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Original article

SUBCHORIONIC HEMATOMA AS AN EARLY MARKER OF PLACENTAL DYSFUNCTION: A PROSPECTIVE COHORT STUDY

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ABSTRACT

Purpose: To evaluate whether subchorionic hematoma (SCH) in early pregnancy is associated with a higher frequency of preeclampsia, preterm birth, small for gestational age (SGA) newborns, placental abruption, and other outcomes related to placental dysfunction.

Material/Methods: A prospective observational study was conducted from December 2020 to July 2025. A total of 460 pregnant women were analyzed, including 178 with SCH and 282 controls without ultrasound evidence of SCH. The frequencies of preeclampsia, preterm birth, SGA, intrapartum complications, and selected associations with SCH size and location were evaluated. Categorical variables were compared using the chi-square test and Fisher's exact test. A value of $p<0.05$ was considered statistically significant.

Results: Preeclampsia occurred in 24.2% of women with SCH compared with 7.8% in controls, $p=0.001$. Preterm birth was observed in 20.2% versus 2.1%, $p<0.001$. SGA occurred in 37.1% versus 7.1%, $p<0.001$. Intrapartum complications were more frequent in women with SCH, 11.2% versus 2.8%, $p<0.001$. Placental abruption accounted for the main difference, 6.7% versus 0.7%, $p<0.001$. Within the SCH group, a larger hematoma size was significantly associated with preterm birth.

Conclusions: SCH in early pregnancy was associated with a higher frequency of preeclampsia, preterm birth, SGA, and placental abruption. These findings suggest that SCH may identify pregnancies with increased risk of placental dysfunction-related outcomes. Due to the observational design, the results should be interpreted as associations rather than evidence of causality.

Keywords: subchorionic hematoma, placental dysfunction, preeclampsia, preterm birth, small for gestational age, placental abruption, obstetrics and gynecology, ultrasound,

INTRODUCTION

Subchorionic hematoma is one of the most common ultrasound findings in early pregnancy. It is usually described as a blood collection between the chorion and the decidua [1, 2, 3]. In everyday clinical practice, SCH is most often detected in women with vaginal bleeding, although it may also be found incidentally during routine ultrasound examination in asymptomatic patients. In many cases, it is regarded as a transient finding. However, published data suggest that in a subgroup of pregnancies, SCH may reflect an earlier disturbance in implantation and placental development [3, 4, 5].

There is a plausible biological basis for this assumption. Impaired implantation, incomplete trophoblast invasion, and insufficient remodeling of the spiral arteries may contribute both to the formation of a subchorionic blood collection and to later complications associated with placental dysfunction [3, 5, 6]. For this reason, the clinical question is no longer limited to whether a hematoma is present. More important is whether SCH provides early information about the subsequent course of pregnancy.

Previous studies have reported associations between SCH and adverse obstetric and perinatal outcomes, including preterm birth, placental abruption, fetal growth disorders, and hypertensive complications of pregnancy [4, 5, 7, 8, 9, 10, 11, 12]. The available evidence, however, is not entirely uniform. The prognostic role of hematoma size, location, persistence, and clinical context remains under discussion [4, 5, 9, 10, 11, 12]. From a practical point of view, it is important to clarify whether SCH may help identify women who need closer follow-up for possible placental dysfunction.

The aim of the present study was to evaluate whether subchorionic hematoma in early pregnancy is associated with a higher frequency of preeclampsia, preterm birth, SGA, placental abruption, and other adverse outcomes that may be interpreted within the clinical spectrum of placental dysfunction.

MATERIALS AND METHODS

A prospective observational study was conducted from December 2020 to July 2025 at Specialized Hospital for Obstetrics and Gynecology "Maichin Dom", Sofia, the Medical Center "Trinity", Sofia, and the Medical Center "Terziyski", Blagoevgrad. A total of 460 pregnant women were analyzed. Of these, 178 had subchorionic hematoma, and 282 served as controls without ultrasound evidence of SCH.

The SCH group included pregnant women with ultrasound-confirmed hematoma, a viable embryo or fetus at the time of diagnosis, gestational age up to 20 gestational weeks, and available follow-up until pregnancy outcome. Ectopic pregnancy, molar pregnancy, severe fetal malformations, and cases with missing key data were excluded.

For the purposes of this article, the following endpoints were analyzed: preeclampsia, preterm birth, delivery of an SGA newborn, intrapartum complications, and placental abruption. Additional within-group analyses were performed to assess the association between SCH size and selected outcomes, as well as the association between hematoma location and preterm birth.

Preterm birth was defined as delivery before 37 completed gestational weeks. SGA was defined as birth weight below the 10th percentile for gestational age. SCH size was classified according to the maximal measured diameter as small, medium, or large. In the size-based analysis, small SCH measured 0.6-1.4 cm, medium SCH measured 1.5-2.7 cm, and large SCH measured 2.8-5.8 cm.

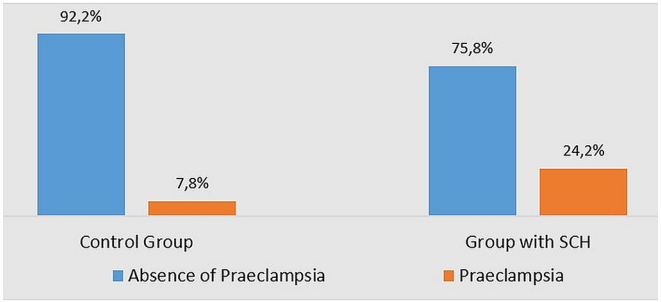
Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS). Categorical variables were presented as absolute numbers and percentages. Comparisons between groups were performed using the chi-square test and Fisher's exact test when expected frequencies were small. A value of $p<0.05$ was considered statistically significant.

RESULTS

Preeclampsia was analyzed in 132 women with SCH who had available follow-up to a gestational age at which hypertensive complications could be assessed. Preeclampsia occurred in 32 of these women, 24.2%, compared with 22 of 282 controls, 7.8%, p=0.001. This corresponds to an approximately threefold higher frequency of preeclampsia in pregnancies with SCH.

In the size-based analysis within the SCH group, the frequency of preeclampsia increased from 16.7% in women with small SCH to 17.9% in those with medium SCH and 42.1% in those with large SCH. This difference did not reach statistical significance, p=0.120.

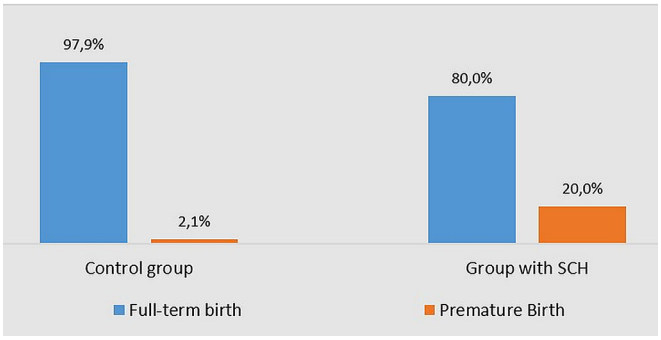
Fig. 1. Association between SCH and preeclampsia in the control group and the SCH group



Preterm birth occurred in 36 of 178 women with SCH, 20.2%, compared with 6 of 282 controls, 2.1%. The difference was statistically significant, $p<0.001$. In the within-group analysis by hematoma size, preterm birth was observed in 6.7% of women with small SCH, 22.2% of those with medium SCH, and 34.8% of those with large SCH. This association was statistically significant, p=0.038.

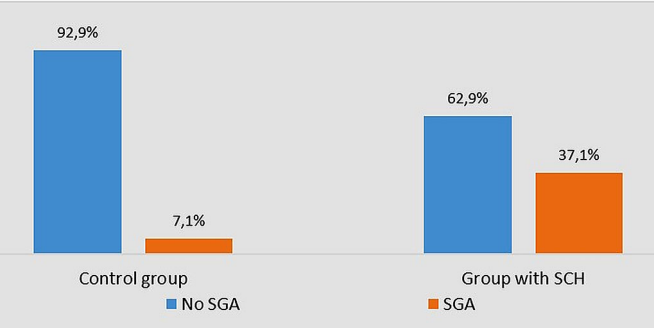
Hematoma location also showed an association with preterm birth. In cases with retroplacental SCH, preterm birth was observed in 21.6%. In cases with lower marginal SCH, it was observed in 14.6%. In cases with upper marginal SCH, preterm birth was observed in 75.0%. The latter result should be interpreted with particular caution because of the very small subgroup size, n=8.

Fig. 2. Association between SCH and preterm birth in the control group and the SCH group



Regarding fetal growth, SCH was associated with a significantly higher frequency of SGA. In the SCH group, SGA was found in 66 of 178 patients, 37.1%. In the control group, SGA was found in 20 of 282 patients, 7.1%, $p<0.001$. Within the SCH group, the frequency of SGA increased with hematoma size: 26.7% in women with small SCH, 41.7% in those with medium SCH, and 43.5% in those with large SCH. This trend did not reach statistical significance, p=0.346.

Fig. 3. Association between SCH and SGA in the control group and the SCH group.



Intrapartum complications were also more frequent in women with SCH. They were registered in 20 of 178 patients with SCH, approximately 11.2%, compared with 8 of 282 controls, approximately 2.8%. The difference was statistically significant, p<0.001.

Among the individual complications, placental abruption was the leading contributor to this difference. It was observed in 12 of 178 women with SCH, 6.7%, compared with 2 of 282 women in the control group, 0.7%, p<0.001.

Overall, pregnancies with SCH showed higher rates of preeclampsia, preterm birth, SGA, and placental abruption. These outcomes are commonly considered part of the broader clinical spectrum of placental dysfunction.

Table 1. Pregnancy outcomes in women with and without SCH

Outcome	Control group	SCH group	p-value
Preeclampsia	22/282, 7.8%	32/132, 24.2%	0.001
Preterm birth	6/282, 2.1%	36/178, 20.2%	<0.001
SGA	20/282, 7.1%	66/178, 37.1%	<0.001
Intrapartum complications	8/282, 2.8%	20/178, 11.2%	<0.001
Placental abruption	2/282, 0.7%	12/178, 6.7%	<0.001

Note: Preeclampsia was assessed in the subgroup of women with SCH who had follow-up to a gestational age, allowing evaluation of hypertensive complications.

Table 2. Outcomes according to SCH size

Outcome	Small SCH	Medium SCH	Large SCH	p-value
Preeclampsia	16.7%	17.9%	42.1%	0.120
Preterm birth	6.7%	22.2%	34.8%	0.038
SGA	26.7%	41.7%	43.5%	0.346

Note: Small SCH was defined as 0.6-1.4 cm, medium SCH as 1.5-2.7 cm, and large SCH as 2.8-5.8 cm.

Table 3. Preterm birth according to SCH location

SCH location	Preterm birth
Retroplacental SCH	21.6%
Lower marginal SCH	14.6%
Upper marginal SCH	75.0%

Note: The result for upper marginal SCH should be interpreted with caution because of the very small subgroup size, n=8.

DISCUSSION

The present study suggests that subchorionic hematoma in early pregnancy should not always be regarded as an isolated ultrasound finding. In our cohort, SCH was associated with several later complications that are commonly linked to impaired placental function. The most pronounced differences were observed for preeclampsia, preterm birth, SGA, and placental abruption. These findings are in line with previous reports showing that SCH may be associated with less favorable obstetric and perinatal outcomes [4, 5, 7, 8].

A possible explanation is that SCH may occur in pregnancies in which placentation is already disturbed. Impaired implantation, defective trophoblast invasion, or early decidual-placental separation could create conditions for both hematoma formation and later placental complications. Such a mechanism would explain why an early ultrasound finding may be followed by hypertensive disorders, impaired fetal growth, preterm birth, or placental abruption. This interpretation is supported by review data on SCH and indirectly by population data linking abnormal bleeding with preeclampsia [1, 3, 6].

The results regarding preeclampsia deserve attention. In our cohort, preeclampsia was approximately three times more frequent among women with SCH than among controls. A higher proportion was also observed in women with large hematomas, although the size-based analysis did not reach statistical significance. This may be related to the limited number of cases in the subgroups. It may also reflect the fact that preeclampsia is a multifactorial disorder and cannot be explained by hematoma size alone. Nevertheless, the observed association is compatible with the concept of early decidual and placental vulnerability [4, 5, 6, 8].

The findings for SGA point in a similar direction. Pregnancies with SCH had a markedly higher frequency of newborns small for gestational age. The proportion of SGA also increased in the medium and large hematoma groups, although without statistical significance. This lack of significance should be interpreted cautiously, given the subgroup sizes and the possible influence of maternal age, hypertensive disorders, assisted reproductive technology, and other confounding factors. Previous studies have also reported less favorable outcomes in pregnancies with larger or more persistent hematomas [10, 11]. Similar observations are included in the meta-analysis by Tuuli MG, et al. [7].

The association with preterm birth was the most consistent finding within our data. It was significant both in the comparison between women with and without SCH and in the analysis according to hematoma size. This makes preterm birth one of the clearest clinical links between the early ultrasound finding and later adverse pregnancy outcome. Our results are consistent with the systematic review and meta-analysis by Yan et al., as well as with studies by Pan, Liang, and Al-Memar, which reported associations between hematoma characteristics and the risk of preterm birth [4, 9, 10, 11].

Hematoma location may also be clinically relevant. Retroplacental and upper marginal hematomas were associated with a less favorable profile in our cohort. The finding for upper marginal SCH should not be overinterpreted because the subgroup was very small. Still, the observation is consistent with reports suggesting that certain ultrasound characteristics and less favorable hematoma locations may be associated with poorer perinatal outcomes [5, 12].

The result for placental abruption is particularly important. Although the absolute number of cases was not large, the difference between groups was clear and statistically significant. Placental abruption is a direct clinical manifestation of pathology at the decidual-placental interface. For this reason, its higher frequency among women with SCH supports the view that, in at least some pregnancies, SCH may be part of a broader placental disorder rather than a purely local bleeding episode. Similar considerations have been discussed in relation to retroplacental hematomas and early pregnancy bleeding [4, 5, 6, 7, 8].

Several limitations should be noted. The study is observational and cannot prove causality. A multivariable model was not applied, so it cannot be concluded that SCH is an independent predictor after adjustment for maternal age, assisted reproductive technology, hypertension, thrombophilia, and other potential confounders. Some within-group analyses, especially those based on hematoma size and location, were limited by small subgroup numbers. For these reasons, the most appropriate interpretation is that SCH is associated with a profile of placental dysfunction-related outcomes, not that it directly causes them.

The clinical implication is that SCH should be interpreted in context. In many women, it may remain an isolated finding. In others, especially when the hematoma is larger, retroplacental, persistent, or accompanied by symptoms, closer surveillance appears justified. Follow-up should be directed toward early recognition of hypertensive complications, impaired fetal growth, and risk of preterm birth. Further prospective studies with adjustment for relevant confounders are needed to clarify the independent prognostic value of SCH.

CONCLUSION

In this prospective cohort, subchorionic hematoma in early pregnancy was associated with a higher frequency of preeclampsia, preterm birth, SGA, and placental abruption. The additional findings related to hematoma size and location support the view that SCH may identify pregnancies at increased risk of placental dysfunction-related outcomes. In clinical practice, this finding may justify more individualized follow-up, particularly when the hematoma is large, retroplacental, or persistent. Due to the observational design and the absence of multivariable analysis, these results should be interpreted as associations. Further prospective studies are needed to confirm the independent prognostic value of SCH.

Abbreviations

ART - assisted reproductive technology
SCH - subchorionic hematoma
SGA - small for gestational age
SPSS - Statistical Package for the Social Sciences

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