

## Research Article

# Multidisciplinary Approach of Placenta Accreta Spectrum Management to Reduce Blood Loss and Prevent Organ Injury in Referral Center

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## Abstract

**Objective:** To investigate the differences in blood loss and organ injury at our PAS referral center over the past six years.

**Methods:** This retrospective analytical study included 150 subjects diagnosed with PAS based on histopathological findings from 2018 to 2023 at the PAS Center of Dr. Moewardi Regional Hospital, Surakarta, Indonesia. Subjects were divided into two groups: before 2020 and after 2021, based on multidisciplinary team appointments.

**Results:** The highest number of Placenta Accreta Spectrum (PAS) cases occurred in 2020, with 36 patients. Hysterectomy was the most frequently performed procedure for managing PAS in all groups. However, differences in blood loss, organ injury, and length of hospital stay between the periods from 2018 to 2020 and 2021 to 2023 were statistically significant ( $p < 0.05$ ).

**Conclusion:** Multidisciplinary approaches involving various medical specialties and teams are essential to ensure maternal safety and effectively manage massive blood loss and organ damage during PAS surgery procedures.

**Keywords:** Placenta accreta spectrum, Blood loss reduction, Organ injury prevention.

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## INTRODUCTION

Placenta Accreta Spectrum (PAS) is one of the most dangerous pregnancy complications, significantly associated with maternal morbidity and mortality<sup>1</sup>. In Indonesia, the incidence of Placenta Accreta Spectrum (PAS) was 2% in 2016 and increased to 4% by 2018. This trend correlates with the growing prevalence of pregnancies occurring after previous uterine surgeries observed over the past three decades.<sup>2</sup>

PAS can lead to severe postpartum hemorrhage (PPH) and a mortality rate of up to 30% when prenatal diagnosis and surgical decisions are suboptimal.<sup>3</sup> This high mortality is attributed to the challenges in separating blood vessels from the abnormal insertion site.<sup>4</sup> From 2015 to 2020, hemorrhage was the leading cause of death in pregnant women with PAS globally, accounting

for approximately 88.5% of all placenta accreta cases.<sup>5</sup>

The surgical procedure of the PAS typically requires difficult pelvic dissection in areas with anatomic distortion and extensive aberrant neovascularization<sup>6</sup>. In numerous cases, clinicians encounter an unexpected intraoperative condition of PAS, which can pose potentially life-threatening risks. Additionally, the bladder and ureters are the organs most commonly damaged during such surgeries. Therefore, surgeons must employ a systematic and strategic approach to enhance prevention of urologic injuries.<sup>7</sup>

Numerous studies have explored PAS, but only a few publications compare complications before and after the implementation of multidisciplinary approaches in PAS centers. Multidisciplinary collaboration can effectively mitigate massive hemorrhage and minimize potential organ injury

during the management of PAS. Furthermore, involving expert personnel and identifying critical steps in developing improvement plans can facilitate better management of at-risk patients in the future, leading to improved outcomes. This study investigated the difference in blood loss and organ injury between two groups before and after 2020 (2018 - 2023) in our hospital.

## METHODS

This retrospective analytic study included subjects diagnosed with PAS based on histopathological findings. Data were collected from 2018 to 2023 at the PAS Center of Dr. Moewardi Regional Hospital in Surakarta, Indonesia. A total of 150 subjects were divided into two groups: Group 1, before the establishment of multidisciplinary teams in late 2018, and Group 2, from 2021 to the present, after the team's formation.

According to the PAS center criteria, our hospital has multidisciplinary expertise and experience, encompassing maternal-fetal medicine, gynecologic oncology, vascular and trauma surgery, urologic surgery, intensivists, neonatologists, interventional radiologists, anesthesiologists, and specialized nursing staff.<sup>8</sup> Therefore, all divisions involved from initial until post-operative procedure management.

The bleeding complications and injury to surrounding organs were assessed during the surgery and then recorded in the medical record as an operative report for evaluation. In addition, discussion after the multidisciplinary surgery was conducted to improve the operative technique to reduce complications in future cases. This is

because placenta accreta may continue to exist in line with the increase in Cesarean Section (CS) cases as one of the risk factors.

## RESULTS

A total of 150 subjects were collected. The characteristics of the subjects are presented in Table 1. There were 75 subjects in group 1 before integrated team was set up (2018-2020) with highest number of cases in 2020. The age of the subjects ranged from 23 - 45 years old, and the average in the third decade.

**Table 1.** Characteristics of the Total Subject within the Past Six Year

	Year	Cases	Maternal Age (year)
before Multidisciplinary (n) <sup>a</sup>	2018	8	35 (30 – 40) <sup>b</sup>
	2019	31	34 (23 – 45) <sup>b</sup>
	2020	36	36 (30 – 44) <sup>b</sup>
after Multidisciplinary (n) <sup>a</sup>	2021	26	36 (30 – 41) <sup>b</sup>
	2022	34	35 (23 – 43) <sup>b</sup>
	2023	15	32 (24 – 44) <sup>b</sup>

Annotation:<sup>a</sup>Amount of the cases per year; <sup>b</sup>Mean (Interquartile range)

PAS is divided into three categories: accreta, percreta, increta. The study showed percreta increased steadily over six years. The highest rate was in 2022 with 22 cases (64.7%) followed by accreta, only 12 cases from the total 34 cases (Table 2). Hysterectomy became the most favorable procedure for managing PAS before 2020, with highest number in 2019. Conservative method became more popular in 2023 performed 66.7% of total cases.

**Table 2.** Characteristics of the Histopathological Findings and Surgery Procedure

	Year					
	2018	2019	2020	2021	2022	2023
Histopathology, n (%) <sup>a</sup>						
Accreta	8 (100)	27 (87.0)	14 (38.9)	6 (23.0)	12 (35.2)	9 (60.0)
Increta	0	2 (6.5)	1 (2.8)	1 (3.8)	0	1 (6.7)
Percreta	0	2 (6.5)	21 (41.7)	19 (73.0)	22 (64.7)	5 (33.3)
Procedure, n (%) <sup>b</sup>						
Hysterectomy	7 (87.5)	26 (83.9)	16 (44.4)	19 (73.0)	22 (64.7)	5 (33.3)
Conservative	1 (12.5)	5 (16.1)	20 (55.6)	7 (27.0)	12 (35.2)	10 (66.7)

Annotation:

<sup>a</sup>The report was by the histologic study of the uterus (after hysterectomy or resection); <sup>b</sup>Procedure during manage the PAS (conservative was preserved the uterus by excision of the uterine corpus part where the placenta morbidly adherent)

Table 3 shows the number of bleeding during surgery. In group 1, blood loss reaches an average of 6025 cc and in group 2 the average bloodloss is 1719 cc. The difference of bloodloss between groups shows significantly value after integrated team was involved. Table 3 also shows that

organ injuries during PAS surgery. The bladder and ureter become the most damaged organ during this procedure. In group 1, the urologic injuries was 13 times while in group 2 only twice. It shows significantly difference after integrated team involved.

**Table 3.** Total Blood Loss and Organ Damage during Surgery

Year	N	Blood loss		Organ injury <sup>b</sup>		
		Mean + SD	P-value	Yes (%)	No (%)	P-value
2018 – 2020	75	6025 + 4224.86	.001 <sup>a</sup>	13 (17.3)	62 (82.7)	.010 <sup>a</sup>
2021 – 2023	75	1719 + 1987.76		2 (2.6)	73 (97.3)	

Annotation:

SD : Standard Deviation; CI 95% pvalue <0.05; *Mann-Whitney test*; <sup>a</sup>Significant value of the data, <sup>b</sup>Bladder and ureter were the most organ injury during the procedure

The group 1, show that more than half of patients' stays after surgery lasted longer than three days, with an average stay of 4.49 days. In comparison, from group 2, the average length of stay was three days, and less than 40% of patients stayed more than three days (Table 4). The difference between the two periods is statistically significant.

**Table 4.** Length of Stay after Surgery

Year	Length of Stay (days)				Mean <sup>a</sup>	P-value
	< 3	%	> 3	%		
2018 – 2020	35	46.7	40	53.3	4.49	.034 <sup>b</sup>
2021 – 2023	46	61.3	29	38.7	3.00	

SD : Standard Deviation; CI 95% pvalue <0.05; *Mann-Whitney test*; <sup>a</sup>Average length of stay after surgery in days; <sup>b</sup>There is a significant value of the data.

### DISCUSSION

The distinctive and proliferative characteristics of the placenta are closely associated with adverse maternal health outcomes, such as morbidity and mortality. Within the placenta accreta spectrum, the incidence of maternal mortality is concerning, currently standing at 7%. This rate can rise significantly to 30% when there is a lack of antenatal diagnosis.<sup>9,10</sup> The Placenta Accreta Spectrum is linked to a markedly increased risk of severe hemorrhage, leading to pronounced coagulopathy. This condition is marked by multi-organ dysfunction, including cardiac arrest, respiratory insufficiency, cerebral hypoxia, sudden renal impairment, and systemic thrombotic events, ultimately resulting in maternal mortality.<sup>11,12</sup> The probability of organ damage, particularly affecting the bladder, ureter, bowel, and vascular system, contributes to the increased incidence of maternal morbidity.<sup>13</sup>

The degree of complications and accompanying morbidity is intricately dependent on the antenatal capacity of the healthcare team to detect PAS disorder. Conversely, instances identified intraoperatively and managed by non-specialist medical personnel present an elevated likelihood of maternal morbidity and mortality<sup>12,14</sup>. The management of PAS at Dr. Moewardi Hospital is characterized by a significant level of interdisciplinary cooperation among its various medical departments based on the findings of several distinct research. From early 2021 we assembled collaboration from other medical fields into multidisciplinary teamwork according to the recommendation, including maternal-fetal medicine, gynecologic oncology, vascular and trauma surgery, urologic surgery, intensivists, neonatologists, interventional radiologists, anesthesiologists, and specialized nursing<sup>8</sup>.

The first step in providing subspecialty care for patients with PAS by a multidisciplinary team involves accurate diagnosis and anticipating potential challenges<sup>15</sup>. Multiple investigations have demonstrated that instances suspected prenatally instead of postnatally exhibit decreased frequencies of hemorrhaging and other adverse maternal health outcomes<sup>16</sup>. The Second management alternatives comprise hysterectomy or conservative surgery, depending on the preoperative condition and the results obtained during the surgical procedure. Ensuring the well-being and survival of both the mother and child while considering the preservation of reproductive organs fosters the creation of an accomplished team characterized by optimal quality.<sup>17</sup>

The responsibility of maintaining fluid balance, administering vasopressors and blood products, and ensuring patient survival during surgery is

entrusted to the intensivist and anesthesiologist. Managing patients experiencing significant blood loss, unstable hemodynamics, and extended surgical procedures requires a crucial collaboration with anesthesiologists who possess extensive expertise in handling massive obstetric hemorrhage.<sup>18</sup> To minimize the risk of bladder or ureter injury and facilitate necessary reconstruction, the urology team will be present in the operating room during the cesarean section and hysterectomy. Additionally, the placement of urinary catheters reduces the risk of ureter injury and enables earlier detection of potential damage.<sup>19</sup>

Although the multidisciplinary approach implemented over the past three years has positively impacted PAS management, further strategies are needed to reduce bleeding complications and the incidence of PAS in the future.<sup>2</sup>

## CONCLUSION

Multidisciplinary approaches by various medical department specialists are required to ensure the mother's safety. Integrated team will minimize blood loss and other complications. Periodic evaluation among the integrated team could have created better surgical procedure and improve the outcome in the future.

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