Maternal Characteristics and Histopathological Features of Placenta Accreta Spectrum in Dr. Hasan Sadikin General Hospital Bandung, Period 2015–2020

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Abstract

Background: The placenta accreta spectrum (PAS) incidence has inclined today. The PAS is divided into three histopathological classifications, including accreta, increta, and percreta, associated with maternal, fetal morbidity, and mortality. This study aimed to explore the maternal characteristics and histopathological features in PAS at Dr. Hasan Sadikin General Hospital Bandung.

Methods: This descriptive observational study involved 135 cases from January 2015–December 2020 at Dr. Hasan Sadikin General Hospital that met the inclusion criteria. The PAS histopathological classification was evaluated based on maternal characteristics such as age, parity, cesarean section (CS), and miscarriage.

Results: The incidence of placenta accreta from 2015 to 2020 was 37.0%, whereas increta was 43.4%, followed by percreta at 19.3%. The maternal age of placenta accreta and increta mainly occurred at the age of 30–34 years with the prevalence of 40% and 46%, respectively, whereas percreta was aged 35–39 yo (27%). Most parities in placenta accreta, increta, percreta were three. Interestingly, 93% of cases had a CS history. Furthermore, the miscarriage history for accreta was 18%, increta 29% and percreta 38%.

Conclusion: The highest incidence of PAS in Dr. Hasan Sadikin General Hospital is placenta increta, which mainly occurs at the age of 30–34 years. Almost all PAS patients have a history of CS; however, most of the patients do not have a miscarriage history.

Keywords: Characteristics, histopathological features, increta, percreta, placenta accreta spectrum

Introduction

Placenta accreta spectrum (PAS), also known as Morbidly Adherent Placenta, is a condition of abnormal trophoblast invasion of either parts or all of the placenta into the myometrial layer of the uterine wall. This abnormal attachment has important clinical implications, leading to severe maternal and neonatal mortality and morbidity.[1] The incidence of PAS has increased in various parts of the world. The PAS affects approximately 3 in 1,000 pregnancies and a 5-fold increase in incidence over the last 3 decades.[2] A cohort study in Ireland found an increase in cesarean section (CS) birth rates by 4.1% in 1975 to 20.7% in 2010. The CS birth rate increased from 17% to 64% during the same period. The increase in CS birth rate also occurs in Asia, including Indonesia. Studies conducted in Asia found that the incidence of PAS is 1 per 1,000 pregnancies. Since 2016, the incidence of PAS in Indonesia has touched 2% and is still increasing today.[3–5]

Several risk factors for PAS include intrauterine procedures such as cesarean section, manual placenta, placenta previa, in vitro fertilization, curettage myomectomy, age, parity, smoking, Asherman's syndrome,

hypertension, infection in the uterus, as well as multiparity. History of cesarean section and placenta previa are risk factors that are often encountered in PAS; whereas other risk factors are still unknown in contributing to the pathogenesis of placenta accreta.[6]

Maternal morbidity in PAS has reached 60%, including hysterectomy, need for blood transfusion, and prolonged length of stay with mortality exceeding 7%. The incidence of perinatal complications is also increasing due to premature birth, low birth weight, and small fetus for gestational age[7,8] resulting in the increasing need for Neonatal Intensive Care Unit (NICU) and resuscitation requirements.[9]

Considering the magnitude of complications in both mother and baby in mothers with PAS and the lack of research on the characteristics of PAS during the last five years, we are interested in exploring the characteristics of PAS patients at Dr. Hasan Sadikin General Hospital Bandung, a referral hospital in West Java. By identifying risk factors for PAS, its incidence in the future may be reduced. Therefore, this study aimed to determine the incidence characteristics of maternal-fetal in PAS patients at Dr. Hasan Sadikin General Hospital Bandung.

Methods

This study was a descriptive-analytic study of 135 PAS patients, collecting secondary data obtained through medical records in Dr. Hasan Sadikin General Hospital Bandung during 2015–2020. The study included only complete data, such as maternal age, parity, history of cesarean section (CS), history of miscarriage, and a histopathological PAS group. The histopathological classification of PAS was conducted through microscopic examination to assess the depth of trophoblast invasion into the myometrium, with the classification as follows: placenta accreta, increta, and percreta. The maternal characteristics were evaluated in each histopathological PAS group. The Research Ethics Committee of Universitas Padjadjaran has approved this study by ethics approval letter number: 777/UN6.KEP/EC/2021.

Results

There was an increase in the incidence rate of PAS in Dr. Hasan Sadikin General Hospital Period 2015–2020. In 2015, there were 3 cases out of 2,452 total deliveries. A total of

Table 1 Incidence and Characteristics of Placenta Acreta Spectrum Patients in Dr. Hasan Sadikin General Hospital Bandung Period 1 January 2015–31 December 2020

Characteristics	Incidence		
	Placenta Accreta	Placenta Increta	Placenta Percreta
	n=50 (%)	n=59 (%)	n=26 (%)
Age (years old)			
<25	2 (4)	2 (3)	0 (0)
25–29	15 (30)	18 (30)	6 (23)
30–34	20 (40)	27 (46)	6 (23)
35–39	13 (26)	8 (14)	7 (27)
≥ 40	-	4 (7)	7 (27)
Parity			
2	10 (20)	25 (43)	2 (8)
3	19 (38)	22 (37)	8 (31)
4	12 (24)	6 (10)	10 (38)
>4	9 (18)	6 (10)	6 (23)
History of cesarean delivery			
Yes	48 (96)	55 (93)	22 (85)
No	2 (4)	4 (7)	4 (15)
History of miscarriage			
Yes	9 (18)	17 (29)	10 (38)
No	41 (82)	42 (71)	16 (62)

Yuktiana Kharisma et al.: Maternal Characteristics and Histopathological Features of Placenta Accreta Spectrum in Dr. Hasan Sadikin General Hospital Bandung, Period 2015–2020
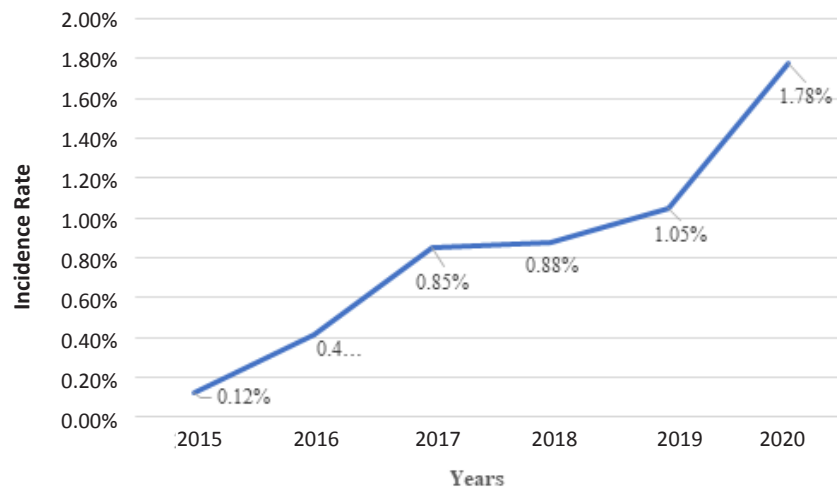
57

Figure 1 Incidence Rate of Placenta Accreta Spectrum at Dr. Hasan Sadikin General Hospital Bandung between 2015 and 2020

9 cases of PAS were found in 2016 with 2,190 total deliveries, while in 2017, there were 23 cases of PAS with 2,707 total deliveries. The incidence of PAS in 2018 was 27 cases with 3,051 total deliveries. In 2019 and 2020, there were 33 and 40 cases of PAS with a total of 3,140 and 2,252 deliveries, respectively, as described in Figure 1. In 2015, 2016, and 2018 there were more cases of placenta increta than other subtypes of the depth of invasion of PAS, while in 2017 and 2020, it was found that the number of cases of placenta accreta was very dominant. The highest incidence of placenta percreta was found in 2019 (Figure 2).

The incidence of placenta increta was 43.4%, placenta creta was 37.0%, and placenta percreta was 19%. The range of maternal age characteristics in placenta accreta and increta occurred at the age of 30–34 years (40% and 46%). However, placenta percreta had the highest percentage at the age of 35–39 years (27%). The highest parity in placenta accreta, increta, and percreta was three. Interestingly, 93% of patients with PAS had a history
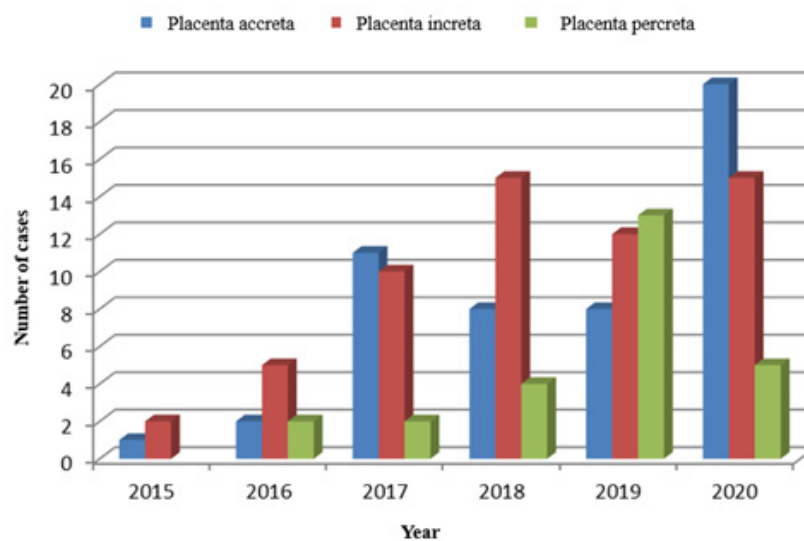

Figure 2 Incidence of Placenta Accreta Spectrum based on the Depth of Placental Invasion into the Myometrium in Dr. Hasan Sadikin General Hospital Bandung
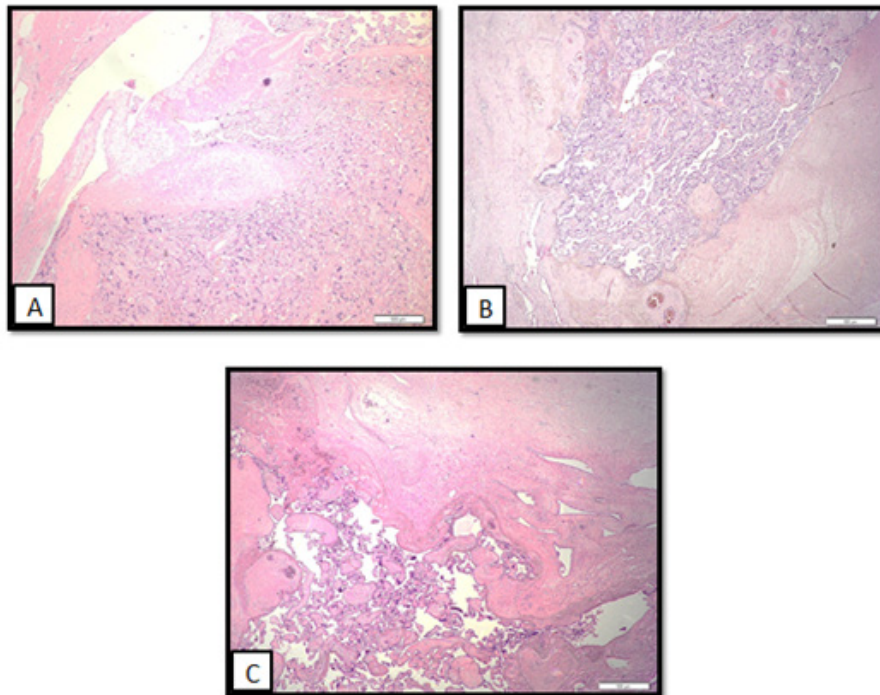
Figure 3 Histopathological Appearance of the PAS, A) Chorionic villi attached to the myometrium (placenta accreta), B) Chorionic villi penetrated the myometrium (placenta increta), C) Chorionic villi penetrated the tunica serosa (placenta percreta)

of cesarean sections. Moreover, most PAS patients did not have a history of abortion in a previous pregnancy. All neonates to mothers with placenta accreta were born alive, while two babies were stillborn in cases of placenta increta and percreta (data not shown).

The PAS was diagnosed through histopathological examination through a microscope examination to confirm PAS diagnosis and evaluate the depth of trophoblast invasion into the myometrium. The placenta accreta was diagnosed based on microscopic findings of direct attachment of the chorionic villi to the myometrium, either without the decidua or the Nitabuch layer (Figure 3A). The presence of the chorionic villi invasion showed penetration in the myometrium (increta) (Figure 3B). In placenta percreta, it was diagnosed by assessing the presence of invasion of the chorionic villi to penetrate the uterine serosa (Figure 3C).

Discussion

The PAS is characterized by abnormal attachment of the placenta to the uterine wall, caused by the absence or deficiency of the decidual Nitabuch layer. Abnormal placentation causes high morbidity and mortality for both the mother and neonates. The incidence of PAS increases to 1/533 pregnancies. Placenta accreta spectrum is considered to be a major cause of postpartum hemorrhage and is a significant cause of maternal and neonates' morbidity and mortality.[10]

In this study, the incidence of PAS in Dr. Hasan Sadikin General Hospital Bandung reached as many as 135 cases out of 15,792 total deliveries in 2015–2020. The PAS incidence rate increased from 0.12% in 2015 to 1.78% in 2020. Similarly, the incidence of PAS in Greece has increased in the last 30 years,[11] with an increase in risk factors for PAS.[6] The main risk factor for the development of PAS is a history of cesarean section delivery.[10] All patients in this study had a history of cesarean section in a previous pregnancy. A history of the cesarean section is one of the critical risk factors in the incidence of PAS. Cesarean section is the most common cause of scar tissue formation in the myometrium, at higher risk of developing PAS when accompanied by placenta previa.[3] Clearly, the countries with high levels of the cesarean section have an increased incidence of PAS.[12]

Yuktiana Kharisma et al.: Maternal Characteristics and Histopathological Features of Placenta Accreta Spectrum in Dr. Hasan Sadikin General Hospital Bandung, Period 2015–2020

59

Furthermore, higher maternal age is a risk factor for PAS,[6] for example, mothers aged 35 years or older have a higher risk of experiencing PAS. This relationship is influenced by the possibility of the number of parity and comorbid placenta previa, which can be one of the causes of decidual defects as a risk factor for PAS.[3] In this study, most mothers with PAS were between the ages of 30–34 years; however, there were some outliers found in women less than 25 years old and women more than 40 years old who experienced PAS.

Although all mothers with PAS in this study had a parity of 2 or more, several studies suggested cases of PAS that occurred in primiparas.[13,15] with the incidence of 22.7/10,000 cases. This condition is associated with other risk factors for PAS, such as a history of uterine instrumentation such as curettage, history of uterine surgery, and infection of the uterine wall. The previous history of surgery on the uterus is still not a strong risk factor because several studies have shown different results. Uterine curettage has the strongest significance concerning the incidence of PAS but cannot be the sole factor in its pathogenesis. Moreover, a study in the United States has shown a significant relationship between invasive procedures of the uterus (laparoscopy, hysteroscopy, and uterine curettage) and PAS, depending on the frequency of procedures performed by the patient.[3]

In this study, only a small proportion of PAS patients had a history of miscarriages in a previous pregnancy. Similar to study in Japan showing no significant relationship between a history of miscarriage.[14]

The placenta accreta spectrum is significantly associated with maternal and infant morbidity. In this study, a baby was stillborn on a placenta increta and percreta. Similarly, a study in Australia has reported an increased risk of stillbirth (RR 5.4, and CI 99% 4.0–7.3) and neonatal death (RR 8.0, and CI 99% 1.5–41.6) in infants born prematurely in mothers with PAS.[15]

One of the pathogenesis of PAS is an endometrial-myometrial defect that causes failure of normal decidualization at the site of the uterine scar. This allows abnormal trophoblast invasion into the myometrium.[16] The decidua potentially regulates trophoblast invasion. Besides, the disruption of decidual integrity results in loss of inherent regulation and uncontrolled invasion of extravillous trophoblasts through the entire depth of the myometrium. The extent of penetration of villous tissue in the myometrium is most likely related to the degree of decidual-myometrial damage.[17] Conditions such as manual removal of the placenta, uterine curettage, and endometritis are more likely to cause abnormally adherent placentation (accreta).

On the other hand, surgical scars over the entire thickness of the myometrium were associated with an absence of endometrial re-epithelization and vascular remodeling around the scar area. This contributes to abnormally invasive placentation (increta/percreta).[10,17,18] The obstetric and gynecological history of the patients in this study has not been explored further to identify other risk factors that may be associated with trophoblast invasion in PAS.

This study found that the number of cases of placenta increta dominated in the last 6 years, followed by placenta accreta and placenta percreta. The diagnosis of PAS has been conducted through antenatal imaging and histopathological assessment. Placenta accreta is the most common subtype of PAS, whereas placenta increta is a minority subtype in Australia and New Zealand.[8] The development of PAS is a complex multifactorial process. The underlying molecular mechanism is not widely known. Several hypotheses regarding the formation of PAS reveal that the etiopathogenesis of the disorder is caused by a decidual defect and excessive invasion of trophoblast cells.[19,20]

This study has several weaknesses, excluding the characteristics such as demographic factors, socioeconomic factors, comorbidities in pregnancy, history of intrauterine instrumentation, and smoking history. Furthermore, risk factors of mothers with incomplete data on curettage, body mass index, and comprehensive clinical outcome mother and babies have been excluded. The study on the relationship between PAS and clinical outcomes needs to be further explored to get a more holistic picture of PAS, especially in West Java, Indonesia.

In conclusion, placenta increta has the highest incidence at Dr. Hasan Sadikin General Hospital Bandung from 2015 to 2020. The characteristics of the maternal age for placenta accreta and increta ranges from 30–34 years, while, the highest percentage of placenta percreta is 35–39 years. All mothers with PAS in this study are multiparous with varying amounts of parity. Moreover, almost all PAS patients in this study have a history of cesarean section, and a small proportion of PAS patients had a miscarriage history. It is necessary to conduct

further research on the characteristics of mothers with PAS accompanied by an assessment of maternal and neonate clinical outcomes with a more significant number of research samples.

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