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CASE REPORT

Caesarean delivery using general anesthesia in pregnant woman with placenta accreta accompanied with massive hemorrhage

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ABSTRACT

Background: Placenta accreta spectrum (PAS) is a disorder of placental implantation that causes peripartum bleeding and is the main cause of maternal death. PAS has a high risk of intraoperative bleeding therefore blood preparation and transfusion are essential. **Objective:** To describe the medical management of obstetric emergency of caesarean surgery with hypovolemic shock underwent general anaesthesia in patient with placenta accreta. **Case:** A woman, 36 years old, diagnosed with G4P3A0, gestational age 27-28 weeks with placenta accreta with blood pressure of 63/43, heart rate of 135, respiratory rate (RR) of 30, SpO_2 97% O_2 non rebreathing oxygen mask (NRBM) 10 lpm, experiencing vaginal bleeding since 6 days, was planned for caesarean delivery with emergency surgery due to hypovolemic shock as the result of massive hemorrhage, anemia, leukopenia, and hyponatremia. PAS diagnosis was determined after ultrasound imaging. Operation duration was 3.5 hours, with blood loss of 3,500 ml. After the surgery, she was transferred to the Intensive Care Unit (ICU). General anesthesia was chosen to maintain hemodynamic stability. The medical decision for this case was caesarean hysterectomy with the placenta left in situ after delivery of the foetus. **Conclusion:** Successful management of placenta accreta with massive bleeding is the result of appropriate perioperative management, good preparation and teamwork.

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Highlights

1. PAS is an emergency case of obstetric complication with a high maternal morbidity due to a massive haemorrhage, and had high mortality for the mother and the fetus.

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2. The prenatal diagnosis is important to determine integrated management involving gynecologist, anesthesiologist, radiologist, and blood transfusion bank.

BACKGROUND

Placenta accreta spectrums (PAS) or morbidly adherent placenta, is a term of various pregnancy complication as the result of abnormal placental implantation (Liu et al., 2021) to the uterine lining, so that the placenta does not properly separate from uterus after delivery and consequently resulting on morbidity and mortality such as maternal hemorrhage, disseminated intravascular coagulation, multi-organ failure, and even death (Eller et al., 2011). PAS including: placenta increta, placenta percreta, and placenta accreta (The Society of Gynecologic Oncology endorses, 2018). PAS is one of health global burden as the related maternal mortality due to delivery. It increases the morbidity by 18-times due to profuse haemorrhage after removing the placenta, even leads to maternal mortality due to postpartum haemorrhage (Fonseca and Ayres de Campos, 2021). And the bad news for medical professional is that the incidence keeps increases in an alarming point (Kumari et al., 2024), which needs the caesarean intervention (Goh and Zalud, 2016).

Among PAS, placenta accreta, is the most frequent cases in pregnant woman, it accounts 75%, while placenta incretas only 18%, and the rest (7%) are placenta percretas (Abuhamad, 2013). Placenta accreta is an abnormal trophoblast invasion (only art of or all) the placenta into the myometrium of the uterine wall without the present of decidua basalis (The Society of Gynecologic Oncology endorses, 2018). It is a complex obstetric complication with a high maternal morbidity, with the consequence of damage at the endometrium-myometrial interface of the uterine wall (Jauniaux et al., 2018b). Maternal mortality due to severe haemorrhage required a blood transfusion (The Society of Gynecologic Oncology endorses, 2018). The risk factors for PAS are advanced maternal age (>35 years) and previous caesarean delivery (Miller et al., 1997). This abnormality needs medical care in the form of caesarean delivery, with the incidence of 0.33% (Usta et al., 2005). Other study found a histological confirmation of abnormal placental implantation from hysterectomy specimens, the frequency and type percentages were: placenta accreta 79%, placenta increta 14%, and placenta percreta 7%. There was 1 in 731 birth cases experiencing this condition, between 2008 and 2011 in the United States. The reported incidence of placenta accreta has increased to 3 per 1,000 deliveries over the past 10 years as deliveries by cesarean section increase (Jauniaux et al., 2018a).

The prenatal diagnosis is important as it decrease the blood loss and complications. Diagnosis can be determined using the real-time ultrasound and magnetic resonance imaging (MRI) in order to increase the sensitivity of prenatal diagnosis (Goh and Zalud, 2016), as the rate of PAS missed diagnosis was more than 50% (Einerson et al., 2023). Also, histopathologic examination characterized by the absence of decidua and chorionic villi are seen to directly adjacent to myometrial fibres. Histopathological approaches was need to improve the antenatal diagnosis (Bartels et al., 2018). Placenta accreta had two type based on the time of diagnosis: expected PAS, which diagnosed during the antenatal period and unexpected PAS, which diagnosed during the intrapartum period with adherent/retained placenta (Silver et al., 2015). The diagnosis was based on the present of: 1) the need for manual removal of the placenta either completely or partially, 2) evidence of gross placental invasion during surgery, 3) ultrasound diagnosis of PAS confirmed during the third stage of labor, and 4) histological confirmation of hysterectomy specimen (Mittal et al., 2019). Those two types had different morbidity and mortality, in term of estimated blood loss and number of units of blood products, The ICU stay and perinatal mortality (Mittal et al., 2019). The medical treatment for placenta accreta including caesarean hysterectomy (Lucas et al., 2024), uterine artery embolization, and leaving the placenta *in situ* to preserve the patient's fertility (Goh and Zalud, 2016). If a hysterectomy has been performed, an anatomical pathology examination can be performed.

The most generally accepted medical decision for PAS is caesarean hysterectomy with the placenta left in situ after delivery of the foetus (attempts at placental removal are associated with significant risk of haemorrhage), which involving a comprehensive multidisciplinary care team, strong nursing leadership and access to a blood bank for transfusion protocols (The Society of Gynecologic Oncology endorses, 2018). The surgical management for PAS pregnant women were recommended to be performed by experienced professional with advanced pelvic surgery, skill in dissection of parametrium,

retroperitoneum and pelvic floor, bladder reconstruction, ureter reimplantation and uterine compression suture techniques and uterine and pelvic devascularization, with structured surgical preparation: two large-calibre venous accesses, a central venous access, invasive blood pressure monitoring, pneumatic compression stockings, reserve of blood products and intensive care beds for the parturient and the newborn (Alves et al., 2021). Caesarean delivery is conducted to improve maternal and foetal outcome, especially in emergencies cases, such as massive haemorrhage in PAS. PAS pregnancy was categorised as 3, as there is no maternal or foetal compromise but needs early delivery (Gandhi and Jain, 2018).

OBJECTIVE

To describe the medical management of obstetric emergency of caesarean surgery with hypovolemic shock underwent general anaesthesia in patient with placenta accreta.

CASE

A 36-year-old woman, 60 kg, 155 cm, G4P3A0, gestational age 27-28 weeks with a history of caesarean section in 2016 and 2018, was referred to RSPAL Dr. Ramelan Surabaya. The patient came with complaints of bleeding from the birth canal for the past 4 days after traveling by motorbike from Jombang - Surabaya round trip. The last bleeding was around 1 adult diaper and the patient complained of dizziness and feeling weak. It was denied that the fetus was still active in movement. There was no history of other comorbidities. While at the hospital, the patient had previously been examined and treated. Hemoglobin when in hospital was previously 6.16 to 7.2, then the patient also experienced hypotension, blood pressure 68/45 mmHg. Resuscitation was carried out with 1 liter of normal saline crystalloid, the shock had not resolved, then continued with 1 liter of colloid after which maintenance was continued with Ringer lactate infusion of 50-75 ml/hour and administration of norepinephrine 0.15 micrograms/kg of body weight/minute (Vascon 150 nano). Packed red cell (PRC) transfusion 4 kolf (3 kolf have been added, 1 kolf remaining). Given 2 ampoules of Isoxsuprine HCl 5 mg/mL injection, 2x5 mg dexamethasone injection, 3x500 mg tranexamic acid injection, 2x1 g ceftriaxone injection. The patient has been fitted with an oxygenation mask, catheter and vaginal tampon ball. After the patient was transported, the patient left to be referred to RSPAL Dr Ramelan Surabaya.

Table 1. Laboratory examination at *May 15th 2024*

Laboratory findings	Value	Normal Range
Leukocyte	25.56	4.00 – 10.0
Erythrocytes	2.67	3.50 – 5.00
Haemoglobin	7.10	12 – 15
Thrombocyte	225	150 - 450
PT	16.8	11 - 15
APPT	32.6	26.0 – 40.0
INR	1.22	1.00 – 2.00
SGOT	12	0 - 35
SGPT	8	0 - 37
GDA	276	< 200
BUN	0.7	0.6 – 1.5
CREAT	13	10 - 24
Na	133.10	135 - 147
K	4.25	3.5 – 5.2
Cl	98.6	95 - 105
Anti-HIV Rapid	Non-reactive	Non-reactive
HBsAg Rapid	Non-reactive	Non-reactive
Anti-HCV	Negative	Negative

Physical examination at May 15th 2024

The patient was conscious, the Glasgow Coma Scale (GCS) was E4V5M6, with blood pressure of 106/73 mmHg. The patient was treated with Syringe Pump Norepinephrine 0.05-0.1 mcg/kg of body weight/minute, installed Ringer Lactate infusion and normal saline infusion, pulse=108 x/minute regular lifting strength, respiratory rate (RR) was 20 times/minute, SpO_2=100% with simple mask 8 lpm, looks anemic, pale warm acral and cardiac resynchronization therapy (CRT) <2 seconds. Fetal heart-beat of 150 x/dop, HIS not available. Not done Vagina Toucher. Tampon ball already installed.

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Management in the room: bed rest, nifedipine tocolytic, dexamethasone fetal lung maturation, tranexamic acid, 1 bag PRC transfusion (leftover from previous hospital stay) and order 4 bags of whole blood (WB), ceftriaxone, caltrofen supplement if available. Laboratory examination results (May 16th, 2024) post transfusion PRC 4 bags showed that leukocytes were 20.32, Hb=5.80, hematocrit (Hct)=17.50, erythrocytes=2.12. The patient receive blood transfuse of PRC for 4 bags and 4 bags of WB.

Physical examination at May 18th 2024 or post caesarean operation

The patient looked anxious and restless, slept on his left side with active bleeding using diapers, looked anemic, cold and pale acral. While in the inpatient room with blood pressure 70/43 mmHg without support, pulse 118 x/minute, respiratory rate 25 x/minute, SpO_2 97% with O_2 NRBM 10 lpm, temperature 36 Celsius. The patient was scheduled with the emergency caesarean delivery.

Table 2. Laboratory examination post caesarean delivery at May 18th, 2024

Laboratorium findings	Value	Normal Range
Leukocyte	40.06	3.60 – 11.0
Erythrocytes	3.33	3.80 – 5.20
Hemoglobin	9.00	11.7 – 15.5
Thrombocyte	97.00	150 - 440
Albumin	2.38	11.8 – 15.1
Natrium	138.80	135 - 147
Kalium	4.21	3.5 – 5.2
Clorida	101.8	95 - 105

On arrival at the premedication room the patient appeared somnolence, with blood pressure 63/43 mmHg without support, pulse 135 times/minute, respiratory rate 30 times/minute, SpO_2 97% with O_2 NRBM 10 lpm.

Table 3. Laboratory examination

Laboratory findings	Value (May, 16th 2024)	Value (May, 18th 2024)	Value (May, 19th 2024)	Value (May, 21st 2024)	Value (May, 22nd 2024)	Normal Range
Leukocyte	40.06	40.06	24.30	16.47	13.31	4.00 – 10.0
Erythrocytes	3.33	3.33	2.79	3.44	3.62	3.50 – 5.00
Haemoglobin	9.00	9.00	7.40	9.30	10.10	12 – 15
Thrombocyte	97.00	97.00	87.00	137.00	301.00	150 - 450

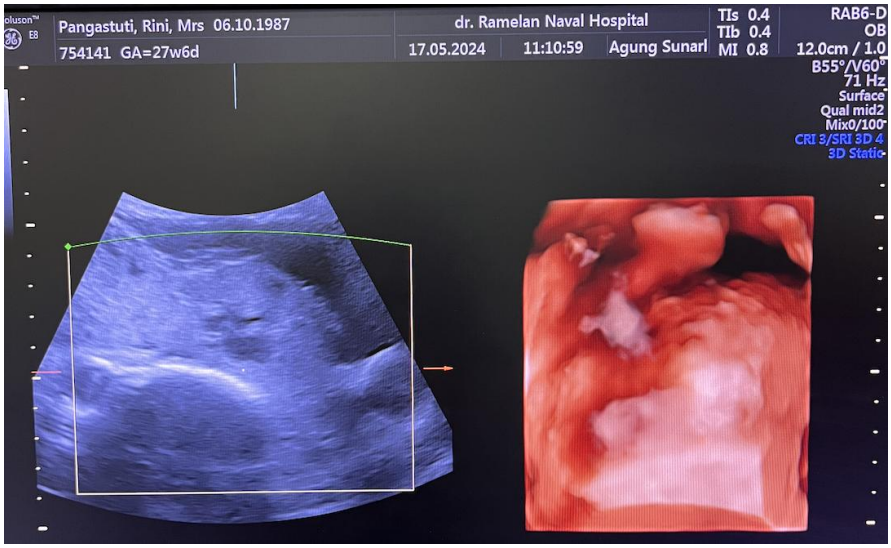

Figure 1. The ultrasound imaging

Supporting radiology findings

Ultrasound feto-maternal showed a single fetus, alive, intrauterine, fetus head position, fetal biometry appropriate 27-28 weeks, the average fetus weight 1200 grams, anterior SBR placenta covering OUI, grade 2, lacuna (+) right side, bulging towards bladder (+), diagnosis of accreta min. grade 3A. The amount of amniotic fluid is sufficient.

Medical management

Pregnant patient with bleeding, anemia, unstable hemodynamics. The patient was planned for caesarean delivery to hysterectomy with American Society of Anesthesiologists (ASA) physical status *of* 3E In this case, the rapid sequence induction (RSI) general anesthesia technique was chosen. The family has informed consent for the anesthesia procedure and the risks that may occur during the operation.

Anaesthesia management

Pre-anesthesia preparation starts from informed consent, preparation of blood components, installation of an adequate intravenous (i.v.) line. Preparations in the operating room start from the anesthesia machine, statics, laryngeal musk air way (LMA) equipment, endotracheal tube (ETT), anesthesia and emergency medicines, infusion warmer, monitoring equipment, syringe pump.

Considering the patient's clinical condition as seen on the monitor showing blood pressure of 63/43 mmHg without support, pulse 135 x/minute, respiratory rate 30 x/minute, SpO_2 97% with O_2 NRBM 10 lpm, it was decided to choose the general anesthesia technique.

Patients and families are educated about undergoing surgery with general anesthesia and that SC surgery has risks for the mother and baby. The patient was prepared with 2 intravenous access lines. Ready 4 bags of PRC blood and 4 bags of WB. The rapid sequence induction (RSI) technique uses Ketamine (1-2 mg/kg), the muscle relaxant rocuronium (0.9–1.2 mg/kg). Intubation using ETT no 7.0. Sevoflurane inhalation 0.5-1 vol%. Norepinephrine syringe pump 0.05 – 0.15 mcg/kg of body weight/min, dexamethasone 10 mg, furosemide 20 mg.

During the operation, active bleeding from the vagina $\pm$ 1,000 ml, hematuria (+), exploration of the abdominal cavity: preterm gravida uterus, right and left tubes and ovaries are normal, the serous bladder wall appears to have many blood vessels, fundus (corporal) incision: the baby was born crying (+), the umbilical cord was cut, the placenta is left in the uterine cavity, the uterine wound is sutured with a running feston. Vital signs were continued to decline, a total hysterectomy was decided. Bleeding during surgery 3,500 ml. Transfused 4 bags of PRC and 4 bags of WB. The operation lasted 3.5 hours with hemodynamics, systolic blood pressure 60-100 mmHg, diastolic blood pressure 40-60 mmHg, pulse 130-150 x/minute, controlled respiration 16 x/minute with oxygen saturation 100%.

Post-operation management

After surgery, the patient was transported to the intensive care unit (ICU) in a sedated and intubated condition.

Feeding: while fasting

Analgesia: morphine 0.5-1 mg/hour syringe pump (SP) and paracetamol 1 g/8 hours IV.

Sedation: Midazolam dosage 1.5 mg/mL injection.

Thrombotic agent: -

Head up 30 degrees

Ulcer protector: Lansoprazole 40 mg/24 hours (i.v.)

Control glucose: 120 mg/dL

Post-operative laboratory examination leukocytes were 40.06, hemoglobin was 9.0, Hct 27.0, erythrocytes 3.33, platelets 97.00, albumin 2.38 (**Table** 2). There was leukocytosis, anemia, thrombocytopenia and hypoalbuminemia. The patient was extubated the next day and on the second day after surgery the patient was moved to the inpatient room.

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DISCUSSION

Placenta accreta spectrum (PAS) is one of the most threatening gynaecological condition in pregnancy due to bleeding (Einerson et al., 2023), as the result of strong adherence of placenta to the myometrium due to the lost of decidua basalis and the abnormal development of the Nitabuch layer. This condition made the placenta villi embedded directly into the uterine muscle fibers, not into the decidual cells, resulting the difficulty in separation of placenta after delivery (Ladella and Ng, 2021). The causes of this pathological condition is still unknown, but the most favoured hypothesis regarding the aetiology of PAS that a defect of the endometrial–myometrial interface leads to a failure of normal decidualization in the area of a uterine scar, which allows abnormally deep placental anchoring villi and trophoblast infiltration (The Society of Gynecologic Oncology endorses, 2018).

Placenta accreta is one of the most dangerous conditions in pregnancy and is increasing in frequency. The risk of life-threatening bleeding is present throughout pregnancy but is particularly high at the time of delivery, but the prevalent was high in delivery period (Einerson et al., 2023), leading to caesarean delivery. The life-threatening complication in PAS due to severe bleeding with further morbidity such as shock and maternal mortality (Ulkumen et al., 2014). This patient experienced uterine rupture due to a long trip with motor riding, which was a rare case, and need further diagnosis and quick management (Boujida et al., 2022). PAS, as the feature of placenta invasion anomalies to the uterus manifest as bleeding in the third semester, after delivery or during late separation of placenta (Loukopoulos et al., 2023). This case was classified as unexpected PAS, as the diagnosis was determined due to bleeding during the third semester of pregnancy and needed an urgent caesarean delivery (Kyozuka et al., 2019).

Diagnosing PAS is still challenging for obstetrician (Arakaza et al., 2023), as it can be asymptomatic, but for pregnant women with the history of precious caesarean delivery should be suspected to have placenta accreta, and the assessment can be enrolled using obstetrical ultrasound (US), particularly during 18-20 week of gestational age (Jauniaux and Jurkovic, 2012). Ultrasound was reported to have 89% of sensitivity in diagnosing placenta accreta (Esakoff et al., 2011). Other found 82.4% (14/17) and the specificity was 96.8% (61/63) (Chou et al., 2000). Ultrasound reflection of PAS is marked with the absence of normal uteroplacental interface (clear zone), extreme thinning of the underlying myometrium, and vascular changes within the placenta (lacunae) and placental bed (hypervascularity) as the consequences of permanent damage in uterine wall until it reached the serosa, so that the placental tissue is embedded until it reached in the deep uterine circulation (Jauniaux et al., 2018c), with various degree of depth (Arakaza et al., 2023). The most common findings PAS under ultrasound are disruption of the interface between the uterine serosa and bladder walls and multiple intra-placental lacunae (Alves et al., 2021). Gray-scale abnormalities include multiple vascular lacunae within the placenta, loss of the normal hypoechoic zone between the placenta and myometrium, decreased retroplacental myometrial thickness (less than 1 mm), abnormalities of the uterine serosa–bladder interface, and extension of placenta into myometrium, serosa, or bladder. Ultrasound can't be used alone for diagnostic tools, colour flow Doppler imaging giving the image of turbulent lacunar blood flow, or the increment in sub-placental vascularity, gaps in myometrial blood flow, and vessels bridging the placenta to the uterine margin (The Society of Gynecologic Oncology endorses, 2018). The usage of magnetic resonance imaging (MRI) in diagnosing PAS in placenta previa patients showed that all 5 patients had PAS: 1 patient was placenta accreta, 1 patient was placenta increta, while the rest were placenta percreta, which managed with caesarean delivery. So, in the case of suspected PAS, along with ultrasound, MRI gave an effective modality for PAS (Koesmarsono et al., 2022). The performance of MRI in predicting PAS with imaging modality with the sensitivity of 94.4% and specificity of 84% (Sherer et al., 2023). The advantage using MRI as it can detecting the depth of trophoblast invasion, so it more superior than ultrasound (Snegovskikh et al., 2011). The pathologic diagnosis of PAS may be needed, but 18-29% of did not have pathologic confirmation, although pathology reports indicating the thinning of the uterine wall with <3 mm of intervening myometrium between the placenta and the overlying serosa (Eller et al., 2011; Hecht et al., 2020), and clinical–pathologic results may affect hospital practice, such as advancing imaging during a subsequent pregnancy to reduces the risk of PAS or determining the PAS grade to review the postoperative quality and preventing the urgent management (Bartels et al., 2018). Prenatal PAS suspicion was confirmed with intraoperative or histological findings (Ali et al., 2019).

Risk factor of PAS including the history of previous caesarean delivery for two consecutive sections (aOR: 2.51, 95% CI 1.35–4.67, $P = 0.004$), smoking during pregnancy (aOR: 1.95, 95% CI 1.15–3.31, $P = 0.013$), uterine anomalies (aOR: 3.97, 95% CI 1.24–12.68, $P = 0.020$) (Kyozuka et al., 2019), advanced maternal age (AMA), grand multiparity, and single-layer uterine closure (Fox et al., 2019). Other also noted previous surgeries such as curettage, caesarean delivery and myomectomy and previous PAS (Sherer et al., 2023). As seen, this patients had previous history of caesarean delivery, and as stated that the most common cases of PAS was seen in a previous caesarean delivery and those with placenta previa (The Society of Gynecologic Oncology endorses, 2018). The risk of having placenta accreta is increased with the frequency or number of previous caesarean delivery up to 76% (Mirani et al., 2023). The link between caesarean delivery and PAS due to decidualisation failure resulting from blastocyst implantation within a caesarean scar defect (Mirani et al., 2023). Other also stated the involvement of primary defect of the trophoblast function, a secondary basalis defect due to a failure of normal decidualization, and abnormal vascularisation and tissue oxygenation of the scar area (Jauniaux and Jurkovic, 2012). In the first PAS cases investigation, it occurred after manual removal of the placenta, uterine curettage, or endometritis, and superficial damaged leads to an abnormally adherent placenta. Moden medicine identify the cause is uterine surgery which left uterine scar due to caesarean delivery (Jauniaux et al., 2018c).

Our patient had a high leukocyte value above the normal range during the referral to inpatient unit. A study found the higher total leukocyte count (leukocytosis), neutrophil count, and neutrophil-to-lymphocyte ratio in the third trimester in placenta previa subjects than normal group, while mean platelet volume (MPV) and large platelet cell ratio (P-LCR) values were lower (Ersoy et al., 2016). High value of leukocyte also showed the signs of infection (Neef et al., 2024). Cell blood count (CBC) can be used as the tool to predict the placental anomalies (Sherif et al., 2024), as stated that cancer cell invasion has common features with the trophoblast invasion (Knöfler and Pollheimer, 2013). Other noted the thigh CBC pre-operative distinct the patients with hysterectomy and those without hysterectomy, in cut-off value 11.3109/L (Ozdemir and Karli, 2019). This patient also had hypoalbuminemia and hypotension, as seen in other case, and treated with the administration of 50 ml of 20% albumin (Laranjo et al., 2024). Hypotension in this patient due to active haemorrhage before diagnosis, so do the incidence of hypoalbuminemia, anaemia, leukocytosis (high level of leukocyte) and hypokalemia, as noted in patients with active vaginal bleeding (Wijaya, 2021). However, our patient had normal kalium, but experienced hyponatremia, which is frequently occur after the delivery, but severe hyponatremia can be a life threatening if not managed well. This condition due to hemorrhagic shock in placenta acrreta (Imoto et al., 2010).

The most acceptable PAS is hysterectomy. However, in this case we used a traditional technique in which the placenta was left in the uterine cavity in this case, in attempt to preserve future fertility and avoid peripartum hysterectomy, PAS-related morbidity, and other consequences. So, after the delivery, the umbilical cord clamped, ligated, and cut as close as possible to the placenta without attempting to detach the placenta (Pegu et al., 2021).

The management of PAS including anaesthetic caring (Reale and Farber, 2022), for minimizing the unanticipated events such as major hemorrhage, which consisted of blood and fluid replacement based on the assessment of blood loss along with heart rate, urine output, and systemic blood pressure (Khokhar et al., 2016). For surgical preparation, it needs two large-caliber venous accesses, a central venous access, invasive blood pressure monitoring, pneumatic compression stockings, blood products, and intensive care beds for the parturient and the newborn (Alves et al., 2021). MRI can be used to predict the estimated blood loss (EBL) and blood transfusion in PAS, in which MRI imaging showed an intra-placental thick dark bands and markedly heterogeneous placenta in predicting massive haemorrhage and blood transfusion (Zhang et al., 2020). Several obstetrician's choice to prevent massive haemorrhage in PAS including: ascending uterine artery ligation (AUAL), uterine artery embolization (UAE) and prophylactic abdominal aorta balloon occlusion (ABO), with various effects (Huang et al., 2014).

This case was categorised as post-partum hemorrhage (PPH) due to the blood loss > 500 ml (1 adult diaper) accompanied with hypovolemic (Loukopoulos et al., 2023). The morbidity of PAS including haemorrhage. Haemorrhage morbidity and mortality are mediated by hypovolemic shock which leads to the reduction of renal perfusion and renal failure due to acute tubular necrosis. Hypovolemic shock is the body mechanism in combating the acute blood volume loss, so that blood replacement is needed

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(Fox et al., 2019). Haemorrhagic shock clinically marked with the decreased of tissue perfusion so that the delivery of nutrient and oxygen for normal function in cell were insufficient, resulting hypovolemia as the secondary complication of massive haemorrhage. The reduction of tissue perfusion made oxygen exceed that of supply, which may lead to metabolic acidosis and multiorgan failure (Mehdi and Chandraharan, 2021). Hypovolemic shock was occur due uncontrolled continuous bleeding (Prayitno et al., 2020), or PPH (Loukopoulos et al., 2023). Hypovolemic shock needs the assessment to maintain the of fluid requirements/fluid balance, hemodynamic control, adequate oxygenation, and laboratory tests including routine blood, coagulation factors, and electrolytes (Wijaya, 2021), and systemic management (Murayama et al., 2021). Intubation, post-operative sedation, neuromuscular relaxants and thermoregulation was needed for severe anaemia ($Hb \leq 4$ g/dl) cases due to blood loss to decrease oxygen consumption (Samir, 2023). Low doses of propofol should be given to patients with ongoing bleeding; in cases with a heavy bleeding, it may be better to avoid propofol. Propofol as halogenated inhale anesthetics are used for maintenance before the delivery, and then reduced or eliminated. Propofol did not affect the uterine tone (Warrick and Rollins, 2018). The usage of propofol reduced the volume of suctioned blood, number of gasses usage, volume of serum received, packed-cell received and urinary output, while the profile of hemodynamic were closer to the basic in the term of systolic and diastolic blood pressures during caesarean delivery with PAS (Mehdi and Chandraharan, 2021). Ketamine and etomidate are alternatives for hemodynamically unstable patients. Ketamine at a dose of 0.5-1 mg/kg is considered safe and efficient. Ketamine was chosen as it increases the heart rate and cardiac contractility, as it acts as a sympathomimetic with the function as amnestic, hypnotic, and analgesic. Ketamine had the similar effect of etomidate, so it suits for the patients with hemodynamic instability, with standard initial dose of 1.5 mg/kg (Warrick and Rollins, 2018).

The life threatening of PAS due to the difficulty to separate the placenta from the uterus. If not removed completely, the placenta will affect the uterine contraction. However, stripping the placenta leads to a huge bleeding on the stripping surface. The bleeding can be uncontrollable, depend on the depth of placenta embedded in the uterine. Blood transfusion is absolutely needed to replace the blood loss (Arakaza et al., 2023). A study formulating a score for predicting transfusion of ≥5 units of PRBCs. Factors related to massive haemorrhage including maternal age, degree of previa, grade of lacunae, presence of a hypoechoic layer, and anterior placentation. All the maternal conditions were scored and counted, and when a pregnant woman had 223/260 score, she had 70% of massive transfusion. this model had a good area under the curve (AUC) of 0.922 (Kang et al., 2020). A case report using a hypervolemic haemodilution (2,000 ml) during intraoperative bleeding to repair the CBC profile, including Hb and Hct, which was proven to increase those two parameters from 9.9 mg/dl and 29.8% to 5.7% and 17.1% respectively. Post-operative profile became 5.7-5.4 and 17.7%-16.6, with 450 ml package of red blood cells (RPC) for blood transfusion (Fanniyah and Hartono, 2022). In this patient, we treated with high dose of inspired oxygen fraction to prevent hypoxemia, and avoid hyperoxia (PaO_2 >200 mmHg). Acute normovolemic hemodilution techniques can be used, but not combined with controlled hypotension techniques. Permissive hypotension with a target systolic blood pressure of 80–90 mmHg (MAP 50–60 mmHg) can be used until active bleeding has been controlled. Vasopressors may be given to maintain arterial pressure in severe hypotension. And inotropic agents are administered in myocardial dysfunction.

In PAS, bleeding can be uncontrollable due to abundant blood flow enters the uterus not only from the internal iliac artery but also via anastomosis of the external iliac artery, interior mesenteric from various section: internal iliac artery, anastomosis of the external iliac artery, interior mesenteric artery, lumbar artery, median sacral artery, etc. Also, the arterial ligation exerts a poor haemostatic effect, which needs an integrative management in haemostatic procedures, damage control surgery and resuscitation for massive haemorrhage, and systemic management (Takeda et al., 2020). The bleeding can be a life threatening for the mother and the foetus, or both, so that the case of placenta accreta was categorised as level 3 pregnancy care by ACOG (Supraptomo and Allan, 2021). The case of placenta accreta also the most challenge for anaesthesiology for this reason (Crochetière, 2003). Not only for anaesthesiology, PAS also a challenging case for transfusion service, as no consensus on blood transfusion preparation, while the average blood loss during delivery due to PAS is 2-5 L, while normal caesarean delivery only had a blood loss of < 1 L (DeSimone et al., 2018). To prevent coagulopathy in massive bleeding, transfusions of fresh frozen plasma (FFP), Thrombocyte and fibrinogen concentrate

can be given. The use of cell salvage can reduce postoperative transfusions and length of stay. Calcium plays an important role in the blood clotting cascade, as well as the risk of hypocalcemia in massive transfusions, so calcium supplements are given. Administration of tranexamic acid as an anti-fibrinolytic is given after the baby is born and continued after surgery. Apart from that, it is also recommended that tranexamic acid be given before caesarean delivery, especially in antepartum bleeding, and given again if bleeding continues.

In case of uncontrolled bleeding, with the high risk of mortality, hysterectomy is needed as a life-saving procedure (Takeda et al., 2020), with general anaesthesia as a routine standard (Ali et al., 2019), especially in hemodynamic instability (Crochetière, 2003) to facilitate caesarean section procedures (Bartels et al., 2018). The advantage of general anaesthesia compared to neuraxial beside appropriate for long procedures, it also preferable for those with suspicion of a difficult airway, so the airway can be managed pre-emptively and carefully. Moreover, during the massive haemorrhage, the addition risk of sympathectomy may occur (Fiszer and Weiniger, 2022). Other reason that this anaesthesia provides better muscle relaxation and to improve patient comfort (Silver et al., 2015). PAS patient had the high risk of severe haemorrhage due to the increased of size and vascularity of the uterus. Also, the risk for removing portions of the bladder and/or ureters during the hysterectomy is possibly high. Severe haemorrhage leading on the present of hypotension in the patient underwent hysterectomy, as seen in a case report with 4,000 ml of blood lost (Sivasankar, 2012). The usage of total intravenous anaesthesia or regional anaesthesia in general anaesthesia was considered based on the advantage on both methods. Total intravenous anaesthesia may not be used as the volatile agents may worsen the uterine atony, while regional anaesthesia may be used in a stable patient who needs uterine or genital tract exploration, with a T4 block in manual uterine exploration (Crochetière, 2003). To optimize transfusion and fluid administration, we placed a central venous catheter in this patient. In this case, use controlled hypotension techniques while maintaining sufficient fluids with the target of producing urine of 0.5–1 ml/kg/hour. Selection of anesthetic agents that can worsen the patient's condition should also be avoided for expected results. Postoperative monitoring is carried out in the ICU for intensive monitoring and assessing whether there are any complications arising from the actions taken.

General anaesthesia is chosen to secure the airway before the surgery in the case of difficult airway (suspected or known), long period of surgery, and the risk of massive haemorrhage. The advantage of this procedures is the ability to secure the airway in a controlled setting as the risk of haemodynamic instability, airway oedema or coagulopathy was high during the procedure. For trachea intubation, video-laryngoscopy is recommended as the risk of difficult intubation, faster rate of deoxygenation, airway friability at term gestation and increased risk of aspiration. However general anaesthesia had disadvantage due the placental transfer of anaesthetic medications may depress neonatal alertness at birth (Reale and Farber, 2022). Other stated that this type of anaesthesia reduces the mother's anxiety, so that the anaesthetist can concentrate on the major problems: haemorrhage, cardiovascular stability, and avoids the hemodynamic instability (Tarantino and Calì, 2021), as shown in this patients.

General anaesthesia needs adequate vascular access for anticipating postpartum haemorrhage (PPH), unstable hemodynamic and need for rapid resuscitation. Patients should have at least two large intravenous accesses (14- or 16-gauge [g]), placed before surgery. These accesses are needed given that large volumes can be infused via large-bore peripheral i.v. cannulae or preparation for transfusion (Reale and Farber, 2022). In this case, anaesthesia can be used with spinal or epidural until foetal extraction was enrolled, and then proceeding to general anaesthesia due to a wide dissection vascular neoformations need a long surgical time (Alves et al., 2021). This case was a surprise PAS as it diagnosed when the patient had 4 days of bleeding, so the surgical involved this case were hysterotomy and foetal extraction outside the invaded uterine area, and further action on hysterorrhaphy with the placenta in situ and laparorrhaphy (Alves et al., 2021). However, there are several things that must be considered when giving general anesthesia to pregnant women, namely the risk of aspiration and the possibility of difficulty in intubation.

Pre-anesthetic evaluation and planning for antenatal patients who are considered to be at high risk of bleeding is important (Metzger et al., 2021). The anesthesiologist's role would ideally begin long before the patient arrives in the delivery room. An antepartum, pre-anesthesia consultation as an outpatient is an important step in preparing and delineating a plan for women who are considered to be at high risk of bleeding during labor, as the mortality rate due to PAS was 20%, while perinatal mortality was 30%. Many things should be considered by the anesthesist, such as the duration of surgical and the estimation

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of blood lost may determine the type of anesthesia (neuraxial/epidural and/or general anesthesia) used for the case (Supraptomo and Allan, 2021). Or even to discussed the possibility of complication during the surgical, and decided the anesthetic option should be given to minimize the anxiety of the patient. The discussion should including: the presentation of PAS, surgical plan, mother's preferences and concern, with the investigation on airway and physical examination, and anaesthetic history to identify a potential difficult airway (Reale and Farber, 2022). Preoperative optimization is very important in mitigating problems that may arise in high-risk pregnant women. Starting from family education (about anesthesia management plans, risks and complications that may occur during surgical procedures), adequate intravenous access, invasive monitoring if necessary, emergency drug preparation, to blood product preparation.

To reduce the risk of aspiration, it is recommended that pregnant women should fast for 6 hours (light meals) and 8 hours (heavy meals) before surgery (Hakak et al., 2018), prophylaxis with non-particulate antacids 30 minutes before surgery (Schneck and Scheller, 2000), H2 antagonist drugs, and prokinetics (metoclopramide) in preventing nausea and vomiting (Jelting et al., 2017). In this case we only gave metocolpramide and ranitidine, because non-particulate antacids were not available. A history of previous caesarean delivery with a risk factor for the development of placenta accreta as seen in this patient. In this case we decided to use the general anesthesia RSI technique. Because the patient's preoperative hemodynamic status was unstable, surgery began after the blood was ready in the blood bank. But this case can't be used a long planning of anesthesia management.

Close intraoperative monitoring is key to the management of patients at risk of massive bleeding. American Society of Anesthesiologists (ASA) guidelines stated that PRC transfusion should be given if the hemoglobin level is below 6 gr/dl (American Society of Anesthesiologists, 2006). This is adjusted to each patient's condition so that oxygen delivery remains adequate. However, in conditions of ongoing bleeding, the anesthesiologist can start a transfusion at Hb above 7 gr/dl. Likewise, recommendations from the European Society of Anesthesiology, in active bleeding, target Hb 7-9 gr/dl, by periodically assessing hematocrit/hemoglobin levels, serum lactate, base excess to monitor tissue perfusion and oxygenation (Spahn et al., 2019). In this case, the initiation of transfusion is based on the calculation of allowable blood loss (ABL), when it approaches the ABL value, the transfusion is given immediately. This takes into account the laboratory examination which takes time and the bleeding is massive and occurs quickly. A study noted that this method helps in alerting the operating team regarding the blood loss and need for blood transfusion (Sharashchandra and Shivaraj, 2020).

Limitations

The limitation in this article did not following further newborn growth and development, as the medical management during the crisis should have impacting their health.

CONCLUSION

Placenta accreta spectrum (PAS) is a disorder of placental implantation that causes peripartum bleeding and is the main cause of maternal death. Placenta accreta has a risk of intraoperative bleeding, therefore blood preparation and blood transfusion are very important. If the patient's condition is not treated immediately, it can worsen the condition of the mother and baby. In this patient, an early diagnosis was made and treatment was given that was appropriate to the patient's condition. The patient's shock condition was resolved well, good teamwork is very necessary in managing patients like this.

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Conflict of Interest

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Patient concern for Publication

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Author Contribution

KRL: supervising, conceptual, funding; HRM: data curation, drafting, translating; IGS: data curation, drafting, translating; VM: data curation, drafting, EP: supervising, editing.

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