Sonographic Spectrum of Placental Abruption

Fifty-seven cases of placental abruption detected by sonography were retrospectively reviewed. The location of hemorrhage was subchorionic in 46 cases (81%), retroplacental in nine cases (16%), and preplacental in two cases (4%). Subchorionic hematomas were more frequently shown in the 33 patients presenting before 20 menstrual weeks (91%) than in the 24 patients presenting after 20 weeks (67%). The echogenicity of hemorrhage depended on the time the sonogram was performed relative to the onset of symptoms: Acute hemorrhage was hyperchoic to isoechoic compared with the placenta, while resolving hematomas became hypoechoic within 1 week and sonolucent within 2 weeks. Acute hemorrhage was occasionally difficult to distinguish from the adjacent placenta. This occurred in five retroplacental hematomas that showed only an abnormally thick and heterogeneous placenta. Nine cases of placental abruption were initially confused with other mass lesions. Placental abruption causes a wide spectrum of sonographic findings that may be overlooked or misdiagnosed.

Placental abruption is recognized as one of the most serious complications of pregnancy. It is commonly associated with premature labor and delivery, and has been implicated in 15–25% of all perinatal deaths [1, 2]. Symptoms of third-trimester abruption, seen in approximately 0.49–1.29% of gestations, include maternal hemorrhage, a tense and painful uterus, fetal distress, and coagulopathy [3]. Less dramatic, but more common, manifestations of placental abruption have been recently recognized throughout pregnancy [4–9], including “idiopathic” premature labor [4], painless vaginal bleeding, and threatened abortion in the first and second trimesters [7–9]. As the signs and symptoms are highly variable, the diagnosis of placental abruption requires a high index of clinical suspicion [10].

Previously published reports suggest that the sonographic findings of placental abruption are also variable [7–9, 11–12]. While most sonographers recognize a retroplacental hematoma as evidence of placental abruption, other findings are less well known. In order to further evaluate the sonographic appearances of placental abruption, we reviewed our experience with 57 cases.

Materials and Methods

The study group included 57 consecutive women who had evidence of a placental abruption on sonograms performed during a 4-year period (1981–1985) at a university hospital. The sonograms, clinical history, and gestational outcome were retrospectively reviewed in each case. Thirty-three patients first presented before 20 menstrual weeks, and 24 patients presented after 20 weeks. All but two women were referred for sonographic evaluation because of vaginal bleeding. Most women also experienced uterine cramps or contractions. Placental abruption was clinically suspected in 14 cases; placenta previa or some other source of vaginal bleeding was suspected in the remaining cases.

Sonograms were performed with commercially available real-time and static equipment by using a 3.5-MHz transducer. Thirty-nine women had two or more sonograms performed. When more than one examination was performed, only the initial sonogram was used for data analysis.
The size, location, and echogenicity of hemorrhage were noted in each case. The volume of hemorrhage was estimated from a measurement of three perpendicular diameters (D) by the formula for an ellipsoid: 0.52 × (D₁D₂D₃). The location of hemorrhage was defined by its predominant location and categorized as one of the following: subchorionic (between the myometrium and the placental membranes), retroplacental (between the placenta and the myometrium), and preplacental (between the placenta and the amniotic fluid). In cases of subchorionic hematomas, a determination was also made as to whether the hematoma extended beneath the margin of the placenta. The echogenicity of hemorrhage was compared with adjacent structures and was defined as hyperechoic when it was equal to or greater than that of the adjacent placenta; hypoechoic when it was less than that of placenta and similar to that of myometrium; and sonoluent when it was similar to that of the amniotic fluid.

Of the 57 cases of placental abruptions in this series, 21 were confirmed by inspection of the placenta after delivery; seven had a subsequent amniocentesis that yielded brownish fluid and were consistent with previous hemorrhage; seven resolved on serial sonograms; and four underwent uterine curettage because of a clinical diagnosis of inevitable abortion. The remaining 17 patients were all seen before 20 menstrual weeks, including six who had a spontaneous abortion, eight whose symptoms resolved and who had a normal term delivery, and four who were lost to clinical follow-up.

Results

The estimated volume of hematoma for the 57 cases ranged from 4.3 to 343 cm³, with a mean of 69 cm³. The size of hematoma did not vary significantly with its location or menstrual age. However, small hematomas were more easily detected during early pregnancy when they were relatively large in comparison with the gestational sac.

The predominant locations of hematomas are shown in Table 1. Of the 57 hematomas visualized, 46 (81%) were subchorionic (Fig. 1), nine (16%) were retroplacental (Fig. 2), and two (4%) were preplacental (Fig. 3) in location. Compared with women seen before 20 menstrual weeks, women presenting after 20 weeks demonstrated a higher frequency of retroplacental hematomas (29% vs 6%) and fewer subchorionic hematomas (67% vs 91%).

All 46 subchorionic hematomas were contiguous with the placental margin, including 26 cases (57%) that extended beneath the margin of the placenta (Fig. 1). However, the majority of blood was often separate from the placenta, and in six cases, the predominant hemorrhage was located on the myometrial surface opposite the placenta (Fig. 4).

Hematomas were hyperechoic in 17 cases, hypoechoic in 21 cases, and sonoluent in 19 cases. The echogenicity of hematomas varied with the time of the sonogram relative to the initial symptoms. Hematomas identified on sonograms performed at the time of the initial symptoms were hyperechoic to isoechoic compared with the placenta, while resolving hematomas became hypoechoic within 1 week and sonoluent within 2 weeks (Figs. 2 and 4).

Because acute hemorrhage was similar in echogenicity to the adjacent placenta, the extent of hemorrhage was occasionally difficult to appreciate on the initial sonogram. Five retroplacental hematomas were seen only as an abnormally thick and heterogeneous placenta (Fig. 5B). In some cases, a previous sonogram for comparison (Fig. 5A) or a follow-up sonogram that showed a resolving hematoma were useful for confirming the diagnosis of placental abruption.

Nine cases (16%) of placental abruptions were prospectively misdiagnosed on the initial sonogram. Primary diagnoses that were initially considered included succinturiate lobe

<table>
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<tr>
<th>Menstrual Age</th>
<th>Hematoma Location</th>
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<tbody>
<tr>
<td></td>
<td>Subchorionic (%)</td>
</tr>
<tr>
<td>&lt;20 weeks</td>
<td>30 (91)</td>
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<tr>
<td>&gt;20 weeks</td>
<td>16 (67)</td>
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<td>Total</td>
<td>46 (81)</td>
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Fig. 1.—A sonogram made at 13 menstrual weeks shows a large, sonoluent hematoma (H) that is predominantly subchorionic in location. Hematoma extends beneath margin of placenta (arrow), detaching it from adjacent myometrium.

Fig. 2.—A, A sonogram made at 25 menstrual weeks shows a hyperechoic hematoma (arrowheads) in a retroplacental location, beneath placenta (P). B, Repeat sonogram made 1 week later shows hematoma (H) to be hypoechoic compared with adjacent placenta (P).
of the placenta (three cases, Fig. 5), uterine myoma (three cases), chorioangioma (two cases, Fig. 6), and coexisting molar pregnancy (one case). In each of these cases, a repeat sonogram that showed a resolving hematoma helped to establish the correct diagnosis (Fig. 5).

Discussion

Placental abruption is defined as premature separation of the placenta from the myometrium, although some authorities reserve this term only for its occurrence in symptomatic patients [5]. The primary sonographic evidence for placental abruption is demonstration of a hemorrhage produced by the placental detachment [11]. Sonographic examination has been reported to be negative in most cases of clinically suspected abruption [10], presumably owing to the free passage of blood through the cervical os, which prevents the formation of a contained hemorrhage large enough to be visualized [11]. Despite the limitations of sonography, however, demonstration of a hematoma is clinically important since these pregnancies may have a worse prognosis than placental abruptions that do not show a hematoma. Fetal demise and premature labor have been correlated with the size of the hematoma in several clinical studies [13, 14] as well as in a recent sonographic study [9].

The reported sensitivity of sonography for detecting placental abruption varies considerably. In one series of 56 pathologically confirmed third-trimester abruptions, only one (2%) was detected by sonography [10]. Similarly, Mantoni [7] detected subchorionic hematomas in six (4%) of 148 women. In comparison, Goldstein et al. [8] detected subchorionic hematomas in 10 (20%) of 50 women with vaginal bleeding at 8–20 menstrual weeks.

![Fig. 3.—Sonogram made at 18 weeks gestation shows a large hematoma (arrows) in a preplacental location, between placenta (P) and fetus (F). An old hematoma was found at delivery.](image)

![Fig. 4.—A, Sonogram made at 31 weeks shows a large subchorionic hematoma (H) located on myometrial surface opposite posterior placenta (P). This hemorrhage, which is similar in echogenicity to that of placenta, was initially confused for a succinturiate lobe. B, Repeat sonogram made 2 weeks later shows that hematoma has become nearly sonolucent in appearance.](image)

![Fig. 5.—A, Sonogram made of a woman who presented with vaginal bleeding at 26 menstrual weeks shows a normal-appearing, anterior placenta (P). B, Repeat sonogram made 5 days later, after acute worsening of vaginal bleeding and onset of uterine contractions, shows a markedly thick and heterogeneous placenta (P). A large retroplacental hematoma was found after spontaneous abortion.](image)

![Fig. 6.—Sonogram made at 31 weeks shows a solid-appearing mass (M) on anterior myometrial surface, adjacent to margin of placenta (P). This mass, which was initially confused for a chorioangioma, proved to be a marginal placental abruption at delivery.](image)
The wide range of sonographic appearances undoubtedly contributes to the range of sensitivities reported for detecting placental abruption. In the present study, sonographic findings varied with the size and location of the hematoma as well as with the time of the sonogram. These are important factors in evaluation of suspected placental abruption.

The most common location of hemorrhage was subchorionic, observed in 81% of cases (Fig. 1). A higher frequency of subchorionic hematomas was shown in women presenting before 20 menstrual weeks (91%) than in those presenting after 20 weeks (67%). These results are consistent with those of other authors [7-9] who have frequently observed subchorionic hematomas in women who experience vaginal bleeding before 20 weeks.

Subchorionic hematomas appear to result from abruptions of the placental margin, a common site of placental detachment that has been frequently recognized in clinical and pathologic studies [4-6]. The marginal detachment itself was observed in 57% of subchorionic hematomas in this study (Fig. 1), a finding that agrees with the 60% of marginal detachments observed by Sauerbrei and Pham [9]. Presumably, hemorrhage produced by a marginal abruption accumulates in a subchorionic location because the placental membranes are more easily stripped from the myometrium than from the more firmly attached placenta. All subchorionic hemmorhages in this study were contiguous with the edge of the placenta, although the predominant hemorrhage was frequently separate from the placenta. In six cases, the hematoma actually accumulated on the myometrial surface opposite the placenta itself (Fig. 4).

Retroploental hematomas (Figs. 2 and 5) were detected in only 16% of abruptions in this study, although they were observed more frequently in women presenting after 20 weeks (29%) than in those presenting before 20 weeks (6%). This difference, although statistically significant \( p < 0.05 \), may simply reflect the difficulty in detecting smaller marginal abruptions later in pregnancy. Alternatively, it may reflect the severity of clinical symptoms in the two patient groups. In one clinical study, marginal abruptions were five times more common than retroploental abruptions in women with mild clinical symptoms, but only twice as common in women with more severe symptoms [5].

Preplacental hematomas are unusual in placental abruptions, seen in two cases (4%) in this series (Fig. 3). Previously described in the pathologic literature as a "subchorial" hemorrhage [15, 16], we have adopted the descriptive term "preplacental" hematoma to indicate its location between the placenta and amniotic fluid and to distinguish it from a subchorionic hematoma. Although the origin and significance of a preplacental hematoma has been debated [15], its association with vaginal bleeding, spontaneous abortion, premature labor, and hypertension [16] leaves little doubt that it represents an unusual site of hemorrhage from placental abruption.

The time at which the sonogram is performed relative to the onset of clinical symptoms significantly affects the appearance of placental abruption, although this point has not been previously emphasized. Acute hemorrhage was hyper-echoic to isoechoic relative to the placenta and gradually became sonoluent in the following 1-2 weeks (Figs. 2 and 4). Acute hemorrhage was particularly difficult to detect on the initial sonogram because its echo texture was similar to that of the adjacent placenta. In five cases, acute retroploental hemorrhage was seen as an abnormally thick and heterogeneous placenta, an observation that has also been noted by others [17]. In these cases, a recent sonogram for comparison (Fig. 5A) or a follow-up sonogram that shows a resolving hematoma can confirm the diagnosis and determine the extent of hemorrhage. Because this study included only patients in whom a hematoma was recognized, many acute hematomas may have been overlooked.

Hematomas may occasionally have a confusing sonographic appearance that may be mistaken for other mass lesions. Spirt et al. [11] previously noted that a resolving hematoma may be confused for a myoma, and in the present study nine placental abruptions were initially misdiagnosed. In each of these cases, a repeat sonogram helped to establish the correct diagnosis by showing a resolving hematoma.

We conclude that placental abruptions result in a wide variety of sonographic findings. In women who present with otherwise unexplained vaginal bleeding and/or premature labor, placental abruption should be strongly suspected and specifically searched for. An awareness of the various sonographic findings that may be seen with placental abruption should improve its sonographic detection.

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REFERENCES