DOPPLER ULTRASOUND FOR ANTENATAL DETECTION OF MORBIDLY ADHERENT PLACENTA IN PATIENTS PRESENTED WITH PLACENTA PREVIA MAJOR DEGREE

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ABSTRACT

OBJECTIVE: To determine the diagnostic accuracy of Doppler ultrasound for antenatal detection of morbidly adherent placenta in patients presented with placenta previa major. **STUDY DESIGN:** Cross sectional validation survey. **SETTING:** Radiology and Gynecology department of Allied Hospital, Faisalabad. **DURATION OF STUDY:** Six month (31-05-2014 to 30-11-2014) after approval of synopsis. **SUBJECTS AND METHODS:** A total of 145 cases were included in this study. Doppler ultrasound was done to detect presence / absence of placenta accreta and patients were followed till delivery and per-operative findings were compared with Doppler USG findings. **RESULTS:** Sensitivity was found to be 86.5%, specificity 90.4%, diagnostic accuracy 95%, positive predictive value 95.7% and negative predictive value 72.5%. **CONCLUSION:** Doppler ultrasound is useful in detecting placenta accreta is patients with placenta previa.
Key words: Placenta accreta, Doppler ultrasound, morbidity.

Introduction

Morbidly adherent placenta is a condition in which all or part of placenta is adherent to the uterine wall because of myometrial invasion.[1] Its incidence is 1:2500 per deliveries.[2]

Morbidly adherent placenta is an important etiology of maternal morbidity and mortality.[3] Morbidly adherent placenta occur 82% cases of Placenta previa.[8] Its a leading cause of emergency postpartum hysterectomy owing to massive haemorrage.[3]

Major risk factors include placenta previa. Other associated factors are prior caesarian section.[5] other associated factors are advance maternal age, uterine curettage and myomectomy.[3]

Ultrasonography and colour studies are first choice diagnostic methods.[6] Myometrial involvement greater than 1mm with large placental lakes on Doppler ultra- sound predicts myometrial invasion.[1] Where as one study showed variable result of sensitivity of Doppler ultrasound in diagnosis of placenta morbidly adherent (accreta, increta, percreta) is 93% and specificity is 71%.[4] Another study shows sensitivity of Doppler ultrasound is 80%and specificity is 95%.[7] A diagnosis of morbidly adherent placenta can be confirmed with tissue histology; however antenatal diagnosis has brought a revolution in the management of such cases.[7]

The approach to management included various procedures like obstetric hysterectomy, internal iliac artery ligation, uterine ligation, sewing placental bed, leaving placenta in situ, B-Lynch suture, uterine packing and pelvic packing wedge resection of uterus.[8]

The importance of this study is to determine the diagnostic accuracy of Doppler ultrasound for ante- natal detection of morbidly adherent placenta, which

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is variable in previous study and may implement Doppler ultrasound for every patient presenting with placenta previa to decrease the morbidity and mortality associated with morbidly adherent placenta.

Materials and Methods

145 pregnant women presenting in Obstetrics & Gynaecology Unit-I Allied Hospital Faisalabad (AHF) through emergency and out patients department, fulfilling inclusion and exclusion criteria was selected in this study.

INCLUSION CRITERIA:
• Age 20-40 years.
• Primigravia to gravida 4
• Single pregnancy on ultrasound
• Gestational age ≥ 28 weeks on ultrasound
• Diagnosed cases of placenta previa major degree on ultrasound

EXCLUSION CRITERIA:
• Maternal bleeding disorders (on investigations: decreased platelets count, deranged coagulation profile)
• Placental abruption (on ultrasound)

Informed consent was taken regarding usage of personal information for purpose of study. All these patients were admitted in ward and their Doppler ultrasound studies were carried out in Radiology department to notice placenta accreta, increta, percreta. All these patients were followed till delivery. Their surgical findings for evidence of morbidly adherent placenta (acreta, increta, percreta) were noticed and compared with Doppler ultrasound report. All surgical procedures were performed by same surgical team. All this information was entered in pre-designed proforma (specimen attached) by resear-cher. Doppler ultrasound was carried out by senior radiologist in Department of Radiology AHF. Data was entered and analyzed by SPSS version 11 computer based software program. Mean and standard deviation were calculated for age and gestational age. Diagnostic accuracy, specificity, sensitivity, positive predictive and negative predictive value were calculated by using 2x2 table.

Results

Distribution of cases by age shows, patients were between 20 - 40 years of age with mean age of 28.23 ± 4.31 years. (Tab. 1)
Distribution of cases by gestational age shows, patient's gestational age between 30-36 weeks. Mean gestational age was found to be 34.3 ± 1.82 weeks. (Tab. 1)

	n	Minimum	Maximum	Mean	Std. Deviation
AGE	145	20	40	28.23	4.31
gestational age	145	30	36	34.14	1.82

Table 1: Distribution of cases by age

Out of 145 patients, patients were found to be married between from 1-15 years with mean married age of 3.52 ± 2.39. (Tab. 2)
Parity of patients were found to be between 1-5 with mean parity of 1.6 ± 0.92. (Tab. 2)

	n	Minimum	Maximum	Mean	Std. Deviation
Married for	145	1	15	3.52	2.39
Parity	145	1	5	1.61	.92

Table 2: Distribution of cases by Parity and Years of Marriage

Out of 145 patients Doppler ultrasound showed 94 positive cases while per operative findings (Gold standard) showed 90 positive cases. Sensitivity rate was found to be 86.5%, specificity was 90.24%, positive predictive value (PPV) 95.7% and negative predictive value (NPV) 72.5%. (Tab. 3, 4 & 5).

		Surgical Result		Total
		Positive	Negative	
Doppler Ultrasound	Positive	90	4	94
	Negative	14	37	51
Total		104	41	145

Table 3: Comparison of Per-Operative finding vs Doppler Ultrasound   n = 145

Discussion

Morbidly adherent placenta with its variants is one of the most feared complications causing high morbidity and mortality in obstetrics. Its incidence is 1 in 200-250,000 in USA and in 800 deliveries in UK. The marked increase in incidence has been attri-

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$$\text{Sensitivity} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}} \times 100 =$$

$$\frac{a}{a+c} \times 100 = \frac{90}{104} \times 100 = 86.5\%$$

$$\text{Specificity} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Positive}} \times 100 =$$

$$\frac{d}{b+d} \times 100 = \frac{37}{41} \times 100 = 90.24\%$$

$$\text{Diagnostic Accuracy} = \frac{TP+TN}{TP+FN+FP+TN} \times 100 = \frac{127}{145} \times 100 = 87.6\%$$

Table 4: Sensitivity, Specificity and Diagnostic accuracy of Doppler Ultrasound   n = 145

$$\text{Predictive value of Positive Test} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Positive}} \times 100 =$$

$$PPV = \frac{a}{a+b} \times 100 = \frac{90}{94} \times 100 = 95.7\%$$

$$\text{Predictive value of Negative Test} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Negative}} \times 100 =$$

$$NPV = \frac{d}{c+d} \times 100 = \frac{37}{51} \times 100 = 72.5\%$$

Table 5: Positive predicative value and negative predictive value of Doppler Ultrasound   n = 145

Figure 1: Sonographic images with placena previa & adherent placenta to myometrium_ Accreta

Figure 2: Doppler image of the same patient showing placental vessels traversing into the myometrium.

buted to the increased rate of caesarean sections in recent years, it occurs when the placenta is abnormally adherent to the uterine wall with the absence of the normal intervening decidua basalis and nitabuch"s layer. The most severe form of the condition is placenta percreta, in which the penetrates through the full thickness of the myometrium, through the serosa and may invade adjacent pelvic organs such as the bladder.[2]

During pregnancy it may be asymptomatic or may present with antepartum haemorrhage, abdominal pain. Whereas when intrapartum it may be retained associated with postpartum haemorrhage, uterine rupture. The MAP remains the greatest challenge in modern obstetrics. maternal risk is the greatest on attempt to separate the placenta, resulting torrential haemorrhage, disseminated intravascular coagulation, massive blood transfusion caesarean hysterectomy, need for intensive care and even death. Risk also increases in cases dealt in emergency without proper planning and multidisciplinary liaison.[7]

Risk factors of MAP include previous uterine scarring from caesarean sections, myomectomies, uterine curettages and infections. With increasing numbers of caesarean sections being now a days, it is postulated that the incidence of MAP would be on the rise. A high index of suspicion is required for diag-

nosis and ultrasonographic features suggestive of MAP must be sought in cases with risk factors.[67] Pelvic ultrasonography has been the most commonly used imaging modality for the diagnosed of MAP. Levine[91] and the coworkers reported their experience with 19 women at risk of whom seven had MAP. Ultrasonography accurately identified six of the seven women and correctly identified normal placentation in 11 of 12 cases. In a larger series, Chou et al[92] followed 80 women prospectively and of 16 considered to have ultrasound findings consistent with MAP, 14 had tissue evidence confirming the diagnosis of the remaining 64 studies interpreted as negative, placenta was adherent in three and the remainder was accurately diagnosed, resulting in a sensitivity of 82% and specificity of 96.8%.the findings of these two studies suggest that ultrasonography has a primary role in screening women at risk of MAP.

As a screening tool to detect MAP, the prerequisite of each individual ultrasound criterion is a sensitivity to detect more true positives in women at risk. A low sensitivity but high specific test (e.g. disrupted bladder mucosa) would result in a number of undiagnosed cases, despite the high level of confidence in recognizing true negative cases (MAP). Given the unique clinical management of MAP, the PPV and NPV of these diagnostic measures are as important as the sensitivity and specificity. Practically, the PPV reported for each criterion in this study indicates its reliability to correctly diagnose MAP; In other words, the confidence with which clinicians can proceed straight to hysterectomy without removing the placenta. In contrast, the NPV represents the precision of diagnosis of MAP, relating to the confidence with which clinicians can remove the placenta without concerns of severe bleeding.[93]

According to the present study, Doppler ultrasonography can be used as a complementary technique for making or excluding the diagnosis of MAP however diagnosis of MAP can be confirmed with tissue histology however medical imaging has brought revolution in the management of such cases.[7]

In present study, sensitivity was found to be 86.5%, specificity 90.4%, diagnostic accuracy 95%, positive predictive value 95.7% and negative predictive value 72.5%. These findings are consistent with a study by sultana N7. Similarly Dywer et al demonstrated that sonography correctly identified the presence of pla-

centa accreta. They reported 93% sensitivity, 71 % specificity.4

Conclusion

Doppler ultrasound is useful in detecting placenta accreta is patients with placenta previa. Doppler ultrasound fairly good diagnostic accuracy for diagnosis placenta accreta.

Clinicians should be aware of the risk factors and imaging features associated with this condition so they can provide the best for the patient.

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