389, 147.44, 7.222, 20.56, 26.61 were respectively in miscarriage.

DISCUSSION & CONCLUSION

In our prospective study of 120 patients there was a linear correlation between age at the time of pregnancy and miscarriage. As the maternal age increases, there is increased chance of spontaneous abortion.

Consanguinous marriage influences the pregnancy outcome. There is increased rate of abortion among consanguinous marriage compared to non-consanguinity. Chama et al recommended that patients at risk of prior pregnancy outcome should have routine TVS before 12 weeks of pregnancy to assess the yolk sac and those with abnormal yolk sac should be followed to exclude fetal abnormalities before 24 weeks of gestation.

In our study women with medical illness like systemic hypertension, diabetes mellitus, hypothyroidism also had a good outcome. Medical illness in the mother does not correlate with pregnancy outcome.

Patients with history of previous abortions are likely to have subsequent abortion in the following pregnancy. Gestational sac size significantly correlates with the first trimester pregnancy outcome. A smaller than expected gestational sac can be a predictor of poor pregnancy outcome both alone or in combination with other parameters. Yolk sac diameter in the first trimester significantly correlates with the pregnancy outcome. An enlarged yolk sac has increased risk of preterm delivery.

In our study embryonic heart rate influences the pregnancy outcome. Fetal bradycardia is a sign of impending fetal death mostly due to chromosomal abnormality trisomy 18 and triploidy. Tachycardia is a feature of trisomy 21.

REFERENCES

1. The role of ultrasound imaging in diagnosing and investigating early pregnancy failure, E.Jauniaux, J.Johns, G.J.Burton, Ultrasound Obstet Gynecol 2005; 25:613–624.
2. Sonographic evaluation of first-trimester bleeding.Raj Mohan Paspulati, MD*, Shweta Bhatt, DMRD, DMRE, Sherif Nour, MD, Radiol Clin N Am 42 (2004) 297–314.
3. Normal Ranges of Embryonic Length, Embryonic Heart Rate, Gestational Sac Diameter and Yolk Sac Diameter at 6–10 Weeks, George I. Papaioannou Argyro Syngelaki Leona C.Y. Poon Jackie A. Ross, Kypros H. Nicolaides, Fetal Diagn Ther 2010;28:207–219.

4. Prognosis of a new pregnancy following previous spontaneous abortions.
5. Knudsen UB, Hansen V, Juul S, Secher NJ. Eur J Obstet Gynecol Reprod Biol 1991;39:31–6.
6. Fetal loss following ultrasound diagnosis of a live fetus at 6–10 weeks of gestation Makrydimas, N. J. Sebire, D. Lolis, N. Vlassis, K. H.