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Comparison between the Role of Transabdominal Ultrasound versus Transvaginal Ultrasound in Evaluation of Placental Invasion in Cases of placenta Previa Anterior wallwith previous Uterine Scar

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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.To compare between the role of Transabdominal ultrasound versus Transvaginal ultrasound inevaluation of placental invasion in cases of placenta previa anterior wall with previous uterine scar applying the unified ultrasonographic descriptors suggested by the European working group on abnormally invasive placenta "EW-AIP'. **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 as 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 was found in 43 patients at the time of Cesarean delivery, and was later confirmed by histopathological evaluation. As regards Grey-scale criteria; the accuracy of detection of the loss of the retroplacental clear zone was76% 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. While the Doppler assessment showed that the accuracy of detection of the uterovesical hypervascularity was 84% by TVS and 88% by TAS. While 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%,putting in mind the difference in the level of experience of the operators **Conclusion:** Both transabdominal and trasnvaginal ultrasound are found to be complementary to each other with an upper hand to transvaginal ultrasound, with the safety of TVS being confirmed also the unified describtors were found to be reliable in accurate diagnosis.

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1. 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 **(Jauniauxet al., 2018).**

Morbidly adherent placenta (MAP) is generally associated with excess bloodloss, bladder injuries and hysterectomies and its incidencehas increased significantly over the last 50 years **(Seoet al., 2017)**

Maternal mortality from placenta accrete is estimated to be 6-7 % regardless of the type of the operation **(Ambreenet al., 2018).**

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 approach 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 (**Belfortet al., 2018).**

According to***Hasegawa 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 **(Mazumder et al., 2017).**

The '***European Working Group on Abnormally Invasive Placenta' (EW-AIP)***is an internationalgroup consisting of 29 obstetricians, gynecologists, pathologists and 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 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.

They are established and published in the "American Journal ofObstetrics and Gynecology"in 2016 **(Collins et al., 2016).**

Aim of the Work

To compare between the role of Transabdominal ultrasound versus Transvaginal ultrasound inevaluation of placental invasion in cases of placenta previa anterior wall with previous uterine scar applying the criteria of the "EW-AIP"and also to evaluate the sensitivity and specificity of each criterion by comparing them with the final outcome of pregnancy.

2, 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 deliveryperformedat Al Azher University Hospitals.

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

Each patient in this study was subjected to:

Full history taking includingPersonal 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 transfusionConservative management to avoid hysterectomyNeed for Intensive Care Unit admission-Postoperative data including:postoperative hemoglobin level and other labs postoperative blood transfusionNeed for Intensive Care Unit admission-Histopathological examination in cases of ccretetomy: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 (ccrete), 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 is 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 turbulentflow visible on grayscale imagingBladder 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 undetectablePlacental 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 distortedFocal exophytic mass: Placental tissue seen breaking through uterine serosa and extending beyond it; most often seen inside filled urinary bladder**2D color Doppler**Uterovesicalhypervascularity: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 regionSubplacentalhypervascularity: Striking amount of color Doppler signal seen in placental bed; this sign

probably indicates numerous, closely packed, tortuous vessels in that regionBridging vessels: Vessels appearing to extend from placenta, across myometrium and beyond serosa into bladder or other organs; often running perpendicular to myometriumPlacental lacunae feeder vessels: Vessels with high-velocity blood flow leading from myometrium into placental lacunae, causing turbulence upon entry.

3D ultrasound and power Doppler

Intraplacentalhypervascularity: complex,irregular arrangement of numerous placental vessels,exhibiting tourtuous courses and varying calibersPlacental bulge (as in 2D)Focal exophytic mass (as in 2D)Uterovesicalhypervacularity (as in 2D)Bridging vessels (as in 2D)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.

3. Results

This study is a prospective study aiming to compare between the role of Transabdominal ultrasound vs Transvaginal ultarsound in assessment of placental invasion in cases of placenta previa anterior wall with previous uterine scar applying the unified descriptors suggested by the "EW-AIP" also to evaluate the sensitivity and specificity of each of the descriptors.

Cases statistically evaluated in the study are 50 pregnant females with persistent placenta previa anterior wall, mean age 32.5 years +/- 3 years SD.

Seven patients had placenta previa with no abnormal invasion, whereas forty three patients had placenta previa with histopathologically confirmed abnormal invasion with all three grades i.e. accreta, increta and percreta.

Each one of the unified descriptors was evaluated both traanvaginally and transabdominally, and the accuracy of each route in detection of the criterion was evaluated also the accuracy of the assessed criterion in prediction of abnormal placental invasion

able (1): Histopathological evaluation

	Frequency	Percent
No abnormality	7	14.0
placenta accreta	20	40.0
placenta inccreta	18	36.0
placenta perccreta	5	10.0
Total	50	100.0

Pathological analysis in cases of hysterectomy for abnormally invasive placenta.

The commonest I placenta accrete followed by increta then lastly percreta.

Table (2): Comparison of the accuracy between TAS&TVSas regards Clear zone

			Clear zoneTVS		**Total**
			Correct	**Incorrect**	
Clear zone TAS	Correct	Count	26	1	27
		% within Clear.zone.TAS	96.3%	3.7%	100.0%
		% within Clear.zone.TVS	68.4%	8.3%	54.0%
	Incorrect	Count	12	11	23
		% within Clear.zone.TAS	52.2%	47.8%	100.0%
		% within Clear.zone.TVS	31.6%	91.7%	46.0%
Total		Count	38	12	50
		% within Clear.zone.TAS	76.0%	24.0%	100.0%
		% within Clear.zone.TVS	100.0%	100.0%	100.0%
Chi-Square Tests					
			p-value		
McNemar Test			**.003**		

Table (3): Comparison of the accuracy between TAS&TVS as regards lacuna

			LacunaTVS		Total
			Correct	Incorrect	
Lacuna TAS	Correct	Count	43	3	46
		% within Lacuna.TAS	93.5%	6.5%	100.0%
		% within LacunaTVS	97.7%	50.0%	92.0%
	Incorrect	Count	1	3	4
		% within Lacuna.TAS	25.0%	75.0%	100.0%
		% within LacunaTVS	2.3%	50.0%	8.0%
Total		Count	44	6	50
		% within Lacuna.TAS	88.0%	12.0%	100.0%
		% within LacunaTVS	100.0%	100.0%	100.0%

Chi-Square Tests	
	p-value
McNemar Test	.625[a]
a. Binomial distribution used.	

Table (4): Comparison of the accuracy between TAS&TVS as regards myometrial thinning

			Myom.Thin.TVS		Total
			Correct	Incorrect	
Myometrial thinning TAS	Correct	Count	29	4	33
		% within Myom.thin.TAS	87.9%	12.1%	100.0%
		% within Myom.Thin.TVS	80.6%	28.6%	66.0%
	Incorrect	Count	7	10	17
		% within Myom.thin.TAS	41.2%	58.8%	100.0%
		% within Myom.Thin.TVS	19.4%	71.4%	34.0%
Total		Count	36	14	50
		% within Myom.thin.TAS	72.0%	28.0%	100.0%
		% within Myom.Thin.TVS	100.0%	100.0%	100.0%

Chi-Square Tests	
	p-value
McNemar Test	.549

Table (5): Comparison of the accuracy between TAS&TVS as regards Utero-vesical vascularity

			UV.vascularity.TVS		Total
			Correct	Incorrect	
Utero-vesical vascularity TAS	Correct	Count	41	1	42
		% within UV.vascularty.TAS	97.6%	2.4%	100.0%
		% within UV.vascularity.TVS	93.2%	16.7%	84.0%
	Incorrect	Count	3	5	8
		% within UV.vascularty.TAS	37.5%	62.5%	100.0%
		% within UV.vascularity.TVS	6.8%	83.3%	16.0%
Total		Count	44	6	50
		% within UV.vascularty.TAS	88.0%	12.0%	100.0%
		% within UV.vascularity.TVS	100.0%	100.0%	100.0%

Chi-Square Tests	
	p-value
McNemar Test	.625

Table (6): Comparison of the accuracy between TAS&TVS as regards Sub Placenta Vascularity

			S.placenta.vasculairty.TVS		Total
			Correct	Incorrect	
SubPlacentaVascularityTAS	Correct	Count	13	2	15
		% within SubPlacenta.Vascular.TAS	86.7%	13.3%	100.0%
		% within S.placenta.vasculairty.TVS	76.5%	6.1%	30.0%
	Incorrect	Count	4	31	35
		% within SubPlacenta.Vascular.TAS	11.4%	88.6%	100.0%
		% within S.placenta.vasculairty.TVS	23.5%	93.9%	70.0%
Total		Count	17	33	50
		% within SubPlacenta.Vascular.TAS	34.0%	66.0%	100.0%
		% within S.placenta.vasculairty.TVS	100.0%	100.0%	100.0%

Chi-Square Tests	
	p-value
McNemar Test	.687

Table (7): Comparison of the accuracy between TAS&TVS as regards Bridging Vessels

			Bridge.V.TVS		Total
			Correct	Incorrect	
Bridging Vessels TAS	Correct	Count	35	2	37
		% within Bridge.V.TAS	94.6%	5.4%	100.0%
		% within Bridge.V.TVS	92.1%	16.7%	74.0%
	Incorrect	Count	3	10	13
		% within Bridge.V.TAS	23.1%	76.9%	100.0%
		% within Bridge.V.TVS	7.9%	83.3%	26.0%
Total		Count	38	12	50
		% within Bridge.V.TAS	76.0%	24.0%	100.0%
		% within Bridge.V.TVS	100.0%	100.0%	100.0%
Chi-Square Tests					
			p-value		
McNemar Test			1.000		

Table (8): Comparison of the accuracy between TAS&TVS as regards Placental feeder vessels

			PL.feeder.v.TVS		Total
			Correct	Incorrect	
Placental feedervessels TAS	Correct	Count	20	6	26
		% within PLfeedervTAS	76.9%	23.1%	100.0%
		% within PLfeedervTVS	76.9%	25.0%	52.0%
	Incorrect	Count	6	18	24
		% within PLfeedervTAS	25.0%	75.0%	100.0%
		% within PLfeedervTVS	23.1%	75.0%	48.0%
Total		Count	26	24	50
		% within PLfeedervTAS	520%	48.0%	100.0%
		% within PLfeedervTVS	1000%	100.0%	100.0%
Chi-Square Tests					
			p-value		
McNemar Test			1.000		

Table (9): Comparison between the overall accuracy ofTAS vs TVS

	Transabdominal ultrasound	**Transvaginal ultrasound**
Sensitivity	94.2	98.1
Specificity	85	93.8
Positive predictive value	96	99
Negativepredictive value	66.7	88.2
Accuracy	91.5	97.5
Validity (out of 43 patients)	Detected 37	Detected 42

4. 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, neonatalintensive care, prophylactic hypogastric artery balloon occlusion, uterine artery embolization and an adequatenumber of blood units available in the operating room can only be achieved effectively through early detection of the placental pathology **(Jing et al., 2018)**

Several authors have reviewed the diagnostic accuracy of sonographic criteria for placenta accrete. 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 **(Bhide et al., 2017)**

A review of the last decade's literature show.s an increasing incidence of placenta accreta, mainly due to more frequent CSs. In almost all cases, abnormal placental invasion is at the site of a previous uterine scar.Other risk factors, which are related less strongly to MAP, include advanced maternal age, myometrial damage due toa myomectomy with endometrial entry, heavy curettage with secondary Asherman syndrome, submucosal myoma **(Jing et al., 2018).**

Women at most increased risk of abnormallyinvasive placenta are, however, those who had a previous CS with a placenta previa overlying the previous uterine scar **(Kilcoyne et al., 2017)**

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 **(Jauniaux, E. et al., 2018)**

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 **(Morel et al., 2019).**

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 **(Morel et al., 2019)**

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 role 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 ulrasonography (TAS).

And***Sensitivity 88.4%, specificity 85.7%, PPV 97.4%, NPV 85.7%, accuracy 88.0% 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 agrees with what **Kilcoyne et al., 2017,**where th found them to be 93% sensitive in women at 20 weeks of gestation and beyond with a 93% PPV; whereas **Jing et al. in 2018** found that presence of abnormal lacune showed. ***Sensitivity 73.0%, specificity 86.7%,*** In a recent 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% **(Jauniaux, E. et al., 2018).**

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.

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

Unlike **Jing et al.,** study which showed that the loss of retropalcental clear zone had **Sensitivity 90%, specificity 81%, PPV 57%, NPV 97%,**However,**Romeo et al., in 2019**stated that the loss of the retroplacental 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. in 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 **andSensitivity 9.3%, specificity 100%, PPV 100%, NPV 15.2%, accuracy 22.0%** by TVS which agrees with **Kilcoyne et al., 2017,** where this finding had **Sensitivity 20%,PPV 75%**and**Bhide et al., 2017 Sensitivity 11%, specificity 100%**unlike Cal et al. where this criterion showed **Sensitivity 70%, specificity 100%, PPV 100%, NPV 100%.**

The cause of the low sensitivity reported in the papers by both **(Kilcoyne et al.**) and **(Bhide et al.**) may be that not all women had transvaginal ultrasound with the quite specific conditions used by **(Jing et al**.)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 hypervascualrity using Color Doppler Flow.*

This study shows **Sensitivity 86.0%, specificity 71.4%, PPV 94.9%, NPV 45.5%, accuracy 84.0%** by TASand **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 agrees with (**Jinget al., ****)** where is 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 confirms with **(Jing et al).**

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 **(De Vita et al., 2019).**

This study used aimed mainly to compare between the role of Transabdominal ultrasound vs Transvaginal ultrasound in assessment of placental invasion in cases of placenta previa anterior wall with previous uterine scar applying the criteria of the "EW-AIP".

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 **(De Vita et al., 2019)**

Throughout the period of this study, every patient who was enrolled has undergone both Transabdominal sonography and transvaginal sosngraphy 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.

While 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 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 ultrasonogropahy 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 (**Chantraine et al., 2019)**

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 **(Morel et al., 2019)**

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

According to***Chantraine et al., (2019),***the safe use of transvaginal ultrasound in cases of placenta previa has been confirmed and it has been found thattransvaginal 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.

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

Conclusion:

Transabdominal sonograhy 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.

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