Original Article

Implications of Placenta Accreta Index on Management of Patients with Placenta Accreta Spectrum

Ayesha Isani Majeed

Professor & Head of Radiology Department, Pakistan Institute of Medical Sciences, Islamabad

Correspondence: *Prof Ayesha Isani Majeed*
Professor & Head of Department Radiology, Pakistan Institute of Medical Sciences, Islamabad
Email: ayeshamajeed_1@hotmail.com

Abstract

Objective: To determine the implications of placenta accreta index on the management of patients with placenta accreta spectrum.

Methodology: A total of 200 patients with a history of at least 1 previous cesarean were included. The study was conducted in Islamabad based private clinic setup. Antenatal obstetric ultrasound was done for placental localization, presence of lacunae, bridging vessels and retroplacental myometrial thickness. The placenta accreta index (PAI) was used for high risk as a sum of scores for PAI parameters is calculated. The cumulative score of PAI parameters ranging between 0-3 were regarded as low risk, 4-5 as medium risk, and >6 as high risk. Data was collected via study proforma and analysis was done by using SPSS version 20.

Results: A total of 200 patients were studied and their average age corresponds to 33 years. Out of all, 35% cases fall in low-risk category, 40% fall in the medium risk category, and 25% of cases were attributed to high-risk category. 58.5% of patients had history of previous 2 or more cesarean deliveries and 17 patients having prior cesarean deliveries. 35 patients having a low risk for placenta accreta showed grade 2 lacunae, 75 patients from medium-risk group shows grade 2 lacunae whereas 20 patients from high risk also show grade 2 lacunae. 30 patients from the high-risk group showed grade 3 lacunae.

Conclusion: The timely diagnosis of placental adherence in terms of high PAI score allows the obstetrician to optimize the patient's care and provide for a preemptive management plan for patients.

Keywords: Placenta Accreta index, Prenatal diagnosis, Prenatal diagnosis.

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Introduction

The human fetus is solely dependent on placental tissue for its nutritive, respiratory, and excretory requirements during intrauterine life.[1] Morbidly adherent placenta (MAP) refers to abnormal placentation encompassing a spectrum depending upon the depth of placental invasion into the myometrium.[2]

Morbidly adherent placenta often results in life-threatening hemorrhages and emergency postpartum hysterectomies.[2] The increase in the incidence of MAP correlates with the rising number of cesarean section deliveries in the last 4 decades followed by endometrial ablation.[3] There is an established association of MAP with placenta previa as well.[4,5]

Prenatal diagnosis of MAP is of paramount importance and has a role in reducing the risk of maternal and fetal morbidity and mortality by optimizing the management at a tertiary care facility.[6] Undiagnosed MAP often leads to unplanned hysterectomies, excessive hemorrhages and longer hospital stays.[7]

The American College of Obstetricians and Gynecologists in collaboration with Society for Maternal-Fetal Medicine formulate a system to provide idealized obstetrical management to patients of placenta accreta spectrum.[8] According to its recommendations, such patients need management at level III subspecialty or higher care that ensures round

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the clock availability of experienced and trained hospital staff having expertise for management of complex obstetrical cases, presence of functioning interdisciplinary linkages and blood bank.[7]

The clinical risk assessment remains the primary tool for raising suspicion of MAP, however, the final diagnosis is based upon imaging where the diagnostic role of ultrasonography (US) cannot be denied. Studies have shown high sensitivity up to 90.7% and specificity of 96.9% of obstetric ultrasonography in the diagnosis of placenta accreta spectrum.[9]

The routine US examination at 18–20 weeks gestation provides an ideal opportunity for initial screening of abnormal placental adherence. Multiple placental lacunae, reduced myometrial thickness, loss of retroplacental hypoechoic clear zone, extension of placenta beyond uterine serosa and invasion of urinary bladder wall are the helpful ultrasound features for diagnosis of MAP.[1,10,11]

The abnormal color Doppler imaging patterns including bridging vessels across uterine-placental interface and increased vascularity also favor the diagnosis of MAP.[12,13]

Literature has documented significant interobserver variation in the interpretation of ultrasound findings of placenta accreta spectrum resulting in obvious disparities in the diagnosis of MAP.[7] Study by Bowman et al. documents results of his study where six experts blinded to clinical assessment and risk factors of MAP showed a difference in their prediction of placenta accreta spectrum based on ultrasound findings resulting in moderate agreement. The sensitivities varied between 53.4% to 74.4% and specificities 70.8% to 94.8%.[14]

In the light of the above data, there is an obvious need to utilize a standardized approach for the diagnosis of placenta accrete spectrum to reduce the element of subjectivity. In this regard, efforts have been made by a group of European experts in the past by standardizing the definitions of descriptors used for diagnosis of MAP however this alone does not serve the purpose.[15] To bring objectivity and uniformity in ultrasound reporting of MAP cases, we propose to follow the Placenta Accreta Index that is based on key predictors of MAP[16] This will help radiologists in focusing the parameters with maximum sensitivity and specificity while making a diagnosis of placenta accreta spectrum.

Methodology

A total of 200 patients from a diagnostic radiology facility were evaluated for placenta accreta spectrum according to PAI parameters. Patients with a history of at least 1 previous cesarean were included in the study. While performing antenatal obstetric ultrasound, the greyscale and Doppler parameters are focused for placental localization, presence of lacunae, bridging vessels and retroplacental myometrial thickness.

In addition to the above features, the parameters included in placenta accreta index (PAI) proposed by Mitchell et al.[16] also includes several cesarean sections. More than 2 cesarean sections is awarded score of 3. The lacunar spaces are scored according to their grade. Grade 2 lacunae are given score of 1 whereas grade 3 lacunae acquire a score of 3.5. The lacunae are graded according to Finberg and William as follows; absence of lacunae: grade 0, 1-3 small lacunae; grade 1, 4-6 larger and irregular lacunae: grade 2 and several bizzare lacunae distributed throughout placenta: grade 3. A score of 1 is awarded to myometrial thickness of $\leq$1mm, 0.5 to a myometrial thickness ranging between <1 to $\geq$3 and 0.25 to myometrial thickness ranging between >3 to $\leq$5 mm. Score of 1 is added for the presence of anterior placenta previa and 0.5 for visualization of bridging vessels.

A sum of scores for PAI parameters is calculated. The cumulative score of PAI parameters ranging between 0-3 were regarded as low risk, 4-5 as medium risk and $\geq$6 as high risk.

Results

A total of 200 patients were included in our study. The age of study participants ranged between 19 to 42 years. The average age corresponds to 33 yrs. Out of 200 patients, 70 patients (35%) fall in low risk category; 10 having PAI score of 0, 5 having a score of 0.5, 14 having score of 1, 22 having a score of 2, 2 having a score of 2.5, and 17 having score of 3. Total of 80 patients i.e. 40% of total fall in medium-risk category, 40 patients with PAI score of 4, 10 with score of 4.5 and 30 having a score of 5. The remaining 50 patients (25%) were attributed to high risk category, 20, 10, 10 and 10 patients having PAI score of 6, 7, 7.5 and >8 respectively. (Table I)

Table I: Classification of patients according to PAI score

PAI score	No. of patients	Percentage	Category
0	10	5%	Low risk
0.5	05	2.5%	
1	14	7%	
2	22	11%	
2.5	02	1%	
3	17	8.5%	
4	40	20%	Medium risk
4.5	10	5%	
5	30	15%	
6	20	10%	High risk
7	10	5%	
7.5	10	5%	
9	10	5%	

Of total 200 patients, 117 (58.5 %) had a history of previous 2 or more cesarean deliveries. Only 17 patients having prior cesarean deliveries correspond to low risk, 80 falls in medium risk, and 50 in high risk group. 35 patients having a low risk for placenta accreta showed grade 2 lacunae, 75 patients from medium risk group shows grade 2 lacunae whereas 20 patients from high risk also show grade 2 lacunae. 30 patients from high risk group showed grade 3 lacunae. 22 patients from low risk category had myometrium thickness of <1 but >3 mm, 10 patients had myometrial thickness of <1mm. 12 patients having anterior placenta previa were categorized as low risk based on composite PAI score, 35 corresponded to medium risk and 50 falls in high risk category. 15 patients from low risk category showed bridging vessels whereas 40 patients from high risk category showed this feature. (Table II)

Discussion

The utilization of placenta accreta index facilitates the management plan for patients diagnosed with MAP. The patients with high PAI score (>6) shall be delivered at a tertiary care facility to optimize the outcome. Our study suggests that ≥2 cesarean deliveries, grade 3 lacunae and myometrial thinning less than 1 mm are associated with higher risk of placenta accrete spectrum and subsequently require aggressive management. Similar features are also documented in literature having positive association with placenta accreta spectrum.[17,18] Cahill A G et al. propose immediate referral in cases of suspected placenta accreta spectrum to level III or IV facility as it grants adequate time for patient's counselling, management planning and making arrangements for fulfilling expected need of blood products.[7] It also gives emotional support to the patient and avoid mental trauma that patient would otherwise experience in cases of undiagnosed MAP. Patient optimization includes maintenance of hemoglobin levels, planning of delivery time, booking in tertiary care facility and collaboration with related departments including urologists, anesthesiologists, ICU specialists, neonatologists and blood banks.[19] It is noteworthy to document that patient counseling, stabilization and transfer to tertiary facility is a big issue in newly

Table II: Frequency of PAI parameters in our study population

Cesarean	lacunae	Sagittal smallest myometrial thickening	Anterior placenta previa	Bridging vessels	Total
0 (n=10)	0 (n=10)	0 (n=10)	0 (n=10)	0 (n=10)	0 (n=10)
0 (n=5)	0 (n=5)	0.5 (n=5)	0 (n=5)	0 (n=5)	0.5 (n=5)
0 (n=11)	1 (n=11)	0 (n=11)	0 (n=11)	0 (n=11)	1 (n=11)
0 (n=3)	0 (n=3)	0 (n=3)	1 (n=3)	0 (n=3)	1 (n=3)
0 (n=15)	1 (n=15)	0.5 (n=15)	0 (n=15)	0.5 (n=15)	2 (n=15)
0 (n=07)	1 (n=07)	0 (n=07)	1 (n=07)	0 (n=07)	2 (n=07)
0 (n=2)	1 (n=2)	0.5 (n=2)	1 (n=2)	0 (n=2)	2.5 (n=2)
3 (n=17)	0 (n=17)	0 (n=17)	0 (n=17)	0 (n=17)	3 (n=17)
3 (n=05)	0 (n=05)	0 (n=05)	1 (n=05)	0 (n=05)	4 (n=05)
3 (n=35)	1 (n=35)	0 (n=35)	0 (n=35)	0 (n=35)	4 (n=35)
3 (n=10)	1 (n=10)	0.5 (n=10)	0 (n=10)	0 (n=10)	4.5 (n=10)
3 (n=30)	1 (n=30)	0 (n=30)	1 (n=30)	0 (n=30)	5 (n=30)
3 (n=20)	1 (n=20)	0.5 (n=20)	1 (n=20)	0.5 (n=20)	6 (n=20)
3 (n=10)	3.5 (n=10)	0 (n=10)	0 (n=10)	0.5 (n=10)	7 (n=10)
3 (n=10)	3.5 (n=10)	0 (n=10)	1 (n=20)	0 (n=10)	7.5 (n=10)
3 (n=10)	3.5 (n=10)	1 (n=10)	1 (n=10)	0.5 (n=10)	9 (n=10)

diagnosed patients of placenta accreta spectrum. Such cases often end up in complications increasing the risk of morbidity and mortality.

In cases with placenta accreta spectrum, the obstetrician makes an appropriate schedule for prolonging pregnancy to the extent where fetal needs are benefitted without compromising the maternal risk.[20] Related studies suggest that 34-35 weeks of gestation is optimal as most tertiary care centers are able to provide care for preterm neonates at this gestation.[21, 22]

The studies suggest against prolonging the pregnancy beyond 36 weeks as this considerably increases the risk of antepartum hemorrhage and emergency delivery.[23]

The PAI index provides objective scoring for diagnosis of MAP, hence similar meticulous management planning needs to be followed in cases of high PAI. This also includes the administration of corticosteroids to expedite fetal lung maturation hence reducing the risk of respiratory distress syndrome in preterm neonates.[24]

In cases of grey zone, where antenatal diagnosis of MAP is uncertain a period of intraoperative observation can be opted for spontaneous uterine placental separation provided valid consent for hysterectomy and its arrangements are already in place.[7] Similar strategies can be adopted for PAI scores of 4 and 5 having an average probability of placental invasion of 51 and 69% respectively.

Simonazzi G. documents the benefits of prophylactic tranexamic acid administered during delivery after cord clamping in reducing the risk of hemorrhage with placenta accreta spectrum.[25] In cases of uncontrolled hemorrhage, ligation of hypogastric artery on embolization of bleeder vessels by interventional radiologists are also helpful in managing life threatening postpartum hemorrhage associated with placenta accrete spectrum.[7] The placenta accrete spectrum patients require close hemodynamic monitoring after surgery. Such arrangements are available in tertiary care hospitals therefore it is recommended to deliver patients of MAP in health facilities that provide optimal care and have the ability to manage complex cases.

We conclude that 50 patients from 6 to >8 grade need referral to a tertiary care facility with proper counseling. The patients with the medium risk category could immensely benefit from this index as the obstetrician can plan for intraoperative observation with a backup arrangement in hand for hysterectomy. Following the PAI index, the low risk patients can be safely delivered in the secondary center.

Conclusion

The timely diagnosis of placental adherence in terms of high PAI score allows the obstetrician to optimize the patient's care and provide for preemptive management plan for patients. In this way only relevant patients are referred to tertiary care facility and the burden on these facilities is reduced.

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