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Original Research Paper

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EFFECTIVENESS OF LOSS OF RETROPLACENTAL CLEAR SPACE AS A DIAGNOSTIC CRITERIA IN THE PRENATAL SCREENING OF PLACENTA ACCRETA SPECTRUM DISORDERS

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ABSTRACT Placenta accreta spectrum (PAS) disorders are associated with high mortality and morbidity due to postpartum hemorrhage, hysterectomy, and organ injury. PAS disorders are expected to see an ascending trend with the increasing rates of cesarean delivery. Therefore, early antenatal diagnosis of the placenta accreta spectrum is highly desirable to optimize patient care and management. The aim of the present study is to evaluate the diagnostic accuracy of loss of the retroplacental clear space as a diagnostic criterion in the prenatal screening for Placenta accreta spectrum disorder.

KEYWORDS : Adherent Placenta, Ultrasound, Placenta accreta, Retroplacental clear space, Placenta previa

INTRODUCTION

Placenta accreta spectrum (PAS) (1), refers to the pathologic invasion of the placental trophoblasts to the myometrium and beyond with subtypes such as accreta (adheres to the myometrium), increta (invades deep to the myometrium) and percreta (the invasion reaches to the uterine serosa and adjacent viscera. The retroplacental clear space (RPS) is the echo lucent space between the placenta and myometrium consisting of decidua basalis and vascular plexus (2). Its absence indicates loss/deficiency of Nitabuch's layer and subsequent fusion of the placenta and myometrium (3). Since PAS disorders are associated with high maternal mortality and morbidity due to postpartum hemorrhage, hysterectomy, and organ injury (4). Therefore, prenatal diagnosis of PAS is highly desirable to identify the risk, seek early intervention and optimize outcomes to avoid placental disruption and catastrophic hemorrhage (5). The aim of the present study is to evaluate the effectiveness of loss of RPS as a diagnostic criterion in the prenatal screening of PAS disorders

MATERIAL AND METHODS

This prospective cross-sectional study was conducted at the Department of Radiodiagnosis over a period of 18 months. The study included 50 patients referred to the Department of Radiodiagnosis with suspicion of PAS Disorder of age > 18 years having a suspicion of PAS and/or – a) H/o ≥ two cesarean sections, b) H/o ≥ cesarean section presenting with placenta previa, c) H/o uterine surgical interventions. Participants who were lost to follow-up and those having incomplete studies were excluded. After approval of the study by our Institute's ethical committee, patients matching the inclusion criteria were enrolled in the study after obtaining informed consent. All patients underwent ultrasound examination in their third trimester using a transabdominal curvilinear array low frequency (2.5-5 MHz) and linear array high frequency (5-7.5 MHz) transducer after optimal bladder filling. The final outcome was assessed on the basis of histopathology /intraoperative findings when a hysterectomy was not performed.

Statistical Analysis

Frequency distribution and cross-tabulation was done from the data collected. Results are presented as mean ± standard deviation (SD) and median. 2 x2 contiguity tables were prepared to calculate diagnostic accuracy, Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the diagnostic criterion and compared with the histopathology or intraoperative findings as the gold standard.

RESULTS

Table 1 - Our study consisted of 50 subjects, the majority of the participants were between 26-30 years (50%), 36 % were in the range of 20-25 years and 14 % of the participants were > 30 years old. The mean POG was 31.9 ± 2.2 weeks, with a maximum i.e., 62% of study participants belonging to the 28-32 weeks group while 38% (19) were more than 32 weeks pregnant. 38% of study participants had a history of one cesarean section, 34 % of participants had a history of two cesarean sections and four had no history of a previous section. Out of 50 study participants, only four participants had a prior history of Dilation and curettage. About 82% (41) had placenta previa. Among the study participants loss of RPS was noted in 27(54 %) patients while 23 (46%) had preserved RPS.

Table 2 - The table below shows that out of 50 subjects, 23 had PAS, while 27 study participants had negative findings.

Table 3 - Of the 50 participants, 5 had a wrong false positive diagnosis on USG and one was classified as false negative. True positive findings were found in 22 study participants while true negative findings were found in 22 study participants.

Table 4 - Above table documents the comparison of

intraoperative/histological outcomes with USG finding of loss of RPS. The diagnostic accuracy of loss of RPS in the diagnosis of PAS is 88 %. Also the Sensitivity, Specificity, PPV, and NPV in differentiating USG from histopathological findings were found to be 95.65%, 81.48%, 81.48%, and 95.65% respectively.

Table – 1 Distribution Of Various Variables In The Study Participants

S.N	Variable	Category	Number	Percentage
1	Age	20-25	18	36
		26-30	25	50
		>30	7	14
2	Period of gestation (POG)	28-32	31	62
		>32	19	38
3	History of caesarean section (Cs)	0	4	8
		1	29	38
		2	17	34
4	History of Dilation and Curettage	Absent	46	92
		Present	4	8
5	Placenta Previa	Absent	9	18
		Present	41	82
6	Loss of RPS	Absent	23	46
		Present	27	54

Table No. 2 - Distribution Of Surgical Outcome Among Study Participants

		N (%)
PAS	Other	8(16)
	Previa	15(30)
Non- PAS	NORMAL	5(10)
	PREVIA	22(44)
	Total	50(100)

Table 3 – Contingency Table (2x2) To Determine The Diagnostic Performance Of Loss Of Rps Finding Among Study Subjects

FINDING		SURGICAL OUTCOME			Chi-square Test	P Value
		PAS Positive	PAS Negative	Total		
		N (%)	N (%)	N (%)		
LOSS OF RPS	NO	1(4.4)	22(95.7)	23(46)	29.748	0.001
	YES	22(81.5)	5(18.5)	27(54)		
Total		23(46)	27(54)	50		

Table No.4 - Sensitivity, Specificity, Diagnostic Accuracy, Ppv And Npv Of Loss Of Rps In Antenatal Diagnosis Of Placenta Accreta Spectrum Disorders

Diagnostic Criteria	Sensitivity	Specificity	Accuracy	PPV	NPV
Loss Of RPS	95.65 %	81.48%	88 %	81.48%	95.65%
95% CI	78.05% to 99.89%	61.92% to 93.70%	75.69% to 95.47%	61.92% to 93.70%	78.05% to 99.89%

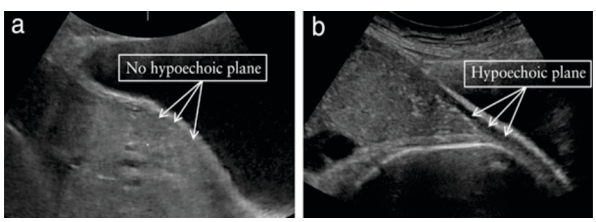

Figure 1: Loss Of The 'clear Zone' (a) And A Normal Example For Comparison (b) On Grayscale Ultrasound

DISCUSSION

The present study consisted of 50 study participants who were pregnant women with mean age 27.4 ± 3.7 years. Among them, maximum (50%) belonged to the age group 26-30 years while minimum (14%) were above 30 years. Most patients presented early at 28-32 weeks of POG, while 38% were diagnosed later in the pregnancy at > 32 weeks with the mean POG at 31.9 ± 2.2 weeks. (Table- 1). A study conducted by Haba RM et al (6), inferred the mean age of 32 ± 3.7 years in PAS-positive patients have a statistically significant association, which is contrary to the following study where no significant association was found between age and PAS, and also stated mean gestational age of 35.77 ± 2.1 weeks, which is not significantly associated with the PAS, similar to our study. Another study done by Cali G et al reported the patients' mean age was 29.5 years, with gestational age at diagnosis of 16–36 weeks (7)

In the current study, 29 study participants had a history of one previous c-section while 4 had no history of cesarean section. (Table -1) However, a review of the last decade's literature shows an increasing incidence of placenta accreta, mainly due to more frequent CSs. Moreover, a few more study shows the patient diagnose with the MAP (15 placenta accreta, nine placenta increta, and 17 placenta percreta) had an anterior placenta previa (34 major and seven minor) and had previously undergone at least one CS (7,8). The risk of PAS was reported to be 3%, 11%, 40%, 61%, and 67% for first, second, third, fourth, and fifth or more cesarean deliveries, respectively by a multicentric US cohort study r in women presenting with placenta previa and prior cesarean delivery (9)

Our study also showed that, out of 50 subjects, 23 had PAS among which, 15 had previa (Table-2). Concerning previa in this study, a statistically significant association has been found with PAS. Studies by Jauniaux et al reported similar findings with at least one cesarean section or uterine surgery and a low-lying placenta or placenta previa increases the high risk of developing PAS disorders (9)

The current study showed that 54 % had a loss of retroplacental space, out of which 81.5% were true positive while 18.5% were true negative (Table -3). The diagnostic accuracy of loss of RPS in the diagnosis of PAS is 88 %. The Sensitivity and Specificity in differentiating USG from histopathological findings were found to be 95.65%, and 81.48%, respectively with significant p-value (p=0.001) (Table -4). A cohort study conducted by Haba et al (6), reported all the evaluated ultrasound signs were significantly associated with PAS-positive women, likely, myometrial thinning (87%), placental lacunar spaces (87%), followed by hypervascularity (84%) and reported maximum sensitivity was held by the loss of retroplacental space. According to Cali G et all the most effective ultrasound criteria for detection of MAP were abnormal clear space and uterine serosa–bladder wall interface hypervascularity, with NPV of 96.7% and 97%, respectively. Their study suggests that the lack of loss/irregularity of clear space may help to exclude the diagnosis of MAP. MAP is unlikely to occur, if the retroplacental echolucent area is preserved, especially in cases of low anterior placenta (7).

CONCLUSION

Our study confirmed the value of ultrasound in the diagnosis of PAS in a low-income setting as a primary modality. Women having any risk factors for PAS such as placenta previa, uterine scar, uterine surgery or intervention can be screened for PAS using ultrasound as it is low cost and easily available. Loss of RPS is a direct marker of PAS (3). It has high sensitivity but low specificity due to high false positive findings. The retroplacental space can be influenced by the compressive effect of the ultrasound probe (10). Care must be taken to minimize the compressive effect of the probe and use of appropriate dynamic range and focus to enlarge the image for proper assessment. (11)

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