Subchorionic Hematomas and Adverse Pregnancy Outcomes among Twin Pregnancies

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Abstract

Objective This study estimates the association of a first trimester finding of subchorionic hematoma (SCH) with third trimester adverse pregnancy outcomes in women with twin pregnancies.

Study Design Retrospective cohort study of twin pregnancies prior to 14 weeks at a single institution from 2005 to 2019, all of whom had a first trimester ultrasound. We excluded monoamniotic twins, fetal anomalies, history of fetal reduction or spontaneous reduction, and twin-to-twin transfusion syndrome. Ultrasound data were reviewed, and we compared pregnancy outcomes after 24 weeks in women with and without a SCH at their initial ultrasound $6^{0/7}$ to $13^{6/7}$ weeks. Regression analysis was used to control for any differences in baseline characteristics.

Results A total of 760 women with twin pregnancies met inclusion criteria for the study, 68 (8.9%) of whom had a SCH. Women with SCH were more likely to have vaginal bleeding and had their initial ultrasound at earlier gestational ages. On univariate analysis, SCH was not significantly associated with gestational age at delivery, preterm birth, birthweight of either twin, low birthweight percentiles of either twin, fetal demise, or preeclampsia. SCH was associated with placental abruption on univariate analysis, but not after controlling for vaginal bleeding and gestational age at the time of the initial ultrasound (adjusted odds ratio: 2.00, 95% confidence interval: 0.63–6.42). Among women with SCH, SCH size was not associated with adverse pregnancy outcomes.

Conclusion In women with twin pregnancies, the finding of a first trimester SCH is not associated with adverse pregnancy outcomes >24 weeks.

Keywords
- twin
- subchorionic hematoma
- first trimester
- adverse outcome

Subchorionic hematoma (SCH) is a common finding on first trimester ultrasound, affecting 0.5% to 39.5% of pregnancies.[1–3] Understanding the clinical implications of a SCH is challenge, as studies have often been limited by lack of clinical information (i.e., presence of absence of vaginal bleeding), inconsistent definitions of SCH, and wide ranges in gestational age at time of diagnosis.[4,5] In a large systematic review including 1,735 women with SCH, the authors found an increased risk of spontaneous abortion, placental abruption, preterm premature rupture of membranes, and stillbirth.[4] However, using data from over 2,000 women with singleton pregnancies undergoing first trimester ultrasound, we recently reported

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that after controlling for differences in baseline characteristics such as gestational age and bleeding, first trimester SCH was no longer significantly associated with pregnancy loss nor third trimester adverse pregnancy outcomes.[6,7]

Among women with twin pregnancies, a group of women with an increased baseline risk for preterm birth and growth restriction, the relationship between SCH and adverse pregnancy outcome is even less clear. Though SCH has been associated with vaginal bleeding in a subset of women with twin pregnancies who underwent in vitro fertilization (IVF), the independent association between SCH and pregnancy outcomes in twin pregnancies is not well understood— particularly as IVF may be independent predictor of SCH.[8,9]

We performed a retrospective cohort study to investigate the relationship between first trimester SCH and adverse pregnancy outcomes in women with twin pregnancies. In addition, we sought to better understand which ultrasound features of SCH and clinical factors are associated with an increased risk of adverse outcomes among women with twins and SCH.

Materials and Methods

This was a retrospective cohort study of all women with twin pregnancies delivered between June 2005 and March 2019 by a single maternal–fetal medicine practice, who presented for prenatal care prior to 14 weeks. As the objective of our study was to understand third trimester pregnancy implications of a first trimester diagnosis of SCH, we excluded women with pregnancy loss prior to 24 weeks. We also excluded women with monoamniotic twins, fetal anomalies, history of multifetal pregnancy reduction or spontaneous reduction, and twin-to-twin transfusion syndrome. In our practice, all women with twin pregnancies undergo ultrasound at our affiliated imaging center at the time of their initial prenatal visit. All images are read in real time by a maternal–fetal medicine attending; images are archived and formal reports are generated. For each patient, we reviewed the initial ultrasound performed between $6^{0/7}$ and $13^{6/7}$ weeks. We reviewed each ultrasound report for the presence or absence of a SCH, the size of SCH, and the presence or absence of vaginal bleeding, which are all routinely on the ultrasound report. SCH was defined as a crescent-shaped, echo-free area between the chorionic membrane and the myometrium.[2] If the ultrasound report was not conclusive, the archived images were reviewed. Reviewers were blinded to pregnancy outcomes. In our practice, women with twin pregnancies are not followed or managed differently based on the presence or absence of SCH.

Demographic and baseline clinical information was obtained from the medical record, including maternal age, chorionicity, gestational age at the time of the ultrasound, IVF, maternal race, uterine anomaly, prior cervical excision procedure, prior preterm birth, fibroids, pre-pregnancy diabetes, chronic hypertension, thrombophilia, and maternal body mass index.

Our primary outcome was preterm birth prior to 34 weeks. Secondary outcomes included preterm birth at earlier gestational ages, gestational age at delivery, birthweight, birthweight less than the tenth percentile, birthweight less than the fifth percentile, preeclampsia, clinical evidence of placental abruption, and fetal demise. Gestational age was based on the last menstrual period or ultrasound based on contemporary guidelines.[10] Women, who underwent IVF, were dated by their IVF transfer date.

Student's *t*-test, Chi-squared test, and Pearson's correlation were used for parametric data as appropriate. Fisher's exact test was used for nonparametric data. Additionally, logistic regressions were performed for the outcomes that were found to be associated with SCH in univariate analysis. Potential confounding variables were added to the regression analysis if they differed between groups in univariate analysis at a level of $p < 0.05$, and odds ratios with 95% confidence intervals were estimated from the regression analysis (IBM SPSS for Windows 22.0; IBM Corp., Armonk, NY). This study was reviewed and approved by the institutional review board of Biomedical Research Alliance of New York (BRANY).

Results

Over the course of the study period, 886 women with twin pregnancies presented for prenatal care prior to 14 weeks. We excluded ten women with monoamniotic twins, 15 women with twin-to-twin transfusion syndrome, eight women with major fetal anomalies, 51 whose twins were the result of multifetal pregnancy reduction, and 29 women whose twins were the result of spontaneous fetal reduction, leaving 773 women. The rate of pregnancy loss prior to 24 weeks did not differ between the SCH and non-SCH group (1/69 [1.4%] vs. 12/704 [1.7%], $p = 0.999$). After these 13 women with pregnancy loss prior to 24 weeks were excluded, our total cohort included 760 women—68 (8.9%) of whom had an SCH on their initial ultrasound and 692 (91.1%) of whom did not have an SCH on their initial ultrasound. For women with SCH, the mean volume (length × width × height) was 14.8 ± 34.3 cm^3 and the mean largest diameter was 3.1 ± 1.7 cm.

Women in the SCH group had a higher incidence of vaginal bleeding at the time of their ultrasound, and their ultrasounds were performed at earlier gestational ages. Otherwise, there were no differences in baseline characteristics between the two groups (►Table 1).

On univariate analysis, SCH was not associated with any adverse pregnancy outcomes studied—aside from an increased incidence of placental abruption (7.4 vs. 2.6%, $p = 0.029$) (►Table 2). However, after controlling for vaginal bleeding and gestational age at the time of the ultrasound, SCH was no longer significantly associated with placental abruption (adjusted odds ratio: 2.00, 95% confidence interval: 0.63–6.42).

On post hoc power analysis, we had 80% power with a α error of 5% to identify an increase in preterm birth <34 weeks from 15.3% in women with no SCH to 29.5% in the SCH group. Using the outcome of birthweight less than the fifth percentile, we had power to identify an increase from 25.9 to 42.2%.

To examine the effect of SCH size on outcomes, we performed a Pearson's correlation test on SCH size with gestational age at delivery as well as birthweight for all women with a SCH. SCH size was calculated both as volume

Table 1 Baseline maternal characteristics based on the presence or absence of a subchorionic hematoma prior to 14 weeks in a twin pregnancy

Maternal outcome	Subchorionic hematoma $n = 68$	No subchorionic hematoma $n = 692$	p-value[a]
Maternal age (mean years)	34.6 ± 5.9	34.5 ± 6.4	0.885
Chorionicity			0.607
Dichorionic–diamniotic	60 (88.2%)	595 (86.0%)	
Monochorionic–diamniotic	8 (11.8%)	97 (14.0%)	
Gestational age at ultrasound (mean weeks)	9.7 ± 1.8	10.3 ± 1.8	0.013
Gestational age week			0.004
$6^{0/7}$–$9^{6/7}$	42 (61.8%)	302 (43.6%)	
$10^{0/7}$–$13^{6/7}$	26 (38.2%)	390 (56.4%)	
In vitro fertilization	45 (66.2%)	433 (62.6%)	0.557
Vaginal bleeding at the time of ultrasound	28 (41.2%)	45 (6.5%)	<0.001
Race			0.056
White	52 (76.5%)	590 (85.3%)	
Non-White	16 (23.5%)	102 (14.7%)	
Uterine anomaly	3 (4.4%)	16 (2.3%)	0.290
Prior cervical excision procedure	1 (1.5%)	24 (3.5%)	0.718[b]
Prior preterm birth	6 (8.8%)	55 (7.9%)	0.800
Fibroids	8 (11.8%)	49 (7.1%)	0.162
Pre-pregnancy diabetes	0 (0%)	4 (0.6%)	0.999[b]
Chronic hypertension	0 (0%)	16 (2.3%)	0.385
Thrombophilia	4 (5.9%)	18 (2.6%)	0.124
Body mass index (mean kg/m^2)	23.0 ± 3.9	23.7 ± 4.8	0.275
Body mass index category			0.311
<18.5 kg/m^2	6 (8.8%)	39 (5.6%)	
18.5–24.9 kg/m^2	44 (64.7%)	459 (66.3%)	
25–29.9 kg/m^2	14 (20.6%)	116 (16.8%)	
≥30 kg/m^2	3 (4.4%)	74 (10.7%)	
No body mass index data available	1 (1.5%)	4 (0.6%)	

[a]Chi-square or Student's t-test.
[b]Fisher's exact test.

(length × width × height), as well as single largest diameter. Neither SCH volume nor largest SCH diameter was associated with gestational age at delivery or birthweight (►Table 3).

Comment

We found that presence of a first trimester SCH in twin pregnancies was not associated with the adverse pregnancy outcomes of preterm birth, low birthweight, preeclampsia, fetal demise, and placental abruption. For women with SCH, we also did not find a correlation between SCH size and adverse pregnancy outcomes. Studies investigating the relationship of SCH and clinical outcome have largely been performed in singletons, and have been limited by their lack of complete and potentially meaningful clinical information such as vaginal bleeding.[1–4] Our findings are consistent with our findings in singleton pregnancies[6,7] and in contrast to what was previously reported in singleton pregnancies, in which several studies showed an increased risk of adverse pregnancy outcomes, primarily preterm birth.[1–4] One study that sought to understand the implications of SCH among twin pregnancies focused on vaginal bleeding and miscarriage, and not late pregnancy outcome.[8]

Strengths of this study include the large sample size, high follow-up for pregnancy outcomes, and the inclusion of many potential confounding variables including maternal age, IVF, body mass index, vaginal bleeding, and gestational age at the time of ultrasound. Since all women in our practice with twin pregnancies have an ultrasound at their first prenatal visit, selection bias was reduced. A limitation of this study is its retrospective design. Although reviewers were blinded to pregnancy outcome, our sonographers and physicians were not blinded to whether a patient had vaginal bleeding or not; thus, it is possible that an increased index of suspicion may have affected the detection of SCH in those women. Our study also only looked at SCH at one point in

Table 2 Pregnancy outcomes based on the presence or absence of a subchorionic hematoma prior to 14 weeks in a twin pregnancy

Maternal characteristic	Subchorionic hematoma $n = 68$	No subchorionic hematoma $n = 692$	p-value[a]
Gestational age at delivery (mean weeks)	35.9 ± 2.5	36.0 ± 2.3	0.796
Delivery <28 weeks	1 (1.5%)	10 (1.4%)	0.999[b]
Delivery <32 weeks	6 (8.8%)	42 (6.1%)	0.373
Delivery <34 weeks	11 (16.2%)	106 (15.3%)	0.852
Delivery <37 weeks	36 (52.9%)	386 (55.8%)	0.653
Larger twin birthweight (mean grams)	$2,544 \pm 514$	$2,544 \pm 507$	0.999
Smaller twin birthweight (mean grams)	$2,288 \pm 495$	$2,262 \pm 492$	0.684
Either twin <10%[c]	31/65 (47.7%)	346/686 (50.4%)	0.672
Either twin <5%[c]	19/65 (29.2%)	178/686 (25.9%)	0.565
IUFD of either twin	1 (1.5%)	4 (0.6%)	0.375[b]
Preeclampsia[d]	8/67 (11.9%)	116/675 (17.2%)	0.272
Placental abruption	5 (7.4%)	18 (2.6%)	0.029

Abbreviation: IUFD, intrauterine fetal death.
[a]Chi-square or Student's t-test.
[b]Fisher's exact test.
[c]Excluding women with IUFD of either twin, as well as women without birthweight data available.
[d]Excluding women with chronic hypertension or women without preeclampsia outcome data available.

Table 3 Correlation between subchorionic hematoma feature and pregnancy outcomes in women with twin pregnancy and a subchorionic hematoma

Hematoma feature	Correlation with gestational age at delivery	Correlation with larger twin birthweight	Correlation with smaller twin birthweight
Largest diameter	0.134, $p = 0.298$	0.172, $p = 0.192$	0.133, $p = 0.316$
Volume (length × width × height)	0.006, $p = 0.966$	0.057, $p = 0.697$	0.054, $p = 0.712$

Note: Data presented as Pearson's correlation coefficient, p-value.
$n = 68$ women with twin pregnancy and subchorionic hematoma.

time; we were not able to analyze if persistence of SCH during the pregnancy, increasing size, and gestational age of the SCH at the time of resolution was associated with pregnancy outcomes.

As we included only twin pregnancies prior to 14 weeks gestation in this study, it is also possible that women with twin pregnancies, who develop an SCH after 14 weeks, may have different outcomes than this population. It is important to note that more than half of the women with twin pregnancies in our study underwent IVF. As these women are only transferred to our practice after confirmation of viability following embryo transfer, it is possible that our population was already selected in that women with nonviable twin pregnancies did not present for prenatal care. Thus, we do not know how many of these women did and did not have SCH on earlier ultrasounds. For this reason, we were not able to use our data to assess the association between SCH and earlier pregnancy loss in this population. Similarly, several pregnancies with SCH prior to this gestational age may have already miscarried, and thus our incidence of SCH could be lower than what is expected in twins overall. Thus, a prospective study of twin gestations initiated at viability confirmation would be needed to understand the implications of SCH on earlier pregnancy loss.

This study demonstrates that for women with viable twin pregnancies at $6^{0/7}$ to $13^{6/7}$ weeks, the presence of an SCH is not associated with adverse pregnancy outcomes later in pregnancy. Thus, assuming they do not miscarry, they should be reassured that the SCH seen earlier in pregnancy is likely not significant. As SCH is a common ultrasound finding in the first trimester, our data suggest that counseling in twin pregnancies should not be routinely altered based on the presence of a first trimester SCH.

In summary, the presence of a first trimester SCH is not associated with adverse pregnancy outcomes in twin pregnancies. The size of the SCH also does not appear to correlate with these outcomes among twin pregnancies with an SCH. These findings may aid in counseling women with this common ultrasound founding during the first trimester.

Condensation

Subchorionic hematoma prior to 14 weeks is not associated with adverse outcomes in twin pregnancies.

Note

This study was presented as a poster at the Society for maternal–fetal medicine 38th Annual Meeting: The Pregnancy Meeting, January 9 to February 3, 2018, Dallas, Texas.

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None.

Conflict of Interest

None declared.

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