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RESEARCH ARTICLE

Retrospective analysis of 277 cases of placenta accreta spectrum diagnosed with ultrasound at a single tertiary care center

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Abstract

Introduction : Placenta accreta spectrum (PAS) is characterized by abnormal placental adherence and failure to separate from the uterine wall after delivery. The PAS-associated morbidities include peripartum hysterectomy (loss of fertility), massive hemorrhage and the requirement of blood transfusion (leading to consumptive coagulopathy and multisystem organ failure), admission to the intensive care unit (ICU), injury to adjacent organs, and death. Its incidence is on the rise due to an increasing number of caesarean deliveries.
Objective : The goal of our study is to analyze the characteristics and outcomes of PAS managed at a tertiary care center with a high volume of PAS.
Methods : The design of analytic observation research with a retrospective cross sectional method with ultrasound diagnosis of PAS at M. Djamil Central General Hospital from January 2020 to December 2022 was reviewed. Details of obstetric backgrounds, predelivery diagnosis, peripartum management, and outcomes were analyzed with mean difference test and chi square.
Results : Two hundred and seventy-seven women with PAS were identified with ultrasound from 4,500 deliveries during the study period (6.15%). Approximately 45.48% of women with PAS had hysterectomy, while 54.52% did not; 3 cases were conservatively performed. Emergency and elective caesarean sections were accomplished in 32.85% and 67.15%, respectively. There was 3.25% maternal mortality. Anterior PAS (83.3%) is associated with attachment to the previous uterine scar and intraoperative blood loss compared to posterior PAS (15.88%) ($p<0.05$). The PAS patients with previous uterine surgery had the highest chance of peripartum hysterectomy ($p<0.001$).
Conclusion : The placenta accreta diagnosed by antepartum ultrasound is approximately 6.15%. Almost half of the women in the study had hysterectomies. Only one-third of women with PAS in our study underwent emergent surgery. Anterior PAS is associated with placental attachment to the previous uterine scar and greater intraoperative blood loss compared with posterior PAS. The history of previous uterine surgery in women with PAS increased the chance of peripartum hysterectomy even further. The placenta accreta spectrum should be managed in a center with a high level of surgical expertise.
Keywords: *hysterectomy, placenta accreta spectrum, placenta previa*

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INTRODUCTION

Placental spectrum accreta (PAS) with higher degrees is a serious obstetric complication. Without prenatal detection, attempts to remove placental tissue after delivery as usual can cause massive bleeding and can end in unplanned hysterectomy surgery, thereby threatening the life of the mother and fetus during labor, so that placenta accreta is the main cause of maternal bleeding and obstetric hysterectomy. Up to 38% of postpartum hysterectomies were found to be associated with placenta accreta in a review by the UK Obstetrics Surveillance System.[1,2]

Prenatal screening and detection by ultrasound examination is a useful way to improve the outcome of these rare cases in preparing optimal conditions for delivery.[1,3]

Placental accreta spectrum disorders (PAS) encompass a group of anomalies caused by abnormal adhesion or invasion of trophoblastic tissue in the uterine myometrium and serosa. PAS is one of the most dangerous conditions associated with pregnancy because it can cause massive bleeding leading to multisystem organ failure, disseminated intravascular coagulation, the need for an intensive care unit, hysterectomy, and even death. This is the first cause for hysterectomy associated with caesarean section and peripartum hysterectomy.[4,5]

METHODS

This study was an analytic observational study using a retrospective cross-sectional approach to detail obstetric background, prenatal diagnosis and peripartum management on the spectrum of placenta accreta at Dr M Djamil General Hospital, Padang.

This research was conducted in the Obstetrics and Gynecology department of Dr M Djamil Hospital, Padang. The sample of this study were all patients diagnosed with placenta accreta by ultrasound at Dr M Djamil Hospital Padang from 2020 to 2022 who met the inclusion and exclusion criteria. Inclusion criteria were patients who had complete medical records and exclusion criteria were patients with incomplete medical records. Sampling was obtained from medical record data and analyzed by means of different tests and chi square using SPSS 26.

RESULTS

Table 1. Spectral Characteristics of Placenta Accreta

	Hysterectomy		**No Hysterectomy**		**Total**	
	f	%	f	%	f	%
Number of Cases (year)						
2020	41	32.54	33	21.85	74	26.71

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2021	18	14.29	49	32.45	67	24.19
2022	67	53.17	69	45.70	136	49.10
Age (years)	34.23 (± 4.201)		32.58 (± 5.317)		33.33 (± 4.903)	
Gestational age (weeks)	34.96 (± 3.616)		35.24 (± 3.080)		35.11 (± 3.332)	
Smoking History						
There is	0	0	0	0.00	0	0.00
There isn't any	126	100	149	98.68	277	100.00
Maternal Exodus						
Life	119	94.4	149	98.68	268	96.75
Die	7	5.56	2	1.32	9	3.25
Neonatal Exodus						
Life	122	96.8	143	94.70	265	95.67
Die	4	3.17	8	5.30	12	4.33
APGAR Score						
Normal	38	30.2	56	37.09	94	33.94
Moderate asphyxia	79	62.7	78	51.66	157	56.68
Severe asphyxia	9	7.14	17	11.26	13	4.69
Gender						
Man	67	53.2	75	49.67	142	51.26
Woman	59	46.8	76	50.33	135	48.74
Number of Fetuses						
Single	125	99.2	150	99.34	275	99.28
gemeli	1	0.79	1	0.66	2	0.72

Two hundred and seventy-seven women with a spectrum of placenta accreta were identified by ultrasound from 4500 deliveries during the study period (6.15%). Approximately 45.48% of women with placenta accreta spectrum underwent hysterectomy, while 54.52% did not; 3 cases were performed conservatively. Emergency and elective caesarean sections were performed respectively by 32.85% and 67.15%. There are about 3.25% maternal deaths. Anterior placenta accreta spectrum (83.3%) was associated with previous uterine scar attachment and intraoperative blood loss compared with posterior placenta (15.88%) ($p<0.05$). Patients with placenta accreta spectrum with previous uterine surgery had the highest probability of peripartum hysterectomy ($p<0.001$).

Table 2. Risk factors for the placenta accreta spectrum

	Hysterectomy		**No Hysterectomy**		**Total**		**P-value**
	f	%	f	%	f	%	
Parity (amount)							
1	1	0.79	16	10.59	17	6.13	0.000
2	22	17.46	48	31.78	70	25.27	
≥3	103	81.74	87	57.61	190	68.59	
History of SC (amount)							
0	4	3.17	53	35.10	57	20.58	0.000
1	42	33.3	58	38.41	100	36.10	
≥ 2	80	63.5	40	26.49	120	43.32	
Curette history							
There is	31	24.6	33	21.85	64	23.10	0.292
No	95	75.4	118	78.15	213	76.90	
Myomectomy history	0	0	2	1.32	2	0.72	0.195
There is							

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No	126	100	149	98.68	275	99.28	
BMI (kg/m2)	23,388 (± 3,391)		22,849 (± 3,144)		23,094 (± 3,264)		
Normoweight	98	77.8	125	82.78	223	80.51	
Overweight	21	16.7	21	13.91	42	15.16	0.507
Obesity	7	5.56	5	3.31	12	4.33	
Hgb (gr/dl)	10,467 (± 1,607)		10,575 (± 2,119)		10,526 (± 1,901)		
Normal (> 11)	61	48.4	81	53.64	142	51.26	
Mild Anemia (10-10.9)	31	24.6	30	19.87	61	22.02	
Moderate Anemia (7 – 9.9)	29	23	33	21.85	62	22.38	0.758
Severe Anemia (< 7)	5	3.97	7	4.64	12	4.33	
Albumin (unit)	3.267 (± 0.4337)		3.211 (± 0.678)		3.236 (± 0.579)		
Normal	11	8.73	18	11.92	29	10.47	0.388
Hypoalbuminemia	115	91.3	133	88.08	248	89.53	
Placental Topography							
anterior	117	92.9	114	75.50	231	83.39	0.000
posterior	9	7.14	35	23.18	44	15.88	
Lateral	0	0	2	1.32	2	0.72	
Lacuna							
Grade 1	23	18.3	81	53.64	104	37.55	0.000
Grade 2	49	38.9	59	39.07	108	38.99	
Grade 3	54	42.9	11	7.28	65	23.47	
Myometrial thickness	0.1498 (± 0.092)		0.227 (± 0.126)		0.192 (± 0.118)		
3-5mm	9	7.14	17	11.26	26	9.39	
1-3mm	74	58.7	127	84.11	201	72.56	0.000
< 1mm	43	34.1	7	4.64	50	18.05	
Bridging Vessels							
Negative	30	23.8	105	69.54	135	48.74	0.000
Positive	96	76.2	46	30.46	142	51.26	
Halozone							
Negative	110	87.3	66	43.71	176	63.54	0.000
Positive	16	12.7	85	56.29	101	36.46	
Placenta bulging							
Negative	98	77.8	142	94.04	240	86.64	0.000
Positive	28	22.2	9	5.96	37	13.36	
Bladder wall interruptions							
Negative	107	84.9	145	96.03	252	90.97	0.001
Positive	19	15.1	6	3.97	25	9.03	
blood loss	916.19 (± 541.906)		403.88 (± 394.697)		640.33 (± 532.957)		
Intraoperative transfusion	507.14 (± 413.350)		110.26 (± 312.707)		290.79 (± 411.977)		
Operation type							
Elective	94	74.6	92	60.93	186	67.15	0.16
Emergency	32	25.4	59	39.07	91	32.85	

DISCUSSION

The spectrum of placenta accreta is an obstetric emergency which is the main cause of cesarean hysterectomy. The exact pathophysiology of this disease is unknown, but it is

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believed that the abnormal invasion of trophoblastic tissue into the decidua basalis, so that the risk factors for PAS abnormalities include a history of previous cesarean delivery, placenta accreta, uterine curettage, myomectomy, uterine abnormalities, endometritis, multiparity, age older mother, and smokes.[6]

In this study, two hundred and seventy-seven women with placenta accreta spectrum were identified by ultrasound from 4,500 deliveries during the study period (6.15%). The sensitivity of ultrasound in diagnosing placenta accreta is reported to be good, but it is less sensitive and specific for measuring the depth of invasion and lateral extension. A systematic review and meta-analysis conducted in 2017 using standard ultrasound signs (using 2D gray scale, 2D color Doppler, or 3D color Doppler) showed that the sensitivity and specificity were 97%, respectively.[7]Similar to the results of the study by Anne Sophie et al which stated that ultrasonography remains the most sensitive and common examination modality for screening for placenta accreta, with a sensitivity of up to 100% compared to using MRI. In addition, the use of ultrasound for the diagnosis of placenta accreta, because it is accurate, inexpensive, non-invasive and time-saving.[8]

The diagnosis of PAS is established from the history, physical examination and supporting examinations. In the history it can be asked about the risk factors in patients who can suffer from PAS, all invasive procedures to the uterus or uterine cavity have been associated with the subsequent development of placenta accreta including uterine curettage, hysteroscopic surgery, endometrial ablation, uterine artery embolization, and myomectomy. However, the most important risk factor for the development of placenta accreta is previous cesarean delivery and the increasing rate of cesarean sections worldwide.[9]In a systematic review, the spectrum placenta accreta rate increased from 0.3% in women with one prior cesarean delivery to 6.74% in women with five or more cesarean deliveries. Additional risk factors include advanced maternal age, multiparity, previous uterine surgery or curettage, and Asherman's syndrome.[10]

The clinical classification suggested by the Federation of Gynecology and Obstetrics: (1) PAS Grade 1 - abnormally attached placenta (creta); (2) PAS Level 2 - AIP (increta); (3) PAS Grade 3 - AIP (percreta), Grade 3a - confined to the uterine serosa, Grade 3b - with invasion of the bladder, Grade 3c - with invasion of other pelvic tissues/organs. Pathological classification: (1) PAS Level 1 - non-invasive; (2) PAS Level 2 - invasive; (3) PAS Level 3 - invasive. (2) PAS Grade 2 - superficial invasion; (3) PAS Level 3A - deep invasion; (4) PAS Grade 3D - deep invasion with disruption of the serosa; (5) PAS Grade 3E - deep invasion with attached extrauterine structures.[1,11]

On physical examination, during a thorough inspection of the external surfaces of the uterus and pelvis for obvious signs of placental invasion including: a) abnormal appearance of the uterus above the placental lining (bluish/purple appearance) with marked distention (protruding placenta); and b) overt invasion of placental tissue through the uterine surface with or without invasion of the serosa. If these aspects are clear, the diagnosis of PAS can be confirmed.

However, if there is no clinical evidence of the most invasive form of PAS, with no visible placental tissue invading through the uterine serosa, a uterine incision should be made leaving

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the placenta unbroken, and controlled cord traction can be performed. If traction on the umbilical cord causes the uterine wall to appear to be pulled inward towards the traction without separation of the placenta and there are uterine contractions that separate from the placental bed, then PAS can be diagnosed. If PAS cannot be diagnosed by the previous two steps, then digital exploration can be performed to assess for the presence of a cleavage plane between the uterus and placenta.[12]

Prenatal detection and risk stratification for PAS is primarily performed by ultrasonography. However, ultrasound is an operator-dependent imaging modality with substantial variability in image quality among providers. In addition, the location of the placenta and challenging imaging conditions, including increased body mass index (BMI) or posterior placentation, may preclude the sonographic detection of PAS markers. Ultrasound "rail sign" defined by color Doppler sonography correlates with deeper villous invasion, additional perioperative appendices, and poorer outcome.[13]There is limited consensus regarding the optimal approach for ultrasound evaluation in patients at risk for PAS, such as the appropriate timing of screening, the need for transvaginal ultrasound imaging (TVUS), use of color and Doppler ultrasound, angle of placental insonation, and equipment settings.[14,15]

As outlined in the recent Midwifery Care Consensus, ultrasound is the primary screening modality for PAS. The ultrasound markers of PAS can be seen early in the first trimester, although historically screening has mostly been done in the second and third trimesters of pregnancy. The ultrasound marker with the strongest association with PAS is persistent placenta previa at delivery, in the setting of a prior cesarean delivery.[16,17,18]

The main advantages of US over MRI, are (i) higher spatial and temporal resolution, (ii) dynamic vascular interrogation with Doppler, and (iii) feasibility of intraoperative use. The disadvantages of ultrasound including operator dependence and limited penetration/field of view can be overcome by large, reproducible field-of-view imaging with MRI. The most attractive advantages of MRI are its higher contrast resolution and tissue-specific characterization which allows visualization of the entire placenta-myometrium interface in fine detail. MRI is also superior for the preoperative assessment of extra-uterine invasion of adjacent organs and imaging of critical iliac vessels. Limited availability and high cost are known challenges with MRI.[10,15]

Depth of placental invasion is one of the main factors affecting the outcome of labour. Therefore, to identify the best strategy in the management of PAS, precise assessment of the degree of invasion at delivery, stratification of women based on this, and appropriate correlation between prenatal imaging, intraoperative aspects, and pathological aspects are of paramount importance when comparing data. from various studies. However, because this condition is relatively rare, and given the ethical concerns that randomized trials would raise, high-quality studies dealing with the management of PAS disorder are lacking.[7]

Cesarean hysterectomy is considered the gold standard for the treatment of invasive placentation. However, this radical approach is also associated with high rates (40–50%) of severe maternal morbidity, mostly related to bleeding and damage to adjacent organs during surgery, and mortality rates of up to 7% due to massive untreatable haemorrhage. ,62 However, a recent meta-analysis showed that when prenatal diagnosis and multidisciplinary

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expert management are available, rates in the 0.05% range can be achieved. 63 In a recent systematic review and meta-analysis, nearly 90% of cases PAS who was suspected from the start underwent a cesarean hysterectomy.[12]

Conservative management of PAS consists of any approach that avoids hysterectomy. A conservative approach may be considered in two situations: 1) when intraoperative findings indicate that hysterectomy is likely to be complicated and associated with a high risk of massive bleeding or injury to adjacent tissues that can be reduced by leaving the placenta in situ; and 2) for women who desire future pregnancies, or whose fertility is closely related to social status and self-esteem.[12]One-step conservative surgery (OSCS) is a valid procedure in most patients with placenta accreta spectrum. This is a technique that can be applied even in scenarios with limited resources. However, its safe application requires knowledge of topographical classification and intraoperative application.[19]

Approximately 45.48% of women with placenta accreta spectrum underwent hysterectomy, while 54.52% did not; 3 cases were performed conservatively. In a study by Soniya Dahiya et al revealed that the One step Conservative Surgery (OSCS) approach would produce better results in 80% of cases with minimum morbidity and reduced blood volume.[6]Emergency and elective caesarean sections were performed respectively by 32.85% and 67.15%. There are about 3.25% maternal deaths. Cesarean hysterectomy is the gold standard for invasive placental management, but it should also be noted that it has a morbidity rate of approximately 40-50%, most associated with bleeding events and organ complications around the time of surgery. Prenatal and multidisciplinary expert management is available, nearly 90% of cases of PAS initially suspected undergo cesarean hysterectomy.[4]

Anterior placenta accreta spectrum (83.3%) was associated with previous uterine scar attachment and intraoperative blood loss compared with posterior placenta (15.88%) ($p<0.05$). This is supported by the statement of Elizabeth et al who stated that the spectrum of placenta accreta with posterior placental location is associated with delayed diagnosis, surgical complications, assisted reproductive technology, and a lower number of previous cesarean deliveries compared to anterior locations. This difference in outcomes and risk factors based on placental location could increase clinical awareness, as well as improve diagnosis and management. So that there are fewer detected from anterior placenta accreta.[20]Patients with placenta accreta spectrum with previous uterine surgery had the highest probability of peripartum hysterectomy ($p<0.001$). Similar to the statement expressed by William Goh et al who said that the most important risk factor for the development of placenta accreta is previous cesarean delivery and the continued increase in the number of cesarean sections worldwide.[9]

CONCLUSION

It can be concluded that placenta accreta is diagnosed by antepartum ultrasound in approximately 6.15%. Nearly half of the women in this study had a hysterectomy. Only one third of the women with placenta accreta spectrum in our study underwent emergency surgery. Anterior placentas are associated with prior uterine attachment of the placenta and greater intraoperative blood loss compared with posterior placentas. A history of previous

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uterine surgery in a woman with a spectrum of placenta accreta raises the possibility of further peripartum hysterectomy. Spectral placenta accreta should be managed in a center with a high level of surgical expertise.

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