COMPARISON BETWEEN THE ROLE OF TRANSABDOMINAL ULTRASOUND VERSUS TRANSVAGINAL ULTRASOUND IN EVALUATION OF PLACENTAL INVASION IN CASES OF PLACENTA PREVIA ANTERIOR WALL WITH PREVIOUS UTERINE SCAR

By

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ABSTRACT

Background: Accurate antenatal diagnosis of an abnormally invasive placenta (AIP), allowing multidisciplinary management at the time of delivery, has been shown to improve maternal and fetal outcomes. Placenta previa and previous cesarean section are the two most important known risk factors for AIP.

Objective: Comparison between the role of transabdominal ultrasound (TAS) versus transvaginal ultrasound (TVS) in evaluation of placental invasion in cases of placenta previa anterior wall with previous uterine scar applying the unified ultrasonography descriptors suggested by the European working group on abnormally invasive placenta "EW-AIP".

Patients and Methods: Fifty pregnant women with persistent placenta previa (after 28 weeks’ gestation) were prospectively enrolled into this study. Both transabdominal and transvaginal ultrasound were performed by two different operators who were blinded to the results of each other. The placenta was studied regarding the exact localization and the unified descriptors were applied and evaluated by TAS and TVS. The ultrasound findings were analyzed with reference to the final diagnosis made during cesarean delivery and histopathological examination.

Results: Abnormally invasive placenta and its variants were found in 43 patients at the time of cesarean delivery, and were later confirmed by histopathological evaluation. As regards Grey-scale criteria; the accuracy of detection of the loss of the retro placental clear zone was 76% by TVS and 54% by TAS, while that of the abnormal placental lacunae was 92% by TVS and 88% by TAS. Myometrial Thinning detection accuracy was 66% by TVS and 72% by TAS, and Doppler assessment showed that the accuracy of detection of the uterovesical hyper vascularity was 84% by TVS and 88% by TAS. The detection of bridging vessels was 76% by TVS and 75% by TAS. The overall accuracy of detection of TAS was 91%, whereas that of TVS was about 97.1%.

Conclusion: Both transabdominal and transvaginal ultrasound were complementary to each other with an upper hand to transvaginal ultrasound, with the safety of TVS being confirmed. The unified descriptors were found to be reliable in accurate diagnosis.

Key words: Transabdominal, transvaginal ultrasound, placental invasion, Previa anterior wall, uterine Scar.
INTRODUCTION

Placental attachment disorder (PAD) or morbidly adherent placenta (MAP) or the most recent synonym abnormally invasive placenta (AIP) encompasses a spectrum of conditions characterized by abnormal adherence of the placenta to the implantation site, with three variants classified according to their degree of trophoblastic invasion through the myometrium and the uterine serosa: placenta accreta, increta and percreta (Jauniaux and Bhide, 2018).

Morbidly adherent placenta (MAP) is generally associated with excess blood loss, bladder injuries and hysterectomies, and its incidence has increased significantly over the last 50 years (Wortman et al., 2013).

Maternal mortality from placenta accrete is estimated to be 6-7% regardless of the type of the operation (Angstmann et al., 2010).

Despite the modern advances in imaging techniques, no single diagnostic technique affords complete assurance for the presence or absence of placenta accreta (Amin, 2019).

Antenatal diagnosis of MAP and multidisciplinary team approaches has the potential of reducing maternal and fetal intrapartum complications. This includes less maternal blood loss, with fewer transfusion requirements, reducing the rate of hysterectomy, intra operative urologic and gastrointestinal injuries and maternal deaths (Warshak et al., 2010 and Abuhamad, 2013).

According to Mazumder et al. (2017), the safe use of transvaginal ultrasound in cases of placenta previa has been confirmed, and it has been found that transvaginal ultrasonography is superior to Transabdominal sonography in the diagnosis of placenta previa.

Transabdominal ultrasound and transvaginal ultrasound are complementary for diagnosis; also transvaginal ultrasound is safe in cases of placenta previa and allows complete examination of the lower uterine segment. The European Working Group on Abnormally Invasive Placenta (EW-AIP) aimed to advance diagnosis and treatment and to promote research and knowledge on AIP in order to improve comparability of future studies, to increase diagnostic capabilities and to facilitate international collaboration; the EW-AIP here proposes standardized definitions of the AIP imaging descriptors (Collins et al., 2016).

The present work aimed to compare between the role of transabdominal ultrasound versus transvaginal ultrasound in evaluation of placental invasion in cases of placenta previa anterior wall with previous uterine scar applying the criteria of the "EW-AIP", and to evaluate the sensitivity and specificity of each criterion by comparing them with the final outcome of pregnancy.

PATIENTS AND METHODS

This study was carried out at Al Azhar university hospitals, in the period between October 2018 and April 2019, where 50 pregnant women with persistent placenta previa (after 28 weeks’ gestation), were prospectively enrolled into this study.

The study included pregnant women in the reproductive age group (18-45) diagnosed persistent placenta previa anterior wall after 28 weeks of gestation,
with history of previous caesarian Section and/or any other type of uterine surgeries, all of these women were admitted and have their operations of delivery performed at Al Azher university hospitals.

However, placenta previa posterior wall and unscarred uterus were excluded from the study.

**Each patient in this study was subjected to:**

- Full history taking including Personal history (name, age, file number) Obstetric history (number of C.S, abortion, placenta previa in previous pregnancy, history of ectopic, medical disorder with pregnancy and number of living children) , present history (complain, gestational age, medical disorder in present pregnancy and history of ante partum hemorrhage) past history (postpartum sepsis, postpartum hemorrhage & chronic diseases).

- Informed consent was obtained before scanning.

- Intraoperative data including: placental site, spontaneous separation, placental invasion into the bladder and other surrounding organs, uterotonic administration, bladder, ureteric or bowel injury, blood loss and blood transfusion, conservative management to avoid hysterectomy, need for Intensive Care Unit admission.

- Postoperative data including: postoperative hemoglobin level and other labs postoperative blood transfusion need for intensive care unit admission.

- Histopathological examination in cases of hysterectomy : definitive diagnosis of abnormally invasive placenta was made at delivery when the myometrium was seen to be invaded by the placenta, and the pathological examination of the removed uterus showed the villi attached to the myometrium without intervening decidua (accrete), invading into the myometrium (increta) or reaching the serosa (percreta). Complete imaging using all diagnostic techniques (gray-scale, color Doppler) by both transabdominal and transvaginal by two expert operators, then an offline analysis of the acquired images & volumes was done. Placenta was examined while the bladder is partially full about 300 ml for adequate visualization and precise localization. The examined placenta was considered to be suspicious of abnormal invasion in case of having one or more of the unified descriptors described by the European working Group on Abnormally Invasive Placenta "EW-AIP":

**2D grayscale:**

- Loss of ‘clear zone’ Loss, or irregularity, of hypoechoic plane in myometrium underneath placental bed (‘clear zone’).

- Abnormal placental lacunae: Presence of numerous lacunae including some that are large and irregular often containing turbulent flow visible on grayscale imaging.

- Bladder wall interruption: Loss or interruption of bright bladder wall (hyperechoic band or ‘line’ between uterine serosa and bladder lumen).
- Myometrial thinning: Thinning of myometrium overlying placenta to <1 mm or undetectable.

- Placental bulge: Deviation of uterine serosa away from expected plane, caused by abnormal bulge of placental tissue into neighboring organ, typically bladder; uterine serosa appears intact but outline shape is distorted.

- Focal exophytic mass: Placental tissue seen breaking through uterine serosa and extending beyond it; most often seen inside filled urinary bladder.

**2D color Doppler:**

- Uterovesical hypervascularity: Striking amount of color Doppler signal seen between myometrium and posterior wall of bladder; this sign probably indicates numerous, closely packed, tortuous vessels in that region.

- Subplacental hypervascularity: Striking amount of color Doppler signal seen in placental bed; this sign probably indicates numerous, closely packed, tortuous vessels in that region.

- Bridging vessels: Vessels appearing to extend from placenta, across myometrium and beyond serosa into bladder or other organs; often running perpendicular to myometrium.

- Placental lacunae feeder vessels: Vessels with high-velocity blood flow leading from myometrium into placental lacunae, causing turbulence upon entry.

**3D ultrasound and power Doppler:**

- Intraplacental hypervascularity: complex, irregular arrangement of numerous placental vessels, exhibiting tortuous courses and varying calibers.

- Placental bulge (as in 2D).

- Focal exophytic mass (as in 2D).

- Uterovesical hypervascularity (as in 2D).

- Bridging vessels (as in 2D).

Every criterion descriptor was assessed both abdominally and vaginally and both assessments will be evaluated separately. The placenta was imaged with a sufficient bladder volume to clearly visualize the serosa–bladder interface, and the resistance index of flow within the abnormal lacunae and any newly formed vessels over the serosa–bladder border was measured in at least three different locations to obviate selection bias, with the lowest value being used for analysis. To analyze the angioarchitecture of the lower uterine segment and placenta, a 2D power Doppler examination targeting to this region was carried out and the views were successively evaluated: the lateral view was used to observe the intraplacental vasculature and serosa–bladder complex along the sagittal axis of the maternal pelvis, and the basal view illustrated the serosa–bladder interface in a 90° rotation of the lateral view (observing from the direction of the bladder). All the pregnancies enrolled in this study were delivered by Cesarean section at Al Azhar University hospitals with full availability of information on the delivery.
COMPARISON BETWEEN THE ROLE OF TRANSABDOMINAL...

RESULTS

The accuracy of detection of the loss of the retroplacental clear zone was 76% by TVS and 54% by TAS (Table 1).

Table (1): Comparison of the accuracy between TAS and TVS as regards loss of retroplacental clear zone

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Clear zone TVS</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear zone TAS</td>
<td>Correct</td>
<td>Count</td>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>% within Clear.zone.TAS</td>
<td>96.3%</td>
<td>3.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within Clear.zone.TVS</td>
<td>68.4%</td>
<td>8.3%</td>
<td>54.0%</td>
</tr>
<tr>
<td>Incorrect</td>
<td>Count</td>
<td>12</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>% within Clear.zone.TAS</td>
<td>52.2%</td>
<td>47.8%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within Clear.zone.TVS</td>
<td>31.6%</td>
<td>91.7%</td>
<td>46.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>38</td>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>% within Clear.zone.TAS</td>
<td>76.0%</td>
<td>24.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within Clear.zone.TVS</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
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</table>

Chi-Square Test

<table>
<thead>
<tr>
<th>p-value</th>
</tr>
</thead>
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<tr>
<td>McNemar Test</td>
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</tbody>
</table>

Detection of abnormal placental lacunae was 92% by TVS and 88% by TAS (Table 2).

Table (1): Comparison of the accuracy between TAS and TVS as regards abnormal placental lacuna

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Lacuna TVS</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lacuna TAS</td>
<td>Correct</td>
<td>Count</td>
<td>43</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>% within Lacuna.TAS</td>
<td>93.5%</td>
<td>6.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within LacunaTVS</td>
<td>97.7%</td>
<td>50.0%</td>
<td>92.0%</td>
</tr>
<tr>
<td>Incorrect</td>
<td>Count</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>% within Lacuna.TAS</td>
<td>25.0%</td>
<td>75.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within LacunaTVS</td>
<td>2.3%</td>
<td>50.0%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>44</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>% within Lacuna.TAS</td>
<td>88.0%</td>
<td>12.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within LacunaTVS</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
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Chi-Square Test

<table>
<thead>
<tr>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>McNemar Test</td>
</tr>
</tbody>
</table>

a. Binomial distribution used.
The accuracy of detection of myometrial thinning was 66% by TVS and 72% by TAS (Table 3).

Table (2): Comparison of the accuracy between TAS and TVS as regards myometrial thinning

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Myom.Thin.TVS</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total</th>
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<tbody>
<tr>
<td>Myometrial thinning TAS</td>
<td>Count</td>
<td>29</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>% within Myom.thin.TAS</td>
<td>87.9%</td>
<td>12.1%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Myom.Thin.TVS</td>
<td>80.6%</td>
<td>28.6%</td>
<td>66.0%</td>
<td></td>
</tr>
<tr>
<td>Incorrect</td>
<td>Count</td>
<td>7</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>% within Myom.thin.TAS</td>
<td>41.2%</td>
<td>58.8%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Myom.Thin.TVS</td>
<td>19.4%</td>
<td>71.4%</td>
<td>34.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>36</td>
<td>14</td>
<td>50</td>
</tr>
<tr>
<td>% within Myom.thin.TAS</td>
<td>72.0%</td>
<td>28.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Myom.Thin.TVS</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Chi-Square Test

<table>
<thead>
<tr>
<th>McNemar Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>.547</td>
<td></td>
</tr>
</tbody>
</table>

Detection of the uterovesical hypervascularity was 84% by TVS and 88% by TAS (Table 4).

Table (3): Comparison of the accuracy between TAS and TVS as regards Utero-vesical vascularity

<table>
<thead>
<tr>
<th>Parameters</th>
<th>UV.vascularity.TVS</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utero-vesical vascularity TAS</td>
<td>Count</td>
<td>41</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>% within UV.vascularity.TAS</td>
<td>97.6%</td>
<td>2.4%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within UV.vascularity.TVS</td>
<td>93.2%</td>
<td>16.7%</td>
<td>84.0%</td>
<td></td>
</tr>
<tr>
<td>Incorrect</td>
<td>Count</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>% within UV.vascularity.TAS</td>
<td>37.5%</td>
<td>62.5%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within UV.vascularity.TVS</td>
<td>6.8%</td>
<td>83.3%</td>
<td>16.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>44</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>% within UV.vascularity.TAS</td>
<td>88.0%</td>
<td>12.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within UV.vascularity.TVS</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Chi-Square Test

<table>
<thead>
<tr>
<th>McNemar Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>.617</td>
<td></td>
</tr>
</tbody>
</table>
Detection of bridging vessels was 76% by TVS and 75% by TAS (Table 5).

Table (5): Comparison of the accuracy between TAS and TVS as regards Bridging Vessels

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Bridge.V.TVS</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridging Vessels TAS</td>
<td>Count</td>
<td>35</td>
<td>2</td>
<td>37</td>
</tr>
<tr>
<td>% within Bridge.V.TAS</td>
<td>94.6%</td>
<td>5.4%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Bridge.V.TVS</td>
<td>92.1%</td>
<td>16.7%</td>
<td>74.0%</td>
<td></td>
</tr>
<tr>
<td>Incorrect</td>
<td>Count</td>
<td>3</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>% within Bridge.V.TAS</td>
<td>23.1%</td>
<td>76.9%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Bridge.V.TVS</td>
<td>7.9%</td>
<td>83.3%</td>
<td>26.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>38</td>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td>% within Bridge.V.TAS</td>
<td>76.0%</td>
<td>24.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Bridge.V.TVS</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Chi-Square Test

Chi-Square Test p-value

McNemar Test 1.000

The overall accuracy of detection of TAS was 91.5% whereas that of TVS was about 97.5% (Table 6).

Table (6): Comparison between the overall accuracy of TAS vs TVS.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Comparison</th>
<th>Transabdominal ultrasound</th>
<th>Transvaginal ultrasound</th>
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</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>94.2</td>
<td>98.1</td>
<td></td>
</tr>
<tr>
<td>Specificity</td>
<td>85</td>
<td>93.8</td>
<td></td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>96</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>66.7</td>
<td>88.2</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>91.5</td>
<td>97.5</td>
<td></td>
</tr>
<tr>
<td>Validity (out of 43 patients)</td>
<td>Detected 37</td>
<td>Detected 42</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

Prenatal diagnosis of MAP and its variants can help reduce maternal/fetal morbidity and mortality by allowing us to choose the best time and place of birth. Multidisciplinary surgical management, neonatal intensive care, prophylactic hypogastric artery balloon occlusion, uterine artery embolization and an adequate number of blood units available in the operating room can only be achieved effectively through early detection of the placental pathology (Cali et al., 2013).

Several authors have reviewed the diagnostic accuracy of sonographic criteria for placenta accretes. The risk of performing an unnecessary hysterectomy (false positive) or the risk of secondary bleeding following attempted placental removal (false negative) should always be considered. An evaluation based on sensitivity and specificity is not sufficient to legitimize the use of diagnostic criteria; assessing PPV and NPV is mandatory to planning appropriate management and information of patients (Wong et al., 2012).
A review of the last decade’s literature shows an increasing incidence of placenta accreta, mainly due to more frequent CSs. In almost all cases, abnormal placental invasion is at the site of previous uterine scar. Other risk factors, which are related less strongly to MAP, include advanced maternal age, myometrial damage due to a myomectomy with endometrial entry, heavy curettage with secondary Asherman syndrome, submucosal myoma (Cali et al., 2013).

Women at most increased risks of abnormally invasive placenta are, however, those who had a previous CS with a placenta previa overlying the previous uterine scar (Comstock and Bronsteen, 2014).

The diagnosis of morbidly adherent placenta involves a number of different ultrasound variables, some qualitative and others that have been quantified.

Several studies have assessed the predictive value of different ultrasound markers of AIP. However, the performance of these markers shows considerable.

Variability among studies using the same signs. These differences have been attributed previously to a combination of limited sample size, retrospective design and variability of study inclusion criteria and eventual diagnosis of AIP (D’Antonio et al., 2013).

Furthermore, as with all diagnostic techniques reliant on subjective opinion, the recorded presence or absence of each sign will be influenced by the operator’s interpretation of what constitutes that marker.

This is particularly important to clinicians, who may not have much experience with ultrasonography of the placenta or diagnosing AIP. Additionally, there is no published consensus on the definition of the ultrasound markers used commonly for AIP. Many signs have been described under different names, and in other cases the same term has been used for different findings (Collins et al., 2016).

The ‘European Working Group on Abnormally Invasive Placenta’ (EW-AIP) is an international non-profit group, currently consisting of 29 obstetricians, gynecologists, pathologists, anesthesiologists and basic science researchers from 11 European countries.

The aim of the group is to advance diagnosis and treatment and to promote research and knowledge on AIP. To improve comparability of future studies, to increase diagnostic capabilities and to facilitate international collaboration, the EW-AIP here proposes standardized definitions of the AIP imaging descriptors.

These standardized definitions were produced by analysis of all 23 studies included in a recent systematic review of the antenatal sonographic diagnosis of AIP (Collins et al., 2016).

The various wordings were unified into a set of 11 descriptors, six for 2D grayscale ultrasound, four for 2D color Doppler and one for 3D power Doppler. Importance was placed on defining each sign unambiguously, irrespective of opinions regarding the predictive value of each descriptor.

This study aims to compare between the roles of Transabdominal ultrasound vs
Transvaginal ultrasound in assessment of placental invasion in cases of placenta previa anterior wall with previous uterine scar applying the unified descriptors of the "EW-AIP" and also to evaluate the sensitivity and specificity of each criterion by comparing them with the final outcome of pregnancy.

The results showed that regarding the presence of abnormal placental lacunae. They showed Sensitivity 93.0%, specificity 66.7%, PPV 97.6%, NPV 85.7%, accuracy 90% by transabdominal ultrasonography (TAS).

Sensitivity 88.4%, specificity 85.7%, PPV 97.4%, NPV 85.7%, accuracy 88.0% were detected by transvaginal ultrasonography (TVS).

The PPV of lacunae shows more variation from author to author than other signs, they were reported as sensitive and specific in some studies and no so in others.

This study agreed with Comstock and Bronsteen (2014) where they found them to be 93% sensitive in women at 20 weeks of gestation and beyond with a 93% PPV; whereas Cali et al. (2013) found that presence of abnormal lacune showed Sensitivity 73.0%, specificity 86.7%.

In a systematic review, the overall pooled sensitivity and specificity from 13 studies of lacunar spaces diagnosing MAP was 77% and 95%, respectively, with an overall diagnostic accuracy of 88% (D’Antonio et al., 2013).

Regarding loss of the retroplacental clear zone, this study showed Sensitivity 51.2%, specificity 71.4%, PPV 91.7%, NPV 19.2%, accuracy 54.0% by TAS.

Sensitivity 74.4%, specificity 85.7%, PPV 97.0%, NPV 35.3%, accuracy 76.0% wer by TVS.

Cali et al. (2013) showed that the loss of retropalcental clear zone had Sensitivity 90%, specificity 81%, PPV 57%, NPV 97%.

However, Romeo et al. (2019) stated that the loss of the retropalcental clear zone accounts for the majority of False Positive results and the criterion should not be used by itself to make the diagnosis.

Bhide et al. (2017) found absence of the clear space in 37 (65%) women without placenta accreta and in 100% of those women with it. Hence, it is sensitive but not specific. The primary use of the clear space appears to be that its presence effectively excludes placenta accreta because it has a high negative predictive value (NPV).

Regarding interruption of the bladder wall, this study showed it to have sensitivity 4.7%, specificity 100.0%, PPV 100.0%, NPV 14.6%, accuracy 18.0% by TAS and Sensitivity 9.3%, specificity 100%, PPV 100%, NPV 15.2%, accuracy 22.0% by TVS which agreed with Comstock and Bronsteen (2014) where this finding had Sensitivity 20%, PPV 75% and Bhide et al. (2017). Sensitivity 11%, specificity 100% was unlike Cali et al. (2013) where this criterion showed Sensitivity 70%, specificity 100%, PPV 100%, NPV 100%.

The cause of the low sensitivity reported by Comstock & Bronsteen (2014), and Bhide et al. (2017) may be that not all women had transvaginal ultrasound with the quite specific
conditions used by Cali et al. (2013). In
that large study the authors first
determined that 300 ml in the bladder
resulted in the best visualization of the
uterine–bladder interface and then
instilled this amount into each woman’s
bladder.

Regarding the uterovesical
hypervascularity using Color Doppler
Flow

This study shows Sensitivity 86.0%,
specificity 71.4%, PPV 94.9%, NPV
45.5%, accuracy 84.0% by TAS and
Sensitivity 93.0%, specificity 57.1%, PPV
93.0%, NPV 57.1%, accuracy 88.0% by
TVS.

The sensitivity of this descriptor
significantly increased using TVS, also
this agreed with Cali et al. (2013) where
they showed Sensitivity 95.0%, specificity
100%, PPV 100%, NPV 97%, regarding
the presence of abnormal bridging vessels
between the placenta and the bladder wall.

This study showed Sensitivity 69.8%,
specificity 100%, PPV 100%, NPV
35.0%, accuracy 74.0% by TAS and
Sensitivity 71.2%, specificity 100%, PPV
100%, NPV 36.8%, accuracy 76.0% by
TVS which also confirmed by Cali et al.
(2013).

Although no studies have been
performed that directly compare the
diagnostic accuracy of transabdominal vs
transvaginal ultrasound in the setting of
suspected placental invasion, transvaginal
ultrasound allows for a more complete
evaluation of the lower uterine segment
and is the current recommended standard
of care (Rac et al., 2015).

Throughout the period of this study,
every patient who was enrolled has
undergone both Transabdominal sonography and transvaginal sonography
and every one of the unified descriptors
was assessed via both modalities, the
accuracy of both modalities was
calculated regarding their ability to
evaluate each one of the unified
descriptors as follows the accuracy of
detection of the loss of the retroplacental
clear zone was 76% by TVS and 54% by
TAS.

That of the abnormal placental lacunae
was 92 % by TAS and 88% by TVS. Myometrial Thinning detection accuracy
was 66% by TAS and 72% by TVS; while
the Doppler assessment showed that the
accuracy of detection of the uterovesical
hypervascularity was 84% by TAS and
88% by TVS; while the detection of
bridging vessels was 76% by TAS and
75% by TVS.

From this we conclude that the accuracy of
detection of the unified descriptors is quite
close regarding TVS and TAS. However,
TVS was found to be more accurate in the exact placental localization.

The overall accuracy of detection of TAS was 91% whereas that of TVS was about 97.1%.

Assigning a score in clinical practice may be helpful in the antenatal diagnosis of MAP and seems to be a key factor in reducing maternal and fetal morbidity and mortality, by allowing multidisciplinary counseling, and planning and timing of delivery.

Other studies suggested different scoring systems based on different criteria that would eventually enhance the ability of ultrasonography to predict abnormal placental invasion and thus enhance the offered approach.

In conclusion, this study suggests that both transabdominal and transvaginal ultrasonographic modalities are complementary to each other, putting in mind that TVS had a slightly higher overall accuracy and was performed by a highly experienced operator.

Also the unified descriptors suggested by the EW-AIP were found to be of dependable accuracy as well.

An important point to be considered is that all the patients who were enrolled in this study and were exposed to transvaginal ultrasound, none of them experienced any attack of bleeding during the procedure which proves the profound safety of this modality confirming many previous studies.

AIP can be predicted as early as in the first trimester, and almost always confirmed in the second and third trimesters.

Grayscale ultrasonography, with or without color Doppler and performed both transabdominally and transvaginally, has been used widely for antenatal screening and diagnosis of AIP (Alfievic et al., 2016).

Many signs have been suggested, with reports varying as to their sensitivity and difficult to assess which are the most robust. To address this, the European Working Group on AIP (EW-AIP) produced a consensus proposal to standardize the ultrasound descriptions used to define each sign (Collins et al., 2016).

Such approach may facilitate better communication, and better evaluation of our diagnostic performance, in cases of suspected AIP.

According to Chantraine and Collins (2019), the safe use of transvaginal ultrasound in cases of placenta previa has been confirmed and it has been found that transvaginal ultrasonography is superior to transabdominal sonography in the diagnosis of placenta previa and invariably correct in ruling it out.

Cesarean scar pregnancy "CSP" is the main precursor of Abnormally Invasive placenta with its variants, its early detection in suspected cases as early as 6 weeks of pregnancy offers better outcome and even allows the opportunity for patient counseling as early as possible and even considering termination of pregnancy.

**CONCLUSION**

Transabdominal sonography and transvaginal sonography are complementary to each other, however transvaginal ultrasound was found to be of
a slightly higher accuracy. Also, it has been confirmed that TVS is completely safe without any attack of bleeding for any of the patients during the procedure.

REFERENCES


المقارنة بين الموجات فوق الصوتية عن طريق البطن والموجات فوق الصوتية عن طريق المهبل في تقييم درجة الغزو المشيمي في حالات المشيمة المتقدمة الأمامية في الأرحام، نادرات الندبة القديمة

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خليفة البحث: يسمح التشخيص الدقيق للمشيّمة معيبة الانتشار قبل الولادة بتنظيم التعامل أثناء الولادة مما يؤدي إلى تحسين النتائج الخاصة بالأميات والمواليد، وتتمثل أهم عوامل الخطورة التي تؤدي إلى حدوث هذه الظاهرة في وجود مشيمة منزاحة (متقدمة) في الحمل الحالي مع وجود تاريخ سابق بالولادة القصرية.

الهدف من البحث: تهدف هذه الدراسة إلى المقارنة بين كفاءة الموجات فوق الصوتية عن طريق المهبل وبكذك التي تعتمد على طريق البطن في تقييم مدى التوتر في حالات المشيمة المتقدمة الأمامية في الأرحام، ذات الندبة سابقة، باستخدام الخصائص الموجودة المتقدمة من قبل "المجموعة الأوروبية المتخصصة بالمشيمة معيبة الانتشار"، وتقسيم مدى حساسية كلا من تلك الخصائص وقدرتها على التنبؤ بوجود مشيمة معيبة الانتشار ومقارنة ذلك بالنتائج الجراحية.

المرضى وطرق البحث: تم متابعة خمسين سيدة من الحوامل في الأسبوع الثامن والعشرين ذات مشيمة متقدمة في هذه الدراسة، وتتم عمل سونار طبي ورحمي، وتتم دراسة مكان المشيمة باستخدام موجات التردد السريع وتقنيات الدوبلر العلوي عن طريق المهبل وعن طريق البطن، وتتم تحليل النتائج لقيمتها أثناء الولادة القصرية وعمل فحص للأنشطة.

نتيجة البحث: أظهرت نتائج الدراسة أن كلتا الطريقتين تكملان بعضهما البعض، وينصح باستخدامهما معاً من أجل الوصول إلى التشخيص الدقيق لتوغل المشيمة مع الوضع في الاعتبار أن الموجات فوق الصوتية عن طريق المهبل أظهرت
كفاءة تشخيصية أعلى قليلاً، أثبتت الدراسة أيضاً أمان استخدام الأشعة المهبلية
وعدد حدوث نزيف مهبلي لأي مريضة أثناء الاجراء، وأظهرت أيضا كفاءة
الخصائص الموحدة المقترحة في التنبؤ التشخيصي وينصح باستخدامها لعمل
معادلة تنبؤية في المستقبل القريب.

الاستنتاج: الموجات فوق الصوتية عن طريق البطن والموجات فوق الصوتية عن
طريق المهبل تكملان بعضهما البعض مع كفاءة تشخيصية أعلى قليلاً في حالة
استخدام الأشعة المهبلية في تقييم درجة الغزو المشيمي في حالات المشيمة
المتقدمة الأمامية في الأرحام ذات الندب القديمة.