

Transvaginal versus Transperineal Ultrasound Examination in Diagnosis of Placenta Previa in Late Pregnancy

Amany Mahrous Seleem Esawy

Obstetrics & Gynecology Specialist, Al-Ahrar Teaching Hospital, Zagazig, Alsharqia, Egypt

*Corresponding author: Amany Mahrous Seleem Esawy, Mobile: (+20) 01111614270, E-Mail: amanyyswy10@gmail.com

ABSTRACT

Background: A low placenta may now be located with absolute accuracy using transvaginal scanning. The procedure known as transperineal sonography (TPS) is quick, easy, safe, and gives the patient very little pain. The objective of the current study is the determination of the accuracy of transperineal ultrasound versus transvaginal ultrasound (TVS) in the diagnosis of placenta previa in late pregnancy.

Patients and methods: In a prospective comparative study at Ain Shams University Maternity Hospital at Ultrasound Special Care Unit for the fetus using Medison sonoace R5 ultrasound 67 cases suspected to have placenta previa by trans-abdominal US were enrolled. Comparison between transperineal versus transvaginal US for having placenta previa diagnosis was judged by intraoperative visualization.

Results: There was significant moderate agreement between intraoperative observation (golden test) and both transperineal ultrasound and transvaginal ultrasound. The diagnostic accuracy was 92.5% (95%CI: 90.4-93.1) for transperineal versus 97% (95%CI: 96.1-97.3) for the transvaginal. Mean "Verbal Descriptor Scale" assessment was significantly higher in transvaginal than in transperineal US (3.3±0.4 versus 1.3±0.4 respectively, p value <0.001).

Conclusion: TPS and TVS are also useful methods that can be used in addition to transabdominal sonography to diagnose placenta previa. However, TPS proved to be superior than TVS due to reduced discomfort, the lack of specialist equipment, and the avoidance of vaginal penetration, particularly in situations where there is a danger of infection.

Keywords: Transvaginal Ultrasound, Transperineal Ultrasound, Transabdominal Ultrasound, Placenta Previa.

INTRODUCTION

The condition known as placenta previa occurs when the placenta is entirely or partially implanted into the lower section of the uterus. Ultrasonic imaging is classed according to what is significant clinically: When the leading edge of the placenta does not cover the internal cervical os, it is known as mild or partial previa. When the placenta covers the internal cervical os, it is known as placenta previa major⁽¹⁾.

Placenta previa occurs 0.5-2 percent of the time at term. Placenta previa is significantly more common earlier in pregnancy, but most occurrences of it resolve, especially if they are discovered in the first or second trimester⁽¹⁾.

A prior caesarean delivery, spontaneous abortion, or artificial inseminations all significantly increase the risk of developing placenta previa. With more past caesarean deliveries, the danger rises. Pregnant women having a history of an abortion or caesarean delivery should be treated as high-risk cases for placenta previa and closely monitored⁽²⁾.

Accurate placenta previa diagnosis lowers maternal and fetal morbidity and death. Diagnostic error has been significantly decreased because to sonography and placenta previa detection accuracy has risen. To identify a placenta previa, sonography is utilized transabdominally, transvaginally, and transperineally⁽³⁾.

Despite being a straightforward and secure procedure for locating the placenta, transabdominal sonography (TAS) has a high rate of false positives and false negatives⁽³⁾.

The procedure known as transperineal sonography (TPS) is painless for the patient and is straightforward,

quick, safe, and well-accepted. Along with being a beneficial therapy to support transabdominal sonography (TAS) for evaluating of suspected placenta previa cases, Although it can't totally replace transabdominal sonography, transperineal sonography can assist weed out false positives and determine the delivery route and should be used regularly when transabdominal sonography's placenta visualization is poor^(4, 5). When transabdominal sonography's placenta viewing is insufficient, it should be regularly employed even if it cannot totally replace it⁽⁵⁾.

The purpose of this study was to compare transvaginal and transperineal ultrasounds for the identification of placenta previa in late pregnancy.

PATIENTS AND METHODS

Study design and setting:

A total of 67 patients were recruited for this prospective comparative study from Ain Shams University Maternity Hospital from the causality and the antenatal care clinic with suspected placenta previa (major or minor) during the third trimester which were diagnosed by 3rd trimester abdominal ultrasound.

Inclusion criteria:

1. Gestational age >20 weeks.
2. Absence of labor pains.
3. Absence of active vaginal bleeding.
4. Vital data are stable.

Exclusion criteria:

1. Gestational age less than 20 weeks.
2. Presence of labor pains.

3. Presence of active vaginal bleeding.
4. Unstable vital data.
5. Rupture of membranes.

Intervention:

After taking informed oral consent, the recruited patients were subjected to the following:

1. History taking to elicit the risk factors for placenta previa as age, parity, previous uterine scar, previous placenta previa, maternal morbidities as diabetes mellitus (DM), hypertension and smoking.
2. Accurate estimation of gestational age either by taking history of first day of last menstrual period (considering that the patient used to have regular cycles, sure of dates and not using oral contraceptive pills for the last 3 months) and /or ultrasound examination for determination of gestational age.
3. General examination to confirm stability of the patient's vital data.
4. Abdominal examination: fundal level, previous abdominal scars, single or multiple intrauterine pregnancy, fetal lie and presentation, fetal heart sounds.
5. **Ultrasound examination:** The patients who were assumed having placenta previa (A distance of more than 2 cm from the os disqualifies previa as a diagnosis) by late pregnancy abdominal ultrasound done at Ultrasound Special Care Unit at Ain Shams University Maternity Hospital were subjected to both transvaginal ultrasound and transperineal ultrasound by two different well trained sonographers and each sonographer was blind to the other sonographer's ultrasound report, then confirmation of placental site was done intraoperatively during cesarean section.

A. Transvaginal ultrasound

Transvaginal ultrasound was done in a setting different from the transperineal sitting by Medison sonoace R5 ultrasound machine with 7.9 MHz transvaginal probe for transvaginal scanning.

The patient was assessed with an empty bladder while reclining. The transducer was cautiously inserted into the vagina up to a short distance from the cervix while being closely monitored by the image. There was no cervical touch at all.

The first sagittal scan was performed on each patient, which comprised the whole length of the cervix and the lower portion of the uterus.

If the lower placental boundary could not be detected in this plane, the transducer was next rotated 90 degrees (in each direction) to check if placental tissue was present in any of the four quadrants of the lower uterine cavity. The transducer needs to be changed such that the internal cervical os could be seen continuously while rotating (6).

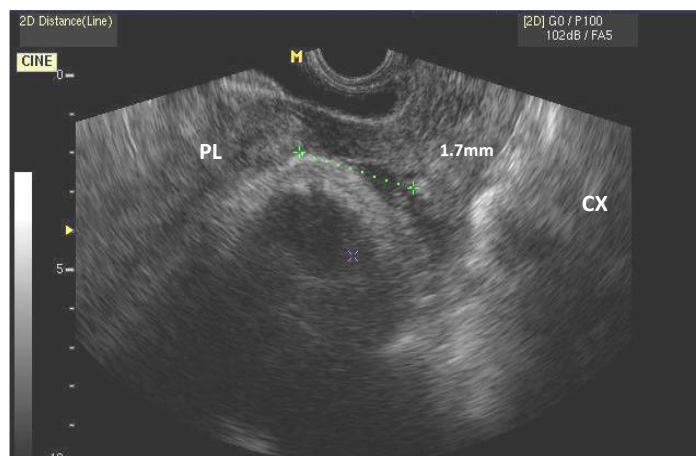


Figure (1): Transvaginal ultrasound that depicts the distance between the internal cervical os and the bottom margin of the placenta.

B. Transperineal scanning

The head of the similar abdominal transducer has ultrasound gel on it. The protective covering had an ultrasonic gel-coated surface on the opposite side, and it was secured to the transducer head with a rubber band. The patient was examined with her legs sufficiently stretched to accommodate the positioning and lateral angulation of the transducer, her bladder empty, and her in a supine position. The transducer was placed in a sagittal orientation directly over the perineum, typically over the labia minora but seldom between them. The transducer's core was placed in front of the vagina and behind the urethra. The transducer was gently adjusted medially and laterally to photograph the whole internal surface of the cervix once the cervix and lower uterine segment were visible (6).

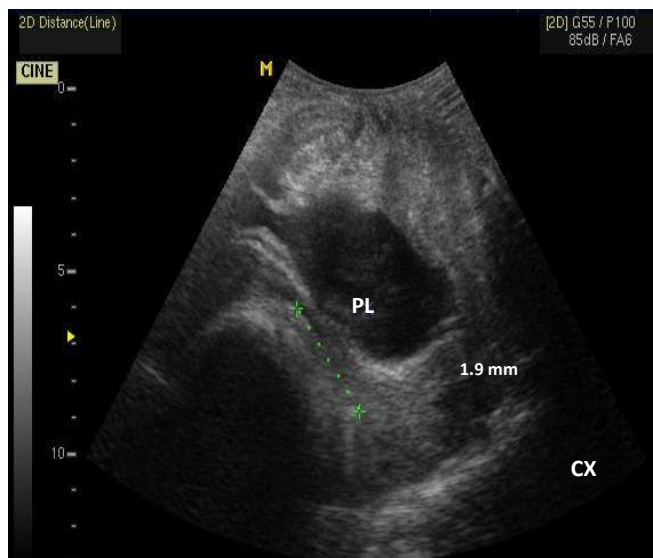


Figure (2): Same previous case done by transperineal ultrasound that shows the distance between the internal cervical os and the placental lower edge

Criteria for excluding the diagnosis of placenta previa are the same for transperineal and transvaginal ultrasound and these are visualization of: (1) Amniotic

fluid lacking placental tissue in between the presenting portion and the cervix. (2) The placenta's bottom border may be observed to be distinct from the cervix. (3) The presenting portion instantly covers the cervix and there is no room for placental tissue to grow in between.

This is based on the same differences between trans-abdominal and transperineal sonography and this according to **Rani et al.** (7).

The ultrasound scans were repeated at least 2 weeks before delivery to exclude placental migration for the patients with conservative management.

Patients were subjected to pain and discomfort assessment that may experience during the ultrasound scan and this will be done using “Verbal Descriptor Scale”.

The Verbal Descriptor Scale (VDS) is a collection of words and phrases that describe various degrees of pain severity or intensity. Patients decide which word or phrase best captures how they are feeling right now. Due to the necessity for patients to comprehend and answer to the scale in verbal terms, this device is best used with more articulate patients. According to **Herr et al.** (8,9), for measuring pain severity in older persons, including those with mild to severe cognitive impairment, the VDS is the preferred scale.

No pain is responded to with a value of 0, whereas the most excruciating agony possible is responded to with a value of 6.

Detection and recording of placental localization at time of delivery to compare it with the results obtained from both groups.

Ethical consent:

This study was ethically approved by the Institutional Review Board of the Faculty of Medicine, Zagazig University. Every patient signed an informed written consent for acceptance of participation in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 20 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi square test (χ^2) and Fisher's exact test to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean and standard deviation (SD).

Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data). P value ≤ 0.05 was considered significant.

RESULTS

Table 1 summarizes the basic characteristics of the participant women in the current study.

Table (1): Basic charactersitics of the studied patients.

Basic Characteristics		Mean \pm SD	Range
Age (years)		33.7 \pm 2.9	27–41
BMI (kg/m ²)		30.7 \pm 1.6	27.1–33.6
GA (weeks)		36.9 \pm 0.6	35–38
Variable		N	%
Parity	Primiparous	17	25.4
	Multiparous	50	74.6
Last delivery (N=50)	Cesarean section	18	36
	Normal vaginal delivery	32	64

Table 2 shows that verbal descriptor scale assessment was significantly higher in transvaginal than in transperineal US.

Table (2): Verbal descriptor scale by transperineal and transvaginal US.

Distance (mm)	Mean \pm SD	Range
Transperineal	1.3 \pm 0.4	1 – 2
Transvaginal	3.3 \pm 0.4	3 – 4
Difference (vaginal– Perineal)	2 \pm 0	2 – 2
\wedge P	<0.001*	

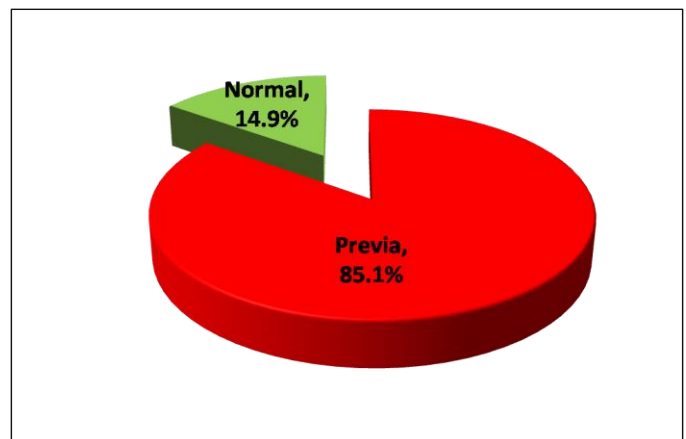


Figure (3): Diagnosis of placenta previa by intraoperative observation.

Figure 3 shows that more than four-fifth of the suspected cases by transabdominal US were actual placenta previa.

Table (3): Agreement between intraoperative observation (golden test) and transperineal US.

Trans-perineal	Intraoperative observation		Kappa	
	Previa	Normal	Value	P
Previa	55 (82.1%) **	3 (4.5) ***	0.694	<0.001*
Normal	2 (3%) ****	7 (10.4%) *****		

* Significant, **: True positive, ***: False positive, **** False negative, *****: True negative

There was significant moderate agreement between intraoperative observation (golden test) and transperineal US.

Table (4): Agreement between intraoperative observation (golden test) and transvaginal US.

Trans-vaginal	Intraoperative observation		Kappa	
	Previa	Normal	Value	P
Previa	56 (83.6%) **	1 (1.5) ***	0.882	<0.001*
Normal	1 (1.5%) ****	9 (13.4%) *****		

* Significant, **: True positive, **: False positive, *** False negative, *****: True negative

There was significant high agreement between intra-operative observation (golden test) and transvaginal US.

Table (5): Agreement between tansperineal and transvaginal US.

Trans-vaginal	Transperineal		Kappa	
	Previa	Normal	Value	P
Previa	56 (83.6%)	1 (1.5%)	0.816	<0.001 *
Normal	2 (2.0%)	8 (11.9%)		

There was significant high agreement between transvaginal and transperineal US.

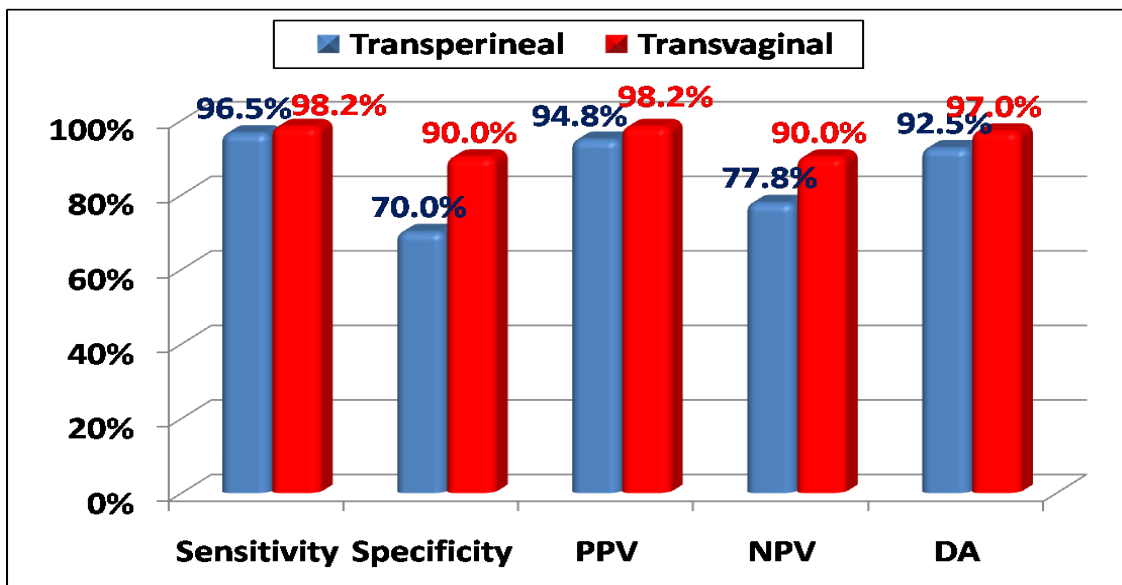


Figure (4): Diagnostic characteristics of transperineal and transvaginal US in diagnosis of placenta previa (intraoperative observation was a golden test).

Figure 4 shows that more than four fifth of the suspected cases by transabdominal US were actual placenta previa. Table 6 shows that transperineal and transvaginal verbal descriptor scale assessment were significantly higher among primiparous than among multiparous. Regarding the transperineal and transvaginal distance from the bottom border of the placenta to the internal cervical os, there is no discernible difference between primiparous and multiparous women.

Table (6): Comparison between primiparous and multiparous regarding verbal descriptor scale and distance from the lower edge of the placenta to the internal cervical os.

Variables		Primiparous (N=17)	Multiparous (N=50)	^P
Verbal descriptor scale	Transperineal	1.9 ± 0.32	1.1 ± 0.21	<0.001*
	transvaginal	3.8 ± 0.4	3.1 ± 0.3	<0.001*
Distance	Transperineal	12.4 ± 2.7	13.2 ± 3.1	0.582
	transvaginal	12.4 ± 2.4	13.1 ± 2.9	0.627

^Independent t-test, *Significant

Table 7 shows that patients with prior CS exhibited non-significantly higher transperineal and transvaginal ultrasonography verbal descriptor scores than patients with prior normal vaginal deliveries. Regarding the distance between the bottom border of the placenta and the internal cervical os, there was no discernible difference between patients who had previous CS and those who had previously given birth normally by vagina.

Table (7): Comparison between patients who had previous CS and patients who had normal vaginal delivery regarding verbal descriptor scale and from the lower edge of the placenta to the internal cervical os.

Variables		CS (N=20)	NVD (N=30)	^P
VDS	Transperineal	1.2 ± 0.23	1.0 ± 0.0	0.200
	Transvaginal	3.2 ± 0.4	3.0 ± 0.0	0.200
Distance	Transperineal	12.5 ± 2.8	13.7 ± 2.9	0.447
	Transvaginal	12.5 ± 2.7	13.5 ± 2.8	0.513

^Independent t-test, *Significant

DISCUSSION

Accurate identification of placenta previa reduces morbidity and death in both the mother and the fetus. Diagnostic error has been significantly decreased because to sonography and placenta previa detection accuracy has risen. To identify a placenta previa, sonography is utilized transabdominally, transvaginally, and transperineally (7).

In this study, 67 cases suspected to have placenta previa by transabdominal ultrasound were enrolled in this analysis, the comparison between transperineal versus transvaginal ultrasound for having placenta previa diagnosis judged by Intraoperative visualization (placenta previa golden test).

In the present study, when we compared the diagnostic accuracy of the two techniques we found no significant difference between the two groups. There was also significant moderate agreement between intraoperative observation (golden test) and both transperineal ultrasound and transvaginal ultrasound.

The diagnostic accuracy was 92.5% (95%CI: 90.4–93.1) for tranperineal versus 97% (95%: 96.1–97.3) for the transvaginal with (sensitivity 96.5%, 98.2%, specificity 70.0%, 90.0% respectively) Positive predictive value 94.8%, 98.2%, negative predictive value 77.8%, 90.0%.

In our study, 67 patients with suspected placenta previa by transabdominal ultrasound, 57 patients with confirmed placenta previa by transvaginal ultrasound, and 10 patients with exclusion. While transperineal ultrasonography identified placenta previa in 58 cases and eliminated it in 9 patients, there were 1 false negative case and 1 false positive case. In the intraoperative observation, placenta previa were identified in 57 patients and excluded in 10 patients. There were 2 false negative instances and 3 false positive cases, and there was a considerable high agreement between transvaginal and transperineal ultrasonography.

The precision of placental localization has historically been the primary subject of several articles. According to a research by **Farine et al.** (10), transvaginal sonography reliably verified the delivery diagnosis with the fewest false positives and false negatives at 30 weeks of pregnancy. However, due to the risk of bleeding and discomfort for the patient, this treatment has not grown more popular.

TVS performs better for the diagnosis of placenta previa than abdominal sonography, according to recent randomized trials and prospective comparative studies

(11,12,13). Transabdominal ultrasonography is used as the initial examination; if placenta previa is detected or the results are unclear, TVS should be used to more accurately determine placental position (14). The relationship between the internal cervical os and the border of the placenta is frequently more clearly seen on TVS than it is on transabdominal ultrasonography. In one study of 100 suspected instances, the TVS had sensitivity, specificity, positive and negative predictive values of 87.5, 98.8, 93.3, and 97.6%, respectively, for the diagnosis of placenta previa (15).

An alternate method that produces great views of the cervix and placenta is transperineal ultrasound imaging. In an early investigation, **Dawson et al.** (16) measured the distance between the placenta and internal cervical os in 40 women who had suspected placenta previa and came to this result. Diagnoses made using sonography were compared to the placental position discovered upon delivery. Both placenta previa diagnosis and exclusion using transabdominal ultrasonography were inferior to transperineal ultrasonography. Measurement of the os-placenta distance can be used in conjunction with a clinical examination to assess the likelihood of a safe vaginal delivery in cases with suspected placenta previa.

While in their 75 suspected cases of placenta previa, **Rani et al.** (7) found that comparatively to 96.6% of TPS instances, 98.7% of TAS cases showed the inferior edge of the placenta. In patients with TAS, 98.7% could view the internal cervical os, while in those with TPS, 100% could. 74 deliveries had placenta previa verified, with one false positive in TPS and six false positives in TAS. When diagnosing placenta previa using TAS as opposed to TPS, the positive predictive value (PPV) was 92 percent vs 98.6 percent. TPS detects placenta previa with a 98.7% accuracy rate. Even while TAS and TPS both agreed on the diagnosis of major degree placenta previa, PPV in the diagnosis of small degree placenta previa was less 86.36 percent with TAS.

Adeyomoye and colleagues (17) contrasted the use of TPS and TAS to diagnose placenta previa. TPS's overall sensitivity, specificity, and accuracy for TAS were 99.2%, 100%, and 99.34%, respectively (95.1, 99.9 and 97.7%). **Mowafi and Hegazi** (18), in their investigation, TPS was found to be superior than TAS in the localization of the placenta, with 98.5%, 97.5%, 94.8%, 99.1%, and 97.75% accuracy, respectively.

In our study, mean Verbal Descriptor Scale assessment was significantly higher in transvaginal ultrasound examination than in transperineal ultrasound

examination (3.3±0.4 versus 1.3±0.4 respectively, p value <0.001). Furthermore, the Verbal descriptor scale assessment of transperineal and transvaginal ultrasound techniques was significantly higher among primiparous than among multiparous.

Also, the Verbal descriptor scale assessment of transperineal and transvaginal ultrasound techniques was non-significantly higher among the patients who had previous CS than among those who had only normal vaginal delivery. Up to our knowledge no previous trials comparing TPS/TVS us objectively assessed the pain scores in both techniques in diagnosis of placenta previa, though in the literature they were compared in cervical length measurement.

In their study, **Cicero et al.** ⁽¹⁹⁾ An evaluation form for the transperineal and transvaginal scans was given to 70 ladies who underwent examinations one after the other. They were instructed to note the level of discomfort (none, slight discomfort, discomfort, or very discomfort), embarrassment (not at all, slight embarrassment, or very embarrassment), and pain (reported on a linear scale measuring 10 cm, with zero representing no pain and 10 representing extremely severe pain) brought on by the two types of scans. Patients tolerated TPS of the cervix better than TVS in **Cicero et al.** ⁽¹⁹⁾ investigation. In other study, **Meijer-Hoogveen et al.** ⁽²⁰⁾ Patients found digital cervix examination to be much more uncomfortable than TVS in the third trimester, while TPS was more unpleasant than that. This might be as a result of the sonographers in the study that was mentioned. **Cicero et al.** ⁽¹⁹⁾ were more adept at TPS, which may have led to less pressure being used to the ultrasound probe during the transperineal examination. Additionally, it should be emphasized that digital cervix exams were occasionally carried out during labor in the **Meijer-Hoogveen et al.** ⁽²⁰⁾ research, which may help to explain why certain patients tolerated digital examinations differently from those who underwent prelabor ultrasounds. Additionally, particularly during the preterm period, transvaginal vs transperineal pictures of the cervix provided sonographers with greater satisfaction. Their levels of pleasure were similar in the third trimester.

In conclusion, TPS and TVS are also useful methods that can be used in addition to TAS to diagnose placenta previa. TPS, however, proved to be superior than TVS since it causes less discomfort, requires no specialist equipment, and avoids vaginal entry, particularly in situations when there is a danger of infection, such as when the fetal membranes prematurely burst. TPS is a beneficial method for assessing this high-risk population of patients with PP with a greater patient acceptance since it is a safe, quick, and accurate procedure with low patient discomfort, albeit more research is required to corroborate our findings.

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