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Diagnosis of Placenta Accreta by Uterine Artery Doppler Velicometry in Patients with Placenta Previa

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ABSTRACT

Background: Placenta accreta occurs in the complete or partial absence of the decidua basalis. Women with previous cesarean delivery or placenta previa are known to be at greater risk of placenta accreta.

Objectives: to evaluate ultrasound accuracy in diagnosing placenta accreta and its variants and to detect the potential value of uterine artery Doppler in diagnosing placenta accreta and to assess the impact of antenatal diagnosis in Egyptian population.

Patients and Methods: This prospective study was conducted on (100) pregnant women diagnosed as placenta previa by ultrasonography and were candidates for either emergency or elective repeated CS or hysterectomy (if the diagnosis of placenta accreta is confirmed). All these patients were randomly selected from the Obstetrics Clinic at Beni-Suef General Hospital during their 3rd trimester. The study was approved by the medical ethics committee of Al-Azhar University academic and ethical committee and a written informed consent was obtained from all patients.

Results: The results obtained from this study indicated no statistically significant differences regarding the mean values of uterine artery Doppler PI and RI between cases of placenta accreta and non accreta (p value =.078 & 0.58 respectively) in correlation with histopathological assessment. Our results showed no statistically significant correlation regarding mean values of uterine artery Doppler PI and RI between cases of placenta accreta and placenta non accreta (p values = 0.341, 0.953 respectively) in correlation with intra-operative assessment.

Conclusion: Several ultrasound criteria can be used in diagnosis of placenta accreta, as this study showed their high accuracy. They include loss of retroplacental clear zone, presence of abnormal placental lacunae, myometrial thinning and utero-vesical hypervascularity. On the other hand, both loss of retroplacental clear zone, abnormal placental lacunae can predict which patient will mostly have CS hysterectomy.

Keywords: Uterine Artery Doppler, Placenta Accreta.

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. It can be classified according to their degree of trophoblastic invasion through the myometrium and the uterine serosa into placenta accreta, increta and percreta [(1)].

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 [(2)].

Maternal mortality from placenta accreta is estimated to be 6-7 % regardless of the type of the operation [(3)].

Despite the modern advances in imaging techniques, no single diagnostic method affords complete assurance for the presence or absence of placenta accreta [(4)].

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, reduction of hysterectomy rate as well as intra operative urologic and gastrointestinal injuries and maternal deaths [(5)].

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 [(6)].

Trans-abdominal ultrasound and trans-vaginal ultrasound are complementary for diagnosis. Also, trans-vaginal ultrasound is safe in cases of placenta previa and allows complete examination of the lower uterine segment [(7)].

The 'European Working Group on Abnormally Invasive Placenta' (EW-AIP) is an international non-profit group 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 of Obstetrics and Gynecology" in 2016[(8)].

PATIENTS AND METHODS

A total of randomly chosen100 women with placenta previa were enrolled prospectively at Obstetrics Clinic at Beni-suef General Hospital during their follow up visits in the 2nd and 3rd trimesters and underwent ultrasound examination by expert ultra-sonographer.

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The ult1rasound diagnosis (2D grayscale and color Doppler) of placenta accreta was based on the detection of the following: loss of the retroplacental clear zone, presence of abnormal placental lacunae, bladder wall interruption, placental bulge, myometrial thickness <1 mm, utero-vesical hypervascularity and bridging vessels, uterine artery Doppler was done for all cases enrolled in this study.

Definitive diagnosis was made at delivery by Cesarean section. Maternal outcome in cases diagnosed antenatal was compared with that in cases diagnosed at delivery and the patient underwent CS hysterectomy, specimen was sent for histopathological confirmation of the diagnosis of placenta accreta.

Ethical approval and written informed consent :

The study was approved by the medical ethics committee of Al-Azhar University academic and ethical committee and a written informed consent was obtained from all patients.

Inclusion criteria:

- Maternal age from 20 to 45 years.
- Gestational age >28 weeks, confirmed by the first day of the last menstrual period or first trimesteric ultrasound.
- Normal spontaneous onset of puberty and normal sexual development.
- Single living fetus.
- One or more cesarean section or hysterotomy.
- Placenta previa (all grades) with high possibility of morbidly adherent placenta accreta (all types).

Exclusion criteria:

- Maternal chronic medical disorder (diabetes mellitus or hypertension).
- Pregnancy induced disorders (pre-eclampsia or gestational diabetes).
- Associated fetal anomalies.

The patients were divided into 2 study groups:

Group A: Placenta Accreta Group (n=51): included patients with placenta previa with invasion.

Group B: Placenta non Accreta Group (n=49): included patients with placenta previa without invasion.

Statistical analysis

The recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Chi-square (x^2) test of significance was used in order to compare proportions between two qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. The p-value was considered significant as the following:
- Probability (P-value)
- P-value <0.05 was considered significant.
- P-value <0.001 was considered as highly significant.
- P-value >0.05 was considered insignificant.

RESULTS

This prospective study was conducted at Gyn/Obs. Department, Beni-Suef General Hospital. It included 100 pregnant women diagnosed as placenta previa and subdivided into two main groups. Placenta Accreta Group (n=51) which included patients had placenta previa with invasion and Placenta non Accreta Group (n=49) that included patients with placenta previa but without invasion. Out of all the women in the final analysis, 51 (51%%) of them had histopathological confirmation of morbidly adherent placenta, and the remaining 49 (49%) women served as the control group.

Cesarean hysterectomy was performed for all the Accreta Group patients (100%) and was performed for 9 patients (18%) in the non Accreta Group due to severe blood loss. No reported cases of maternal or neonatal mortality among cases enrolled in this study.

Out of the 100 patients, US suggested that 72 patients of them had placenta accreta while the other 28 cases had placenta non accreta. However, intra-operative assessment suggested that 56 patients had placenta accreta and only 44 cases had placenta non accreta. Moreover, histopathological assessment showed that 51 patients (out of 60 specimen) had placenta accreta and the other 9 cases were not **Table 1**.

Table (1): Results of used evaluation parameters in both study groups

Parameter		Count	%
Ultrasound evaluation	**Accreta**	72	72.0%
	Non Accreta	28	28.0%
Intra-operative assessment	**Accreta**	56	56.0%
	Non Accreta	44	44.0%
Histopathological Pattern	**Accreta**	51	85.0%
	Non Accreta	9	15.0%

Mean age of patients enrolled in the study was 31.14 years, while the mean gestational age was 36 weeks and the mean number of CS is 2.59 **Table 2**.

Table (2): Comparison between mean age, gestational age, parity, number of CS and SE among all patients

	Mean	SD	Median	Minimum	Maximum
Age	31.14	5.01	32.00	20.00	40.00
GA	36.11	2.06	36.00	28.00	39.00
Parity	2.98	1.19	3.00	1.00	6.00
No. of CS	2.59	1.09	2.00	1.00	5.00
No. of SE	0.21	0.57	0.00	0.00	3.00

There were no statistically significant differences regarding age, gestational age, parity, number of CS or Surgical evacuation by using ultrasound examination between both groups. On the other hand, the estimated blood loss was significantly higher in the accreta group compared to the non accreta group (**P- value = 0.003) Table 3.**

Table (3): Comparison between cases of both groups regarding age, parity, gestational age, number of previous CS and surgical evacuation as well as estimated blood loss.

	Accreta (n=51)					Non accreta (n=49)					P value
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	
Age	31.18	4.63	32.00	20.00	40.00	31.10	5.43	31.00	20.00	40.00	.793
GA	36.14	2.10	36.00	28.00	39.00	36.08	2.05	36.00	28.00	39.00	.957
Parity	2.98	.99	3.00	1.00	5.00	2.98	1.38	3.00	1.00	6.00	.946
No. of CS	2.67	.95	3.00	1.00	5.00	2.51	1.23	2.00	1.00	5.00	.367
No. of SE	.22	.61	.00	.00	3.00	.20	.54	.00	.00	3.00	.781
Estimated blood loss (ml)	2531.37	786.76	2500.00	600.00	4000.00	2032.65	911.13	2000.00	700.00	4000.00	.003

There were no reported cases of ureteric injury in both groups. Bladder injury was significantly higher in the placenta accreta group (n=10, 19.6%) compared to the non accreta group (n=3,6.1%) (**p value 0.045)**. Postoperative ICU admissions were significantly higher in the accreta group (n=29,56.9%) compared to the non accreta group (n=7,14.3%) (**P value < 0.001).** Also, the need for blood transfusion was significantly higher in the placenta accreta group (no.45, 88.2%) compared to the non accreta group (no.20, 40.8%) (**P value < 0.001**) **Table 4.**

Table (4): Comparison between cases of both groups regarding incidence of bladder and ureteric injury, post-operative ICU admission as well as Blood transfusion.

		Accreta (n=51)		Non accreta (n=49)		P value
		Count	%	Count	%	
Bladder injury	YES	**10**	**19.6%**	**3**	**6.1%**	**0.045**
	No	**41**	**80.4%**	**46**	**93.9%**	
Ureteric Injury	No	**51**	**100.0%**	**49**	**100.0%**	**---**
Post Op. ICU admission	YES	**29**	**56.9%**	**7**	**14.3%**	**< 0.001**
	No	**22**	**43.1%**	**42**	**85.7%**	
Intra and post op blood transfusion	yes	**45**	**88.2%**	**20**	**40.8%**	**< 0.001**
	No	**6**	**11.8%**	**29**	**59.2%**	

Placenta previa was grading as below:
Grade 1 – Minor: Placenta extends to lower portion of the uterus but does not reach cervix.
Grade 2 – Marginal: Lower edge of placenta reaches cervix but does not cover it.
Grade 3 – Major: Placenta partially covers cervix.
Grade 4 – Major: Placenta completely covers cervix.

Table 5 showed that placenta previa grade 4 was significantly higher in the placenta accreta group (n=42,82%) compared to the non accreta group (n=29,59%) (**p value 0.001)**. Gray scale, color Doppler criteria and diagnostic sensitivity, specificity, PPV and NPV of different methods of grayscale and color Doppler criteria in the studied group in correlation with histopathological pattern (60 patients had CS hysterectomy),

Table (5): Comparison between cases of the two groups regarding placenta grade.

		Accrete(n=51)		Non accreta (n=49)		P value
		Count	%	Count	%	
Placental previa grade	1	**0**	**.0%**	**5**	**10.2%**	
	2	**2**	**3.9%**	**11**	**22.4%**	
	3	**7**	**13.7%**	**4**	**8.2%**	
	4	**42**	**82.4%**	**29**	**59.2%**	**0.001**

Our results showed highly statistically significant correlation between loss of clear zone and histopathological confirmation (**P-value 0.001).** In addition, the overall sensitivity, specificity, PPV, NPV and accuracy were 82.3%, 77.7%, 95.5%, 43.7%, 81.6%. This criterion showed high sensitivity with very high positive predictive value **Table 6**.

Table (6): Significance of loss of clear zone by ultrasound and histopathological pattern

		Histopathological Pattern				
		Accreta (n=51)		Non accreta (n=9)		value
		Count	%	Count	%	
Loss of clear zone	**Yes**	42	82.4%	2	22.2%	001
	No	9	17.6%	7	77.8%	

Statistic	Value	95% CI
Sensitivity	82.35%	69.13% to 91.60%
Specificity	77.78 %	39.99% to 97.19%
Positive Predictive Value	95.45%	86.00% to 98.63%
Negative Predictive Value	43.75 %	28.10% to 60.75%
Accuracy	81.67%	69.56% to 90.48%

Our results showed highly statistically significant correlation between the presence of abnormal lacunae and histopathological confirmation **(P-value < 0.001).** In addition, the overall sensitivity, specificity, PPV, NPV and accuracy were 90%,100%,100%,64.2%, 91.6%. This criterion showed very high sensitivity and specificity with very high positive predictive value and accuracy to become the most important criteria **Table 7**.

Table (7): Significance of the presence of abnormal lacunae by ultrasound and histopathological pattern

		Histopathological Pattern				
		Accreta (n=51)		Non accrete (n=9)		P value
		Count	%	Count	%	
Abnormal lacunae	**yes**	46	90.2%	0	.0%	< 0.001
	no	5	9.8%	9	100.0%	

Statistic	Value	95% CI
Sensitivity	90.20%	78.59% to 96.74%
Specificity	100.00 %	66.37% to 100.00%
Positive Predictive Value	100.00%	
Negative Predictive Value	64.29 %	43.91% to 80.54%
Accuracy	91.67%	81.61% to 97.24%

The present results showed no statistically significant correlation between the presence of bridging vessels and histopathological confirmation **(P-value =0.134).** In addition, the overall sensitivity, specificity, PPV, NPV and accuracy were 56.8%, 11.11%, 78.3%, 4.35%, 50% **Table 8.**

Table (8): Significance of the presence of bridging vessels by ultrasound and histopathological Pattern**.**

		Histopathological Pattern				P value
		Accreta (n=51)		Non accreta (n=9)		
		Count	%	Count	%	
Bridging vessels	**yes**	29	56.9%	8	88.9%	0.134
	no	22	43.1%	1	11.1%	

Statistic	Value	95% CI
Sensitivity	56.86%	42.25% to 70.65%
Specificity	11.11 %	0.28% to 48.25%
Positive Predictive Value	78.38%	72.22% to 83.48%
Negative Predictive Value	4.35 %	0.69% to 22.86%
Accuracy	50.00%	36.81% to 63.19%

Our results showed statistically significant correlation between ultrasound evaluation and histopathological pattern (**p value=0.003).** In addition, the overall sensitivity, specificity, PPV, NPV and accuracy were 96%, 44.4%, 90.7%, 66.6%, 88.3% **Table 9.**

Table (9): Significance of Ultrasound evaluation and histopathological pattern

		Histopathological Pattern				P value
		Accreta (n=51)		Non accreta (n=9)		
		Count	%	Count	%	
Ultrasound evaluation	**Accreta**	49	96.1%	5	55.6%	0.003
	not accreta	2	3.9%	4	44.4%	

Statistic	Value	95% CI
Sensitivity	96.08%	86.54% to 99.52%
Specificity	44.44 %	13.70% to 78.80%
Positive Predictive Value	90.74%	84.49% to 94.63%
Negative Predictive Value	66.67 %	29.96% to 90.34%
Accuracy	88.33%	77.43% to 95.18%

Our results showed no statistically significant correlation regarding mean values of Uterine artery Doppler PI and RI between cases of both groups by histopathological examination (**p value =.078 & 0.58 respectively) Table 10.**

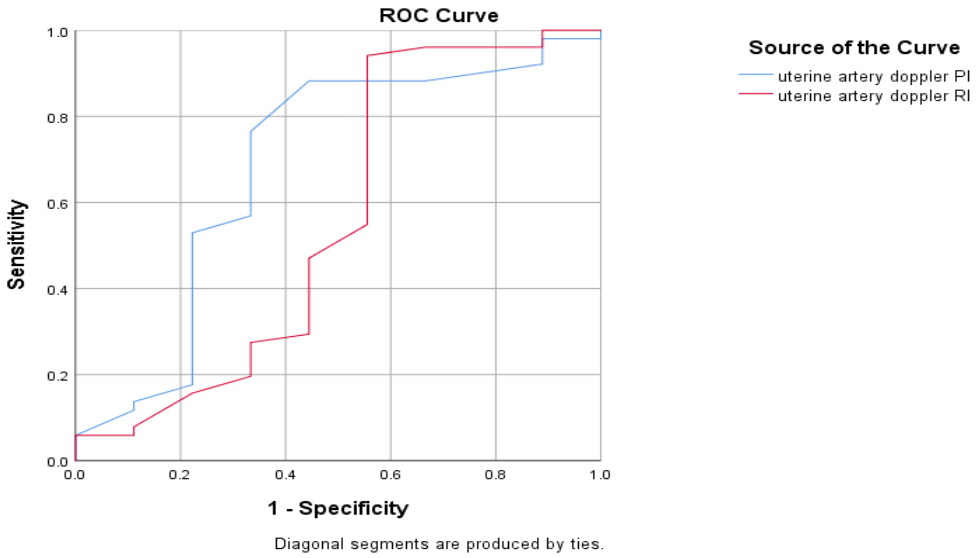
Table (10): Comparison between cases of the two groups regarding mean values of uterine artery Doppler PI and RI in correlation with Histopathological pattern.

	Histopathological Pattern										P value
	Accretea (n=51)					Non accreta (n=9)					
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	
Uterine artery doppler PI	0.81	0.21	0.81	0.40	1.50	0.91	0.22	1.03	0.52	1.12	0.078
Uterine artery doppler RI	0.54	0.12	0.52	0.32	0.80	0.58	0.17	0.52	0.39	0.81	0.583

The present results showed no statistically significant correlation regarding mean values of uterine artery Doppler PI and RI between cases of both groups by clinical evaluation (**p values = 0.341, 0.953 respectively) Table 11**

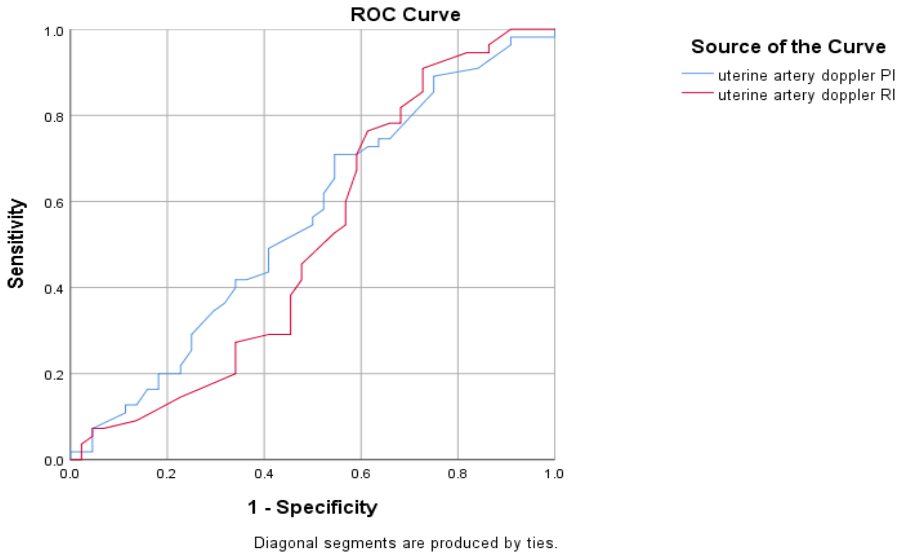
Table (11): Comparison between cases of both groups regarding mean values of uterine artery Doppler PI and RI in correlation with operative findings.

	Operative findings										
	Accreta (n=56)					Non accreta (n=44)					P value
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	
uterine artery doppler PI	0.82	0.20	0.82	0.40	1.50	.85	0.21	0.84	0.42	1.20	0.341
uterine artery doppler RI	0.55	0.13	0.52	0.32	0.80	0.56	0.17	0.52	0.31	0.90	0.953



Test Result Variable(s)	Area Under the Curve	P value	95% Confidence Interval	
			Lower Bound	Upper Bound
Uterine artery doppler PI	0.685	0.078	0.464	0.906
Uterine artery doppler RI	0.558	0.583	0.299	0.816

Figure (1): Receiver operating characteristic curve (ROC) curve for prediction of accrete by histopathology using Doppler measures.



Test Result Variable(s)	Area Under the Curve	P value	95% Confidence Interval	
			Lower Bound	Upper Bound
Uterine artery doppler PI	0.556	0.342	0.440	0.672
Uterine artery doppler RI	0.511	0.855	0.390	0.632

Figure (2): ROC curve for prediction of accrete by operative findings using Doppler measures.

DISCUSSION

The aim of the study was to assess the efficacy of ultrasound (2D gray scale and Doppler study) via trans-abdominal and/or trans-vaginal approach in the prediction of the operative findings and possible associated co-morbidities, thus to optimize and individualize preoperative preparations and set the operative plan among placenta accreta cases, thus improving the post-operative outcomes.

Also, the study of uterine artery Doppler as a new modality to help assess the possibility of invasion of placenta by comparing Doppler values of placenta accreta with placenta non accreta.

Regarding the presence of abnormal placental lacunae:

This study showed sensitivity, specificity, PPV, NPV and accuracy were 90.2%, 100%, 100%, 64.2% and 91.6% respectively in correlation with histopathological assessment. In addition our study showed sensitivity, specificity, PPV, NPV and accuracy were 83.93%, 81.8%, 85.4%, 80% and 83% respectively in correlation with intraoperative assessment.

Highly statistical difference was noticed between the two groups where 90% of cases with histopathological confirmation had abnormal lacunae among the accreta group vs 0% in the non accreta group.

Our study agreed with **Maged and his colleagues** [9] who found that the presence of abnormal lacunae sensitivity 93%, PPV80.82% , NPV 85.19% while accuracy reached 82.00%.

Pilloni *et al.* [10] suggested the presence of abnormal lacunae with 94.6% specificity and with 48.6% sensitivity.

Whereas **Cali *et al.*** [11] found that presence of abnormal lacunae showed sensitivity 73.0%, and specificity 86.7%.

Yang *et al.* [12] who found that the presence of abnormal lacunae showed sensitivity 86.9%, specificity 78.6%, PPV 76.9 and NPV 88%. In a recent systematic review, the overall pooled sensitivity and specificity from 13 studies of lacunear spaces diagnosing MAP was 77% and 95% respectively, with an overall diagnostic accuracy of 88% **D'Antonio *et al.*** [13]. Abnormal placental lacunae have the highest accuracy among other criteria of US findings with high sensitivity and specificity.

Regarding **loss of the retroplacental clear zone:**

This study showed that sensitivity , specificity , PPV ,NPV and accuracy were 82.35%, 77.7% , 95.4%, 43.7% and 81.6% in correlation with histopathological assessment, in addition our study showed sensitivity , specificity , PPV, NPV and accuracy were 78.5%, 88.6% , 89.8%, 76.4% and 83 % in correlation with intra-operative assessment.

Maged *et al.* [9] suggested the loss of retro-placental clear zone to have 87.3% sensitivity, 89.1% specificity, 93% PPV, 80% NPV and 88% accuracy which agreed with our study.

Pilloni *et al.* [10] suggested 81% sensitivity and 97% specificity to the retro placental zone disruption. In a recent systematic review, the overall pooled sensitivity and specificity from 13 studies of loss of retroplacental clear zone diagnosing MAP was 66% and 95% respectively.

Wong *et al.* [14] found absence of the clear space in 37 (65%) of 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), in contrary. **Finberg and Williams** [15] stated that the loss of the retroplacental clear zone accounts for most of False Positive results and the criterion should not be used by itself to make the diagnosis.

Regarding the **presence of placental bulge:**

This study showed that the sensitivity, specificity, PPV, NPV and accuracy were 47.06%, 44%, 82.6%, 12.9 % and 46.6% respectively in correlation with histopathological assessment. In addition, our study showed sensitivity, specificity, PPV, NPV and accuracy were 46%, 75% ,70% ,52% and 59% respectively in correlation with intra-operative assessment.

Our study agreed with **Comstock** [16] who stated that placental bulge isn't sensitive and agreed with him in being specific where he found it a specific sign.

Regarding **interruption of the bladder wall:**

This study showed that the sensitivity, specificity, PPV, NPV and accuracy were 68.6%, 44.4%, 87.5%, 20% and 65% respectively in correlation with histopathological assessment. In addition, the present study showed sensitivity, specificity, PPV, NPV and accuracy were 64%, 77%, 78%, 62% and 70% respectively in correlation with intra-operative assessment.

Pilloni *et al.* [10] suggested 40% sensitivity and 98% specificity to disruption of serosal-bladder interface.

Lax *et al.* [17] suggested 21% sensitivity and 100% specificity. In a previously systematic review, the overall pooled sensitivity and specificity from 9 studies of abnormalities of utero-bladder interface diagnosing MAP was 49% and 99% respectively [13].

Cali *et al.* [11] suggested that this criterion showed sensitivity 70%, specificity 100%, PPV 100%, NPV 100%. Unlike **Comstock** [16], whose finding had sensitivity of 20%, PPV 75%, and **Wong *et al.*** [14] **whose** sensitivity reached 11% and specificity 100%.

The interruption of this line is a result of increased vascularity in this space, as they showed using color Doppler; it does not signify invasion of the bladder

because interruption can be seen in placenta accrete [13].

Our results did not agree with most studies because it showed low specificity unlike most studies which have high specificity. These differences may be due to intra-observer variability.

Regarding the **uterovesical hypervascualrity using Color Doppler Flow**

This study showed that sensitivity, specificity, PPV, NPV and accuracy were 82%, 33%, 87%, 25% and 75% respectively in correlation with histopathological assessment. In addition, our study showed Sensitivity, specificity, PPV, NPV and accuracy were 83%, 70%, 78%, 77% and 78% respectively in correlation with intra-operative assessment.

Our study did not agree with **Pilloni *et al.*** [10] where it showed 10.8% sensitivity and 98% specificity.

Our study agreed with a recent systematic review, the overall pooled sensitivity and specificity from 12 studies of abnormalities of color Doppler diagnosing MAP was 90% and 89% respectively [13].

Our study agreed with **Cali *et al.*** [11] where it showed sensitivity 90%, specificity 100%, PPV 100%, NPV 97%.

Regarding **uterine artery Doppler values:**

The present results showed no statistically significant correlation regarding mean values of uterine artery Doppler PI and RI between cases of placenta accreta and non accreta (p value =.078 & 0.58 respectively) in correlation with histopathological assessment. Our results showed no statistically significant correlation regarding mean values of uterine artery Doppler PI and RI between cases of placenta accreta and placenta non accreta (p values = 0.341, 0.953 respectively) in correlation with intra-operative assessment.

A study was held by **Cho *et al.*** [18] reported that the mean uterine artery PI was significantly lower in the placenta accreta group compared to placenta previa group and this disagreed with the present study as we found no significant association.

Our study had some limitations as uterine artery Doppler velocimetry and placental morphology were performed by different operators during the study period. However, all operators were well-trained experts who fully understood the protocol before starting the examination, but a bias between operators may still have existed. A well-organized prospective study will be necessary to address this issue. Yet what we conclude and address firmly is that planning which could be aided by such simple tools could easily decline morbidity and mortality both on maternal and fetal sides.

CONCLUSION

Different ultrasound criteria can be used for accurate diagnosis of placenta accreta. They include loss of retroplacental clear zone, presence of abnormal placental lacunae, myometrial thinning and utero-vesical hypervascularity. On the other hand, both loss of retroplacental clear zone, abnormal placental lacunae can predict which patient will mostly have CS hysterectomy.

No statistically significant value of uterine artery Doppler indices was observed during the present study when comparing both study groups.

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