The Chorionic Bump
A First-Trimester Pregnancy Sonographic Finding Associated With a Guarded Prognosis

Robert D. Harris, MD, Corey Couto, MD, Clara Karpovsky, BS, Misty M. Blanchette Porter, MD, Sophia Ouhilal, MD

Objective. We describe a series of patients with a previously unreported sonographic finding, the chorionic "bump," which is an irregular, convex bulge from the chorio-decidual surface into the first-trimester gestational sac. The pregnancy outcome is investigated in this series of patients and compared with the general population and infertility first-trimester control groups. Methods. We prospectively noted a cohort of 15 cases with the chorionic bump on first-trimester sonograms (in a total of 2178 patients) performed over 3 years at our institution (prevalence, 0.7%). We then compared pregnancy outcomes against 2 pregnant control groups (15 general, noninfertility patients and 15 infertility patients) who were maternal age and gestational age matched to our patient group. Results. The difference in outcomes between the patients with bumps and the healthy control subjects was statistically significant (7 live births versus 13 live births; \(P < .03\)), but the difference in outcomes between the patients with bumps and infertility control subjects was not statistically significant (7 live births versus 11 live births; \(P = .1\)). Bump size was not correlated with pregnancy outcome. In most patients with serial sonograms, the bump showed evolutionary changes typical for hematoma. Conclusions. The finding of a chorionic bump on the first-trimester sonogram is associated with a guarded prognosis for the early pregnancy (live birth rate <50%); it probably represents a small hematoma that bulges into the gestational sac, and, in our series, most patients had a history of infertility treatments. Key words: abnormal gestational sac shape; first-trimester sonography; intrauterine hematoma; miscarriage.
Materials and Methods

We prospectively analyzed all first-trimester sonograms obtained between November 2001 and November 2004 (2178 sonograms) at our institution, and found 15 cases that showed the finding that we have called the chorionic bump, defined as a focal, irregular convexity or bulge in the surrounding choriodecidual reaction into the early gestational sac (Figure 1). We also reviewed 2 control groups for this study, obtained through our patient logbook manually, to find control patients within 1 year of maternal age and 0.5 weeks’ gestational age matched to our experimental group: 15 randomly selected patients from the noninfertility, general pregnant population seen in our ultrasound section and 15 patients from our infertility clinic referred for sonography during the same period. None of these patients had any vaginal bleeding or other complications. Institutional Review Board approval was obtained for the study.

Sonography was performed with HDI 5000 machines (Philips Medical Systems, Bothell, WA) with a C8-4 endovaginal probe. The indication for the sonogram was recorded. Gestational age was determined by last menstrual period (LMP), if accurate, or by mean sac diameter or crown-rump length if there were uncertain menstrual dates or discordance between LMP and sonographic dates.

We measured the chorionic bump in 3 dimensions with electronic calipers (either prospectively or on a picture archiving and communications system; IDX-Stentor, Burlington, VT) to obtain its volume (length × width × height/2, formula for approximated prolate ellipse), and recorded its appearance on serial sonograms where available. Color and power Doppler sonography was applied in some cases by the sonographer/sonologist but was minimized because of first-trimester energy deposition concerns.

We also recorded by review of the medical charts any history of infertility therapy (past pregnancy or present), vaginal bleeding, and thrombophilia, maternal smoking history, other findings in the gestational sac (embryo [with or without heartbeat], yolk sac, mean sac diameter, and internal debris/echoes), pregnancy outcome (by chart review or contacting referring physicians), and pathologic report (when available). The Fisher exact test of proportions was used to compare the outcomes between the patients with chorionic bumps and the infertility and healthy control groups, as well as the bump size versus outcomes.

Results

The prevalence of the chorionic bump was 0.7%. The mean age of patients with the chorionic bump was 33.1 years (range, 21–40 years), and the mean gestational age was 6.7 weeks (range, 5.8–9.3 weeks) at the time of sonography (Table 1). The indications for the sonograms were as follows: to evaluate viability in 9 patients; to evaluate gestational dating in 4 patients; to evaluate right lower quadrant pain in 1 patient; and a referral for an abnormal gestational sac mass in 1 patient seen on an outside sonogram. Six patients had vaginal bleeding before sonography, whereas 4 did not. Nine patients had a history of infertility treatment in this or prior pregnancy attempts, and 6 had been treated with infertility drugs or procedures during the gestation of interest. None of our patients had positive screen results for thrombophilia. One patient was a smoker.

The bumps ranged in size from 0.7 × 0.4 × 0.4 to 1.9 × 1.9 × 1.4 cm, with volumes from 0.1 to 2.5 mL. Two patients with bumps had empty gestational sacs (both resulting in miscarriages); 5 patients had only yolk sacs but no embryos in the gestational sacs (resulting in 3 live births and 2

Figure 1. Color Doppler transvaginal image of a moderately sized chorionic bump (arrows), a slightly irregular convexity bulging into the gestational sac, which resulted in a normal pregnancy outcome in a 34-year-old woman (patient 7).
miscarriages); 2 patients had small embryos without a heartbeat (crown-rump lengths of 2 and 6 mm, 1 resulting in miscarriage and 1 in a live birth); and 5 had embryos with a heartbeat of 100 beats per minute or greater (resulting in 4 live births and 1 miscarriage). In the miscarriage after visualization of an embryo with a positive heartbeat, the patient had a 9-mm embryo with a heart rate of 124 beats per minute.

Of the 15 pregnancies with chorionic bump, 7 (47%) had live births, whereas 8 (53%) had nonviable outcomes. One live birth result was monochorionic, diamniotic twins born before term at 33 weeks’ gestation) in a mother with pre-eclampsia. Of the 8 nonviable gestations, 6 were (or became) nonviable in the first trimester, and 2 had fetal demise in the second trimester (at 17 and 18 weeks’ gestation).

The infertility control group had a mean age of 32.7 years (range, 21–40 years) and a mean gestational age of 6.3 weeks (range, 5.3–8.6 weeks) at the time of their sonograms. Of this group, 11 (73%) of 15 had live births; 3 had miscarriages (20% nonviable rate); and 1 had an elective termination.

The healthy control group had a mean age of 32.3 years (range, 21–39 years) and a mean gestational age of 6.4 weeks (range, 4.7–9.3 weeks) at sonography. The pregnancy outcome in the healthy control group was live birth in 13 patients (87%) and miscarriage in 2 patients (13%).

The bump was avascular on color or power Doppler imaging in all cases in which color or power Doppler imaging was used (5 cases) (Figure 1) and hypoechoic centrally in 3 of 15 cases (Figure 2). Swirling of low-level echoes in the bump during real-time sonography was seen.

Figure 2. Normal outcome in a woman (patient 6) with a large hypoechoic bump (arrow). The bump measured 2 × 1.6 × 1.4 cm and was centrally hypoechoic, and the pregnancy resulted in a healthy term fetus; no further sonograms were available for review. Note the normal yolk sac (asterisk).

### Table 1. Patient Characteristics

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age, y</th>
<th>Sonographic Findings, wk</th>
<th>No. of Gestations</th>
<th>MSD, cm</th>
<th>Yolk Sac or Embryo Vol, mL</th>
<th>Vaginal Bleed?</th>
<th>Outcome</th>
<th>Infertility History</th>
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<tr>
<td>1</td>
<td>37</td>
<td>5.8</td>
<td>MC DA twins</td>
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<td>Yolk sac</td>
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<td>Normal term</td>
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<td>6.7</td>
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<td>1.9</td>
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<td>Yes</td>
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<tr>
<td>6</td>
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<td>6.9</td>
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<td>5 mm no HB</td>
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<td>Yes</td>
<td>1st-trimester demise</td>
</tr>
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</table>

HB indicates heartbeat; MC DA, monochorionic diamniotic; MSD, mean sac diameter; and Vol, volume.
in 4 cases. The bump decreased in size over 1 to 4 weeks when serial sonographic examinations were performed (Figure 3) in 3 patients and increased in size in 2 cases, both of which ended in nonviable pregnancy. No fibrin strands were noted during serial scans of any patients. There was no correlation between bump size and outcomes; the mean volume in the good outcomes group was 0.49 mL, versus 0.59 mL in the poor outcomes group ($P > .1$, Fisher exact $t$ test).

**Discussion**

Choriodecidual irregularity in the first-trimester gestational sac, or an unusual or bizarre shape of the early gestational sac, has been well described as a sign of threatened abortion by Nyberg et al among others. Nyberg et al reported a distorted sac shape to have 100% specificity for nonviability. We have, in contradistinction, encountered a focal bulge or bump in the choriodecidual reaction on occasion in our first-trimester population, which, on the basis of our review, has a 2-fold increase in miscarriage rate compared with infertility control patients and a 4-fold increase in miscarriage rate compared with the general population, based on our small series.

Nyberg et al did not specifically define their criteria for distorted sac shape, other than stating that there was a “grossly aberrant shape compared to the more uniformly round or oval shape of normal gestational sacs.” The chorionic bump seems to constitute a less prominent irregularity, being focal, with unclear etiology, and may represent a small hematoma. The few cases in which the pregnancy continued and serial sonograms were available showed that most of the bumps became hypoechoic and smaller over time.

However, this theory of origin is without proof in our series because of the difficulty in obtaining histologic confirmation in most cases and also because of the fact that most first-trimester patients do not undergo histologic evaluation or other imaging apart from serial sonography. One of our infertility patients in the study group, however, had pathologic tissue available for analysis, which showed hypovascular chorionic villi with hydropic changes and fibrous material, as well as some material that was characterized as foreign body material (cellulose) on histologic examination and at crystallography. It seems unlikely that this material, in fact, represents the chorionic bump. We had no other cases with similar material, and we know of no foreign or plant material that was placed inside the uterus for treatment.
during fertility therapy. Conversely, we have recently encountered a similar case of a chorionic bump (T. Dubinsky, MD, oral communication, 2005) at another institution in which magnetic resonance imaging revealed the bump to have a shortened T1, compatible with a hematoma (Figure 4).

The chorionic bump temporal relationship to miscarriage is also unclear. In 10 of our cases, there was never a living embryo seen (Figure 5) to document that the normal early gestational development was occurring, and in the 5 cases with an embryo and a normal early heart rate, 4 patients had normal outcomes, which confirms the good prognostic finding of a normal early heartbeat for viability. Certainly, it could represent an associated sign of miscarriage (similar to a calcified yolk sac) of a nonembryonic gestation or a demised embryo in some cases.

Serial scanning, when available, showed that the irregularity generally decreased during the short interval, except in 2 cases in which the bump continued to increase in size, both of which ended in nonviable outcomes. Although the etiology of the chorionic bump is unknown, it is reasonable to assume that it represents a hematoma or small area of hemorrhage. This theory is supported by 4 sonographic points: the swirling appearance of echoes in the bump (similar to that of a venous lake in the second or third trimester); the lack of vascularity on color Doppler imaging; the serial hypoechoic echo...
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texture in some patients’ sonograms; and the tendency of the bump, in most patients, to become smaller over time. However, there did not seem to be a statistically significant relationship between the presence of a bump and a history of vaginal bleeding.

Most women who have vaginal bleeding during the first trimester and who have sonographic findings of hemorrhage have a subchorionic or an intrauterine hematoma that resides outside of, but closely parallel to, the gestational sac. Previous studies have clearly shown an inverse relationship between hematoma size and pregnancy outcome. Most early pregnancy bleeding appears to be venous and thus occurs at low pressure and tends to conform to the gestational sac shape. Whether the chorionic bump hematoma is more arterial in origin than the common subchorionic hemorrhage is purely conjectural, but this could account for the convexity of shape and the rather poor prognostic implications. Another possible theory is that the developing placenta has a tendency for bleeding to occur in the decidua or cytotrophoblastic shell; hence, any bleeding is crescentic or oval on the outer side of the choriodedidual reaction and mirrors the gestational sac. In the case of the bump, it would seem plausible that the hematoma arises from the developing intervillus space or chorionic plate and bulges into the gestational sac.

Most patients in our small series had a history of infertility treatment, but we cannot assess the relative frequency of infertility treatment in the general population because there is no computerized method of determining the number of sonographic examination per infertility patient because our radiology and hospital information systems are not integrated fully.

Limitations of our study include lack of histologic correlation, absence of correlative imaging, the small number of cases, and the inherently confounding data from using an infertility control group, albeit a useful comparison group. The small number of cases limits the statistical significance somewhat, although there was a significant difference in the pregnancy outcomes between the bump group and healthy control subjects by the Fisher exact t test. The prevalence of the bump may be overestimated in the infertility population because this group tends to be scanned more frequently than the general population during early pregnancy; therefore, the bump may be encountered more often in this group of patients.

In conclusion, the finding of a chorionic bump is a newly described but uncommon sign (0.7%) that is associated with a guarded prognosis for early pregnancy. It may represent a small hematoma that bulges into the gestational sac but could also represent a blighted second pregnancy being resorbed, and it is also seen in some patients undergoing infertility treatment, although this latter group has more frequent sonograms, which may spuriously increase its incidence overall in this group. Whether it is causal to the poor outcome of pregnancy or is a finding occurring after

Figure 5. Transverse (A) and longitudinal (B) endovaginal images of a poor outcome in an infertility patient at 6.2 weeks (patient 15) who had undergone vitro fertilization and who had a large (1.9 \times 1.9 \times 1.4-cm) bump and a 4.6-mm embryo without a heartbeat. This pregnancy resulted in a non-viable gestation.
nonviability remains to be determined, and the finding of an embryonic heartbeat in the presence of this sign is confirmed as a good prognostic sign for the pregnancy (80% [4/5] in our small series).

References