

## Determining the Viability of Early Pregnancies: Two Case Reports

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First-trimester bleeding demands that an expedient diagnosis be made if an ectopic pregnancy is suspected. In addition, rapid determination of a failed pregnancy or blighted ovum is often sought to facilitate quick evacuation of the products of conception. Ultrasonography and quantitative measurement of the  $\beta$ -subunit of human chorionic gonadotropin ( $\beta$ -HCG) have raised the expectation that early determination of fetal viability is possible. These expectations may be unfounded. This report presents two cases in which undue reliance on laboratory interpretations could have led to adverse iatrogenic outcomes.

### Case 1

A 28-year-old woman, gravida 6, para 1, with a history of 3 therapeutic abortions and 1 spontaneous abortion, presented to the office 6 $\frac{5}{7}$  weeks after her last menstrual period. She had a history of occasional irregular periods and was not using contraception. Her examination was unremarkable except for obesity. A qualitative serum  $\beta$ -HCG pregnancy test was positive. Two weeks later the patient reported pain on the left side of her pelvis. The uterus felt soft and enlarged, and the adnexa were normal. A pelvic ultrasonogram showed an echogenic ring in the center of the uterus, consistent with an atypical gestational sac, and a 5-cm cyst on her right ovary. The radiologist reported this as most consistent with a blighted ovum, but concluded that abnormal gestation or early normal gestation was possible. At the time of the test, the patient's  $\beta$ -HCG level was 9100 mIU/mL, and 48 hours later it was 14,300 mIU/mL. The patient remembered some "red discharge" 1 month after her re-

ported last menstrual period. The implications of the slow rise in the  $\beta$ -HCG were discussed, and the patient wished the pregnancy terminated if the physicians believed it was abnormal. Two days later the  $\beta$ -HCG was 17,900. After gynecological consultation, she was tentatively scheduled for a dilation and curettage (D&C).

On further consideration, surgery was postponed. A repeat ultrasound 6 days after the initial one revealed no change: a persistent empty gestational sac without a fetal pole (Figure 1). The evidence pointed to an inevitable abortion; however, the patient's stable condition and the clinician's skepticism about the available information prompted further waiting. Two days later, the  $\beta$ -HCG level was 29,000, and a third ultrasound 13 days after the original one demonstrated a viable intrauterine pregnancy corresponding to a fetal age of 8 weeks. The patient subsequently gave birth to a normal male infant at term.

### Case 2

A 35-year-old woman, with an obstetric history identical to the patient in case 1, was seen 6 $\frac{1}{2}$  weeks after her last menstrual period to confirm a possible pregnancy. She had a history of regular periods and was trying to conceive; therefore, she was not using contraception. The patient began spotting that day. Examination revealed a drop of blood on a closed cervix, a soft fundus, and normal adnexa. Continued spotting and fears arising from a recent miscarriage prompted the patient to request an ultrasound examination. At 7 $\frac{2}{7}$  weeks a pelvic ultrasound examination was obtained. It indicated a gestational sac of 22 mm mean diameter, which corresponded to an age of 7 weeks. No fetal pole was visualized, however, and the possibility of a blighted ovum or an incomplete abortion was raised (Figure 2). One week later the physical examination was unchanged. The patient's  $\beta$ -HCG level that day (8 $\frac{2}{7}$  weeks) was 123,000

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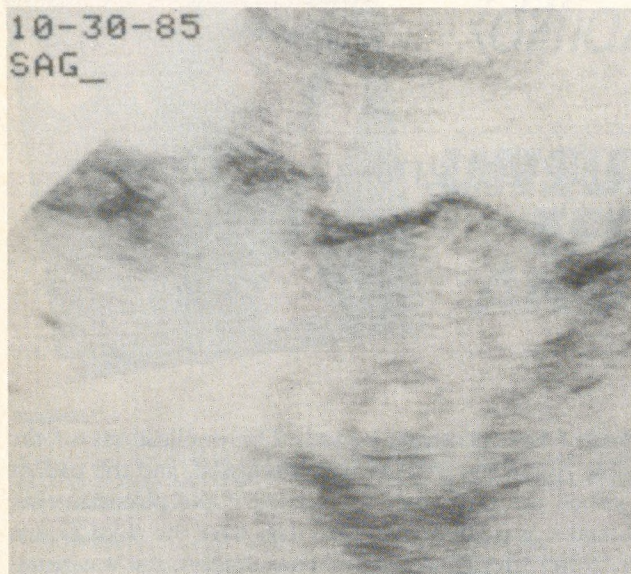


Figure 1. Pelvic ultrasonogram 7 weeks after last menstrual period (case 1). Note the echogenic ring in the uterus without a fetal pole, consistent with a blighted ovum.

mIU/mL; 48 hours later the level was 50,840 mIU/mL. The patient was informed of the significance of the results and advised to repeat the tests in 1 week. The following week the patient's  $\beta$ -HCG level was 710,000 mIU/mL, and a second ultrasound examination 2½ weeks after the initial study demonstrated a viable 9½-week fetus (Figure 3). The patient gave birth to a normal female infant at 42 weeks.



Figure 2. Pelvic ultrasonogram at 7 weeks after last menstrual period (case 2). No fetal pole is visualized.



Figure 3. Pelvic ultrasonogram at 9 weeks after last menstrual period demonstrates a viable 9½-week fetus (case 2).

## Discussion

Ultrasonic demonstration of cardiac activity by 9 weeks is an established test of fetal viability.<sup>1</sup> Earlier confirmation is now frequently possible with vaginal probe ultrasonography. Measurements of  $\beta$ -HCG are most predictive before 6 weeks.<sup>2,3</sup> It is in the 6-to-9-weeks stage, when bleeding often occurs, that prognosis is difficult.

Single samples of  $\beta$ -HCG are not reliable predictors of fetal viability<sup>4,5</sup>; therefore, serial measurements of  $\beta$ -HCG are advocated.<sup>2,6-12</sup> The character of  $\beta$ -HCG levels to rise in normal pregnancy has led to the use of the  $\beta$ -HCG "doubling time" to establish viability. Measured doubling times vary from 1.4 to 5 days and increase with gestational age.<sup>6,7</sup> The need to translate these data into clinical practice has resulted in the establishment of 48 hours as the normal doubling time in early pregnancy.<sup>8,13-15</sup> The use of doubling time is often faulty, however, owing to its relationship to the gestational age, which may be in error.

One difficulty in establishing pregnancy viability early lies in differentiating the blighted ovum ("empty sac") from the similar appearing misdated early gestation. The pelvic ultrasound cannot distinguish between the two before 8 weeks' gestation.<sup>16,17</sup> Therefore, the diagnosis of a blighted ovum requires two or three serial ultrasound examinations. Certain sonographic findings are proposed as measures of nonviability. The only indicator universally agreed upon is that a sac 2.5 mL in size without a fetal pole is the threshold of nonviability.<sup>15-21</sup> The vaginal probe ultrasound, which is now available, offers earlier confirmation of viability. Additional expe-

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rience is necessary to see if it eliminates the uncertainty in identifying a blighted ovum.

The use of both serum  $\beta$ -HCG levels and ultrasonograms helps to eliminate the uncertainty. Between 6 and 9 weeks, the use of  $\beta$ -HCG can be helpful with an inconclusive ultrasonogram and can predict abortion in 95% of cases.<sup>2,3,22</sup> Jouppilla et al<sup>1</sup> reported, however, that the  $\beta$ -HCG level and gestational sac diameter were usually normal between 6 and 9 weeks of gestation, even in pregnancies that later aborted.<sup>1</sup> Nyberg et al<sup>23,24</sup> concluded that when ultrasound findings are uncertain, a disproportionately low  $\beta$ -HCG level is supportive evidence for an abnormal pregnancy, and serial  $\beta$ -HCG levels complement ultrasound predictions.<sup>25,26</sup> These studies point out that normal values do not guarantee future viability, and that abnormal values usually portend a poor outcome, but not with complete certainty.

Widespread recommendations from the family practice and obstetrics literature encourage the use of a simple 48-hour doubling time standard without emphasis on its limitations.<sup>8,13,14</sup> Thus, in case 1, the radiologist's original ultrasonogram interpretation of "most consistent with a blighted ovum," (confirmed 1 week later by a "no change" reading) was "substantiated" by the failure of  $\beta$ -HCG levels to double appropriately. The difficulties encountered in case 2 might have been avoided when the original inconclusive ultrasonogram, again reading possible blighted ovum, was compared with the initial  $\beta$ -HCG level of 120,000 mIU/mL. Instead, the serial imperative was obeyed in search of 48-hour doubling, and a large drop in value (still unexplained) nearly initiated evacuation of the uterus.

Do the current techniques used to establish first trimester viability justify active intervention when fetal demise is suspected? Levels of  $\beta$ -HCG vary widely as previously discussed, and the practitioner cannot forget the human variables intrinsic to a laboratory test: specimen collection, sampling, testing quality, and communicating results. The ultrasonogram's scope and resolution has magnified in the last decade, but is also subject to human skill and experience. The literature and the community experience suggest that the confidence placed in both ultrasonography and serum  $\beta$ -HCG levels may be greater than the accuracy of the tests warrants. The physician can be misled in using test results as absolutes without seriously examining their potential fallibility. Both techniques have proved invaluable for managing patients with suspected ectopic pregnancy. This potentially lethal condition makes their margins of error acceptable. The potential morbidity of awaiting spontaneous miscarriage of nonviable embryos has not been defined, however, nor can it be measured against the consequences of terminating a viable fetus. The cursory

references in the literature to possible complications of a delayed expulsion of a spontaneous abortion (maternal infection, hemorrhage, and anxiety) are not equivalent to the known morbidities of an ectopic pregnancy.<sup>16,27,28</sup>

If the exclusion of a clinically suspected extrauterine pregnancy can be made by sonography or serology, do the other diagnostic possibilities require proof in an urgent manner? The cases presented here suggest that actions to terminate a potentially nonviable pregnancy based on the available laboratory and radiographic data would have led to the unwarranted destruction of two healthy fetuses.

**Key words.** Fetal viability; gonadotropins, chorionic; ultrasonic diagnosis; pregnancy outcome.

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