Diagnosis of Placenta Previa During the Third Trimester: Role of Transperineal Sonography

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Placenta previa can be difficult to diagnose with transabdominal sonography during the third trimester of pregnancy, because of difficulties in imaging the cervix late in pregnancy. Although transperineal sonography offers an additional view of the cervix, its value in the diagnosis of placenta previa has not been studied. Accordingly, we performed transperineal sonography on 164 patients who had had transabdominal scans that had shown placenta previa or had been inconclusive during the third trimester of pregnancy. Transabdominal sonograms had been inconclusive for placenta previa in 157 of these patients because the cervix was not visualized. The remaining seven patients had transabdominal scans that showed placenta previa. Transperineal sonography successfully visualized the internal surface of the cervix in all 164 patients, allowing determination of the presence or absence of placenta previa in all cases. Transperineal sonograms showed absence of placenta previa in 154 patients. At delivery, none of these patients had evidence of placenta previa. Transperineal sonography showed placenta previa in 10 patients. In nine of these patients, placenta previa was confirmed at delivery. The 10th patient did not have clinically significant placenta previa at delivery.

Our study shows that transperineal sonography is a valuable technique to complement transabdominal sonography for detection of placenta previa during the third trimester of pregnancy. Use of transperineal sonography should be strongly considered when a definitive diagnosis regarding placenta previa is not possible by transabdominal sonography because the cervix is not visualized. In such cases, transperineal sonography will usually show the internal surface of the cervix without overlying placental tissue, allowing confident exclusion of placenta previa. Occasionally, however, transperineal sonography will show a placenta previa that was not seen with transabdominal sonography.

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Sonographic evaluation for placenta previa requires direct visualization of both the cervix and the lower edge of the placenta [1–3]. Although this is usually readily accomplished by transabdominal sonography during the second trimester, visualization of these structures becomes more difficult with advancing gestation. In the third trimester, the inferior edge of the posterior, midline placenta may be obscured by fetal parts; similarly, it is often impossible to depict the cervix by transabdominal sonography late in the third trimester [4, 5]. Because of these limitations, alternative techniques are needed to complement transabdominal sonography for the diagnosis of placenta previa. Although endovaginal sonography has been suggested [6–10], a transperineal approach provides another, more convenient means of imaging the cervix and lower uterus without requiring specialized equipment, vaginal penetration, or external fetal manipulation [11–14].

The goal of this study was to investigate the value of using transperineal sonography to complement transabdominal sonography in the diagnosis of placenta previa.
Subjects and Methods

Transabdominal sonography was used prospectively to evaluate 164 women for possible placenta previa. All patients were in their third trimester of pregnancy. The indications for sonography were diverse, and included determination of fetal age and presentation, size-dates discrepancy, placental location, fetal anomalies, adnexal mass, fetal growth, preterm labor, premature rupture of membranes, fetal presentation, vaginal bleeding, and multiple gestations. Patients were included in the study if results of their transabdominal sonography were either inadequate to exclude placenta previa (157 patients) or suggestive of placenta previa (seven patients) and if they subsequently delivered at our institution.

Transabdominal sonography was performed with a 3.5-MHz phased-array sector transducer (Acuson 128, Mountain View, CA) positioned on the lower portion of the abdomen and angled caudally, using the amniotic fluid as an acoustic window. The examination was performed with the mother’s urinary bladder empty so as not to distort the configuration of the cervix or lower uterine segment.

For transperineal sonography, ultrasound gel was placed on the head of the transducer, which was draped with a protective covering (Hefty Baggies, Mobil Chemical Co., Pittsford, NY) secured with a rubber band. A scanning medium of KY Jelly (Johnson & Johnson, New Brunswick, NJ) was applied to the outer surface of the protective covering. The transducer was positioned directly on the perineum in a sagittal orientation, usually over but occasionally between the labia minora, with the center of the transducer typically posterior to the urethra and anterior to the vagina (Fig. 1). When the cervix and lower uterus were visualized on the sonogram, the transducer was slowly angled medially and laterally in order to image the entire internal surface of the cervix. Hard-copy films were obtained for both the transperineal and transabdominal sonograms.

Transabdominal sonograms were considered diagnostic of placenta previa if placental tissue was shown over any part of the cervix while the mother’s urinary bladder was empty, in the absence of cervical or lower uterine contractions. Complete placenta previa was diagnosed if transabdominal sonograms showed placental tissue covering the entire surface of the internal os. Marginal placenta previa was defined as placental tissue covering part of the cervix without encroaching on the internal os, and partial placenta previa was defined as placental tissue covering a portion of the internal os without covering the entire os, but these two grades of placenta previa were grouped together for data analysis as they are frequently difficult to distinguish from each other by sonography. The transabdominal sonogram was considered inadequate to exclude placenta previa if the inferior margin of the placenta could not be imaged in its entirety or the cervix could not be visualized.

Placenta previa was diagnosed when transperineal sonograms showed placental tissue completely covering the internal os of the cervix (complete placenta previa) or overlying a portion of the cervix without completely covering the internal os (marginal or partial placenta previa). Placenta previa was excluded if transperineal sonograms showed at least one of the following: (1) direct transperineal visualization of both the lower edge of the placenta and the cervix, with the lower edge of the placenta seen separate from the cervix, (2) amniotic fluid between the presenting part and cervix without interposed placental tissue, or (3) the presenting part immediately overlying the cervix without space for intervening placental tissue. In patients with multiple transperineal sonograms, the examination that included the transperineal/transabdominal combination performed closest to delivery was the one used for analysis.

Medical records were reviewed to determine the presence or absence of placenta previa at delivery. Placenta previa was confirmed at delivery when placental tissue was visualized overlying the cervix during cesarean section or cesarean hysterectomy. Absence of clinically significant placenta previa at delivery was confirmed if no placental tissue was seen overlying the cervix at cesarean section or if successful vaginal delivery was accomplished without abnormal vaginal bleeding attributable to placenta previa.

Results

Transperineal sonography successfully depicted the internal surface of the cervix in all 164 patients in the study, allowing determination of the presence or absence of overlying placental tissue in all cases. The transperineal sonograms excluded placenta previa in 154 patients and showed placenta previa in the remaining 10.

Of the 154 patients in whom transperineal sonograms excluded placenta previa, the absence of previa was based on (1) visualization of the presenting part of the fetus immediately overlying the cervix without space for intervening placental tissue in 90 patients (58%, Fig. 2A), (2) visualization of amniotic fluid between the presenting part and the cervix without interposed placental tissue in 60 patients (39%, Fig. 2B), and (3) direct transperineal visualization of the lower edge of the placenta, separate from the cervix, in four patients (3%, Fig. 2C). Transabdominal sonograms were inconclusive for placenta previa in all 154 patients with transperineal sonograms that excluded placenta previa, because the cervix was obscured by the presenting part of the fetus. Delivery records confirmed that all 154 patients with transperineal sonograms excluding placenta previa had no evidence of placenta previa at the time of delivery.

Five of the 10 patients in whom transperineal sonography showed placenta previa had a complete placenta previa (Fig. 3), and five had a marginal or partial placenta previa. Of the 10 patients with transperineal sonograms that showed placenta previa, seven had transabdominal sonograms that showed placenta previa. For these seven, the sonographic appearance of placenta previa was similar, although the cervix
and placenta were depicted in different orientations by the two approaches (Fig. 4A–4E). In the other three patients with transabdominal sonograms showing placenta previa, the transabdominal sonogram was inconclusive for placenta previa because overlying fetal parts obscured the cervix and the lower uterine segment. Cesarean section (n = 7) or cesarean hysterectomy (n = 2) was performed in nine of 10 patients with transabdominal sonograms showing placenta previa, confirming the diagnosis in all nine. One result was false-positive, in a patient with an inconclusive transabdominal sonogram and a marginal placenta previa shown by transperineal sonography at 30 weeks’ gestation who had an uncomplicated vaginal delivery at term.

During cesarean section, one of the patients with a marginal placenta previa diagnosed on the basis of both transabdominal and transabdominal sonography also had a succenturiate lobe of the placenta with vasa previa. Both transabdominal and transperineal sonograms had revealed a membrane over the cervical os, but only the transabdominal study showed the succenturiate lobe. Color Doppler sonography was not done in this case.

Six patients had more than one transperineal sonogram obtained in the third trimester. Interpretations of the sonograms for the presence or absence of placenta previa were the same in all but one of these patients. In this case, a transperineal sonogram at 28.8 weeks’ gestation showed a marginal placenta previa, but follow-up at 32.9 weeks’ gestation revealed no placenta previa, and the patient had an uncomplicated vaginal delivery at term.

No complications were attributable to transperineal sonography, and the procedure was uniformly accepted by patients.

**Discussion**

Although sonography is considered the imaging procedure of choice in evaluating patients for placenta previa, there are several sources of potential errors in making a sonographic diagnosis. Sources of false-positive results include distortion of the lower uterine segment by a cervical or uterine contraction or an overdistended urinary bladder and the presence of a subchorionic hematoma overlying the cervix that simulates placental tissue [1, 3, 4, 15]. To avoid false-negative interpretations, one must visualize both the lower edge of the placenta and the cervix. Although visualization of the lower edge of the placenta at a point above the region of the cervix usually correlates with absence of placenta previa, the cervix itself must be directly visualized to exclude completely the possibility of an accessory lobe overlying the cervix. Moreover, although transabdominal sonography frequently localizes a segment of the inferior edge of the placenta cephalad to the

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**Fig. 2.**—Transperineal sonograms show absence of placenta previa. 
*A,* Sonogram shows head (H) of fetus directly abutting internal surface of cervix (arrowheads) without space for interposed placental tissue, thereby excluding placenta previa. B = maternal bladder, arrows = cervix. 
*B,* Sonogram excludes placenta previa by showing amniotic fluid (F) between head of fetus (H) and cervix (C), without interposed placental tissue. 
*C,* Sonogram shows inferior edge of placenta (curved arrow) separate from cervix (straight arrows), thereby excluding placenta previa. B = maternal bladder, F = amniotic fluid, P = placenta.

**Fig. 3.**—Transperineal sonogram shows placental tissue (P) covering entire internal os (open arrow), consistent with complete placenta previa. F = amniotic fluid, C = cervix.
Fig. 4.—Posterior, marginal placenta previa. 
A, Schematic diagram of transabdominal scanning plane depicts cervix (C) in an approximately vertical orientation with placental tissue (P) in a more horizontal plane. 
B, Schematic diagram of transperineal scanning plane. 
C, Transperineal scanning plane as displayed on monitor. Before display, transperineal scanning plane (left) is rotated approximately 90° to conform to convention of displaying portion of sonogram nearest transducer at top of image. Rotated image (right) reveals cervix (C) in a horizontal orientation and placental tissue (P) in a vertical plane. 
D, Transabdominal sonogram shows placental tissue (P) covering a portion of cervix (C) without encroaching on internal os (open arrow), consistent with marginal placenta previa. As in A, cervix is depicted in a vertical orientation and placental tissue is shown in a horizontal plane. 
E, Transperineal sonogram shows placental tissue (P) covering a portion of cervix. Note that as illustrated in C, cervix (C) is depicted in a horizontal orientation, with placental tissue in a vertical plane.

region of the cervix, other portions of the inferior placental edge may be obscured by fetal parts.

Although transabdominal sonography is usually successful in depicting the cervix during the first and second trimesters of pregnancy, visualization becomes progressively more difficult during the third trimester. Thus, an alternative technique is needed to complement transabdominal sonography during the third trimester. To this end, techniques have been devel-
oped to elevate the presenting part of the fetus from the pelvis, but these can be uncomfortable for the patient and are often unsuccessful late in the third trimester [2, 16]. Another approach has been to use endovaginal sonography [6–10]. Initial studies using endovaginal sonography have been promising, but the endovaginal probe must be inserted cautiously while directly visualizing the cervix, and further adjustments in the position of the probe also must be made with caution to minimize the possibility of inducing bleeding in the patient with possible placenta previa. Alternatively, transperineal sonography is a more convenient and possibly safer means of imaging the cervix and lower uterus because vaginal penetration is avoided, virtually eliminating the potential for inducing bleeding that is associated with endovaginal sonography.

Transperineal sonography has been used in other clinical situations, such as in imaging the cervix, evaluating vaginal atresia, or imaging the presenting part of the fetus [11–14, 17–20]. However, we are not aware of prior studies of the value of this technique in the evaluation of placenta previa. Although the presence of rectal gas obscuring the region of the external os is a potential difficulty with transperineal sonography, [12, 13], this does not pose a significant problem when evaluating patients for placenta previa because it is the internal surface of the cervix that is important when imaging to look for overlying placental tissue.

In the current study, the greatest value of transperineal sonography was in helping to exclude placenta previa in patients in whom the cervix was not seen on transabdominal sonography. Most patients with placenta previa shown by transperineal sonography also had it shown by transabdominal sonography. This may be attributed to placental tissue in the lower uterus elevating the presenting fetal part sufficiently to allow transabdominal visualization of the cervix during the latter stages of gestation, when this might not otherwise be possible. However, in a significant minority of patients with placenta previa, transperineal sonography was the only method that detected placental tissue overlying the cervix during the third trimester.

The relative lack of false-positive results in this study as compared with prior reports [1, 4, 15, 21] can be attributed to a number of factors. In this study, all images were obtained with the patient’s urinary bladder empty, and only third-trimester patients were evaluated. The majority of false-positive results in prior studies tended to occur earlier in pregnancy when lower uterine contractions are more problematic and changes that occur in the cervix near term (“ripening”) [22] have not yet taken place.

Accurate interpretation of transperineal sonograms requires the same precautions as in the evaluation of transabdominal sonograms. Sonograms should not be considered to show placenta previa unless the mother’s urinary bladder is empty. Images must be obtained in the absence of lower uterine contractions, because a contraction may temporarily pull placental tissue into the lower uterine segment [3]. An echogenic subchorionic hematoma overlying the cervix can simulate placental tissue. Finally, the entire internal surface of the cervix must be scanned to avoid overlooking a marginal placenta previa positioned lateral to scans through the midportion of the cervix.

Our results show that transperineal sonography is a valuable procedure to complement transabdominal studies. Transperineal sonography should not replace transabdominal sonography in the evaluation of placenta previa. Sonography in these cases requires visualization of both the inferior edge of the placenta and the cervix. The cervix is almost always seen on transperineal sonograms, but the lower edge of the placenta is usually beyond the field of view. In such cases, transabdominal sonograms facilitate visualization of the lower edge of the placenta.

REFERENCES

3. Artis AA, Bowie JD, Rosenberg ER, Rauch RF. The falcity of placental migration: effect of sonographic techniques. AJR 1985;144:79–81