DOI: 10.38103/jcmhch.83.1

Original Research

PROSPECTIVE SIGNIFICANCE OF THE PLACENTA ACCRETA INDEX AND PREGNANCY OUTCOMES IN PREGNANT WOMEN WITH PLACENTA PREVIA AT HUE CENTRAL HOSPITAL

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ABSTRACT

Objectives: *This study aims to explore the predictive value of placenta accreta scoring system (PASS) in diagnosing placenta accreta spectrum and the birth outcomes in pregnant women with placenta previa at Obstetrics Department of Hue Central Hospital.*

Method: *A cross-sectional descriptive study was conducted on 42 pregnant women who were diagnosed with placenta previa at Obstetrics Department of Hue Central Hospital from January 2021 to December 2021. On ultrasound, PASS was used to assess the potential of placenta accreta spectrum.*

Results: *Pregnant women with placenta previa had at least 1 previous cesarean section accounted for 66.7%. The high-risk group of placenta accreta (PASS ≥ 8 points) was 89 times more likely to predict placenta accreta than the group low-risk and medium-risk group (< 8 points) (OR= 89.2; 95%CI: 11.4-901.4; p<0.001). The area under the ROC curve (AUC) of the PASS showed a very- high level (AUC: 0.977; p<0.001) to predict the placenta accreta spectrum. The optimal cut-off point was 8 points with a sensitivity of 89.5% and specificity of 91.3%. The PASS was relevant to the hysterectomy, and blood transfusion happened in operation (p<0.001). The proportion of pregnant women with placenta accreta was 45.2%, underwent hysterectomy was 33.3%, needed blood transfusion accounted for 52.4% and had complications during surgery was 23.8%. Gestational age at birth in the group ≥ 38 weeks accounted for the majority, with 69.0%. Newborns weighing 2500 - 3500 grams accounted for 73.8% in the majority. The first minute Apgar > 7 points is 69%, the 5th minute Apgar > 7 points is 95.2%.*

Conclusion: *PASS is strongly recommended to use in predicting of placenta accreta spectrum in pregnant women with placenta previa. PASS is easily and widely applied in clinical practice, suitable for the current situation of almost obstetricians and ultrasound practitioners that are occupied on clinical systems.*

Key words: *scoring system, Doppler, morbidly adherent placenta, ultrasound.*

Received:
01/04/2022
Revised:
17/5/2023
Accepted:
23/05/2022

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I. INTRODUCTION

Placenta previa is a placenta attached to the lower part of the uterus, which can partially or completely cover the hole in the uterus [1]. Placenta previa and cesarean section (CS) are two significant risk factors for placenta accreta. Placenta accreta is a pregnancy complicated by abnormal placental adhesions to the uterine muscle, potentially life-threatening for the mother and fetus. The incidence of placenta previa has been shown to increase statistically significantly

in women with placenta previa and women with a history of cesarean section. In the United States, the prevalence of placenta accreta is 9.3% among women with placenta previa [2]. In Vietnam, Doan Ton Linh reported that the placenta accreta was 8.7% in women with placenta previa at Hue Central Hospital and Hue University Hospital of Medicine and Pharmacy [3]. The study of Dinh Van Sinh and al. at the National Hospital of Obstetrics and Gynecology on pregnant women with previous CS was 21.8% [4]. Early prenatal diagnosis plays a very important role in helping doctors take the initiative in surgical management, contributing to improving pregnancy outcomes. In particular, ultrasound is a common, feasible and valuable tool to diagnose placenta accreta. Currently, there have been studies showing the individual value of each ultrasound marker and clinical sign in the diagnosis of placenta accreta. However, there have not really been many studies on the combined value of these markers in the same scale as Tovbin's study on the placental score. Therefore, we conducted the above study with two objectives: (1) Studying the predictive value of placenta accreta score in pregnant women with placenta previa at Hue central hospital. (2) Evaluation of pregnancy outcomes of pregnant women with placenta previa at Hue Central Hospital.

II. MATERIALS AND METHODS

This study involved 42 pregnant women diagnosed with placenta previa with assessment of placenta previa (PASS), treated at the Department of Obstetrics and Gynecology - Hue Central Hospital from January 2021 to December 2021.

Inclusion criteria: (1) Pregnant women diagnosed with placenta previa from the 32nd week: Vaginal bleeding in the third trimester of pregnancy; The placenta is attached to the lower part of the uterus, which can partially or completely cover the internal orifice in the cervix on ultrasound. (2) Evaluation of the placenta score according to Tovbin et al., including the following criteria [9]: Number of cesarean sections; Vascular sinus size; Number of multi-shaped vascular sinuses; Absence of the boundary between the uterus and the placenta; Placenta position; Doppler image shows multiformed sinus flow and angiogenesis between the placenta and bladder. (3) Being monitored and treated at the Department of Obstetrics and Gynecology - Hue Central Hospital.

A cross-sectional descriptive study design with sample size selected according to the convenience selection method.

Research method: Step 1: Record the general characteristics of the research subjects such as: name, age, number of cesarean sections, etc. Step 2: Patients are clinically examined and diagnosed by ultrasound to confirm placenta previa. Step 3: Evaluate Tovbin's placental score with 5 criteria: number and size of vascular sinuses, destruction of the boundary between uterus and placenta, position of placenta, assessment of flow Color Doppler flow in the intermediate position and the number of previous cesarean sections. Step 4: Evaluate pregnancy results. For mother: clinical diagnosis of the adherent placenta, hysterectomy, blood transfusion and surgical complications. For newborns: Gestational age, weight, Apgar index at the first and fifth minute.

Table 1: Detailed scoring system for ultrasound evaluation of suspected morbidly adherent placenta according to six different criteria

Parameter		**Score**
Number of previous Cesarean deliveries	1	1
≥ 2	2	
Lacuna maximum dimension	≤ 2	1
> 2	2	
Number of lacunae	≤ 2	1
> 2	2	
Obliteration of uteroplacental demarcation		2
Location of placenta	Anterior	1
	Placenta previa	2
Doppler assessment	Blood flow in placental lacunae	1
	Hypervascularity of placenta–bladder and/or uteroplacental interface	2

III. RESULTS

Forty - two pregnant women were diagnosed with placenta previa, treated at the Department of Obstetrics and Gynecology - Hue Central Hospital from January 2021 to December 2021, and we have the following results :

Table 2: Characteristics of study subjects

Variables		n	%
Age	≤ 24	4	9.5
	25 - 29	7	16.7
	30 - 34	11	26.2
	≥ 35	20	47.6
	Total	42	100.0
Mean age of patients		32.8 ± 5.4	
Previous history of one Caesarean section	0	14	33.3
	1	15	35.7
	≥ 2	13	31.0
	Total	42	100.0

The mother age group ≥35 years old accounted for the highest rate 47.6%, the mother age group ≤ 24 years old accounted for the lowest rate 9.5%. The mean maternal age was 32.8 ±5.4 years. Pregnant women with 1 caesarean section accounted for 35.7%, and those with 2 or more caesarean sections accounted for 31%.

Table 3: Clinical features

Clinical symptoms	n	%
No symptoms	8	19.0
Vaginal bleeding	13	31.0
Abdominal pain	12	28.6
Vaginal bleeding and abdominal pain	9	21.4
Total	42	100.0

Vaginal bleeding was a common symptoms at admission.

Table 4: Placenta accreta scoring system (PASS)

Placental invasion	Yes		No		Total		OR (95% CI)	p
	n	%	n	%	n	%		
high probability (≥ 8)	17	89.5	2	10.5	19	100.0	89.2 (11.4 - 701.4)	< 0.001
low, moderate probability (< 8 điểm)	2	8.7	21	91.3	23	100.0		

The group with placental invasion score ≥ 8 points was 89 times more likely to have placental invasion than the group with placental invasion score < 8 points (or= 89.2; 95% CI: 11.4 - 901.4; p < 0.001); sensitivity: 89.5%, specificity: 91.3%

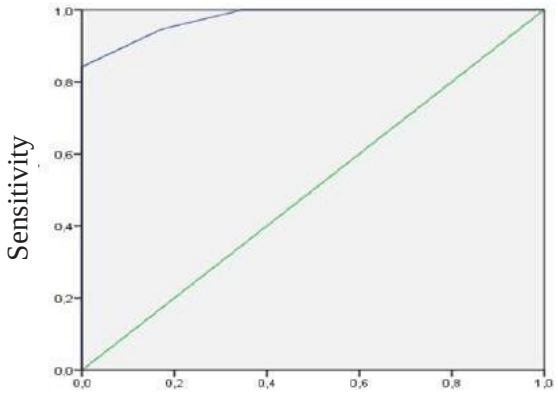

Figure 1: ROC curve of comb score

Table 5: predictive value of placental invasion score

	AUC (95% CI)	Cut off	Se (%)	Sp (%)	p
Placental invasion score	0.977 (0.930 - 1.000)	8	89.5	91.3	< 0.001

The area under the ROC curve (AUC) of the placental invasion score was very good (AUC: 0.977; p < 0.001) in predicting placental invasion. The optimal cutoff point was 8 points.

Table 6: Maternal pregnancy outcome

Variables		n	%
Diagnosis of placenta Previa	Yes	19	45.2
	No	23	54.8
Hysterectomy	Yes	14	33.3
	No	28	66.7
Blood transfusion	Yes	22	52.4
	No	20	47.6
Surgery complications	Yes	10	23.8
	No	32	76.2
Total		42	100.0

The group of pregnant women with placenta previa had 45.2% placental invasion, 33.3% hysterectomy, 52.4% blood loss, and 23.8% surgical complications.

Table 7: Newborns pregnancy outcome

Variables		n	%
Gestational age at birth (weeks)	33-37 weeks	13	31.0
	≥ 38 weeks	29	69.0
Mean gestational age (± SD)		37,8 ± 1,4 weeks	
Weight at birth (gram)	< 2500	7	16.7
	2500 - 3500	31	73.8
	> 3500	4	9.5
Mean weight at birth (± SD)		2878 ± 461g	
Apgar 1st minute	≤ 7 Points	13	31.0
	> 7 Points	29	69.0
Apgar 5th minute	≤ 7 Points	2	4.8
	> 7 Points	40	95.2
Total		42	100.0

Gestational age at birth in the group ≥ 38 weeks accounted for the majority, with 69.0%. Newborns weighing 2500 - 3500 grams accounted for the majority with 73.8%, the first minute Apgar > 7 points took 69% of the study population, the 5th minute Apgar >7 points took 95.2%.

Table 8: Relationship between placental scores and hysterectomy and blood transfusion

n		High risk (≥ 8 points)		Medium risk (6 - 7 points)		Low risk (≤ 5 points)		p
		%	n	%	n	%		
Hysterectomy	Yes	13	68.4	1	12.5	0	0.0	<0.001
	No	6	31.6	7	87.5	15	100.0	
Blood transfusion	Yes	15	78.9	5	62.5	2	13.3	<0.001
	No	4	21.1	3	37.5	13	86.7	
Total		19	100.0	8	100.0	15	100.0	

The prevalence of hysterectomy within the high-risk placental score group was 68.4%, higher than that of the low-risk group of 0% (p<0.001). The rate of blood transfusion in high-risk placental score was 78.9%, higher than that in the low-risk group of 13.3% (p<0.001).Comment: The rate of blood transfusion in the group in high-risk placental score was 78.9% higher than the low-risk group with 13.3% (p < 0.001).

IV. DISCUSSION

4.1. Clinical objective characteristics

The average age of pregnant women with placenta previa was 32.8 ± 5.4 years old; the age group ≥ 35 accounted for the highest proportion of 47.6%. According to a study by Doan Ton Linh, pregnant women ≥ 35 years old with placenta previa accounted for the highest rate of 32.6%; this study also shows that pregnant women over 35 years old

have a 4.26 times higher risk of developing placenta previa compared with age group 25 - 29 years old [3]. According to Koo Y.J and colleagues, a study on about 30,000 pregnant women showed that the risk of placenta previa in the age groups 30 - 34, 35 - 39 and ≥ 40 years old increased by 1.6, 2.1 and 3.6 times than that of the 20-29 age group [5].

According to our study, the rate of pregnant women with placental previa with a history of cesarean section was 66.7%, higher than the rate of Doan Ton Linh study in 2017 which was 21.74% [3]. According to Tuzovic et al., in women with a history of one or more cesarean sections, the risk of placenta previa is twice as high as those without a history of cesarean section. The authors suggest that damage to the uterine lining and muscle from the surgical scar in the uterus carries a risk of placenta previa in subsequent pregnancies. The mechanism is due to several reasons: Firstly, due to the placental abnormal implatation; The second is due to uterine scarring that prevents the placenta from moving towards the fundus of the uterus – a common phenomenon in the last months of pregnancy, on the other hand, scarring of the uterus has prevented the proper development of the lower uterine segment [6].

4.2. Clinical features

According to our study results, the rate of vaginal bleeding was 52.4%. Research by Doan Ton Linh also shows that vaginal bleeding is the most common symptom in placenta previa, with 58.7% [3]. According to Pham Van Do, the rate of bleeding in placenta previa is 57%, and the average number of bleeding episodes in partial placenta previa is more than that of complete placenta previa; the difference is statistically significant [7]. Vaginal bleeding is the most common clinical symptom in placenta previa, with the characteristics of spontaneous bleeding, red blood mixed with clots, often spontaneous and recurrent. This is the most important clinical sign and is also the main cause of preterm birth in patients with placenta previa.

4.3. Placenta accreta index

In the diagnosis of placental accreta of our study, the group with the Placenta accreta index score ≥ 8 points had higher predictability than the group with the placenta accreta index score < 8 points (OR= 89.2; 95%CI: 11.4-901.4; p < 0.001). The optimal cut - off point of the Placenta accreta score was 8 points with a sensitivity of 89.5% and a specificity of 91.3% (AUC: 0.977; 95%CI: 0.930 - 1; p < 0.001). Research by Nguyen Tien Cong and al. on the results of diagnosing placenta previa with placenta invasion on pregnant women with old cesarean section scars by ultrasound. The combination of all 3 criteria (thin retroplacental myometrium, intraplacental lacunar spaces; retroplacental arterial-trophoblastic blood flow; and irregular placental vascularization on 3D power Doppler) had a sensitivity of 77.4% and a specificity of 94% [8]. The study is also similar to Tovbin et al with the high - risk group with sensitivity: 69.6%, specificity: 98.7% [9]. Thereby, this score has good value in the diagnosis of placental invasion in placenta previa. In addition, the way to build ultrasound standards, according to author Tovbin's scale is quite complete but simple and easy to apply widely in clinical practice, suitable for the current situation of the majority of resource settings.

4.4. Maternal pregnancy outcome

The rate of placental invasion in placenta previa accounted for 45.2%. According to Doan Ton Linh, the proportion of placental invasion in the placenta previa is 8.7% [3]. According to research by Pham Van Do, the rate of placental invasion in placenta previa is 6.8% [7]. Our results are higher than those of other authors' studies due to the increasing trend of cesarean section, using invasive uterine procedures. On the other hand, most of my studies are complete placenta previa, many cesarean sections, so the rate of placental invasion is somewhat higher.

The rate of hysterectomy in placenta previa is 33.3%. According to author Doan Ton Linh, the rate of hysterectomy with placental invasion in the Placenta previa group was 15.2%, also according to this study, the rate of hysterectomy with placental invasion in the placenta previa group was 28.5 times higher than that of the other pacenta previa group. [3]. The hysterectomy rate is quite high because most of the patients are placental invasion, have a history of cesarean section, have had 2 or more children and agreed to have a hysterectomy after being consulted by the doctor.

The rate of cases of placenta previa requiring blood transfusion was 52.4%, with complications during surgery being 23.8%. According to a study by Pham Huy Hien Hao et al., the rate of surgical complications in pregnant women with placenta

previa was 19.6% [10]. Research by Le Hoai Chuong in pregnant women with placental invasion recorded 48.7% had complications, of which severe bleeding events required 2 or more blood units to be transfused 38.5% [11].

4.5. Neonatal outcomes

In our study, the average gestational age in women with placenta previa was 37.8 ± 1.4 weeks, mainly at term (≥ 38 weeks), with a rate of 69%. Pham Van Do's study also had similar results, and the mean gestational age was 37.6 ± 1.9 weeks [7]. According to Doan Ton Linh, the percentage of the gestational age group at full-term delivery was higher than that of preterm pregnant women with placenta previa [3]. Thus, in our study and other studies, most pregnant women with placenta previa indicated cesarean section at term.

The average birth weight in pregnant women with placenta previa was 2878 ± 461 grams, mainly newborns weighing 2500 - 3500 grams, accounting for 73.8%. According to a study by Pham Huy Hien Hao et al., the average birth weight in pregnant women with placenta previa was 2840 ± 537g [10]. According to Doan Ton Linh, the infant weight group from 2500 -3500g accounted for the majority with 76.59% in pregnant women with placenta previa [3].

Most newborns of women with placenta previa have normal Apgar scores after birth. The rates of Apgar score at first and fifth minute > 7 points were 69.0% and 95.2%, respectively.

4.6. Relationship between placenta accreta index and hysterectomy and blood transfusion

In our study, the hysterectomy rate in pregnant women with a high-risk placental invasion score (≥ 8 points) was 68.4%, a statistically significant difference from other groups. In Tovbin's study, the hysterectomy rate in the high-risk group was 56.2% [9].

According to our study results, the rate of placenta previa cases requiring blood transfusion with high-risk placental invasion score (≥ 8 points) was 68.4%, the difference in rate was statistically significant compared to other groups. According to the study of Pham Huy Hien Hoa et al., the rate of placental invasion group on pregnant women with placenta previa requiring blood transfusion was 65.2%, the difference in rate was statistically significant compared with other groups [10].

V. CONCLUSION

The group of placental invasion scores ≥ 8 points had an 89 times higher risk of placental invasion than the group < 8 points (OR = 89.2; 95% CI: 11.4 - 901.4; p < 0.001), sensitivity : 89.5%, specificity: 91.3%. The AUC of the placental invasion score was very good (AUC: 0.977; p < 0.001) in predicting placental accreta. The optimal cutoff point was 8 points. Pregnant women with placenta previa had 45.2% placental accreta, 33.3% hysterectomy, 52.4% blood loss, and 23.8% surgical complications. Gestational age at birth in the group ≥ 38 weeks accounted for 69.0%. Newborn weighing 2500 - 3500 grams accounted for 73.8%, Apgar at the first minute of 7 points was 69%, Apgar at the 5th minute of 7 points was 95.2%. There was an association between the placental accreta score and hysterectomy/blood transfusion (p < 0.001).

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