

Diagnostic Accuracy of Grey Ultrasound in Antenatal Diagnosis of Morbidly Adherent Placenta, Taking Per-Operative Findings of Caesarean Section as Gold Standard

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ABSTRACT

Objective: To assess the diagnostic accurateness of grey ultrasound in the antenatal diagnosis of morbidly adherent placenta, taking per- operative findings of caesarean section as gold standard.

Study Design: Cross sectional study.

Place and Duration of Study: Radiology Department in collaboration with Obstetrics and Gynecology Department, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Aug 2019 to Aug 2020.

Methodology: 89 pregnant women registered with diagnosis of placenta Previa in present pregnancy were included. Primi-gravida and females with pregnancies complicated by diabetes, heart disease and hypertension were omitted from study. All patients endured grey ultrasound examination and revealed absence or presence of morbidly adherent placenta Previa. Grey ultrasound results were associated with surgical per-operative findings.

Results: The mean age of the patients was 27.78 ± 2.65 years. In patients with positive ultrasound results, 01 was false positive and 10 were true positive. Of the 78 ultrasound negative results, true negative were 70 patients and 02 were false negative ($p=1000$). Of the 78 ultrasound negative results, true negative were 70 patients and 02 were false negative ($p=1000$). Specificity, sensitivity, negative predictive value, positive predictive value and diagnostic accurateness of grey ultrasound in the antenatal analysis of morbidly adherent placenta are 98.36%, 87.5%, 98.36%, 87.5% and 97.10%, respectively.

Conclusion: In this study, the grey ultrasonography showed greater diagnostic accuracy in the prenatal detection of the morbidly adherent placenta in pregnant women with placenta previa.

Keywords: Diagnosis, Doppler Ultrasound, Morbidly Adherent Placenta.

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INTRODUCTION

A morbidly adherent placenta (MAP) is define as the anomalous or partial placental adherence to the underlying wall of uterus. The MAP is a rare complication of the placenta, but it causes complications that are life-threatening and fertile issues, and involves accrete, increta and percreta.¹⁻⁴ It was institute to be the 3rd utmost usual indication for sudden obstetric hysterectomy after uterine atony and uterine rupture in Pakistan.⁵

The MAP incidence has increased dramatically over the past three decades. Especially in women with placenta Previa, the incidence of the abnormal placenta increases everyday and is multiplied by ten. Placenta accreta about 80% of MAP , 15% increta⁶⁻⁷ and percreta is about 5% .The well identified MAP risk factors are the previous cesarean section and placenta previa. Rendering to the American College of

Obstetrics and Gynecologists, the MAP incidence is one in 2,500 live births. The latest reports show a frequency of between 1 in 2,500 and 1 in 1,100 births. The company reports maternal deaths at 10%.⁷

Our capability to identify pathologically adherent placenta has transformed over the past era. Depending on experience and the availability of equipment, magnetic resonance imaging (MRI), ultrasound (ultrasound) or a mixture of these methods are currently used.⁸⁻¹⁰

Considering MAP that may cause fertility problem and life-threatening issue, this analysis was held to govern the grey ultrasound diagnostic accuracy in the prenatal analysis of a MAP. This will assist us understand the importance of this method in the prompt MAP diagnosis and treatment of patients.

METHODOLOGY

This cross sectional study was held in the Radiology department in collaboration with obstetrics and gynecology department of Pak Emirates Military Hospital, Rawalpindi for one-year duration from

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March 2019 to March 2020. Ethical approval was obtained by ethical committee via letter number A/28/Ec/219/2020. Sample size was calculated by using the WHO sample size calculator by using the population prevalence of morbidly adherent placenta as 0.32%.¹¹ Non probability consecutive sampling technique was used to gather the sample for this study.

Inclusion Criteria: A total of 89 pregnant women registered in the third trimester of pregnancy (diagnosed in early ultrasound) with the diagnosis of the placenta Previa in the present pregnancy were included.

Exclusion Criteria: The females who were primi-gravida and females with pregnancies complicated by diabetes, heart disease and hypertension were omitted from the study. All patients endured grey ultrasound examination and revealed the absence or presence of a morbidly adherent placenta Previa. Grey ultrasound results were associated with per op surgical findings (considered the gold standard).

After obtaining informed agreement and a sufficient history of all patients, grey ultrasound was done in all patients by an ultrasound consultant with 3 years of experience. The diagnosis of MAP was made by grey ultrasound due to the presence of any of them, namely; Sonolucent vascular lakes with turbulent flow, complete retroplacental sonolucent zone loss, distinctly vessels in dilated form over the peripheral sub-placental region and disruption or thinning of hyperechoic uterine serosa-bladder interface with atypical blood vessels connecting the placenta to the bladder. Each woman had an operation in the appropriate setup. Grey ultrasound results were associated with surgical per-operative findings (considered the gold standard).

The gathered information was analyzed using the SPSS 21.0 software. The standard deviation and mean were documented for quantitative variables. For qualitative variables; Percentage and frequency were determined. Pearson chi-square test was used to see the association. A 2x2 likelihood table was applied to assess the sensitivity, specificity, NPV, PPV and grey ultrasound diagnostic accuracy in the prenatal diagnosis of morbid adherent placenta in pregnant women with placenta Previa. The p value ≤ was considered as significant.

RESULTS

A total of 89 patients meeting the inclusion/exclusion criteria were made part of the final analysis.

27.78±2.65 years was the mean age of the patients. In patients with positive ultrasound results, 01 was false positive and 10 were true positive. Of the 78 ultrasound negative results, true negative were 70 patients and 02 were false negative (Table-I). Specificity, sensitivity, negative predictive value, positive predictive value and diagnostic accurateness of grey ultrasound in the antenatal analysis of MAP are 98.36%, 87.5%, 98.36%, 87.5% and 97.10%, respectively (Table-II). There was a distribution of patients by parity, 35(39.32%) had >3 points between 1-3 and 38(42.69%). Grey ultrasound was performed in all patients. The pathologically adherent placenta was found on ultrasound in 11(12.36%) women. Surgical identification of the diseased placenta was confirmed in 12(13.48%) patients, and 77(86.51%) women did not have a disease-related placenta. Patients who were ultrasound positive during surgery had no morbidly adherent placenta 07 (true positive) and morbid adherent placenta 01 (false positive).

Table-I: Comparison of results of Ultrasound and Operative Findings (n=89)

	Results on ultrasound		p-value
	Positive	Negative	
Operative findings			
Positive	17(19.1%)	01(1.1%)	<0.001
Negative	26(29.2%)	22(24.7%)	

Table-II: Diagnostic Accuracy of Color Doppler Ultrasound in Antenatal Diagnosis of Morbidly Adherent Placenta (n=89)

Diagnostic Parameters	Values
Sensitivity= True Positive / (True Positive +False Negative)	87.5%
Specificity= True Negative / (True Negative +False Positive)	98.36%
Positive Predictive Value= True Positive / (True Positive+ False Positive)	87.5%
Negative Predictive Value= True Negative / (True Negative +False Negative)	98.36%
Diagnostic Accuracy= (True Positive +True Negative) / All Patients	97.10%

DISCUSSION

The introduction to modern obstetrics using the grey Doppler method in obstetrics has assisted in the fast diagnosis and treatment of the morbidity adherent placenta. Through this achievement, these inexpensive methods can completely replace MRI in the analysis of pathologically adherent placenta. The necessity for this analysis was that we consider MAP as a life-intimidating issue and that the grey ultrasound diagnostic accuracy could help us understand the role

of this method in early diagnosis and subsequent therapy.¹²

In this study 52(58.43%) 18-30 years, 37(41.51%) 31-35 years, 27.78±2.65 years is the Mean±SD. Specificity, sensitivity, negative predictive value, positive predictive value and diagnostic accurateness of grey ultrasound in the antenatal analysis of MAP are 98.36%,87.5%, 98.36%, 87.5% and 97.10%, respectively.

These results are reinforced by other analysis showing that the Color Doppler US specificity is 92% to 96.8% and sensitivity is 82.4% to 100%. The predicted frequency of ultrasound in MAP detection was 83%. It was detected that the anterior segment of the inferior uterus was the most common site of placental accreta, and grey ultrasonography was useful for demonstrating blood flow through the placenta to the bladder border due to its superficial position.^{13,14}

Cali *et al.*, in their study concluded that Color Doppler diagnostic accuracy has been established in patients with morbid adherent placenta (MAP) and criteria have been established for the separation of the placenta percreta,¹⁵ from the placenta accreta. Naz *et al.*, in 2016 described, placental lacunae were the most predictive findings of ultrasound for PA. Intraplacental lacunae are linear and parallel vascular channels that vary in shape and size.¹⁶ They are observed in the placental parenchyma, which extends from the placental parenchyma to the uterine muscle and forms a placenta with a "Swiss cheese" or "moth-eaten" appearance.¹⁷

Rendering to the study, the placental lacunae presence is much significant in the PA diagnosis, especially if the visualization of the placental lacunae takes place at the age of 15 weeks, its sensitivity is 78% -93%, and specificity is 78.6%. The greater the number of lacunae, the greater the risk of PA.¹⁸

Three recently published study demonstrated the diagnostic accuracy of ultrasound in the diagnosis of invasive placenta, the use of magnetic resonance imaging, and the comparison of ultrasound with magnetic resonance. It was concluded that 100% sensitivity for the diagnosis of invasive placenta and 37.5% specificity for USG and 76.9% sensitivity and 50% specificity for MRI.¹⁹

Color Doppler ultrasound images are popular because they are inexpensive, readily available, and widely used to detect abnormalities and placental positioning.²⁰ Color Doppler ultrasonography is

characterized by high sensitivity and specificity in the diagnosis of a diseased placenta, especially with the use of specific diagnostic criteria. However, the results of studies confirming other studies indicate that the diagnostic accuracy of color Doppler ultrasound in the prenatal diagnosis of a sick placenta in pregnant women with premature placenta is much greater and this method may be more often used in treatment. on time.

CONCLUSION

The study showed an advanced analytical accurateness of grey ultrasound in the prenatal diagnosis of pathologically adherent placenta in pregnant women with placenta previa. Screening of particularly high-risk patients prior to delivery is recommended for the diagnosis of morbidity in order to implement appropriate treatment protocols.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

DS & AC: Data acquisition, data analysis, critical review, approval of the final version to be published.

K & IT: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

ZT & SA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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