

# A low-middle income country experience: conventional hysterectomy vs conservative placenta accreta spectrum management



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**BACKGROUND:** Placenta accreta spectrum is one of the most dangerous complications of pregnancy, and its incidence has been rising in recent years. The standard management approach is an elective cesarean-hysterectomy, but it presents with its own set of risks and complications. Although conservative management options exist, there is a lack of definitive guidelines and must be considered on a case-by-case basis.

**OBJECTIVE:** This study aimed to describe and compare the outcomes (surgical duration, intraoperative blood loss volume, and maternal mortality) of patients with placenta accreta spectrum who were treated with a hysterectomy and those treated with conservative surgery in the Dr. Cipto Mangunkusumo General Hospital, a tertiary referral hospital in Indonesia.

**STUDY DESIGN:** Data from 271 patients with placenta accreta spectrum at the Dr. Cipto Mangunkusumo General Hospital that were collected over 3.5 years were taken and analyzed in this retrospective cohort study. Data collected included the patients' age, reproductive history, placenta accreta index score, gestational age, emergency status, management method, type of hysterectomy, surgery duration, intraoperative blood loss volume, histopathologic data, and maternal mortality. The data were analyzed using the Statistical Package for Social Sciences, version 29, with statistical significance set at  $P < .05$ . Mann-Whitney U tests, independent  $t$  tests, chi-square tests, and correlation tests were used where appropriate.

**RESULTS:** There were no significant differences in the demographics and reproductive history between the hysterectomy and conservative surgery groups. There was considerable difference in terms of surgical duration, intraoperative blood loss, and placenta accreta index score. The hysterectomy group had longer surgeries (median 180 minutes vs 135 minutes;  $P < .01$ ), greater blood volume lost (median 1000 mL vs 700 mL;  $P < .01$ ), and higher placenta accreta index scores (median 6.5 vs 5.5;  $P < .01$ ). The maternal mortality rate of this study was 1.1%, all of whom were patients from the hysterectomy group, but this finding was not statistically significant.

**CONCLUSION:** In this study, patients who underwent conservative surgical management for placenta accreta spectrum experienced shorter surgeries with less bleeding and no maternal death. These patients typically had lower placenta accreta index scores, which may have influenced the choice of management methods and affected surgical outcomes. Although conservative surgery is a viable option, patients and surgeons must carefully weigh the risks and benefits before deciding on a treatment approach.

**Key words:** hemorrhage, hysterectomy, intraoperative bleeding, maternal mortality, PAI score, pregnancy complication, surgical duration, uterine sparing

## Introduction

Placenta accreta spectrum (PAS), formerly referred as morbidly adherent placenta, is the term used to describe pathologic placental adherence to the uterine myometrium. Based on the depth of villi invasion into the

myometrium, PAS is categorized into 3 types, namely accreta, increta, and percreta.<sup>1–3</sup> The 2 main risk factors identified are a history of cesarean delivery and placenta previa.<sup>4–6</sup>

Unstandardized criteria and reporting of PAS throughout the years

complicates confirmation of the exact rate of PAS, but the few studies that were able to use a consistent definition reports an increasing incidence. This increasing incidence is an issue because PAS is one of the most perilous conditions associated with pregnancy. The

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## AJOG Global Reports at a Glance

**Why was this study conducted?**

This study aimed to determine whether there are significant differences in the maternal outcomes between patients with placenta accreta spectrum (PAS) who were managed with classical hysterectomy and those managed with conservative surgery at our hospital.

**Key findings**

We found that, in our conservative surgery group, there tended to be less bleeding, shorter surgery duration, and no maternal deaths. We also found that the conservative surgery group had a lower median placenta accreta index score than the classical hysterectomy group.

**What does this add to what is known?**

This study adds a large number of patients to the field of conservative PAS management, which is an area of research with a relatively small studied population, and provides evidence to reinforce the notion that conservative management is safe.

placenta's abnormal attachment hinders its detachment process after delivery of the fetus, often leading to severe hemorrhage that may, at worst, lead to death. Maternal morbidity and mortality are higher among women with PAS than among those without.

The widely adopted approach to PAS management is an elective cesarean-hysterectomy without attempting placental removal, but a hysterectomy also poses its own set of risks, such as pelvic organ injury. This approach, naturally, leads to the loss of fertility, which may not be desirable for some patients. Conservative management of PAS is defined as any procedure that aims to avoid hysterectomy and its related risks.<sup>1,2,5,7–10</sup>

There is currently no definite guidelines on the best method to conservatively manage PAS because of the paucity of available data, thus, this method must be considered in a case-dependent manner.<sup>11</sup> The conservative management strategy used in this study was conservative uterine sparing surgery in which, instead of the standard hysterectomy, the invasive placenta (placenta and invaded myometrium or serosa) is surgically resected while keeping the uterus intact. An incision is made away from the site of placental invasion, and after the fetus is delivered, the placenta and invaded uterine tissue is then resected with a 1- to 2-cm invasion-free margin and closed with a hysterorrhaphy.

Indonesia's Dr. Cipto Mangunkusumo General Hospital has seen an increase in the incidence of PAS since the creation of their PAS team in 2017. As the team gained experience and insight on the management of PAS in this tertiary referral hospital, conservative treatment has become increasingly used, and the team wanted a deeper understanding of the results of their work. This retrospective cohort study described and compared the outcomes of patients treated either conventionally or conservatively and the variables that play a part.

**Materials and methods**

A retrospective cohort study was conducted using data from 271 patients with PAS who were treated at the Dr. Cipto Mangunkusumo General Hospital over a course of 3.5 years, from July 2020 to December 2023. Data were gathered from electronic health records and surgical reports. This timeframe was chosen for its fulfillment of the required quality of data recording. This study observed the outcomes (surgical duration, intraoperative blood loss, and maternal death) of patients treated by either conventional hysterectomy or conservative surgical management techniques. PAS was diagnosed prenatally based on the placenta accreta index (PAI) score and intraoperatively by the

surgical operator, then confirmed through histopathologic examination.

Conservative management was selected if the following criteria were fulfilled: (1) the placental invasion covered <50% of the anterior uterus, (2) the blood supply originated from the level of S1, (3) there was no invasion of the parametrium, cervix, or surrounding organs, and (4) there was a minimum of 2 to 3 cm of free margin that enabled approximation and hysterorrhaphy or uterine reconstruction. Cases that did not fulfill these criteria were managed using a standard hysterectomy. Conservative management was only selected in emergency cases if the previously described criteria were met and if grade 3 or higher hypovolemic shock was absent, because the presence thereof suggested a high risk for uterine atony after uterine sparing surgery.

We analyzed the maternal variables including age, gravida-parity-abortion (GPA), PAI score, history of cesarean delivery, myomectomy, and curettage. The intraoperative variables analyzed were type of anesthesia used and type of hysterectomy performed (if conducted). The data were analyzed using IBM Statistical Package for Social Sciences (SPSS), version 29 (Armonk, NY). Functions used were the Mann-Whitney *U* test, independent *t* test, chi-square test, and correlation test suitable to each variable. A *P* value of <.05 was considered statistically significant.

**Results**

Table 1 provides an overview of the data from our study cohort at the Dr. Cipto Mangunkusumo General Hospital, the highest referral hospital in Indonesia. Except for 1 patient, all patients included in this study had a history of cesarean delivery. As many as 27.1% (73/269) had undergone a previous myomectomy, and 16.3% (44/270) had a history of uterine curettage.

In total, 30.7% (82/267) of our study participants were emergency cases, whereas 69.3% (185/267) were scheduled electives. Of the 82 emergency cases, 25 cases (30.5%) were managed using conservative management. Histopathologic examination confirmed the

**TABLE 1**  
**Demographics and case characteristics**

Variable	No.	Percentage
History of CD		
Yes	270	99.6 %
No	1	0.4 %
Total	271	100 %
History of myomectomy <sup>a</sup>		
Yes	73	27.1 %
No	196	72.8 %
Total	269	100 %
History of curettage <sup>b</sup>		
Yes	44	16.3 %
No	226	83.7 %
Total	270	100 %
Emergency case <sup>c</sup>		
Yes	82	30.7 %
No	185	69.3 %
Total	267	100 %
Emergency management		
Hysterectomy	57	69.5%
Conservative	25	30.5%
Total	82	100%
Histopathologic confirmation of PAS <sup>d</sup>		
Present	239	92.3 %
Absent	20	7.7 %
Total	259	100 %
Type of anesthesia <sup>d</sup>		
Spinal	224	86.4 %
GA	35	13.6 %
Total	259	100 %
Type of hysterectomy <sup>a</sup>		
Did not undergo hysterectomy	81	30.1 %
Hysterectomy, unspecified	1	0.4 %
Supracervical hysterectomy	138	51.3 %
Subtotal hysterectomy	20	7.4 %
Total hysterectomy	29	10.8 %
Total	269	100 %
Type of PAS surgery		
Hysterectomy	190	70.1 %
Conservative	81	29.9 %
Total	271	100 %

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(continued)

diagnosis of PAS in a substantial proportion (239/259, 92.3%) of our cohort, while showing an absence of PAS in a minority (20/259, 7.7%) despite clinical and pathologic confirmation. Of the 20 patients in which histopathologic examination showed an absence of PAS, 4 patients were from the hysterectomy group, whereas 16 patients were from the conservative group.

In terms of the anesthesia method used, regional spinal anesthesia was used in 86.4% (224/259) of cases, whereas general anesthesia was used 13.6% (35/259) of cases. The most performed type of hysterectomy was supracervical hysterectomy, used in 51.3% (138/269) of cases, followed by total hysterectomy (138/269, 10.8%) and subtotal hysterectomy (20/269, 7.4%) and a single case in which the hysterectomy type was unspecified (0.4%). A total of 81 (29.9%) cases underwent a conservative (uterine sparing) surgery. The case fatality rate in this study was 1.1% (3/270), all being patients in the hysterectomy group.

A bivariate analysis was conducted to gain deeper insight. Table 2 shows the results of the bivariate analysis.

In our center, patients who underwent a hysterectomy had a median age of 34 years with a range of 31 to 37 years, whereas in the conservative surgery group, the median age was 33 years with a range of 30 to 36 years. There were no significant differences between these 2 groups (Shapiro-Wilk  $P < .05$ ; Mann-Whitney U  $P = .305$ ). Likewise, with the gravida, which showed a median of 3 in both groups, this difference was not significant (Shapiro-Wilk  $P < .05$ ; Mann-Whitney U  $P = .597$ ), although the ranges were slightly different (3 to 4 in the hysterectomy group and 2 to 4 in conservative surgery group). In terms of parity, the median number was 2 in both groups with a range of 2 to 3 for hysterectomy and 1 to 3 for conservative surgery. This difference was not statistically significant (Shapiro-Wilk  $P < .05$ ; Mann-Whitney U  $P = .061$ ).

The median gestational age was 36 weeks in both groups, because it is the gestational age at which intervention is suggested in our PAS guidelines<sup>12</sup> and in other well-known international

**TABLE 1**  
**Demographics and case characteristics** (continued)

Variable	No.	Percentage
Maternal mortality <sup>b</sup>		
Yes	3	1.1 %
No	267	98.9 %
Total	270	100 %

CD, cesarean delivery; GA, general anesthesia; PAS, placenta accreta spectrum.

<sup>a</sup> A total of 2 missing values; <sup>b</sup> A total of 1 missing value; <sup>c</sup> A total of 4 missing values; <sup>d</sup> A total of 12 missing values.

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guidelines.<sup>10</sup> Although the hysterectomy group had a slightly earlier gestational age range (34–36 weeks) than the conservative surgery group (35–37 weeks), this difference was not statistically significant (Shapiro-Wilk  $P<.05$ ; Mann-Whitney U  $P=.060$ ). The median number of previous cesarean deliveries was 2 in both groups with both groups having a range of 1 to 2 (Shapiro-Wilk  $P<.05$ ; Mann-Whitney U  $P=.137$ ). There were 3 deaths in our study, all in the hysterectomy group. This difference, however, was not statistically significant (chi-square  $P=.254$ ).

There were significant differences in our study in terms of surgical duration, intraoperative bleeding volume, and

PAI score. The median duration was 180 minutes in the hysterectomy group with a range of 150 to 205 minutes, whereas in the conservative surgery group, the median duration was 135 minutes with a range of 120 to 165 minutes. This difference was statistically significant (Shapiro-Wilk  $P<.05$ ; Mann-Whitney U  $P=.000$ ). Our findings for intraoperative blood loss showed a median of 1000 mL in the hysterectomy group with a range of 700 to 1500 mL. In the conservative surgery group, the median volume of blood lost was 700 mL with a range of 500 to 1000 mL. This difference was statistically significant (Shapiro-Wilk  $P<.05$ ; Mann-Whitney U  $P=.000$ ). The median PAI in the

hysterectomy group was 6.5, whereas the median was 5.5 in the conservative surgery group, which was statistically different (Shapiro-Wilk  $P<.05$ ; Mann-Whitney U  $P=.000$ ). It is worth noting that the conservative group's 50th and 75th percentile blood volume loss and PAI score values were the hysterectomy group's 25th and 50th percentile scores, respectively, and the median duration of surgery for the conservative group was less than the hysterectomy group's 25th percentile.

## Comment

### Principal findings

We found that, within our cohort, there was a statistically significant difference between patients with PAS who underwent conventional hysterectomy and those who underwent conservative surgery in terms of the length of surgery, the amount of intraoperative bleeding, and PAI score. The conservative surgery group tended to have a lower PAI score and experienced a shorter surgery duration and less bleeding. There were no maternal deaths in the conservative surgery group, whereas there were 3 deaths in the hysterectomy group, but this difference was not statistically significant.

## Results

In this study, the surgical duration for hysterectomy in comparison with the duration in conservative surgery was significantly lengthier and may be attributed to the complexity of the cases that underwent hysterectomy. Hysterectomy is usually reserved for cases with more diffuse and complex PAS invasion, and therefore hysterectomy tended to be more invasive and longer to perform. In contrast, conservative surgery, when conducted under the appropriate circumstances, may shorten the surgical duration, such as in cases with focal PAS invasion with S1 vascularization.<sup>13</sup> A long surgical duration also increases the risk for intraoperative and postoperative complications.<sup>14</sup>

The greater volume of blood lost in the hysterectomy group reflects the more invasive nature of the procedure that is generally used for more complex cases with more diffuse PAS invasion

**TABLE 2**  
**Bivariate analysis**

Variable	Hysterectomy	Conservative surgery	P
Age	34 (31–37)	33 (30–36)	.305
Gravida	3 (3–4)	3 (2–4)	.597
Parity	2 (2–3)	2 (1–3)	.061
Abortus	0 (0–1)	0 (0–1)	.285
Gestational age (wk)	36 (34–36)	36 (35–37)	.060
History of CD	2 (1–2)	2 (1–2)	.137
Maternal mortality <sup>a</sup>	3/186 (1.6)	0/81 (0)	.254
Surgery duration (min) <sup>b</sup>	180 (150–205)	135 (120–165)	<.01 <sup>c</sup>
Intraoperative blood loss (mL) <sup>d</sup>	1000 (700–1500)	700 (500–1000)	<.01 <sup>c</sup>
PAI <sup>e</sup>	6.5 (5.5–8.5)	5.5 (3.5–6.5)	<.01 <sup>c</sup>

The data are presented as median (interquartile range) or n/N (percentage).

CD, cesarean delivery; PAI, placenta accreta index.

<sup>a</sup> A total of 2 missing values; <sup>b</sup> A total of 3 missing values; <sup>c</sup> Statistical significance; <sup>d</sup> A total of 4 missing values; <sup>e</sup> A total of 5 missing values.

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and hypervascularization that involves the S2 area, which also contributes significantly to intraoperative hemorrhage.<sup>13</sup> This is in line with literature that shows that more extensive surgical procedures tend to lead to increased hemorrhage and require stricter hemostasis management.<sup>14</sup> In addition, because 1 of the main criteria for conservative management was blood supply originating from the level of S1, it is not a surprise that the conservative cohort have less blood lost.

The PAI score is used to diagnose PAI prenatally as suggested by the Indonesian Placenta Accreta Task force of the Indonesian Society of Obstetrics & Gynecology.<sup>12</sup> We found that the median PAI score was higher in the hysterectomy group than in the conservative group, which indicates that the patients in the hysterectomy group had greater invasion and more pronounced ultrasound markers of PAS during their prenatal examination. A higher PAI score may have influenced the management choice of hysterectomy over conservative surgery because there was an assumption of a deeper or more severe PAS as reflected by the higher median PAI score in the hysterectomy group. The maternal deaths that only occurred in the hysterectomy group may also be attributed to these factors, although in our study, there were minimal deaths and hence the statistical insignificance.

We also noticed that the rate of a false positive diagnosis of PAS in our study was 7.7% (20/259). We presume that this finding could be attributed to uterine dehiscence on an anterior placenta previa that mimics PAS clinically, as mentioned in previous studies.<sup>15,16</sup> Uterine dehiscence is more likely to present clinically as lower grade PAS that fulfills the criteria for conservative management, and therefore there was a higher false positive rate in the conservative management cohort. A higher false positive rate in the conservative group may present another layer of bias in terms of the volume of intraoperative blood loss and the maternal mortality rate. The possibility of a false diagnosis, albeit a low rate, must also be taken into consideration when choosing the

method to manage PAS, because a hysterectomy is an invasive and irreversible surgical procedure.

Our data showed that patients with PAS managed by conservative surgery were more likely to have a shorter surgical duration and less blood loss. They were also more likely to have a lower PAI score in their antenatal PAS diagnosis. There was also no maternal mortality in our conservative surgery cohort. Our experience suggests that conservative management of PAS is safe but may have been influenced by the degree PAS and thus the management choice must still be made on a case-by-case basis.

### Clinical implications

One of the leading causes of death for pregnant and postpartum women in Indonesia is mortality owing to hemorrhage. According to data from the Indonesian Ministry of Health, hemorrhage accounts for about 27% of all maternal deaths.<sup>17,18</sup> Postpartum hemorrhage is a common condition that occurs within the first few hours after childbirth and often as a consequence of the uterus not contracting well after delivery (uterine atony). Several risk factors can increase the likelihood of postpartum hemorrhage, including a history of postpartum hemorrhage, prolonged or difficult labor, and certain medical conditions, such as preeclampsia.<sup>19,20</sup>

According to the latest report from the Indonesian Ministry of Health, the maternal mortality ratio in Indonesia is still high, but has been decreasing significantly in recent years because of the interventions carried out. In 2020, the maternal mortality rate was approximately 185 deaths per 100,000 live births with hemorrhage being one of the primary causes.<sup>17,18</sup>

PAS is one of the major contributors to maternal mortality rates in Indonesia. Managing this condition is challenging because of several factors, including the following:

- Complexity of the condition: PAS involves the abnormal attachment of the placenta to the uterine wall, which can lead to severe bleeding during

childbirth. These cases often require meticulous medical intervention and sometimes complex surgeries.

- Access and resource limitations: Indonesia, as a developing country with varying levels of access to healthcare services, faces challenges in ensuring that all pregnant women receive timely and quality care. Healthcare facilities in remote areas often lack the necessary equipment to manage PAS, and the number of medical personnel trained to handle such cases is highly limited.
- Lack of education and awareness: knowledge about PAS is often insufficient within the general public and sometimes even among healthcare providers. This hinders early detection and appropriate management of PAS.
- Economic challenges: high healthcare costs pose a major barrier for many families. The availability of health insurance that covers pregnancy complications remains limited, which leads to many pregnant women not having full access to the necessary medical services.

With a holistic and coordinated approach, Indonesia can overcome the challenges of reducing maternal mortality caused by hemorrhage as a consequence of PAS. By improving education, selecting appropriate surgical techniques, strengthening healthcare infrastructure, and supporting proactive government policies, Indonesia can make significant progress in improving the safety of pregnant women in the country. The following main strategies are highlighted:

- Healthcare provider education: continuous training for obstetricians, midwives, and nurses on the early identification and management of PAS is crucial. This includes the use of technologies such as ultrasound for more accurate diagnosis.
- Public education: extensive educational campaigns to raise awareness among the public about the risks of PAS, danger signs, and the importance of regular prenatal care can

help in early detection and timely medical assistance.

- Medical team collaboration: managing PAS often requires collaboration among various specialists, including surgeons, anesthesiologists, and blood transfusion experts. Well-coordinated medical teams are essential for ensuring effective management and adequate hemorrhage control.
- Appropriate surgical techniques: selecting the surgical technique should be considered based on the patient's clinical condition. Ensuring that medical staff have the skills and experience in these techniques is crucial for patient safety and optimal outcomes.

It is important to continue to improve the existing interventions and to ensure adequate support for pregnant women and healthcare workers to reduce the maternal mortality rate caused by hemorrhage. In addition to strengthening the appropriate choice of surgical technique, knowing which surgical option a patient with PAS will need is also directly correlated with the advancement of healthcare provider education and medical team collaboration.

### Research implications

In this study, we focused on the immediate maternal results and established that conservative surgical management of PAS is safe and beneficial. It would be of great benefit if future studies delve further into which specific type of conservative surgical management brings most benefit for patients and their future fertility. It is also of great interest to conduct further research on what characteristics make patients with PAS good candidates for conventional hysterectomy or better suited to conservative surgical management.

### Strengths and limitations

This study has the advantage of being conducted in the Dr. Cipto Mangunkusumo General Hospital, which is the highest referral hospital in Indonesia that handles the rarest and most complex of cases on a daily basis. This allowed us to naturally gain our large

population of patients with PAS, which is an advantage not bestowed on many other facilities. However, this very strength may also pose as a limitation, because our PAS population also represents PAS cases with the highest complexity and risk in Indonesia and may thus be considered as an inadvertent selection bias. The retrospective nature of this study also exposes it to biases associated with retrospective research, such as information bias that may lead to inaccuracies owing to human errors during data recording. This study was also unable to fully eliminate all confounding biases, such as the discrepancy in the rates of false positive between the 2 groups and selection criteria for conservative treatment. We also did not consider factors such as fetal conditions that may or may not have played a part in the decision of which management choice to opt for.

### Conclusion

There were no significant differences in the demographic and reproductive history, age, number of gravidas, parity, abortions, gestational age, and number of previous cesarean deliveries between those who underwent hysterectomy and those who underwent conservative surgical treatment in our cohort. The hysterectomy group had a longer surgery durations and greater blood volume loss than the conservative surgery group. Both the increased length of surgery and bleeding may be attributed to the inherently more complex procedure and nature of cases that underwent hysterectomy. The PAI score in the hysterectomy group was also higher than that in the conservative surgery group.

In our study, patients who were managed with conservative surgery tended to have a shorter duration of surgery with less bleeding. They also tended to be patients with lower PAI scores, which may have played a part in the selection of conservative management method and may have influenced the surgical duration and intraoperative bleeding. Conservative surgical management is a feasible option for PAS, but patients and surgeons need to thoroughly evaluate the risks and benefits of

each treatment method before making a clinical decision. ■

### CRediT authorship contribution statement

**M. Adya F. Dilmy:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Jenica X. Budiman:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Yudianto B. Saroyo:** Validation, Data curation. **Amanda Rumondang:** Data curation. **Yuditiya Purwosunu:** Validation, Data curation.

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