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ORIGINAL ARTICLE

The Impact of Incidental Ultrasound Finding of Subchorionic and Retroplacental Hematoma in Early Pregnancy

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Abstract

Background Chorionic hematomas can be caused by the separation of the chorion from the endometrium, with an incidence of 3.1% of all pregnancies. It is the most common sonographic abnormality and the most common cause of first-trimester bleeding.

Objectives To evaluate the impact of subchorionic and retroplacental hematomas detected by ultrasound in the first trimester of pregnancy.

Patients and Methods A prospective observational case-control study was conducted at Elwiya Maternity Teaching Hospital on 100 pregnant ladies with subchorionic or retroplacental hematoma shown in ultrasound compared with 200 pregnant ladies without hematoma in the first trimester. The demographic feature, course of pregnancy, obstetric outcome, and neonatal outcome were analyzed.

Results There was statistically significant difference between both groups regarding maternal and neonatal outcome. In regard to maternal outcome, there is increasing rate of miscarriage (20%, $P = 0.004$), preterm labor (18%, $P = 0.005$), intrauterine growth restriction (7%, $P < 0.001$), abruption (9%, $P = 0.001$), and cesarean section (60%, $P < 0.001$) compared to control group. Regarding neonatal outcome, there is increasing rate of low gestational age at birth ($P = 0.004$), low birth weight

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($P = 0.003$), low Apgar score at 1 & 5 min ($P < 0.001$, $P = 0.002$, respectively), and more admission to NICU ($P = 0.015$) in study group when compared to control group.

Conclusion

1. The presence and the characteristic of an intrauterine hematoma during the first trimester may identify a population of patients at increased risk of adverse pregnancy outcome as miscarriage, preterm delivery, IUGR, abruption, low birth weight, cesarean section rate, low Apgar score at 1 and 5 min, and NICU admissions in patients with intrauterine hematoma.
2. The miscarriage rate with retroplacental hematoma is significantly higher than with subchorionic hematoma. The size of the hematoma is significantly greater in the miscarriage group.
3. All subchorionic hematomas disappeared, but 2% of retroplacental hematomas did not disappear until the end of second trimester.

Keywords Retroplacental hematoma · Subchorionic hematoma · Miscarriage

Introduction

The clinical significance of intrauterine hematomas has always been controversial since it was first described in 1981. The reported incidence of intrauterine hematomas is 3.1% depending on the population studied, definition, and gestational age at diagnosis [1]. Maternal–placental–fetal unit can develop a number of hematomas. These include: (a) retroplacental hematoma, (b) marginal hematoma known clinically as subchorionic hemorrhage, (c) subchorial thrombosis, (d) subamniotic hematoma [2]. Subchorionic hemorrhage is the most common sonographic abnormality in the presence of a live embryo. Vaginal bleeding affects 25% of all women during the first half of pregnancy and is a common reason for first-trimester ultrasonography [3]. The subchorionic hematoma often regresses, especially if it is small or moderate in size. Large hematomas, which strip at least 30–40% of placenta away from endometrium, may enlarge further, compressing the gestational sac and leading to premature rupture of membranes with consequent spontaneous abortion [4]. Although the exact etiology is uncertain, they are believed to result from partial detachment of the chorionic membranes from the uterine wall [5]. Another possible mechanism might be the underlying cause of the subchorionic bleeding and secondary mechanical effects of the hematoma. The presence of a hematoma, especially in a retroplacental location, may create an area of weakness, where further separation of the placenta from the uterine wall may occur, resulting in placental abruption [6].

Aim of the Study

The aim of this study is to evaluate the impact of subchorionic and retroplacental hematomas detected by ultrasound in the first trimester of pregnancy.

Patients and Methods

An observational prospective case–control study was conducted at Elwiya Maternity Teaching Hospital, Baghdad, Iraq. The study protocol was approved by the Obstetrics and Gynecology Committee of Arabic Board for Medical Specialization and Hospital Administration.

Data collection was carried out during the period of 12 months from June 2014 to June 2015 at Elwiya Maternity Teaching Hospital. Pregnant ladies who presented to the gynecologic consultancy clinic in first trimester were divided into two groups: first group: pregnant ladies presented with threatened miscarriage and the ultrasound showing subchorionic or retroplacental hematoma and second group: pregnant ladies who presented without hematoma in first trimester. All pregnant ladies were properly assessed and followed up during pregnancy. Inclusion criteria are the presence of singleton viable intrauterine pregnancy, gestation between 6 and 14 weeks with or without intrauterine hematomas. Exclusion criteria are patients with a nonviable fetus, multifetal pregnancy, fetal abnormality, patients who underwent elective termination of pregnancy, or with history of recurrent miscarriage, medical diseases and with scarred uterus. Three hundred and forty pregnant ladies who met the inclusion criteria were followed up, and of these, 40 patients were missed. First group included 100 pregnant ladies, and second group included 200 pregnant ladies. Ultrasonography was performed transabdominally using Siemens Acuson X300. The size of the gestational sac was recorded, and position of hematoma described in regard to placental site as being subchorionic (located between the chorion and the uterine wall, external to the chorionic leave), retroplacental (behind the placenta, external to the chorion frondosum), or both. The sonographic evaluation also included the size of the hematomas relative to the gestational sac size and was characterized as small (less than 20%), medium (20–50%), or large (more than 50%). All patients were followed and reassessed accordingly, patients with hematoma were assessed every 7–14 days until it disappeared; then, by monthly visit. At each visit, full history, examination, investigations and ultrasound were done. Women in both

groups were followed throughout their pregnancy course to obtain maternal and neonatal outcome, where we recorded whether their pregnancy ended with miscarriage or continued, and maternal and fetal outcomes were assessed. Gestational hypertension, preeclampsia, abruption, preterm labor, intrauterine growth retardation (estimated fetal weight by ultrasound examination of < 10th percentile for gestational age), and mode of delivery (vaginal or cesarean section) were compared in both groups in regard to maternal outcome, while neonatal outcome which included gestational age at delivery, birth weight, Apgar scores (low when it is below 7 at one and 5 min), meconium-stained liquor, and neonatal intensive care unit (NICU) admission. Statistical analysis: Data were entered and analyzed by using the statistical package for social sciences (SPSS) version 22, IBM Chicago, USA, 2013.

Results and Discussion

Mean gestational age at first visit was 11.2 for hematoma group and 10.9 for control group. Parity did not affect the outcome, and this agrees with study done by Yavuz et al. [7]. Regarding position and fate of hematoma as shown in Fig. 1, retroplacental hematoma was detected in 60 women (60%) at the first visit, while the remaining 40 women (40%) had subchorionic hematoma. At the third visit (after 50 days), hematoma was resolved in all cases except in two patients with retroplacental hematoma, and they continued to have it until the end of second trimester; these two cases were complicated with preterm delivery.

Xiang et al. [1] reported that the incidence of persistent subchorionic hematomas until delivery was 0.46%, which was much lower than that of a hematoma detected in the first trimester (4–48%); almost half of the women with an intrauterine hematoma did not experience vaginal bleeding. This suggests that persistent hematoma until delivery could be a severe type. Regarding the size of detected hematomas in relation to the gestational sac size as plotted in Fig. 2, 23 (23%) pregnant ladies had large hematoma (greater than 50% of gestational sac size).

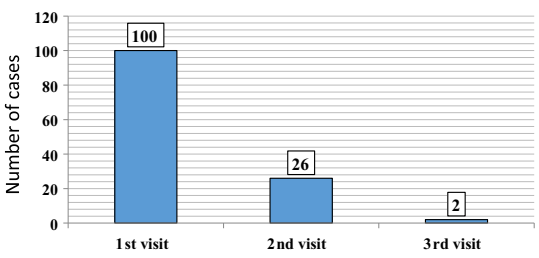

Fig. 1 Distribution of total detected hematomas at subsequent visits

Table 1 shows the cross-tabulation of the comparison between hematoma and control groups regarding pregnancy complications, and hematoma was significantly associated with frequent miscarriage (RR = 1.83, $P = 0.004$), preterm labor (RR = 1.76, $P = 0.005$), IUGR (RR = 3.17, $P < 0.001$), and abruption (RR = 2.59, $P = 0.001$). On the other hand, no significant association has been found between hematoma and pregnancy-induced hypertension ($P = 0.45$) or preeclampsia ($P = 0.72$).

Soldo et al. [8] reported that intrauterine hematomas are associated with higher miscarriage rate, but the size of hematoma had no effect. Ozkaya et al. [9] reported that the presence of intrauterine hematoma is associated with increased risk of miscarriage and intrauterine growth restriction. Norman et al. [10] reported that the presence of intrauterine hematoma is associated with increased risk of preterm labor and abruption than control group, and this agrees with the current study, while Ozkaya et al. [9], Palatnik [1], and Grobman [11] reported that intrauterine hematoma is not associated with increased risk of preterm labor. Tuuli et al. [6] showed that the presence of intrauterine hematoma did not significantly increase the incidence of pregnancy-induced hypertension; this agrees with our results.

It has been significantly found that hematoma was associated with higher rate of cesarean sections; women with intrauterine hematomas were 2.7-fold more likely to be delivered by cesarean section than control group (RR = 2.71, $P < 0.001$). Yavuz et al. [7] reported that intrauterine hematoma was not associated with increased rate of cesarean section. The same was reported by Zhonghua et al. [12]. Table 2 reveals that the mean gestational age at birth and fetal birth weight were significantly lower in hematoma group than in control group. Apgar score of < 7 was more frequently reported among neonates in hematoma group with relative risk of more than twofold. On the other hand, neonates in hematoma group

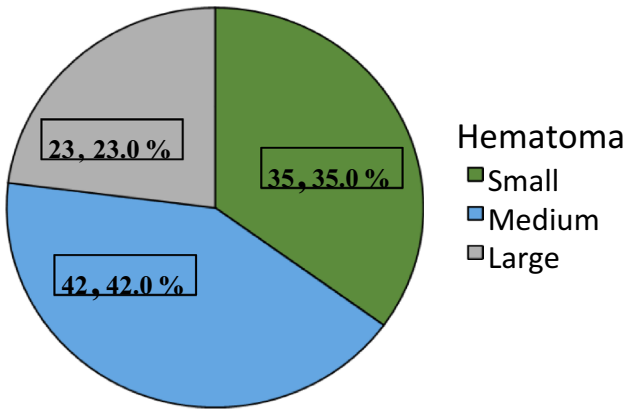

Fig. 2 Distribution of size of hematomas relative to the gestational sac size (N = 100)

Table 1 Relationship between hematoma and pregnancy complications

	Hematoma (N = 100)	Control (N = 200)	RR*	*P*
Miscarriage	20 (20.0)	16 (8.0)	1.83 (1.29–2.58)	0.004
Preterm labor	18 (18.0)	14 (7.0)	1.76 (1.29–2.58)	0.005
IUGR	7 (7.0)	0 (0.0)	3.17 (2.68–3.75)	< 0.001
Abruption	9 (9.0)	2 (1.0)	2.59 (1.87–3.60)	0.001
PIH	8 (8.0)	11 (5.5)	1.28 (0.74–2.23)	0.45
Preeclampsia	2 (2.0)	6 (3.0)	0.75 (0.22–2.51)	0.72
Uneventful pregnancy	50 (50.0)	156 (78.0)	0.46 (0.34–0.62)	< 0.001

RR relative risk, 95% CI 95% confidence interval of the RR

Table 2 Relationship between hematoma and fetal outcome

Fetal variables	Hematoma (N = 80)	Control (N = 184)	RR (95% CI)	*P*
Gestational age at birth (week)				
Mean (SD)	38.1 (1.9)	38.8 (1.7)	–	0.004
Birth weight (kg)				
Mean (SD)	3.0 (0.5)	3.2 (0.6)	–	0.003
Sex of the newborn				
Male n (%)	42 (52.5%)	98 (53.3)	0.97 (0.68–1.4)	1.0
Female n (%)	38 (47.5%)	86 (46.7)		
Meconium-stained liquor n (%)	6 (7.5%)	28 (15.2)	0.49 (0.17–1.15)	0.11
Apgar score at 1 min n (%)				
< 7	30 (37.5)	28 (15.2)	2.13 (1.51–3.01)	< 0.001
≥ 7	50 (62.5)	156 (84.8)		
Apgar score at 5 min n (%)				
< 7	18 (22.5)	14 (7.6)	2.10 (1.45–3.06)	0.002
≥ 7	62 (77.5)	170 (92.4)		
Admission to NICU n (%)	25 (31.3)	32 (17.4)	1.65 (1.14–2.40)	0.015

Table 3 Relationship between position of hematoma and pregnancy complication

	Position of hematoma		RR (95% CI)	*P*
	Retroplacental (n = 60)	Subchorionic (n = 40)		
Miscarriage	18 (30.0)	2 (5.0)	1.71 (1.33–.21)	0.004
Preterm labor	14 (23.3)	4 (10.0)	0.98 (0.78–1.90)	0.11
IUGR	6 (10.0)	2 (5.0)	1.28 (0.83–198)	0.47
PIH	4 (6.7)	4 (10.0)	0.82 (0.40–1.67)	0.71
Preeclampsia	2 (3.3)	0 (0.0)	–	0.52
Abruption	9 (15.0)	0 (0.0)	–	0.10
Uneventful pregnancy	18 (30.0)	32 (80.0)	4.0	< 0.001

were about 1.65 times more likely to need admission to NICU than those in control group (RR = 1.65, $P = 0.015$).

Our result agrees with study done by Donogol et al. [13], while Yavuz et al. [7] reported that there was no statistical significance between hematoma group and control group regarding gestational age at birth and birth weight. Donogol et al. [13] showed that there was no relation between the presence of intrauterine hematoma and sex of baby, and this agrees with our results. Biesiada et al. [14] reported that low Apgar score at 1 and 5 min was more frequent in patients with intrauterine hematoma; this might be due to increased rate of preterm delivery, fetal growth restriction, and placental abruption, and this is similar to

Table 4 Relationship between size of hematoma and pregnancy complications

Outcome	Size of hematoma			*P*
	Small	Medium	Large	
Miscarriage	1 (2.9)	4 (9.5)	15 (65.2)	< 0.001
Preterm labor	4 (11.4)	10(23.8)	4(17.4)	0.38
IUGR	4 (11.4)	4 (9.5)	0 (0.0)	0.29
PIH	2 (5.7)	4 (9.5)	2 (8.7)	0.90
Preeclampsia	1 (2.9)	0 (0.0)	1 (4.3)	0.33
Abruption	2 (5.7)	4 (9.5)	3 (13.0)	0.55
Uneventful pregnancy	24 (68.6)	22 (52.4)	4 (17.4)	< 0.001

our results. Guruvare et al. [15] and Nagy et al. [16] support our results about neonatal admission to NICU. Further analysis was carried out within hematoma group for the relationship between pregnancy complications and position of hematoma, as shown in Table 3. Miscarriage was significantly associated with retroplacental hematoma 18/60 (30%) pregnant ladies than with subchorionic only 2/40 (5%) pregnant ladies ($P = 0.004$). Preterm labor, IUGR, PIH, preeclampsia, and abruption were more frequent in women with retroplacental hematoma; however, the differences were not statistically significant ($P > 0.05$). In contrast, the uneventful pregnancy was less frequent in retroplacental hematoma group compared to those with subchorionic hematomas (30%) versus (80%) (RR = 4, $P < 0.001$).

With regard to the position of hematoma, Nagy et al. [16] reported that retroplacental hematomas significantly correlated with an increased risk of adverse maternal and neonatal complications. This agrees with the current study. Preterm labor, intrauterine growth restriction, pregnancy-induced hypertension, preeclampsia, and abruption were more frequent in women with retroplacental hematoma; however, the differences did not reach the statistical significance (in all comparison $P > 0.05$). Miscarriage was more likely to occur with large hematomas than medium- or small-sized hematomas, where 65.2% of women with large hematoma aborted compared to 9.5% of those with medium and only 2.9% of those with small hematomas ($P < 0.001$) as shown in Table 4.

This was supported by Ozkaya et al. [9] and Leite et al. [17]. Nagy et al. [16] reported the size ratio of hematoma to gestational sac was significantly greater in abortion group ($P < 0.001$); perhaps, it was the presence or absence of a hematoma, not its size, which could be used as a marker of the integrity of placentation, while Maso et al. [5] postulated that both the presence and location of a hematoma which represented the impaired placentation, rather than its size, were important for pregnancy outcome. By comparing fetal outcome across the position of hematoma, all fetal parameters except the Apgar score showed insignificant association with the position of hematoma ($P > 0.05$). Retroplacental hematoma was significantly associated with lower Apgar score (< 7) at 1 min (RR = 1.67, $P = 0.021$) and at 5 min (RR = 1.54, $P = 0.030$) as shown in Table 5.

It can be easily noticed that all fetal parameters except Apgar score at 5 min were insignificantly associated with the size of hematoma, while large hematoma was significantly associated with lower Apgar score at 5 min; Apgar

Table 5 Relationship between position of hematoma and fetal outcome

	Position of hematoma		RR (95% CI)	*P*
	Retroplacental (n = 60)	Subchorionic (n = 40)		
Gestational age at birth (week) (mean (SD))	38.9 (1.72)	38.8 (1.53)	–	0.86
Birth weight (kg) (mean (SD))	2.9 (0.5)	3.1 (0.6)	–	0.54
Mode of delivery				
NVD	16 (38.1)	16 (42.1)	0.92 (0.60–1.43)	0.82
Cesarean section	26 (61.9)	22 (57.9)		
Sex of the newborn				
Male	20 (47.6)	22 (57.9)	0.82 (0.54–1.25)	0.38
Female	22 (52.4)	16 (42.1)		
Meconium-stained liquor	2 (4.8)	4 (10.5)	0.617 (0.20–1.94)	0.42
Admission to NICU	16 (38.1)	9 (23.7)	1.35 (0.90–2.03)	0.23
Apgar score at 1 min				
< 7	21 (50.0)	9 (23.7)	1.67 (1.16–2.48)	0.021
≥ 7	21 (50.0)	29 (76.3)		
Apgar score at 5 min				
< 7	13 (31.0)	5 (13.2)	1.54 (1.10–2.28)	0.030
≥ 7	29 (69.0)	33 (86.8)		

Table 6 Relationship between size of hematoma and fetal outcome

Variable	Size of hematoma			*P*
	Small	Medium	Large	
Gestational age at birth (week) (mean (SD))	38.9 (1.6)	38.9 (1.9)	38.4 (1.1)	0.74
Birth weight (kg) (mean (SD))	3.1 (0.5)	2.9 (0.6)	2.9 (0.4)	0.23
Mode of delivery				
NVD	12 (35.3)	18 (47.4)	2 (25.0)	0.40
Cesarean section	22 (64.7)	20 (52.6)	6 (75.0)	
Sex of the newborn				
Male	22 (64.7)	18 (47.4)	2 (25.0)	0.11
Female	12(35.3)	20 (52.6)	6 (75.0)	
Meconium-stained liquor	2 (5.9)	4 (10.5)	0 (0.0)	0.83
Admission to NICU	8 (23.5)	13 (34.2)	4 (50.0)	0.29
Apgar score at 1 min				
< 7	10 (29.4)	16 (42.1)	4 (50.0)	0.42
> 7	24 (70.6)	22 (57.9)	4 (50.0)	
Apgar score at 5 min				
< 7	4 (11.8)	10 (26.3)	4 (50.0)	0.046
> 7	30 (88.2)	28 (73.7)	4 (50.0)	

score < 7 was more frequent among neonates of women with large hematomas than those with medium or small hematomas 50%, 26.3%, and 11.4%, respectively ($P = 0.046$), as shown in Table 6.

To our knowledge, many studies often assessed and compared the pregnancy outcomes between the groups with or without intrauterine hematoma, rather than comparing between both types of hematoma.

Conclusion

1. The presence and the characteristic of an intrauterine hematoma during the first trimester may identify a population of patients at increased risk of adverse pregnancy outcome.
2. Miscarriage rate with retroplacental hematoma is significantly higher than subchorionic hematoma. The size of the hematoma is significantly greater in the miscarriage group.
3. All subchorionic hematomas disappeared, but 2% of retroplacental hematomas did not disappear until the end of second trimester.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval This study involves human participants. All procedures performed in this study involving human participants were in accordance with the ethical standards of the scientific committee at Al Kindy College of Medicine.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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