

Diagnostic Accuracy of Ultrasonography in Diagnosing Morbidly Adherent Placenta, Taking Intra-Operative Findings as Gold Standard

Anum Yousaf,¹ Misbah Durrani,² Khoala Riaz,³ Ume Kalsoom,⁴ Hassan Parvez⁵

Abstract

Objective: Various imaging modalities can be employed for the placenta accreta diagnosis like USG and MRI, however, their exact diagnostic accuracy is yet to be established. This study was conducted for determining the accuracy of ultrasonography in diagnosing morbidly adherent placenta in women with a previous scar, taking the per-operative findings as gold standard.

Methods: This descriptive cross-sectional study was carried out at department of Radiology, Benazir Bhutto Hospital, Rawalpindi from 6th January 2019 to 5th July 2019. Using non-probability purposive sampling 118 pregnant women with single pregnancy of age 18-40 years were included. Both grey scale and color doppler findings of ultrasound were employed for ascertaining presence or absence of morbidly adherent placenta. Per-operative findings of all patients who underwent cesarean section afterwards in their respective wards were registered. The findings of USG were then compared with the per-operative observations.

Results: Among patients in whom USG findings were of morbidly adherent placenta, 60 were true positive while 05 were false positive, whereas, in the patients with no evidence of morbidly adherent placenta on USG, 03 were false negative while 50 were true negative. The sensitivity, specificity, positive predictive value negative predictive value and diagnostic accuracy of USG in diagnosing morbidly adherent placenta in previous scar women, taking per-operative findings as gold standard was 95.24%, 90.91%, 92.31%, 94.34% and 93.22% respectively.

Conclusion: It can be inferred from our study that USG is a very sensitive and accurate non-invasive imaging technique for the diagnosis of morbidly adherent placenta.

Keywords: morbidly adherent placenta, ultrasonography, sensitivity.

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Introduction

The term “morbidly adherent placenta” is used to denote an abnormal attachment of placenta. It can either be accreta, increta or percreta as per its depth of invasion. The increased cesarean rate in the world is the main culprit of increasing incidence of morbidly adherent placenta.¹ A recent study

conducted by WHO which included 137 countries found that 69 nations had rates of cesarean sections above 15% whereas a significant number of countries had this rate as high as 30-35%.² These high rates of cesarean sections world-wide are associated with a number of complications and constitute a significant proportion of maternal morbidity and mortality rate.³ These complications include massive hemorrhage, need for large volume transfusions, infections, ureteral and bladder damage, ICU admissions and ventilation. With a view to over-come these complications the overall management of pregnancy has been improved significantly from time to time including an update of antenatal diagnostic approach and perioperative strategies.⁴

Prenatal diagnosis is essential for appropriate

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counseling and surgical planning to be performed. A confirm diagnosis of placenta accreta can only be made on pathological basis after hysterectomy. Visualization of chorionic villi extending to myometrium with no decidual layer in-between on the histological sample confirms the diagnosis.

Various imaging modalities can be employed for the placenta accreta diagnosis like USG and MRI, however, their exact diagnostic accuracy is yet to be established and is mainly operator dependant.⁵ The features of adherent placenta on ultrasonography are numerous vascular spaces within placenta, no retro-placental clear or hypo-echogenic zone, interrupted bladder wall and thin myometrium as shown in figure I.⁶

This study was conducted for determining the accuracy of ultrasonography in diagnosing morbidly adherent placenta in women with a previous scar, taking the per-operative findings as gold standard. This will not only highlight the local stats of the USG diagnostic accuracy in morbidly adherent placenta but also these particular patients can be provided with a non-invasive imaging modality for accurate prenatal identification of morbidly adherent placenta. Moreover, it will also help clinicians for optimal obstetric management.

Methods

This descriptive cross-sectional study was carried out at department of Radiology, Benazir Bhutto Hospital, Rawalpindi from 6th January 2019 to 5th July 2019. Using non-probability purposive sampling 118 pregnant women of age 18-40 years with singleton pregnancy with history of one or more cesarean sections were included after ethical approval of the study from the ethical review board of Rawalpindi Medical University. After taking informed consent, ultrasound was done by Doppler ultrasound machine using 3.5 MHZ curvilinear transducer. Both grey scale and Color Doppler findings of ultrasound were noted and interpreted collectively under supervision of a classified radiologist and presence or absence of morbidly adherent placenta was ascertained. Then intra-operative findings of all patients who underwent cesarean section in the concerned ward were noted. USG findings were compared with the operative findings.

Age, gestational age, parity and number of previous cesarean sections were presented as mean and standard deviation. Morbidly adherent placenta on USG and intra-operative findings were presented as frequency

and percentage. Collected data was analyzed through computer software SPSS 23.0.

Results

The mean age of patients in our study was 28.64 ± 3.87 years with a range of 18-40 years. About three fourth of the subjects 89 (75.42%) were between 18 to 30 years of age. The mean gestational age was 38.55 ± 1.22 weeks with a mean parity of 2.25 ± 0.64 . Whereas, the mean number of previous cesarean sections was 1.24 ± 0.64 . All of this is summarized in Table I.

Ultrasound of all the subjects was done by a qualified sinologist having appropriate training in this regard. USG showed the morbidly adherent placenta in 65 (55.08%) patients. Operative findings confirmed morbidly adherent placenta in 63 (53.39%) cases where as 55 (46.61%) patients revealed no morbidly adherent placenta. In USG positive patients, 60 were true positive while 05 were false positive. Among, 53 USG negative patients, 03 were false negative while 50 were true negative as shown in Table II.

Table 1: Demographics and Other Characteristics of the Patients

Parameters	Mean \pm SD
Age	28.64 \pm 3.87 years
Gestational Age	38.55 \pm 1.22 weeks
Parity	2.25 \pm 0.64
Cesarean section	1.24 \pm 0.64

Table 2: Table II: Diagnostic Accuracy of Ultrasonography (USG) in Diagnosing Morbidly Adherent Placenta in Previous Scar Women, Taking Intra-Operative Findings as Gold Standard

USG Findings	Positive result on Surgery	Negative result on surgery
Positive result on USG	60 (TP)	05 (FP)
Negative result on USG	03 (FN)	50 (TN)

TP= True Positive, FP= False Positive, FN= False negative, TN= True Negative

Table 3: The Sensitivity, Specificity, PPV, NPV and DA of USG in Diagnosing Morbidly Adherent Placenta

Parameters	Sensitivity	Specificity	PPV*	NPV**	Dv***
Value	95.24	90.91	92.31	94.34	93.22

*Positive Predictive Value, **Negative Predictive Value, ***Diagnostic Accuracy

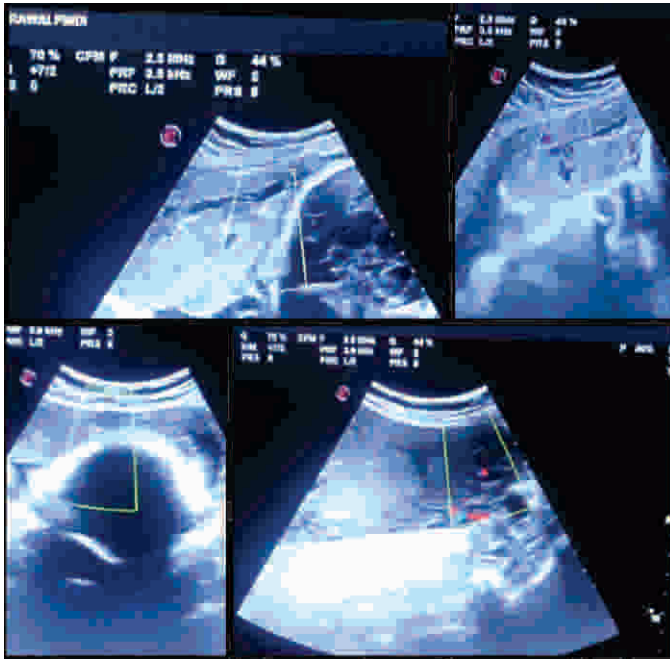


Figure 1: Normal Appearing Placenta Showing Maintained Retroplacental Hypoechoic Zone and No Significant Vascularity or Placental Lacunae in the Upper Half. In the Bottom Half, Marked Thinning of Retroplacental Hypoechoic Zone with Placental Lacunae and Vascularity is Evident

Overall sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of ultrasonography (USG) in diagnosing morbidly adherent placenta in previous scar women, taking intra-operative findings as gold standard was 95.24%, 90.91%, 92.31%, 94.34% and 93.22 respectively. This is summarized in table III.

Discussion

Morbidly adherent placenta is one of the biggest causes of maternal illness and death and can be regarded as the commonest cause of hysterectomy after delivery now a days. Placenta previa and previous history of cesarean sections are the major predisposing factors with the risk increasing as high as 50% with a history of 3 or more previous cesarean sections.^{7,8} An abnormality of the decidua basalis allows the chorionic villi to invade the myometrium. It is classified into 3 sub-types as per degree of invasion i.e. placenta accreta, placenta increta and placenta percreta. The most common type is the placenta accreta in which the villi attach to the myometrium of uterus but do not invade it. The second most common type is placenta increta in which the villi penetrate into the myometrium, however, invade it partially. The least common and the most severe form of morbidly adhe-

rent placenta is the placenta percreta in which the villi passes through the entire uterus and placenta may be seen attached to the nearby organs like bladder.

In our study, overall sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of ultrasonography (USG) in diagnosis of morbidly adherent placenta in previous scar women, taking per-operative findings as gold standard was 95.24%, 90.91%, 92.31%, 94.34% and 93.22% respectively. These results are in line with many of the previously conducted studies on the same topic. In a study, prevalence of morbidly adherent placenta was found to be 28.0% and sensitivity and specificity of ultrasonography in diagnosing morbidly adherent placenta as 85.7% and 83.3% respectively.⁹ In another study, sensitivity and specificity of ultrasonography in diagnosing morbidly adherent placenta was found to be 50.8% and 86.4% respectively.¹⁰

Ultrasonography is the first investigation of choice for assessment of placenta and its position. The transvaginal ultrasound has a sensitivity of 77% to 87% and specificity of 96% to 98% to detect an adherent placenta as per American College of Obstetrics & Gynecology. In addition, Positive Predictive Values (PPV) and Negative Predictive Value (NPV) reported are 65% to 93% and 98%, respectively.¹¹

Similarly, a local study showed sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of Doppler ultrasound in detecting morbidly adherent placenta as 87.5%, 98.36%, 87.5%, 98.36% and 97.10% respectively.¹²

Conclusion

This study concluded that ultrasonography is a very sensitive and accurate method of detecting a morbidly adherent placenta, and not only greatly improves our ability to detect it but also improves patient care through accurate diagnosis and timely devising appropriate intra-operative strategies. Therefore, being risk-free and a very sensitive diagnostic tool, we should recommend it as a primary diagnostic tool to accurately identify the placental abnormality in these patients in order to reduce maternal morbidity and mortality.

Conflict of Interest: None

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Authors Contribution

YA,DM: Conceptionlization of Project

YA,DM,RK: Data Collection

DM,RK: Literature Search

RK,KU: Statistical Analysis

KU,PH: Drafting, Revision

YA,DM,PH,KU: Writing of Manuscript