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Role of Threatened Abortion in Development of Premature Rupture of Membrane and its Effect on Fetal Growth

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Abstract

Background: Before the gestational age at which a foetus would be viable ex utero, bleeding through the vagina with a closed cervix is referred to as a threatened abortion.

Aim and objectives: The aim of this study is to assess how threatened abortion affects foetal growth, early membrane rupture, and other unfavourable pregnancy outcomes like abortion and preterm labour, preeclampsia, placenta Previa, intrauterine growth restriction (IUGR), and cesarean section.

Patients and methods: This prospective case–control study was carried out during a 6-month period, from January 4, 2021, to January 10, 2021. 100 pregnant women participated in the current study. They were split into two groups: group 1 (cases), which consisted of 100 women who presented with signs of an impending abortion at or before 20 weeks of gestation and underwent an ultrasound examination as a result. 100 women in group 2 (controls), who do not exhibit any signs of an impending abortion.

Result: Regarding past abortions, there is a big disparity between the groups. Preterm labour, newborn sepsis, and NICU admission differ significantly amongst the groups.

Conclusion: A threatened miscarriage is linked to a higher rate of negative pregnancy results. The risk is increased by premature membrane rupturing, preterm birth, and low birth weight for newborns.

Keywords: Threatened abortion, Fetal growth, Colorectal cancer

1. Introduction

Before the gestational age at which a foetus would be viable ex utero, bleeding through the vagina with a closed cervix is referred to as a threatened abortion.¹

Bleeding occurs prior to 20 weeks of pregnancy in about one-fourth of all pregnancies, and 12–57% of these pregnancies result in termination.²

The diagnosis of threatened abortion is routinely made in clinical practise, because a history of vaginal spotting was taken and a closed cervix was seen on a subsequent vaginal examination. After an ultrasound examination shows foetal heart activity in an intrauterine pregnancy, a clear diagnosis of threatening abortion should be made.³

Pregnancy bleeding can make a woman anxious, and new research indicates that it may also have a negative impact on both the foetus and the mother.⁴

While spontaneous membrane rupture (ROM) is a common occurrence during labour and delivery, premature membrane rupture (PROM) refers to the rupture of the foetal membranes before the start of labour, regardless of gestational age (can occur even at 42 weeks gestation).⁵

Preterm premature membrane rupturing (PPROM) is a common obstetrical occurrence (3%) that can lead to difficulties for both the mother and the foetus, including infection and preterm.⁶

The purpose of the study is to determine how threatened abortion affects foetal growth, early membrane rupture, and other unfavourable

pregnancy outcomes like abortion and preterm labour, preeclampsia, placenta previa, intrauterine growth restriction (IUGR) and cesarean section.

2. Patients and methods

This study was a prospective case–control study conducted during a period of 6 months, starting from 1/4/2021 to 1/10/2021. The study included 200 pregnant women, according to the following inclusion and exclusion criteria:

2.1. Inclusion criteria

Patients with single intrauterine pregnancy with sure last menstrual period and patients who experienced threatened abortion, diagnosed by vaginal spotting and minimal pain with closed cervix on examination and viable fetus by ultrasound.

2.2. Exclusion criteria (Causes of abortion)

Smoker, diabetes mellitus, thrombophilia, chronic hypertension, and a history of recurrent abortion, congenital uterine anomalies, large leiomyomata distorting uterine cavity, cervical incompetence, local cervical pathology as cervical polyp, congenital fetal anomalies, maternal liver, renal and heart diseases and any patient that developed PPRM before 20 weeks (inevitable abortion), or drop-out patients during follow-up program.

According to the previous, study patients were divided into two groups as follows; Group 1 (cases); group 2 (controls) consists of 100 women who do not exhibit any signs of threatened abortion but present with signs of an impending abortion at 20 weeks or less of pregnancy. Based on ultrasound evidence of the foetus's heart activity, a history of vaginal bleeding with a closed cervix, and a gestational age of 20 weeks or less, the diagnostic criteria for threatening abortion will be considered.

2.3. Recruitment and procedures applied in the study

2.3.1. Place of recruitment (place of conduction of the study)

Patients recruited in the study from the Obstetrics and Gynaecology Department's Outpatient Clinic and Causes at Alhunssein Hospital.

2.3.2. Research ethics committee approval and quality control

The purpose of the study and procedures will be explain in details and in plain terms to each of the

patients before giving an informed written consent to participate. Quality control of screening, handling of data, and verification of adherence to protocols will be done on a regular basis by the trial coordinator.

2.4. Procedures applied in the study

2.4.1. History taking

Including; personal history, menstrual history (to be sure for the last menstrual period and its gestational age), past history (for any previous pregnancy complications or medical disorders), and family history.

2.4.2. Examination

A careful examination and assessment will be done with special attention to the inclusion and exclusion criteria among all couples, as follows; general examination [focusing on the blood pressure to exclude pregnancy-induced hypertension (PIH), temperature and respiratory rate]. BMI, which will be calculated according to the formula, $BMI = Kg/M^2$, abdominal examination for fundal level, and any sign of trauma and obstetric examination.

2.4.3. Investigations, as follows

Blood typing (ABO grouping) and antibody testing (Rh antibody, in cases of Rh negative), complete blood count (CBC), fasting blood glucose and 2-h oral glucose tolerance test, urine analysis, thyroid, kidney and liver function tests, and ultrasound assessment.

2.4.4. Ultrasound protocol

Patients preparation: patients had been asked to remove their clothes and put on a gown or cover for the procedure.

2.4.5. Device used

Phillips HD5.

2.4.6. Sonographic parameters evaluated was

Size of gestational sac and crown-rump length (CRL) if less than 12 weeks, fetal cardiac activity, subchorionic hematoma, fetal biometry: bi-parietal diameter (BPD), femur length (FL), and abdominal circumference (AC) if greater than 12 weeks, placental site and amniotic fluid index.

2.4.7. Medication

All patients of case group had been given 200 mg progesterone supplementation twice daily in the

Table 1. Demographic characteristics distribution between the two groups.

Variables	Group 1 (n = 100)	Group 2 (n = 100)	t	P
Age (years) Mean ± SD	28.74 ± 4.15	28.27 ± 4.05	0.811	0.419
Parity Mean ± SD	2.50 ± 1.1	2.60 ± 1.12	0.637	0.525
Gravidity Mean ± SD	3.61 ± 1.75	3.81 ± 1.43	0.885	0.377
BMI (kg/m ²) Mean ± SD	25.52 ± 2.38	26.45 ± 2.75	2.557	0.011

form of rectal suppositories till one week after stoppage of bleeding.

2.4.8. Follow-up

Patients in both groups will be followed-up every 2-week until delivery. For development for PPORM and assessment of fetal growth.

2.5. Statistical analysis

Using SPSS 22.0 for Windows (SPSS Inc., Chicago, IL, USA) and MedCalc 13 for Windows, all data were gathered, tabulated, and statistically evaluated (MedCalc Software bvba, Ostend, Belgium). Using the Shapiro-Walk test, the distribution of the data was examined for normality. To represent qualitative data, frequencies and relative percentages were used. The χ^2 -test and Fisher exact were used to determine the difference between the qualitative variables, as illustrated. For parametric and nonparametric variables, respectively, the Independent T test and the Mann–Whitney test were employed to calculate the difference between quantitative variables in two groups.

3. Results

This table shows there is a statistically significant difference between groups as regard BMI (Table 1).

This table shows there is a statistically significant difference between groups CS, Cesarean section and VD, vaginal delivery as regard birth weight and mode of delivery (Table 2).

This table shows that biparietal diameter, abdominal circumference, and femur length were

significantly lower in group 1 compared with group 2 (Table 3).

This table showed there is a significant difference between the groups PROM, preterm premature rupture of membrane regarding abortion (Table 4).

This table showed there is a significant difference between the groups regarding preterm labor, IUGR, neonatal sepsis, and NICU admission (Table 5).

4. Discussion

PROM is a common obstetrical occurrence (3%) that can lead to difficulties for both the mother and the foetus, including infection and preterm. The most frequent factor in preterm labour (30–40%) is PPROM.⁷

This prospective case–control study was carried out during a 6-month period, from January 4, 2021, to January 10, 2021. 100 pregnant women participated in the current study. 100 women were divided into group 1 (cases), who underwent an ultrasound examination after exhibiting symptoms of a threatening abortion at or below 20 weeks of gestation, and 100 women were placed in group 2, who did not. Regarding the demographic characteristics of the patients analysed. Considering BMI, there was a statistically significant difference between the groups. Age, parity, and gravidity did not statistically significantly differ between the groups. Our findings are consistent with those of Wafa et al. study, which discovered that the mean mother ages for the groups who experienced threatening miscarriages and controls were 28.65 and 28.61, respectively (ranged from 18 to 40).

The age distribution of the groups did not differ statistically significantly ($P = 0.5$). In the research group, the mean parity was 2.4 deliveries, while in the control group, it was 2.5 deliveries ($P = 0.5$). Also, Dadkhah et al.⁸ found no relation between threatened abortion and gravidity. They also found no relation between threatened abortion and parity which supported our results.

However, in the study of Davari-Tanha et al.,⁹ who showed that the mean maternal age was (27.13 ± 4.76) in case group versus (26.5 ± 4.52) in control group with P value 0.014 and this deference

Table 2. Neonatal outcome distribution between the two groups.

Variables	Group 1 (n = 100)	Group 2 (n = 100)	t	P
GA at time of presentation (weeks) Mean ± SD	15.33 ± 2.47	15.92 ± 2.69	1.23	0.264
GA at time of rupture of membrane (weeks) Mean ± SD	32.81 ± 2.41	33.94 ± 3.26	1.97	0.051
Birth weight (gm) Mean ± SD	2485.1 ± 668.51	3115.4 ± 225.8	6.3	0 (–)
Mode of delivery				
CS	62 (62%)	46 (46%)	4.529	0.033
VD	38 (38%)	54 (54%)		

Table 3. Fetal biometry distribution between the two groups.

	Group 1 (n = 100)	Group 2 (n = 100)	T	P
Biparietal diameter (mm) Mean ± SD	32.52 ± 6.96	37.11 ± 7.25	4.567	0 (-)
Abdominal circumference (mm) Mean ± SD	102.12 ± 23.55	116.86 ± 26.38	3.536	0 (-)
Femur length (mm) Mean ± SD	20.19 ± 6.43	26.4 ± 5.50	7.339	0 (-)

because their research applied only on first 13 weeks of gestation and majority of previous research were retrospectives. They also reported a significant difference regarding the gravidity between case and control group with *P* value less than 0.001.

Whereas Al-Kashif,¹⁰ discovered that the mother ages of the two groups did not differ significantly. As shown, less than half (40%) of the case group and less than one-fourth (22%) of the control group had more than three pregnancies. Statistics indicated that the difference was significant.

The results of the current investigation revealed a substantial difference in the number of prior abortions across the groups. Our results supported the findings of El-Raheem et al.¹¹ investigation, which discovered a significant difference in the groups' past abortion rates. The 152 cases total sample size needed for this study was divided into two groups of 76 instances each as follows: category 1 (cases): 76 women who were at or below the 20th week of pregnancy and exhibited symptoms and indicators of an impending abortion, diagnosed by vaginal spotting and minimal pain with a closed cervix on examination, and a viable fetus by ultrasound, who will be subjected to ultrasound examination afterwards. Group 2 (controls): 76 women who do not have any symptoms of threatened abortion.

Similarly, in the Ghosh et al.,¹² study, abortion during the current pregnancy and a history of miscarriages were statistically significantly associated (*P* = 0.000). According to Bhattacharya et al.¹³ having an abortion the first time increases the chance of obstetric difficulties in subsequent pregnancies. According to Lewis et al.¹⁴ 30.67% of patients with vaginal bleeding in the first trimester had previously had an abortion. The same results were also noticed by Hackney and Glantz.¹⁵

Table 4. Obstetric Outcome distribution among studied groups.

	Group 1 (n = 100) N (%)	Group 2 (n = 100) N (%)	χ ²	P
Preeclampsia	6 (6%)	2 (2%)	1.17	0.279
Eclampsia	2 (2%)	0 (-)	0.505	0.497
Placental abruption	8 (8%)	2 (2%)	2.632	0.105
Placenta previa	4 (4%)	0 (-)	2.296	0.121
PROM	8 (8%)	4 (4%)	0.798	0.372
Emergency SC	18 (18%)	12 (12%)	0.980	0.322
Abortion	48 (48%)	8 (8%)	37.7	0 (-)

Table 5. Perinatal Outcome distribution among studied groups.

	Group 1 (n = 100) N (%)	Group 2 (n = 100) N (%)	χ ²	P
Preterm labor	16 (16)	4 (4)	6.722	0.010
IUGR	12 (12)	2 (2)	6.221	0.013
Neonatal sepsis	10 (10)	0 (-)	8.526	0.004
NICU admission	28 (28)	6 (6)	8.58	0 (-)

In contrary to our results study of Ahmed et al.,¹⁶ as they stated that a total of 134 women, 45 controls, and 89 women with threatened miscarriage were enrolled in this study. There was no statistically significant difference between groups as regard number of previous abortion.

According to the results of the current study, there was a statistically significant difference between the groups in terms of birth weight when comparing the distribution of neonatal outcomes between the two groups. Abdominal circumference, femur length, and biparietal diameter were all considerably smaller in group 1 than in group 2. Our results were in line with study of Wafa et al.,¹⁷ since they demonstrated a substantial statistical difference between the case group's incidence of IUGR and the control group's incidence of IUGR. The neonates of patients who were threatened with abortion had significantly different birth weights when compared with the control group. The incidence of caesarean sections increased proportionally in the case group when compared with the control group. El-Raheem et al. research, published in 2012, also showed a significant difference between the groups in terms of low birth weight.

Then again, Kanmaz et al.,⁴ reported that extremely preterm as well as very preterm occurrences in pregnant women with a threat of abortion were statistically greater than in the control. Likewise, pregnant women with a threat of abortion had significantly higher rates of extremely low birth-weight (ELBW) and very low birthweight (VLBW) than the control group.

Moreover, Emara,¹⁸ demonstrated that women who were at risk of abortion had significantly smaller babies weighing less than 2500 gm in comparison to the control group, with a mean birth weight (2335.1 ± 644.9 vs. 3118.9 ± 211.7, *P* < 0.0001).

In the study in our hands, as regard obstetric outcome distribution among studied groups; there was a significant difference between the groups regarding abortion.

According to Sarmalkar et al.,¹⁹ threatened miscarriages in the first trimester have been linked to a higher risk of LBW, preterm delivery, PPRM, as well as PIH. Furthermore, Emara,¹⁸ found that women who had been threatened with an abortion had significantly higher rates of preterm labour (labour lasting less than 37 weeks' gestation) than women in the control group (16% versus 2%, $P = 0.001$). Preterm births, low birth weight babies, compared with the control group, early membrane ruptures and abortion rates considerably increased in Ahmed et al. study (15.7% versus 2.2%, $P = 0.001$), (6.7% versus 4.45, $P = 0.016$), respectively. None of the pregnancy-related data showed any discernible variations. Our results showed that the distribution of perinatal outcomes among the study groups and preterm labour rates were significantly different between the groups, neonatal sepsis, and NICU admission. Our results were supported by study of Wafa et al.,¹⁷ as they showed a significant difference regarding the neonatal admission to NICU as the incidence was 28% in the case group vs. 7% in the control group with P value 0.001.

This is similar to the study done by Saraswat et al.²⁰ who reported a significant difference regarding the NICU admission between both groups with P value 0.009.

Also, El-Raheem et al.,¹¹ found that the rates of premature labour, infant death, and NICU hospitalisation varied significantly amongst the groups. According to Kanmaz et al.,⁴ babies who were delivered as a result of threatening abortions during the first trimester required more NICU care than babies in the control group. Similar rates of moderate LBW were present in the control group and the abortion risk group, moderate preterm pregnancy, stillbirth, and macrosomia infantile occurrence. Also, Emara,¹⁸ demonstrated that there was a significant difference in neonatal NICU admissions (28% in the case group vs. 7% in the control group, $P = 0.001$). The occurrence of PROM between the two groups did not differ significantly. However, in the study of Abd-Elaziz et al.,²¹ there was no statistically significant difference in NICU admissions between cases and controls.

4.1. Conclusion

A threatened miscarriage is linked to a higher rate of negative pregnancy results. The risk is increased

by premature membrane rupturing, preterm birth, and low birth weight for newborns.

Conflict of interest

None declared.

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