

ORIGINAL ARTICLE

Diagnostic Accuracy of Doppler Ultrasound for Antenatal Detection of Morbidly Adherent Placenta

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ABSTRACT

Introduction: The incidence of the morbidly-adherent placenta, previously thought to be very uncommon, is rising in contemporary obstetrical practice and obstetricians must be cognizant of this. Massive obstetric haemorrhage, particularly at delivery, is the principal clinical problem and the condition is associated with a risk of maternal and perinatal mortality of upto 10%. Imaging plays an important role in the antenatal detection of this condition.

Objective: To determine the diagnostic accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard.

Study Design: Cross sectional study

Settings: The study was conducted in Obstetric and gynaecology unit 1, Sir Ganga Ram Hospital Lahore

Duration of Study: Jan 2013 to June 2013

Results: Frequency of morbidly adherent placenta is females having placenta previa revealed in 14.38%(n=23), accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard reveals 12.5%(n=3) true positive, 1.25%(n=2) false positive, 1.88%(n=3) false negative and 84.38%(n=135) as true negative. Whereas specificity, sensitivity, positive predictive value, negative predictive value and diagnostic accuracy was calculated as 86.96%, 98.54%, 90.91%, 97.83% and 98.13% respectively.

Conclusion: It is concluded that Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard is an accurate method of diagnosis.

Key words: Morbidly adherent placenta, diagnosis, ultrasound, diagnostic accuracy.

INTRODUCTION

Morbidly adherent placenta is a condition in which all or part of placenta is adherent to the uterine wall because of myometrial invasion by chorionic villi¹.its incidence is 13.4%.²

Morbidly adherent placenta is an important etiology of maternal morbidity and mortality³.The morbidity is 10.3%.⁴.Its is the leading cause of emergency postpartum hysterectomy owing to massive haemorrhage³.Other complications include ureteric damage, bladder injury, perinatal death, disseminated intravascular coagulations, infections and vesicovaginal fistula formation.⁵

Major risk factors include placenta previa and prior caesarean section⁶.Other associated factors are advanced maternal age, uterine curettage and myomectomy.³

Ultrasonography and color Doppler studies are first choice diagnostic methods⁷.Myometrial involvement greater than 1 mm with large placental

lakes on Doppler ultrasound predicts myometrial invasion¹.One study shows sensitivity of Doppler ultrasound in diagnosis of placenta previa (Accrete, Increta, Percreta) is 77.3% and specificity is 98.4%.⁴

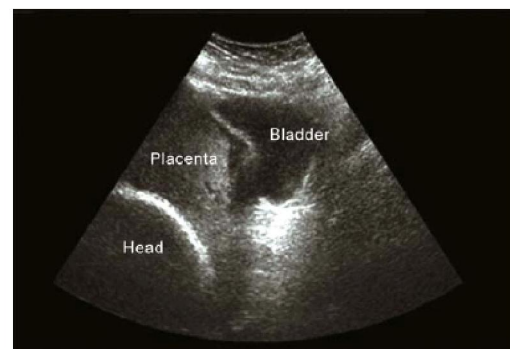


Fig 1: Ultrasound image shows disruption of the posterior bladder wall-uterine interface.

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Another study shows sensitivity of Doppler ultrasound is 93% and specificity is 71%⁸. Doppler ultrasound has positive impact on peripartum management of the affected patients through reducing the fetomaternal morbidity and mortality.⁴

Hysterectomy has traditionally been advised for management of morbidly adherent placenta but conservative management for preservation of fertility has now been implicated⁹.

The importance of my study is to determine the diagnostic accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta, as still there are discrepancies in results of different studies, my study will add to sort out these discrepancies.

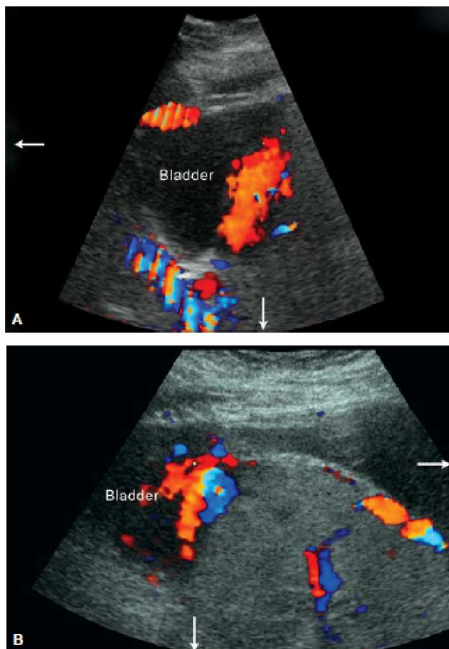


Fig. 2: Color Doppler US Images (A,B) show large vessels at the bladder base which cross the placenta

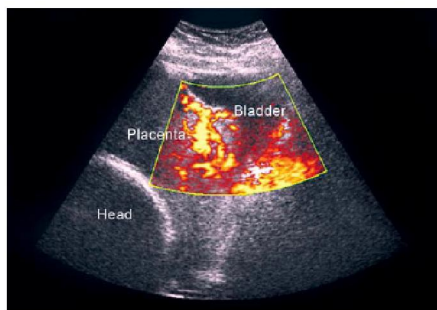


Fig. 3: Spectral power Doppler Ultrasound image of vessels exhibiting high velocity and low impedance flow

MATERIAL AND METHODS

Study Design:

- Cross sectional study

Settings:

- Obstetrics and gynaecology unit 1, Sir Ganga Ram Hospital, Lahore.

Study Duration:

- Jan 2013 to June 2013

Sample Size:

- Sample size of 160 cases, was calculated with 95% confidence level, 11% margin of error and taking expected percentage of morbidly adherent placenta i.e 13.4% with sensitivity 93%, specificity 71% of Doppler ultrasound in the diagnosis of morbidly adherent placenta by taking surgical findings as Gold standard.

Sampling Technique:

- Non-probability purposive sampling

SAMPLE SELECTION

Inclusion Criteria:

- Age 20-40 years
- Primigravida to gravida 4
- Single pregnancy (on ultrasound)
- Gestational age \geq 28 weeks (on ultrasound)
- Diagnosed cases of placenta previa (type-III and IV on ultrasound)

Exclusion Criteria:

- Maternal bleeding disorders (on investigations, decreased platelets count, deranged coagulation profile)
- Placental abruption (on ultrasound)

DATA COLLECTION PROCEDURE:

160 pregnant women presenting in Obstetrics and Gynae Unit-1 SGRH Lahore through emergency and Outpatient Department, fulfilling inclusion and exclusion criteria were selected in this study. Informed consent was taken regarding usage of personal information for purpose of study. All these patients were admitted in wards and their Doppler ultrasound studies were carried out to look for placenta previa, increta and percreta. All these patients were followed till delivery. Their surgical findings for evidence of morbidly adherent placenta (previa, increta, percreta) were noted and compared with Doppler ultrasound reports. All these information were entered in predesigned performa. Doppler ultrasound was performed by senior radiologist in Department of Radiology SGRH, Lahore.

DATA ANALYSIS:

Data was entered and analysed by SPSS version 11 computer based software programme. Mean and standard deviation was calculated for patient age and gestational age. Diagnostic accuracy, specificity, sensitivity, positive predictive value and negative predictive value was calculated by using 2x2 table and surgical findings were taken as Gold standard.

RESULTS

A total of 160 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the diagnostic accuracy of Doppler ultrasound for antenatal detection of morbidly

adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard.

Accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard reveals 12.5%(n=20) true positive, 1.25%(n=2) false positive, 1.88%(n=3) false negative and 84.38%(n=135) as true negative. Whereas specificity, sensitivity, positive predictive value, negative predictive value and diagnostic accuracy was calculated as 86.96% , 98.54% , 90.91% , 97.83% ,and 98.13% respectively.(table no 1).

Table 1: Diagnostic accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard (n=160)

Doppler ultrasound	Morbidly adherent placenta (n=23)		Total
	Positive	Negative	
Positive	True positive (a) 20 (12.5%)	False positive (b) 2 (1.25%)	a + b 22 (13.75%)
Negative	False negative (c) 3 (1.88%)	True negative (d) 135 (84.38%)	c + d 138 (86.25%)
Total	a + c 23 (14.38%)	b + d 137 (85.62%)	160 (100%)

Sensitivity = $a / (a+c) \times 100 = 86.96\%$
 Specificity = $d / (d + b) \times 100 = 98.54\%$
 Positive predictive value = $a / (a + b) \times 100 = 90.91\%$
 Negative predictive value = $d / (d + c) \times 100 = 97.83\%$
 Accuracy rate = $a+d / (a+d+b+c) \times 100 = 98.13\%$

DISCUSSION

The incidence of morbidly adherent placenta with its associated complication is on rise due to increasing rate of cesarian section rate. Imaging plays an important role in the antenatal detection of this condition. Based on the case series at our local institution, we describe the imaging characteristics of this condition as seen on greyscale ultrasonography, colour/power Doppler ultrasonography, three dimensional ultrasonography and magnetic resonance imaging.

We intend to conduct this to determine the diagnostic accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta , as still there are discrepancies in results of different studies, this study may add to sort out these discrepancies.

The results of the study reveal that majority of the patients i.e 44,38%(n=71) were between 26-30

years, frequency of morbidly adherent placenta in gravid females having placenta previa revealed in 14.38%(n=23)

The findings regarding frequency of the morbidity are slightly higher but considered to be with Okoro O¹¹ who recorded it in 9.3% having placenta previa.

Accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard reveals 12.5%(n=20) true positive, 1.25%(n=2) false positive , 1.88%(n=3) false negative and 84.38%(n=135) as true negative. Whereas specificity, sensitivity, positive predictive value, negative predictive value and diagnostic accuracy was calculated as 86.96%, 98.54% , 90.91% ,97.83% , and 98.13% respectively.

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These findings are in agreement with a study showing sensitivity of Doppler ultrasound in diagnosis of placenta previa (Accreta, increta, percreta) is 77.3% and specificity is 98.4%⁴ while another study shows sensitivity of Doppler ultrasound is 93% and specificity is 71%⁸.

Cali G and workers¹² in a recent study reviewed ultrasound criteria as an accurate prenatal diagnosis of the degree of pathologies placental adherence and to differentiate between placenta accreta and percreta a 3D power Doppler techniques were an important aid in the diagnosis.

Another recent study by Wong HS and co workers¹³ examined the usefulness of sonographic criteria in the assessment of the lateral extent and depth of myometrial involvement in morbidly adherent placenta and concluded that assessment of the placental/myometrial involvement of morbidly adherent placenta is possible on antenatal ultrasound examination.

However, we determined higher diagnostic accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta, the results of the study may be an addition to sort out the discrepancies regarding frequency of diagnostic accuracy.

CONCLUSION

It is concluded that Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presenting with placenta previa major degree taking surgical evidence as gold standard is an accurate method of diagnosis, so should be included for pre operative assessment of all patients presenting with placenta previas with other risk factors.

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