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EARLY DETECTION AND GOOD TEAM COLLABORATION FOR PREVENTING MATERNAL DEATH CAUSED BY PLACENTA ACCRETA SPECTRUM DISORDER

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ABSTRACT

Background: Placenta accreta spectrum (PAS) is considered one of the most harmful pregnancy conditions, as it is strongly linked with maternal morbidity and mortality. An accurate and early prenatal diagnosis of PAS allows time for a multidisciplinary team to plan the best course of action for delivery management. The aim of this study is to describe placenta accreta spectrum management and outcomes with early detection and a multidisciplinary team approach.
Method: A retrospective cohort study was conducted on 167 cases of placenta accreta from 2016 to 2021. Medical records were then reviewed, and data were collected for delivery management and maternal outcome, including estimated amounts of bleeding, urinary tract injury, delivery time, ICU referral, and maternal death.
Result: Delivery management (hysterectomy and conservative management) and maternal bleeding were significantly associated with MAP score ($p < 0.05$), while urinary tract injury, delivery time, ICU admission, and maternal death were not significantly associated ($p > 0.05$). 55.1% of patients underwent hysterectomy, and the rest 44.9% underwent conservative surgery. Massive bleeding of more than 2500 mL happened in 54.5% of patients, and the rest 45.5% managed to bleed less. Preterm deliveries accounted for 29.9% of all deliveries, with the remaining 70.1% being term. 5.4% of patients experienced urinary tract injuries. 6.6% of patients were referred to the intensive care unit. The maternal mortality rate is 4.8%.

Conclusion: Early detection of the placenta accreta spectrum, as well as good collaboration among members of a multidisciplinary team from various medical fields, are required to ensure the mother and baby's safety and survival.

Keywords: *placenta accreta spectrum, early detection, multidisciplinary team, maternal death.*

INTRODUCTION

Placenta accreta spectrum (PAS) is the contemporary nomenclature for a set of clinical pregnancy issues caused by a combination of abnormal placental implantation and a uterine wall defect [1,2].

PAS is one of the most serious pregnancy disorders, as it is strongly linked to maternal morbidity and mortality[3]. The spectrum of PAS disorder now affects approximately 1 in 500 pregnancies in developed countries, where the prevalence of pregnancy after prior uterine surgery has progressively increased over the last three decades.[4]. Placenta accreta incidence in Indonesia reached 2% in 2016 and doubled to 4% in 2017 and 2018[5]. As a result, all types of maternity care providers must be aware of the dangers and effects of PAS disorders complicating pregnancy[2].

An accurate and early prenatal diagnosis of PAS allows time for a multidisciplinary team to plan the best course of action for delivery in a center with expertise in surgical management of these disorders[6]. The aim of this study is to describe placenta accreta spectrum management and outcomes with early detection and a multidisciplinary team approach.

METHODS

A retrospective cohort study was conducted of pregnancies complicated by PAS at Dr. Moewardi Hospital from 2016 to 2021. These cases were confirmed as PAS with pathological findings. Medical records were then reviewed, and data were collected for delivery management and maternal outcome, including estimated amounts of bleeding, urinary tract injury, delivery time, ICU referral, and maternal death. Cases were divided into three groups based on prenatal diagnosis using ultrasound and the Morbidly Adherent Placenta (MAP) score. The rationale for this classification is the MAP score as the result of prenatal diagnosis, and the classification reflects the patient's management.

The statistical analysis was performed using SPSS software. Chi-square was used to investigate the association between underlying variables and the MAP score.

RESULT

A total of 167 patients were identified. Prenatal screening with the MAP score classified those patients into three categories: 62 MAP high-risk (37.1%), 57 MAP moderate-risk (34.2%), and 48 MAP low-risk (28.8%). Delivery management and maternal outcomes are shown in **Table 1**. Delivery management, including hysterectomy and conservative management, was significantly associated with the MAP score ($p < 0.05$). The hysterectomy group (55.1%) was dominated by high-risk (31.1%), followed by moderate-risk (19.2%) and low risk (4.8%) MAP score. The conservative group (44.9%) was dominated by low-risk (24.0%), followed by moderate-risk (15.0%) and high-risk (6.0%) MAP score.

The amount of bleeding, either more or less than 2500 mL, was significantly related to the MAP score. Massive bleeding (more than 2500 mL), dominated by high-risk patients, is followed by moderate-risk and low-risk patients. On the contrary, bleeding less than 2500 mL was dominated by low-risk patients, followed by moderate-risk and high-risk patients.

Delivery time is not related to the MAP score. 5.4% of patients suffered from urinary tract injuries. 6.6% of patients were referred to the intensive care unit. Maternal death occurred in 8 cases (4.8% mortality rate).

Table 1. Delivery management and maternal outcomes in placenta accreta spectrum.

Variable	MAP score						*p value*
	High risk		Moderate risk		Low risk		
	f	%	f	%	f	%	
Management							
Hysterectomy	52	31.1%	32	19.2%	8	4.8%	0.000[a]
Conservative	10	6.0%	25	15.0%	40	24.0%	
Bleeding							
> 2500	51	30.5%	33	19.8%	7	4.2%	0.000[a]
< 2500	11	6.6%	24	14.4%	41	24.6%	
Injury							
Bladder	5	3.0%	3	1.8%	0	0.0%	0.210[a]
Ureter	0	0.0%	1	.6%	0	0.0%	
Delivery time							
Preterm	22	13.2%	18	10.8%	10	6.0%	0.237[a]
Term	40	24.0%	39	23.4%	38	22.8%	
ICU							
ICU	7	4.2%	2	1.2%	2	1.2%	0.168[a]
Maternal death							
Maternal death	5	3.0%	1	0.6%	2	1.2%	0.266[a]

[a] *p value* from Chi-square test
$p < 0.05$ is statistically significant

DISCUSSION

Placenta accreta spectrum (PAS) is the modern term for a group of clinical pregnancy problems caused by different combinations of abnormal placental implantation and a uterine wall defect [2]. Placenta accreta occurs when implantation is abnormal and the placenta grows too deeply into the myometrium, tunica serosa, and organs surrounding the uterus[1,2]. The pathologic invasiveness of the placenta is classified into three categories: placenta accreta (anchoring villi cling to the surface myometrium without interposing decidua), placenta increta (placental villi penetrate into the myometrium), and placenta percreta (anchoring villous tissue penetrates through the entire uterine wall even to the surrounding organs)[7,8].

The abnormally invasive placenta was significantly associated with maternal morbidity and mortality[9]. The maternal mortality rate in the placenta accreta spectrum is 7% and can even reach 30% in the absence of an antenatal diagnosis[10–12]. A high risk of massive hemorrhage in the placenta accreta spectrum leads to an excess of coagulopathy, which includes multiorgan dysfunction such as cardiac arrest, respiratory failure, brain hypoxia, acute renal failure, and systemic blood clotting disorders that cause maternal death[13–15]. The risk of organ injury, such as to the bladder, ureter, bowel, and even the vascular system, raises maternal morbidity[16,17]. Placenta accreta also increased neonatal morbidity significantly. Neonates born from placenta accreta women were also at risk of being born preterm, having intrauterine growth restriction, and having respiratory distress syndrome[18]. The severity of complications and accompanying morbidity are heavily reliant on the healthcare team's ability to detect PAS diseases antenatally, since this allows for

optimal birth preparation and skilled intervention in the most severe cases[16,19]. Cases detected intraoperatively and cared for by nonexpert professionals, on the other hand, have the highest risk of maternal morbidity and mortality [10,15,20].

PAS management at Dr. Moewardi Hospital entails close collaboration among multidisciplinary medical departments as multiple research has recommended[10,16,17,21–26]. Beside OB/GYN, other department including thoracic and cardiovascular surgery, anesthesia, urology, and pediatric neonatal department were involved in PAS management. From 2016 to 2021, we managed 167 cases of placenta accreta. Management options include hysterectomy and conservative surgery, depending on parity, the amount of hemorrhage, and surgery-related complications such as organ injury and ICU readiness. The priority being the safety and survival of the mother and baby, including reproductive organs, creates a team with optimum quality. Collaboration between specialists from various medical divisions at Dr. Moewardi Hospital managed to lower the total maternal death rate to 8 out of 167 (4.8%), similar to a recent study in North Sumatera, Indonesia,[27] and slightly lower than the recent study in Aceh, Indonesia, that shows a 5.6% mortality rate[28]. However, given that recent data suggests that a range of 0.05% is achievable,[29] these results can still be improved.

The initial stage in the multidisciplinary team subspecialty care of patients with PAS is to make the diagnosis. The obstetry and gynecology department in Dr. Moewardi Hospital used ultrasound and the MAP score developed by Tovbin et al. (2016)[30] to diagnose and predict the severity of the placenta accreta spectrum antenatally. The tool, both of ultrasound and the scoring system has sensitivity and specificity above 90%[31–34], easy to access and have relatively low cost[35–37]. Several studies have revealed that cases suspected antenatally rather than at birth have decreased rates of bleeding and other maternal problems[12,17,20,23,38,39]. Accurate prenatal diagnosis allows for multidisciplinary planning in an effort to reduce maternal and neonatal morbidity and mortality[16,19]. According to the findings of this study, labor management (conservative or histerectomy) and the amount of bleeding are significantly related to the MAP score. Therefore, prenatal diagnostics with a MAP score are useful for labor preparation and managing bleeding.

The updated guidelines' strongest recommendation for PAS management was cesarean hysterectomy with the placenta left in situ[7]. The other option is conservative management, which includes all procedures that aim to avoid peripartum hysterectomy and its related morbidity and consequences. Conservative management also preserves fertility and thus reduces the impact on a woman’s societal status and self-esteem associated with the loss of her uterus[40]. It is important to note that the management that is put in place may differ from the original plan. First, performing a hysterectomy on a patient with PAS, particularly bladder or parametrium invasion, which can result in organic or uncontrolled bleeding and substantial maternal morbidity and mortality, is difficult. In these cases, conservative therapy should be considered following a complete preoperative evaluation and preparation. Second, uncontrollable bleeding is a sign that a hysterectomy is necessary[41]. This study found that hysterectomy and conservative surgery account for roughly equal proportions of PAS treatment options. Hysterectomy was performed on 55.1% of PAS patients, the vast majority of whom had a high-risk MAP. Conservative surgery, on the other hand, was used by 44.9% of patients, with low-risk MAP being the most common. The management selection is significantly related to the MAP score ($p < 0.05$).

The main goal of treating patients with PAS condition is to control excessive

hemorrhage throughout the intrapartum and postpartum periods[7]. In cesarean sections, the placenta accreta spectrum is the major cause of peripartum bleeding and the potential for severe bleeding, resulting in increased maternal morbidity and mortality. Fluid and blood replenishment, as well as a big transfusion, are frequently used to treat it[42]. In the last few decades, obstetricians have used intravascular interventional therapies like uterine artery embolization, common iliac artery balloon occlusion, and bilateral internal iliac artery balloon occlusion to reduce intraoperative bleeding and the number of hysterectomies. Due to the uterus's extensive collateral circulation, the following methods don't work as well as they could, and they may even cause problems like bleeding, clots, artery damage, and bladder damage[43]. In collaboration with the thoracic and cardiovascular surgery departments, the management of PAS at Dr. Moewardi Hospital uses a newer method, abdominal aortic balloon occlusion. The thoracic and cardiovascular surgeon puts a balloon catheter in the lower part of the abdominal aorta, just below where the renal arteries come out of the right femoral artery. After the baby is born and the cord is cut, the balloon is quickly inflated to temporarily cut off the blood supply to the uterus. This helps prevent bleeding when the OB/GYN surgeon removes the placenta and sews up the uterine cut[43,44].

In this study, despite being treated by a multidisciplinary team of experts in their field, massive bleeding still occurs in more than half of the population. Patients with estimated bleeding >2500 mL were 54.5% of the population, similar to the results of the Fitzpatrick et al. (2013) study, where >2500 mL of bleeding occurred in 55% of cases with an antenatal diagnosis,[3] and slightly better than the study by Wright et al. (2011), where >2500 mL of bleeding occurred in 59.7% of the population[45]. Nonetheless, these results are superior when compared to the study by Fitzpatrick et al. (2013) in a population without antenatal diagnosis, where >2500 mL of bleeding occurred in 70% of the population[3]. The amount of bleeding is also significantly correlated with antenatal diagnosis using the MAP score ($p < 0.05$). Thus, it can be concluded that antenatal diagnosis using the MAP score is important to consider in preparing for the management of bleeding along with the management of delivery.

At Dr. Moewardi Hospital, the anesthesia department's service is an integral part of PAS management. Anesthesiologists were responsible for balancing patients' body fluids, administering vasopressors and blood products, and keeping them alive during surgery. To keep the patient alive during times of rapid blood loss, unstable blood flow, and potentially lengthy surgery, the collaboration of anesthesiologists with extensive experience in massive obstetric hemorrhage is critical [23].

Urological intervention is frequently required in PAS to avoid and repair bladder and ureter damage[46–48]. To reduce the risk of bladder or ureteric injury and for reconstruction as required, the urology team will remain in operating room during the caesarean section and hysterectomy. The placement of ureteric catheters not only reduces the risk of ureteric injury but also allows for the earlier identification of injury[48].

The multidisciplinary team at Dr. Moewardi Hospital was successful in preventing urinary bladder and ureter injury, with only 9 bladder and ureter injury cases (5.4%), which is lower than the previous study by Mohammed et al. (2018) with 31%,[49] Mitric et al. (2019) with 12.7%,[26] and Friedrich et al. (2022) with 9.3%[50]. The maternal ICU referral in Dr. Moewardi Hospital was also comparatively low, with only 11 out of 167 (6.6%) admissions, compared to previous studies by Mohammed et al. (2018) with 42% admissions,[49] Kandil et al. (2019)

with 22.5% admissions,[18] and Ornaghi et al. (2021) with 24% admissions[51].

As long as clinical circumstances do not warrant earlier delivery, the Society for Maternal-Fetal Medicine (SMFM) clinical guidelines for PAS recommend late preterm birth (34 0/735 6/7 weeks of gestational age [GA])[7]. This method seeks to avoid unscheduled emergency deliveries, which increase morbidity due to preterm labor and vaginal hemorrhage[52]. However, in a facility equipped for accreta care, chosen, stable previa-accreta patients can be considered for delivery at gestational ages exceeding 34 and 35 weeks without increased maternal morbidity[53]. Delaying delivery will help reduce unnecessary neonatal risks from prematurity[53]. This approach is used by Dr. Moewardi Hospital, where 70.1% of PAS patients underwent term delivery and only 29.9% experienced preterm delivery. The PAS management at Dr. Moewardi Hospital involves collaboration from the pediatrics and midwifery departments to guarantee an optimal neonatal outcome. The neonatal pediatric and midwifery teams were in the operating room at the time of the delivery. PAS may not have a significant negative impact on newborn outcomes, but because neonates are often born prematurely, early participation of the neonatal team will ensure high standards of care[16,54].

The nature of experience and teamwork from a multidisciplinary team also contribute to the successful treatment of PAS at Dr. Moewardi Hospital. A large cohort study found that the most relevant problems in the process that led to maternal death in PAS treatment were inexperienced personnel, inadequate surgical technique, a lack of hospital resources, an underestimation of risk, the surgeons' complacent self-regard, a refusal to seek help, a lack of timely contact with health services, and the severity of the underlying pathologies[10]. Most of those problems can be solved by the experience that the multidisciplinary team has gained over time and by good collaboration between various divisions in the hospital. Collaboration between specialists from various divisions of the medical field, such as fetomaternal, obstetric anesthesiology, urology, cardiovascular surgery, intensivists, neonatologists, skilled nurses and midwives, is needed in the team for it to be successful. Coordination with the hospital's management is also needed for things like emergency maternal referral, surgical tools, the intensive care unit (ICU), and the neonatal intensive care unit (NICU). Coordination with midwifery organizations and OB/GYNs is also needed for early detection and early referral, which will lead to a better outcome.

CONCLUSION

Early detection of the placenta accreta spectrum, as well as good collaboration among members of a multidisciplinary team from various medical fields, are required to ensure the mother and baby's safety and survival.

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