

# Pregnancy characteristics of patients with placenta accreta spectrum at Prof. Dr. I.G.N.G. Ngoerah Hospital Denpasar, Bali-Indonesia during January 2020 - January 2022



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## ABSTRACT

**Introduction:** Placenta accreta spectrum is a problem during delivery when the placenta is not completely separated from the uterus and is followed by massive obstetric bleeding and can cause postnatal morbidity and mortality. The purpose of this study was to describe the pregnancy characteristics of patients with placenta accreta spectrum at Prof. Dr. I.G.N.G. Ngoerah Hospital Denpasar, Bali-Indonesia during period 1 January 2020 - 1 January 2022.

**Methods:** This study is a descriptive study that describes the basic sociodemographic characteristics, ligation procedures, ultrasonographic findings, and histopathology.

**Results:** A total of 48 patients were sampled in this study, the highest proportion of pregnant women with placenta accreta spectrum with lacuna grade II (39.6%), loss of basal hypoechoic zone (64.6%), myometrial thickness <1 mm (39.6%), anterior placenta location (81.3%), regular vesicouterine border (75%), no exophytic mass (97.9%), bridging vessels (68.8%), no feeding vessels (85.4%), loss of placental basal Doppler image (97.9%), no hypervascularity of the vesicouterine area (66.7%), no lacunae vascular turbulence (83.3%) and the highest PAI score with a value of less than 5.37 (56.3%).

**Conclusion:** The spectrum of placenta accreta was found with grade II lacunae, loss of basal hypoechoic zone, myometrial thickness <1 mm, anterior placenta location, regular vesicouterine border, no exophytic mass, no bridging vessels, no feeding vessels, loss of placental basal Doppler image, there was no hypervascularity in the vesicouterine area, no vascular lacunae turbulence and the highest PAI score with a value of less than 5.37.

**Keywords:** placenta, descriptive, vessels, characteristics.

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## INTRODUCTION

Pregnancy is the growth and development of the fetus starting from conception and ending at the onset of labor. After the egg is fertilized, fertilization will occur and implantation into the uterine wall to form an embryo and placenta.<sup>1</sup> In this process sometimes clinical conditions occur when part of the placenta, or the entire placenta, invades the uterine wall making it difficult to separate. Abnormally attached placental abnormalities, known as placental accreta spectrum disorders (PAS), are associated with pathological placental attachments, including placenta accreta, placenta increta, and placenta percreta.

PAS is a problem during labor when the placenta is not completely separated from the uterus and is followed by massive

obstetric hemorrhage (Jauniaux, 2018). This can lead to disseminated intravascular coagulation (DIC), hysterectomy, injury to the ureter, bladder, bowel, or neurovascular structures, acute transfusion reactions, electrolyte imbalance, and renal failure.<sup>2</sup> Obstetric hemorrhage can result in a mean delivery blood loss in women with placenta accreta of 3,000–5,000 ml. Based on this, 90% of patients with placenta accreta require blood transfusions, and 40% require more than 10 units of packed red cells (PRC).<sup>3</sup>

PAS is considered a condition that is the cause of maternal death. Epidemiological reports show that the incidence of PAS causes 7%-10% of maternal deaths worldwide.<sup>4</sup> Reports from referral centers in America show that PAS occurred in

about 1 in 4000 deliveries in the 1970s, 1 in 2500 deliveries in the 1980s, and in the 2010s occurred in 1 in 533 deliveries.<sup>5</sup>

PAS can be associated with several risk factors such as history of caesarian section (CS), placenta previa, in vitro fertilization (IVF), age, parity, curettage, and other uterine surgery such as myomectomy, smoking, Asherman's syndrome and hypertension.<sup>6</sup> Based on several studies, a history of CS and placenta previa are the most common risk factors for placenta accreta.<sup>7</sup> The most common treatment for placenta accreta is hysterectomy, either subtotal hysterectomy or total hysterectomy. Palacio's developed a uterine-conserving surgical technique in cases of placenta accreta. A conservative approach cannot always be applied to

all cases of placenta accreta, because the clinical presentation of placenta accreta varies greatly.<sup>8</sup>

This study aimed to describe the pregnancy characteristics of patients with placenta accreta spectrum at Prof. Dr. I.G.N.G. Ngoerah Hospital Denpasar, Bali-Indonesia from 1st January 2020 to 1st January 2022.

## METHOD

This study is a descriptive study, which is a study that aims to describe the pregnancy characteristics of patients with placenta accreta spectrum at Prof. Dr. I.G.N.G. Ngoerah Hospital Denpasar, Bali-Indonesia during the period from January 1st, 2020 to January 1st, 2022. The study participant was pregnant woman with placenta accreta spectrum who gave birth at Prof. Dr. I.G.N.G. Ngoerah Hospital Denpasar, Bali-Indonesia. A description will be carried out based on basic sociodemographic characteristics, ligation, ultrasound (USG) findings, and histopathology.

## RESULT

### Characteristics of study participant

This study was conducted over a period of 2 years, a total of 48 patients were enrolled in this study. Characteristics of study participants can be seen in [table 1](#).

Based on the data in [table 1](#), the highest proportion of pregnant women with placenta accreta spectrum aged <35 years (70.8%), parity was once (41.7%), history of caesarean section 0-1 times (58.3%), had a curettage (95.8%), duration of treatment more than 5 days (43.8%), bleeding <1500 cc (68.8%), diagnosed with placenta in creta (41.7%), no complications (66.7%) and the highest number of blood transfusions was in PRC transfusions (55.5%).

### Ultrasound Findings on the Spectrum of Placenta Accreta

The results of ultrasound findings in pregnancy with placenta accreta spectrum are according to the explanation in [table 2](#). Ultrasound results show that the highest proportion of pregnant women with placenta accreta spectrum with lacuna grade II (39.6%), loss of basal hypoechoic zone (64.6%), myometrial thickness <1

mm (39.6%), anterior placenta location (81.3%), regular vesicouterine border (75%), no exophytic mass (97.9%), bridging vessels (68.8%), no feeding vessels (85.4%), loss of placental basal Doppler

image (97.9%), no hypervascularity of the vesicouterine area (66.7%), no lacunae vascular turbulence (83.3%) and the highest PAI score with a value of less than 5.37 (56, 3%) ([Table 2](#)).

**Table 1.** Frequency distribution of study participant.

Characteristics	frequency	%
Age (years)		
Median (range)	32 (19-44)	
≤ 35	34	70.8
> 35	14	29.2
Parity		
P0	5	10.4
P1	20	41.7
P2	15	31.3
P3	7	14.6
P>3	1	2.1
Previous caesarean section		
0-1	28	58.3
≥2	20	41.7
History of curettage		
Ya	46	95.8
Tidak	2	4.2
Length of stay (day)		
Median	4 (0 - 49)	
0-2	12	25
3-4	15	31.3
≥5	21	43.8
Blood loss (cc)		
Median	1000 (200-8000)	
<1500	33	68.8
1500-3000	8	16.7
>3000	7	14.6
Histology characteristics		
Plasenta Accreta	6	12.5
Plasenta Increta	20	41.7
Plasenta Percreta	5	10.4
Plasenta Non-Adhesive	17	35.4
Complication		
Bladder rupture	11	22.9
Urethra rupture	2	4.2
Re-laparotomy	3	6.3
None	32	66.7
Blood transfusion		
Packed red cell	98	55.5
Thrombocyte concentrate	25	14
Fresh frozen plasma	54	30.5

### Comparison of ultrasound and histopathological findings in the spectrum of placenta accreta

Grade 3 lacunae were most commonly found in placenta percreta (60%), loss of basal hypoechoic was most common in non-adhesive placentas (88.2%). Myometrial thickness > 3 mm was most commonly found in placenta accreta

(50%), the predominant location of the placenta was anterior in all cases of placenta percreta, the predominant bridging vessel was found in placenta percreta (80%), loss of Doppler basal blasta was found in all placenta in creta, percreta, and non-adhesive. Vascular turbulence was most commonly found in non-adhesive placentas (100%), PAI scores of more

than 5.37 were most common in placenta percreta (80%) (Table 3) (Figure 1).

### Comparison of Ultrasound Findings with Bleeding Incidence

Grade 3 lacunae were most commonly found in bleeding 1500-3000 cc (62.5%), loss of basal hypoechoic was most commonly found in bleeding < 1500 cc (69.7%). Myometrium thickness > 3 mm was the most common with bleeding < 1500 cc (36.4%), the predominant location of the placenta was anterior in all cases, the presence of a bridging vessel was dominant in bleeding < 1500 cc (63.6%), loss of Doppler basal placenta was found in all cases. bleeding. Most vascular turbulence was found in the amount of bleeding 1500-3000 cc (87.5%). PAI scores of more than 5.37 were most commonly found in bleeding more than 3000 cc (71.4%) Table 4.

**Table 2. Ultrasound Findings on the Spectrum of Placenta Accreta.**

Temuan USG	Frekuensi	%
Lacunar		
Grade 0	12	25
Grade I	2	4,2
Grade II	19	39,6
Grade III	15	31,3
Loss of basal hypoechoic zone		
Ya	31	64,6
No	17	35,4
Myometrium thickness (mm)		
<1	19	39,6
1-3	15	31,3
>3	14	29,2
Placenta Location		
Anterior	39	81,3
Posterior	9	18,8
Vesicouterine border		
Reguler	36	75
Irregular	12	25
Exophytic mass		
Yes	1	2,1
No	47	97,9
Bridging vessels		
Yes	33	68,8
No	15	31,3
Feeding vessels		
Yes	7	14,6
No	41	85,4
Loss of placental basal doppler image		
Yes	47	97,9
No	1	2,1
Hypervascularity of the vesicouterine area		
Yes	16	33,3
Not	32	66,7
lacunae vascular turbulence		
Yes	8	16,7
Not	40	83,3
PAI Score		
< 5.37	27	56,3
> 5.37	21	43,7
<b>Total</b>	<b>48</b>	<b>100</b>

### Comparison of hypogastric artery ligation actions with bleeding events

The results of hypogastric arterial ligation in pregnancy with bleeding events are obtained according to table 5. Arterial ligation will be performed more frequently if the amount of bleeding increases.

## DISCUSSION

### Ultrasound findings on the spectrum of placenta accreta

The diagnosis of placenta accreta is difficult and the accuracy of sonography compared to MRI is questionable. The accuracy of sonography using grayscale and color Doppler techniques for the prenatal diagnosis of placenta accreta is quite variable. The sensitivity is between 33% and 100%, and the specificity also varies.

In subsequent ultrasound findings, the basal hypoechoic zone loss in 31 people (64.6%) and 17 people (35.4%) did not disappear. In line with research conducted by Fitriana et al.<sup>9</sup> as many as 13 people experienced loss of the basal hypoechoic zone (42%). The most common loss of placental basal Doppler images was found in this study as many as 47 people (97.9%) while only 1 person found that the ultrasound results had a loss of placental basal Doppler images (2.1%).

The myometrial thickness was mostly

**Table 3.** Comparison of ultrasound and histopathological findings on the spectrum of placenta accreta.

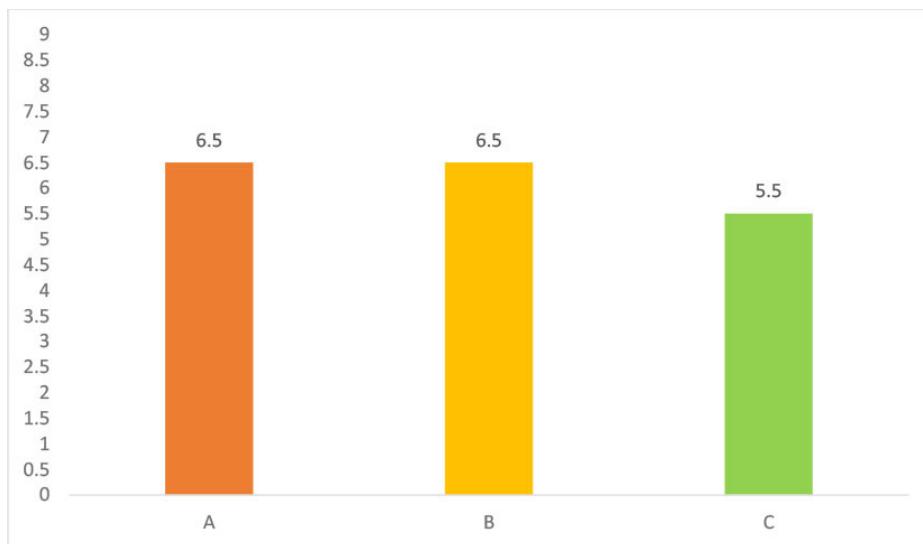
Ultrasound findings	Spectrum of plasenta accreta								Total	
	Acreta		Increta		Perkreta		No Adhesive			
	n=6	%	n=20	%	n=5	%	n=17	%	n=48	%
Lacunar										
Grade 0	2	33.3	2	10	1	20	7	41.2	12	25
Grade I	0	0	0	0	0	0	2	11.8	2	4.2
Grade II	1	16.7	11	55	1	20	6	35.3	19	39.6
Grade III	3	50	7	35	3	60	2	11.8	15	31.2
Loss of basal hypoechoic zone										
Yes										
No	3	50	11	55	2	40	15	88.2	31	64.6
Yes	3	50	9	45	3	60	2	11.8	17	35.4
Myometrium thickness (mm)										
<1	2	33.3	11	55	3	60	3	17.6	19	39.6
1-3	1	16.7	5	25	2	40	7	41.2	15	31.2
>3	3	50	4	20	0	0	7	41.2	14	29.2
Placenta Location										
Anterior	4	66.7	16	80	5	100	14	82.4	39	81.2
Posterior	2	33.3	4	20	0	0	3	17.6	9	18.8
Vesicouterine border Regular										
Irregular	5	83.3	12	60	4	80	15	88.2	36	75
Yes	1	16.7	8	40	1	20	2	11.8	12	25
Exophytic mass										
Yes	0	0	0	0	0	0	1	5.9	1	2.1
No	6	100	20	100	5	100	16	94.1	47	97.9
Bridging vessels										
Yes	4	66.7	17	85	4	80	8	47.1	33	68.7
No	2	33.3	3	15	1	20	9	52.9	15	31.3
Feeding vessels										
Yes	2	33.3	2	10	3	60	0	0	7	14.6
No	4	66.7	18	90	2	40	17	100	41	85.4
Loss of placental basal doppler image										
Yes	1	16.7	0	0	0	0	0	0	1	2.1
No	5	83.3	20	100	5	100	17	100	47	97.9
Lacunae vascular turbulence										
Yes	2	33.3	5	25	1	20	0	0	8	16.7
No	4	66.7	15	75	4	80	17	100	40	83.3
Hypervascularity of the vesicouterine area										
Ada	2	33.3	7	35	2	40	5	29.4	16	33.3
Tidak	4	66.7	13	65	3	60	12	70.6	32	66.7
PAI Score										
< 5.37	4	66.7	8	40	1	20	14	82.3	27	56.3
> 5.37	2	33.3	12	69	4	80	3	17.7	21	43.7

between <1 mm, as many as 19 people (39.6%), 15 people had a thickness of 1-3 mm (31.3%) and 14 people had a thickness >3 mm (29.2%). A retroplacental myometrial thickness of less than 1 mm is a characteristic finding. When combined with extensive lacunae features, the sensitivity is close to 100% and the specificity is 72-79% with a predictive success rate of 73%.<sup>6</sup>

Most of the placenta locations were found in the anterior position, namely 39 people (81.3%) and the posterior position as many as 9 people (18.8%). The vesicouterine border in most of the subjects was 36 people (75%) regular and 12 (25%) irregular. In addition, there were no exophytic masses in 47 people (97.9%) and the rest had exophytic masses. It was found that 33 people (68.8%) had bridging

vessels, while 15 people did not have bridging vessels (31.3%). Feeding vessels for 41 people were not found (85.4%). However, there were 7 people (14.6%) with feeding vessels.

In their study assessing ultrasound predictors of the placenta accreta spectrum, Rac et al.<sup>10</sup> found that the vesicouterine border and bridging vessels have a fairly high predictive factor. This is



**Figure 1.** Overview of PAI scores > 5.37 in samples with non-adhesive histopathological results.

what then underlies the use of these two parameters in PAI. Both parameters are good enough to strengthen the prediction of the presence of a spectrum of placenta accreta in patients. Bridging vessels themselves have an odds ratio value of 2.3.

There was no hypervascularity of the vesicouterine area found in 32 people (66.7%), while 16 people (33.3%) found hypervascularity of the vesicouterine area. A total of 40 people (83.3%) did not have lacunae vascular turbulence, and 8 people (16.7%) had lacunae vascular turbulence. Multiple vascular lacunae in the placenta, or swiss cheese appearance, is one of the most important sonographic of placenta accreta in the third trimester, with a sensitivity of 79% with a detection rate of 92%. When multiple, especially 4 or more lacunae, this finding correlates with a 100% detection rate for placenta accreta. Turbulent blood flow through the lacunae on Doppler sonography is associated with placenta accreta.<sup>6</sup>

In this study, the PAI cutoff score of 5.37 was chosen based on research by Abu Hashim et al.<sup>11</sup> where the most optimal intersection of sensitivity and specificity was 83.9% and 76.3%, respectively. The ultrasound results found the highest PAI score with a value of more than 5.37 (56.3%). The higher the PAI score, the higher the chance of placenta accreta.

#### Comparison of ultrasound and histopathological findings on the spectrum of placenta accreta

Ultrasound findings found the most with grade II lacunae with placenta increta type as many as 11 people (55%). The results of this study are in line with the research of Rac et al.<sup>10</sup> in a study that assessed ultrasound predictors based on the main histopathological criteria according to the International Federation of Gynecology and Obstetrics (FIGO) for diagnosing PAS at delivery showed that hysterectomy specimens or partial myometrial resection of the area of increta showed deep and muscular placental villi and sometimes the lumen of the uterus. Blood vessels in the uterus occur in grade II, often found in placenta increta.

Subsequent ultrasound findings, loss of the basal hypoechoic zone in 15 people (88.2%) on no adhesive. These findings differ from the findings of a study by Jauniaux et al.<sup>12</sup> which showed that loss of the hypoechoic zone was reported to be the most common in 70% of cases of placenta accreta. However, other studies have shown this sign to be inaccurate because it changes with increasing gestational age. In addition, the picture also varies according to the location of the placental attachment, depending on the probe pressure, and how much the bladder is filled and depending on the thickness of the scar tissue.

The thickness of the myometrium in each type of placenta varies. The most common myometrial thickness was <1 mm, 11 people in placenta increta and 3 in placenta percreta. Meanwhile, myometrium thickness >3 mm was found in 3 people with placenta accreta and 7 people with non-adhesive placentas. These findings differ from the findings of data from Jauniaux et al.<sup>13</sup> which showed that findings in the form of an endometrial thickness of less than 1 mm or the presence of a large area of the placenta (placental lake) might suggest the presence of placenta accreta. The existence of these two findings has a positive predictive value (PPV) of 72%.

In placenta accreta, 4 of them are located anteriorly, while 2 are located posteriorly. In placenta increta, there were 16 people with anteriorly positioned placenta and 4 with posterior position. Meanwhile, in placenta percreta, all subjects had anteriorly located placentas and 14 people with non-adhesive placentas had anteriorly positioned placentas. The most common location of placenta accreta is in the low anterior uterine wall at the level of the cesarean section scar with cervical involvement in the case of an existing placenta previa. There is a correlation between cervical length and risk of bleeding, with cervix <25 mm having a higher risk of bleeding. The risk of placenta accreta is lower if a cesarean section is performed in an established delivery because the incision is made inadvertently through a thinning cervix in about one-third of cases.<sup>3</sup>

The absence of ultrasound images of exophytic masses was most commonly found in all types of placenta with 6 people on placenta accreta, 20 people on placenta increta, 5 people on placenta percreta and 16 people on no adhesive placenta.

The most common bridging vessel ultrasound images were found in placenta increta as many as 17 people, followed by placenta percreta and placenta accreta with the same number of subjects, namely 4 people. Meanwhile, in the non-adhesive placenta, the ultrasound image did not reveal any bridging vessels as many as 9 people.

The absence of feeding vessel images was most commonly found in placenta accreta as many as 4 people, placenta increta as many as 20 people and non-

adhesive placenta as many as 17 people. While the picture of the feeding vessel was found in placenta prekerta.

None of the types of placenta

experienced loss of the placental basal Doppler image. Absence of ultrasound images of lacunae vascular turbulence is also present in all types of placenta.

**Table 4. Comparison of ultrasound findings with bleeding incidence.**

Ultrasound findings	Bleeding						Total	
	<1500		1500-3000		>3000			
	n=33	%	n=8	%	n=7	%	n=48	%
Lacunar								
Grade 0	12	36.4	0	0	0	0	12	25
Grade I	2	6.1	0	0	0	0	2	4.2
Grade II	13	39.4	3	37.5	3	42.9	19	39.6
Grade III	6	18.2	5	62.5	4	57.1	15	31.2
Loss of basal hypoechoic zone								
Yes	23	69.7	4	50	4	57.1	31	64.6
No	10	30.3	4	50	3	42.9	17	35.4
Myometrium thickness (mm)								
<1	9	27.3	6	75	4	57.1	19	39.6
1-3	12	36.4	2	25	1	14.3	15	31.2
>3	12	36.4	0	0	2	28.6	14	29.2
Placenta Location								
Anterior	26	78.8	7	87.5	6	85.7	39	81.2
Posterior	7	21.2	1	12.5	1	14.3	9	18.8
Vesicouterine border Regular								
Irregular	26	78.8	6	75	4	57.1	36	75
Regular	7	21.2	2	25	3	42.9	12	25
Exophytic mass								
Yes	1	3	0	0	0	0	1	2.1
No	32	97	8	100	7	100	47	97.9
Bridging vessels								
Yes	21	63.6	6	75	6	20	33	68.7
No	12	36.4	2	25	1	80	15	31.3
Feeding vessels								
Yes	2	6.1	3	37.5	2	28.6	7	14.6
No	31	93.9	5	62.5	5	71.4	41	85.4
Loss of placental basal doppler image								
Yes	33	100	8	100	6	85.7	1	2.1
No	0	0	0	0	1	14.3	47	97.9
Lacunae vascular turbulence								
Yes	6	18.2	1	12.5	1	14.3	8	16.7
No	27	81.8	7	87.5	6	85.7	40	83.3
Hypervascularity of the vesicouterine area								
Ada	9	27.3	4	50	3	57.1	16	33.3
Tidak	24	71.7	4	50	4	42.9	32	66.7
PAI Score								
< 5.37	21	67.7	4	40	2	28.6	27	56.3
> 5.37	10	32.3	6	60	5	71.4	21	43.7

**Table 5. Comparison of Hypogastric Artery Ligation Actions with Bleeding Incidence in Samples with PAI Score > 5.37.**

Artery ligation	Bleeding						Total	
	<1500		1500-3000		>3000			
	n=10	%	n=6	%	n=5	%	n=21	%
Hypogastric Artery Ligation								
Yes	2	20	3	50	2	40	7	33.3
No	8	80	3	50	3	60	14	66.7

And the absence of ultrasound images of hypervascularity of the vesicouterine area is most commonly found in all types of placentas.

In their study assessing ultrasound predictors of the placenta accreta spectrum, Rac et al.<sup>10</sup> found that the vesicouterine border and bridging vessels have a fairly high predictive factor. This is what then underlies the use of these two parameters in the Placenta Accreta Index (PAI). Both parameters are good enough to strengthen the prediction of the presence of a spectrum of placenta accreta in patients. Bridging vessels themselves have an odds ratio value of 2.3.

### Comparison of hypogastric artery ligation actions with bleeding events

In this study, a comparison was made between hypogastric artery ligation and the amount of bleeding. Grouping is done on PAI scores above 5.37 to get a more equal comparison. It was found that bleeding <1500 cc was more common in the non-ligated group (80%) compared to the ligated group (20%). Bleeding 1500-3000 cc occurred in the same amount in both groups (50% in the ligation group and 50% in the non-ligation group). Bleeding >3000 cc was more common in the non-ligation group (60%) than in the ligation group (40%).

The study by Martimucci et al. showed no benefit in using prophylactic hypogastric artery ligation to reduce bleeding or the amount of blood products transfused in patients undergoing cesarean hysterectomy for placenta in creta and percreta.<sup>14</sup>

This is most likely because the gravid uterus, especially with abnormal placentation, causes a physiologic and pathological increase in large-diameter collateral vessels with potential for bleeding. This can occur even after ligation of the hypogastric artery. Due to this reason, cases of placenta in creta and percreta are known to carry a high risk of massive postpartum hemorrhage and mortality.

### CONCLUSION

The description of the characteristics of pregnant women with placenta accreta spectrum is most often found in women

aged <35 years, parity once, history of caesarean section at most 1 time, had curettage, length of stay more than 5 days, bleeding <1500 cc, diagnosed with placenta in creta , there were no complications and the highest number of blood transfusions was PRC transfusion.

Ultrasound images of pregnant women with placenta accreta spectrum found grade II lacunae, loss of basal hypoechoic zone, myometrial thickness <1 mm, anterior placenta location, regular vesicouterine border, no exophytic mass, no bridging vessels, no feeding vessels, missing Basal Doppler of the placenta, no hypervascularity in the vesicouterine area, no lacunae vascular turbulence and the highest PAI score with a value of less than 5.37.

### CONFLICT OF INTEREST

All author declares there is no conflict of interest.

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This study doesn't receive any specific government or private sector grant.

### AUTHOR CONTRIBUTION

All author had contributed to manuscript writing and agreed for the final version for publication.

### ETHICAL STATEMENT

This study has been approved by Ethical Committee Faculty of Medicine Universitas Udayana/Sanglah Hospital with ethical clearance reference number 2273/UN14.2.2.VII.15/LT/2021

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