ANDALAS OBSTETRICS AND GYNECOLOGY JOURNAL
eISSN : 2579-8324
pISSN : 2579-8323

CASE REPORT

EARLY HAEMORRHAGE POSTPARTUM (HPP); WITH COMPLICATION DISSEMINATED INTRAVASCULAR COAGULATION, SEPSIS, ACUTE KIDNEY INJURY

Rizki Oktavian[1], Roza Sriyanti[2], Emilzon Taslim[3]

1. Department of Obstetrics and Gynecology, Faculty of Medicine, Andalas University, RSUP Dr.M. Djamil Padang, Indonesia;

2. Fetomaternal Subdivision, Department of Obstetrics and Gynecology, Faculty of Medicine, Andalas University/Dr. M. Djamil Hospital, Padang

3. Department of Anesthesia and Intensive Therapy, Faculty of Medicine, Andalas University, RSUP Dr.M. Djamil Padang, Indonesia

Korespondensi: *Rizky Octavian;* rizkioktaviandr@gmail.com *and +62853-6115-3406*

Abstarct

Background : *Hemorrhage Postpartum (HPP) is the leading cause of maternal death worldwide with an incidence of 5%-10% of all deliveries. 70% of cases of HPP are caused by atony of the uterus. If HPP is not handled properly, it will cause worsening of the patient's condition which causes various multiorgan complications.*
Objectives : *To discuss the management of HPP cases complicated by DIC, sepsis and AKI.*
Method : *case report.*
Case : *A female patient, 36 years old, was referred from a private hospital to PONEK RSUP Dr. M. Djamil Padang with a diagnosis of decreased consciousness ec suspected sepsis in post SCTPP oi used SC 2x + post relaparotomy oi bleeding subfascia + moderate anemia. After surgery, the patient looked pale and the hemoglobin was 7, then relaparotomy was done and done B-lynch oi uterine hypotony. After relaparotomy, the patient experienced worsening then referred to the hospital. The patient arrives with hipovolemic shock + AKI + Sepsis + DIC , then the condition improvement is carried out in ROI and hysterectomy relaparotomy is performed. The patient has worsened, maximum treatment has been carried out from the intersivist, but the patient's condition continues to worsen and eventually dies.*
Conclusion : Early diagnosis and rapid treatment through a multidisciplinary team and the availability of an Intensive Care Unit (ICU) can prevent complications and reduce morbidity and mortality.
Keywords *: Early Postpartum Hemorrhage; Uterine Atony; Acute Kidney Injury; Disseminated Intravascular Coagulation; Sepsis Shock*

Copy and paste keywords in English here. The number of keyword is 3-5 words. Between keywords separated by semicolons [;].

ANDALAS OBSTETRICS AND GYNECOLOGY JOURNAL
eISSN : 2579-8324
pISSN : 2579-8323

Copy and paste keywords in English here. The number of keyword is 3-5 words. Between keywords separated by semicolons [;].

INTRODUCTION

The high maternal mortality rate (MMR) is a health problem in the world. The three main causes of maternal death are bleeding, hypertension in pregnancy, and infection. The initial target of the Millennium Development Goals (MDGs) was to reduce the maternal mortality rate to 102 per 100,000 births in the 2000-2015 era, this target increased in the Sustainable Development Goals (SDGs) era, namely less than 70 per 100,000 births from 2016-2030.[1]

Based on the 2020 Indonesian Demographic and Health Survey (SDKI), MMR in Indonesia is 230 per 100,000. In West Sumatra alone, in 2020, the maternal mortality rate was 151 cases, and specifically in the city of Padang, the maternal mortality rate in 2020 was 21 cases.[2]

Early post partum bleeding is bleeding of more than 500 cc that occurs after the baby is born vaginally or more than 1,000 mL after abdominal delivery that occurs after the third stage up to the first 24 hours. The cause of HPP is 4T which stands for Tone, Trauma, Tissue and Thrombin. Tone is a problem in 70% of cases of post partum hemorrhage, which is caused by atony of the uterus. If post partum hemorrhage is not handled properly, it will cause a worsening of the patient's condition, causing various multiorgan complications such as shock, acute kidney injury, sepsis, disseminated intravascular coagulation and several other conditions that can lead to death.[3]

Prenatal identification of women at risk, rapid assessment of blood loss, effective management and involvement of a multidisciplinary team are essential to save lives in patients with post partum haemorrhage.[4]

CASE REPORT

A female patient, 36 years old, was referred from a private hospital to the Comprehensive Neonatal Emergency Obstetric Service (PONEK) RSUP Dr. M. Djamil RSUP Dr. M. Djamil Padang with a diagnosis of decreased consciousness ec suspected sepsis in post Sectio Cesaria Transperitoneal Profunda (SCTPP) ai former Sectio Cesaria 2x + post relaparotomy ai subfascial bleeding + moderate anemia. Previously the patient underwent SCTPP ai ex Sectio Cesaria 2x. Observations were carried out after the operation, then it was found that the patient looked anemic and a Cito blood test was carried out, the hemoglobin result was 7. Because the patient's condition was getting worse, it was decided to carry out a relaparotomy. During the relaparotomy, sub-fascial bleeding and hypotonia were found, then B-lynch was carried out. During intra-operation, a blood transfusion of 2 units of Pocket Red Cell and 1 unit of Whole Blood was carried out. At 24 hours after surgery, the patient's condition was short of breath, appeared anemic, and began to feel sleepy. A vital sign examination was carried out and blood pressure was 80/60, pulse 110x/I, Drain 400cc/6 hours with laboratory

Hb results: 7.8, leukocytes 51,500, platelets 95,000. The patient received 2-way IV line therapy, RL drip oxytocin 20 IU: metergin 0.2 mg, + RL rapid drip, inj. Tranexamic acid 500mg, inj. Vitamin K 10 mg, Inj. Ceftriaxone 2x1 gram, metronidazole inj 3x500mg. Due to limited facilities, the patient was referred to RSUP Dr. M. Djamil Padang for further treatment with oxygen, 2-way Intravenous (IV) line, drain and catheter.

Comprehensive Neonatal Emergency Obstetric Services (PONEK) RSUP Dr. M. Djamil, a primary survey was carried out, the general condition was severe, somnolence (Glasgow Coma Scale 11), blood pressure 88/44 mmHg, pulse 128 x/minute, respiration 28 x/minute, temperature 36.7^{o}C, patient was attached drain 200 cc/5 hours (dark red), urine 100 cc/5 hours, then the patient is resuscitated and stabilized, the patient is given oxygen 15L/I, IVFD RL drip oxytocin 20 IU: metergin 0.2 mg rapid drip + IVFD HES rapid drip with Abocath number 16, ceftriaxone injection 2x1 gram, Vit K injection 3x10 mg, and transfusion of 3 units of Pocket Red Cell (PRC) + 3 units of platelets. On physical examination, it was found that the conjunctiva was anemic, the heart and lungs were within normal limits, on the obstetric status examination the abdomen appeared to be covered with bandage, a 200 cc/5 hour drain was reddish, the fundus of the uterus was at the level of the navel, contractions were good, tympanic, bowel sounds (+) were normal . In the genitalia, the vulva/urethra is calm, vaginal bleeding (-). The patient has no history of suffering from blood, heart, lung, liver, kidney disorders, diabetes mellitus, hypertension and allergies. There is no family history of infectious, hereditary or psychiatric diseases.

On ultrasound examination, the uterus appeared retroflexed, endline (+), no free fluid was visible in the peritoneum, the right and left adnexa did not appear abnormal, and there was no subfascial hematoma. Laboratory examination showed that hemoglobin was 5.7 gr/dl, hematocrit 17%, leukocytes 53,250/mm3, erythrocytes 4.5 million/mm3, platelets 94,000/mm3, urea 78 mg/dl, creatinine 3.0 mg/dl, sugar Blood Current (GDS) 98 mg/dl, PT 26.1, APTT 113, D-dimer 4,511, SGOT 4,423 u/L, SGPT 2.32 u/L, Albumin 1.9 g/dl, globulin 2.0 g/dl , Sodium 133 mmol/L, Potassium 5.5 mmol/L, Chloride 102 mmol/L, Procalcitonin 26.47. This patient was diagnosed with Hypovolemic Shock ec early Post partum hemorrhage on P3A0H3 post relaparotomy from outside ai subfascial bleeding + Post Sectio Cesaria Transperitoneal Profunda (SCTPP) from outside ai former Sectio Cesaria 2x + Post B-Lynch + fimbrectomy + severe anemia + thrombocytopenia + Disseminated Intravascular Coagulation + liver function disorders + Hyponatremia + Hyperkalemia + Hypoalbumin + AKI Stage III + Sepsis. The patient was then treated at ROI to improve his general condition.

While in the Intensive Observation Room, the patient receives adequate antibiotics, anti-bleeding, administers sedation, maintains stable hemodynamics with the use of vasopressors, controls blood gas analysis, closely monitors fluid and urine output, administers blood products for severe anemia and coagulation factor disorders, blood cultures. , Urine and sputum are carried out to test sensitivity analysis and germ patterns present in the patient.

On the second day of treatment, general condition was severe, somnolence (Glasgow Coma Scale 11), blood pressure 83/63 mmHg, pulse 120 x/minute, respiration 22 x/minute, temperature 36.6^{o}C, drain 920 cc/16 hours red concentrated, Hemoglobin 5.9 Platelets 77,000, albumin 2.1, urea 122, cretainin 4.2, Procalcitonin 27.89 Then intubation and Central Venous Catheter (CVC) were installed. The intersivist doctor suggested a repeat relaparotomy, but due to prolonged goagulation, the condition was improved and optimized by administering blood products. Planned transfusion of 6 units of platelets + 2 units of Fresh Frozen Plasma + 1 unit of Pocket Red Cell.

On the third day of treatment, general condition was severe, consciousness was under the influence of medication, blood pressure 84/52 mmHg, pulse 130 x/minute, saturation 100% on venti, temperature 36.6^{o}C, urine 180 cc/24 hours, drain 800 cc/24 dark red hours, Hemoglobin 4.2 Platelets 59,000, albumin 2.2, urea 171, cretainin 5.8, Procalcitonin 19.25, Sodium 133, Potassium 6.1, SGOT 2113, SGPT 1311. No improvement after maximum optimization, So it was decided to perform a Cito relaparotomy.

Relaparotomy was carried out, Couvelaire's uterus was visible and bleeding in the right ovarian artery branch was decided to perform a hysterectomy. Evaluation of bleeding, after there is no bleeding, a drain is placed intra-abdominally (right) and in the subfascia (left). Intraop transfusion Whole Blood 3 units + Platelets 5 units. Intraoperative bleeding was approximately 500 cc. After surgery, the patient was again treated in the Intensive Observation Room and closely monitored his general condition, urine production and drains.

When treatment was completed after surgery, there was an increase in hemoglobin after surgery to 8.8, there was a decrease in platelets, worsening of kidney function and severe metabolic acidosis. The patient has received maximum therapy from an internist plus the administration of blood products. Then on the 5th day of treatment, the kidney function got worse, the urea level was 210 mg/dl, the creatinine level was 8.0 mg/dl, the internist consulted with an internal medicine specialist to do Cito hemodialysis, but it couldn't be done because the systolic blood pressure was <100 mmHg, and temperature >38^{0}C. decided to improve conditions to the maximum.

On the seventh day of treatment, the condition continued to worsen, general condition was severe, consciousness was under the influence of medication, blood pressure 71/35 mmHg, pulse 87 x/minute, saturation 97% on venti, temperature 38.9^{o}C, urine 180 cc/24 hours, intra-abdominal drain 90 cc/24 hours, Sub fascia drain 40 cc/24 hours, dark red, Hemoglobin 9.9, leukocytes 20,670, Platelets 59,000, Albumin 2.2, urea 240, creatinine 9.4, Procalcitonin 6.37 , Sodium 126, Potassium 7.7. The patient was given a maximum dose of vasopressor. Informing the patient's family about worsening concerns is carried out.

Then on the eighth day of treatment in the early morning, there was a worsening of the condition where the general condition was severe, consciousness was under the influence of drugs, blood pressure was not measured, pulse was not measured, saturation was 40% on

venti, Cardiopulmonary resuscitation (CPR) was performed and atropine sulfate (SA) was administered. and epinephrine. After carrying out 5 cycles of Cardiopulmonary resuscitation (CPR) and maximum therapy from the internist, blood pressure was not measured, pulse was not measured, saturation was not measured, pupils were maximally dilated, carotid pulsation was not palpable, Electrocardiography was flat. Then the patient was declared dead in front of the family and paramedics with a final diagnosis of Apnea + cardiac arrest ec multiple organ failure in Post laparotomy hysterectomy ai hypovolemic shock ec early HPP ec uterus couvelaire + active bleeding of the right ovarian artery branch in P3A0H3 post relaparotomy from outside ai subfascia bleeding + post SCTPP from outside ai used Sectio Cesaria 2x + Post B-Lynch + fimbrectomy + moderate anemia + thrombocytopenia + DIC + liver function disorders + Hyponatremia + Hyperkalemia + Hypoalbumin + AKI stage III + Sepsis, Postpartum Day 8.

Gambar 1. Uterus Couvelaire.

DISCUSSION

Early post partum hemorrhage (HPP) is bleeding of more than 500 cc that occurs after the baby is born vaginally or more than 1,000 mL after abdominal delivery. Bleeding is more than normal if it has caused changes in vital signs characterized by complaints of weakness, cold sweats, shivering, tachypnea, systolic blood pressure <90 mmHg, pulse >100 x/minute, Hb level <8 g/dl.[5-8]

The cause of HPP is 4T which stands for Tone, Trauma, Tissue and Thrombin. Tone is a problem in 70% of cases of post partum hemorrhage, which is caused by atony of the uterus. Meanwhile, 20% of HPP cases are caused by trauma. Trauma can be caused by lacerations of the cervix, vagina and perineum, extension of lacerations to the SC, rupture or inversion of the uterus and non-genital tract trauma, such as subcapsular rupture of the liver. Meanwhile, another 10% of cases can be caused by tissue factors, namely retention of products of conception, placental (cotyledon) membranes or clots, and abnormal placenta. Factors

causing thrombin include coagulation abnormalities which are very rare, namely around <1% of cases.[6,7]

The most appropriate way to determine whether someone is experiencing postpartum hemorrhage is to calculate the blood loss that occurs. Conditions during labor make it difficult to determine the amount of bleeding that occurs, so the limit for the amount of bleeding is stated as bleeding that is more than normal which has caused changes in vital signs, including patients complaining of weakness, unsteadiness, cold sweats, chills, hyperpnea, systolic blood pressure <90 mmHg, pulse >100 x/minute, Hb level <8 g/dl.[8,9]

Prevention of uterine atony is by carrying out active management in the third stage, namely administering oxytocin 10 IU (IM), controlled stretching of the umbilical cord and uterine massage after the placenta is delivered. Apart from oxytocin, we can use several uterotonic agents such as methylergometrine 0.2 mg (IM), syntometrine (a combination of oxytocin 5 IU and ergometrine 0.5 mg per ampoule IM); or misoprostol 600 µg orally.[10,11]

The principles of management for patients with cases of post-partum hemorrhage are to immediately seek help from other health workers, such as obstetricians, anesthesiologists and radiologists, prevent hemorrhagic shock, resuscitate as soon as possible, look for the source of the bleeding and immediately take the necessary action. Avoiding delays in diagnosis and therapy will have a significant impact on sequelae and prognosis (life expectancy).[12,13,14]

Initial treatment at the Comprehensive Neonatal Emergency Obstetric Service (PONEK) M. Djamil Hospital is appropriate, namely resuscitation and stabilization by replacing lost fluids through blood transfusions, administration of fluids, antibiotics and anti-bleeding.

Based on the theory, the management used for post partum bleeding is based on the principle of "HAEMOSTASIS", namely Ask for HELP.[15,16,17] Immediately ask for help, or the patient is referred to the hospital. Second, assess and resuscitate. It is very important to immediately assess the amount of blood coming out as accurately as possible and determine the degree of hemodynamic changes. Assess the level of consciousness, pulse, blood pressure, and if facilities allow, oxygen saturation must be monitored. When installing an IV line with Abocath 14G-16G, a blood specimen must be taken immediately for checking hemoglobin, blood clotting profile, electrolytes, determining blood group, and crossmatch (RIMOT = Resuscitation, 2-line infusion, given crystalloid and colloid fluids quickly while waiting for the results of the crossmatch. Third, Estabilish etiology, ensure availability of blood, ecbolics (Oxytocin, Ergometrin or syntometrine bolus IV/IM) Determine the etiology of HPP. Assess uterine contractions, evaluate trauma, check the completeness of the placenta and placental membranes and check blood clotting factors. Ensure availability of blood and uterotonic drugs. Fourth, massage the uterus. Massage the uterus to stimulate the uterus to contract

properly. If the uterus remains soft, internal bimanual compression should be performed. Fifth, oxytocin infusion/Prostaglandin. You can administer 40 units of oxytocin in 500 cc of normal saline at a speed of 125 cc/hour15. Ergometrine as a second line of oxytocin can be given intramuscularly or intravenously. Initial dose 0.2 mg (slowly), follow-up dose 0.2 mg after 15 minutes if still needed. Administration can be repeated every 2-4 hours if still needed. The maximum dose is 1 mg or 5 doses per day. Contraindications for administering ergometrine include preeclampsia, vitium cordis, and hypertension. If HPP still cannot be treated, misoprostol can be given rectally 800-1000ug. Sixth, Shift to theater - exclude retained products and trauma / bimanual compression (conservative; non-surgical) If massive bleeding still occurs, immediately evacuate the patient to the operating room. Perform an examination to rule out any remaining placenta or amniotic membranes. If you suspect there is still tissue remaining, immediately carry out curettage. Bimanual compression can be done while the mother is taken to the operating room. seventh, Tamponade balloon or uterine packing (conservative; non-surgical). If bleeding persists, consider the possibility of coagulopathy accompanying refractory atony. Uterine tamponade can be done by installing a tampon balloon condom catheter to help reduce bleeding. This action can also provide an opportunity for correction of clotting factors.[17] Eighth Apply compression sutures – B-Lynch / modified (conservative surgery). The decision to perform a laparotomy must be made quickly after providing informed consent for all possible actions that will be carried out in the operating room. The compression action that we do is B-Lynch. It should be remembered that the B-Lynch procedure must be preceded by a tamponade test, namely an effort to assess the effectiveness of the B-Lynch procedure by means of bimanual compression of the uterus directly on the operating table. is to reduce blood flow to the uterus. Actions that can be performed are bilateral uterine artery ligation, bilateral ovarian artery ligation and internal iliac artery ligation. Tenth Interventional radiology, if appropriate, uterine artery embolization (conservative surgery) Uterine artery embolization is useful in situations where preservation of fertility is desired when surgical options have been exhausted in controlling both atonic and traumatic HPP. The main drawback is the 24-hour availability of interventional radiologists with appropriate facilities and teams, patients must be hemodynamically stable enough to be transferred to the radiology suite. Eleventh Subtotal / total abdominal hysterectomy (non-conservative) Peripartum hysterectomy can be total or subtotal, performed as a last resort when all other methods to control HPP have failed. [18,19]

In this patient there was an error during the initial management at the referring hospital where an error occurred in handling the HPP and there was a delay in referring the patient. Stages of HPP management where after we have done all the algorithms but bleeding still occurs, the final choice we make is subtotal/total hysterectomy. In this patient, when he is at the referring hospital, when the B-Lycnh is completed, he should be re-observed to ensure whether the uterus is responding well and the bleeding has stopped. If it is confirmed that it is safe, then we will close the surgical wound. Meanwhile, in this patient, B-Lynch failed, resulting in bleeding which caused a uterine couvuleir, causing hypovolemic shock. Then the

delay in deciding to be referred is also one of the causes of worsening of the patient's condition.

The consequences of Early HPP which are severe and not treated properly will result in hypovolemic shock and various multiorgan complications such as Sepsis, Acute Kidner Injury, Disseminated Intravascular Coagulation and failure of other vital organs. In this patient there was a change in mental status, somnolence, respiratory failure > 22 and systolic blood pressure < 100 mmHg from D1. Meeting 3 of the 3 criteria was classified as sepsis based on the qSOFA score. On the procalcitonin examination on the first day of treatment, the result was 26.47 mg/ml, which indicates a high risk of developing sepsis or septic shock..[20]

In this patient, kidney function also worsened, at the beginning of admission the urea level was 78 mg/dl, serum creatinine was 3.0 mg/dl and kidney function worsened, where the urea level reached 240 mg/dl and the serum creatinine level was 9.4 mg/dl and oliguria persisted. So it can be said that the patient experienced Acute Kidney Injury, namely a sudden decrease in kidney function within 48 hours, namely in the form of an increase in serum creatinine levels > 0.3 mg/dl (≥ 26.4 ɲmo/l), presentation of an increase in serum creatinine ≥ 50% (1.5 x increase in baseline value), or reduced urine output (recorded oliguria ≤ 0.5 ml/kg/hour for more than 6 hours).[21]

From DIC scoring, this patient obtained a score of ≥ 5 which is considered compatible with Disseminated Intravascular Coagulation, namely a decrease in platelet count < 100,000 (score 2), D-dimer 4,511 (score 3), an increase in prothrombin time > 100 (score 2) and for fibrinogen examination there are no facilities, so the total score is ≥ 5 which means DIC.[22]

The HPP management chart is to find the source of bleeding and stop it. The patient experienced hypovolemic shock ec early HPP and it was decided to do a relaparotomy and during the intraoperative procedure, Couvelaire's uterus was found and bleeding in the right ovarian artery branch and it was decided to do surgery, namely hysterectomy..

The management of this patient in the ROI/ICU by an intersivist was appropriate where ventilator support was carried out, sedation was provided, maintaining stable hemodynamics with the use of vasopressors, control of blood gas analysis, strict monitoring of fluid and urine output. Providing blood products for severe anemia and disorders of coagulation factors is appropriate, blood cultures are carried out for sensitivity analysis tests and germ patterns in patients and treatment of sepsis is in accordance with the Surviving Sepsis Campaign 2021. Cito hemodialysis, but cannot be done because of systolic blood pressure <100 mmHg, and temperature > 38^0C.

The cause of the patient's death was a combination of multiple organ failure which was a complication of severe post partum hemorrhage. In this patient the worsening of the general

condition was evident, during monitoring in the ROI starting from admission with a state of shock, severe anemia, active drain production, and the patient experiencing 85% desaturation with the patient's vital signs continuing to decline drastically even though he had been given inotropic, vasoconstrictor, anticholinergic therapy. and mechanical ventilation.

HPP is another cause of bleeding associated with DIC. This is an acquired clinicopathological syndrome, characterized by activation of the coagulation system which results in fibrin deposits in the microvasculature, resulting in impaired blood supply to organs and bleeding, as a result of consumption of platelets and coagulation factors.[29]

Based on the severity of the disease, patients are grouped into the category of severe acute renal failure (complicated ARF). Where this is caused by reduced blood intake to the kidneys due to HPP and sepsis that occurs which causes damage to the blood vessel endothelium which results in increased production of inflammatory factors accompanied by adhesion of leukocytes and platelets which increases the risk of microthrombus formation and capillary occlusion which this will cause. causes a decrease in renal perfusion and oxygen transport to the kidneys which over time will cause AKI. This also occurs in the blood vessels of other vital organs, causing multiple organ failure. The death rate in multiple organ failure is very high, reaching 50–80%.[23,24,25]

CONCLUSION

Post partum hemorrhage is a serious and life-threatening condition faced by post partum women. Early diagnosis and rapid treatment through a multidisciplinary team and the availability of an Intensive Care Unit (ICU) can prevent complications and reduce morbidity and mortality. In this case there was an error during the initial management at the referring hospital where there was an error in handling post partum hemorrhage and there was a delay in referring the patient which resulted in multiple organ failure which led to death. The initial management at the M. Djamil Padang General Hospital was appropriate and then the choice of hysterectomy that was carried out was in accordance with the principles of post partum Haemorrhage management. Management of patients in the Intensive Observation Room (ROI) is appropriate.

REFERENCES

1. Cunningham et al. Williams Obstetric. 25th Edition. http://t.me/ebookers; 2018
2. Kementerian Kesehatan RI. Profil Kesehatan Indonesia 2020. Jakarta; 2020.
3. Queensland Health. Primary Postpartum Haemorrhage. Queensland Clinical Guideline 2018 march MN18.1-V7-R23

4. The Society of Obstetricians and Gynaecologists of Canada. Alarm Course Manual 22nd Edition. SOGC. 2016; 16 :1-37.
5. Rani, P.Reddi, Begum Jasmina.Recent Advances in the Management of Major Post Partum Hemorrhage-a review. Journal of Clinical & Diagnostic Research 2017 Feb vol 11 (2) QE01-QE05
6. WHO. WHO Guideline for the Management Postpartum Hemorrhage and Retain Placenta. World Health Organization; 2009
7. Begum Jasmina, et.all. B-Lynch; a Technique for Uterine Conservation or Deformation? A Case Repport with Literature Review. International Journal of Gynecology and Obstetric 2014 apr, vol-8(4): OD01-0D03
8. FIGO. Prevention and Treatment of Post Partum Hemorrhage in Low-resource setting. International Journal of Gynecology and Obstetric 117 (2012) 108-118
9. POGI. Pedoman Nasional Pelayanan KesehatanPerdarahan Pasca-Salin. Perkumpulan Obstetri dan Ginekologi Indonesia Himpunan kedokteran Fetomaternal 2016
10. Karkata MK, Kristanto H. Panduan Penatalaksanaan Kasus Obstetri. Himpunan Kedokteran Fetomaternal POGI. 2012; 11 : 160-183
11. Hoelman, Mickael B., et.all. PANDUAN SDGs untuk Pemerintah Daerah (Kota dan Kabupaten) dan Pemangku Kepentingan Daerah. International NGO Forum on Indonesian Development; 2015
12. Shakur, et.all. The Woman Trial (World Maternal Antifibrinolytic Trial); Tranexamic acid for the Treatment of Postpartum Haemorrhage; an International Randomised, Double Blind placebo Controlled Trial. UK: Biomed Central: 2010
13. ACOG. Clinical Management for Obstetrician-Gynecologist: Postpartum Haemorrhage. ACOG Practice Buletin vol 130, no. 4, October 2017
14. NHS. Obstetric Haemorrhage – Clinical Guideline. Royal Cornwall Hospitals. NHS Trust. V2.1 2018
15. Al Banna, Weaam Nabil. Postpartum Haemorrhage and How to be Managed. EC Gynaecology 5.6 (2017) 223-229
16. The RANZCOG. Management of Postpartum Haemorrhage (PPH). The Royal Australian and New Zealand College of Obstetrician and Gynecologist: 2017
17. Balogoun-Lynch Christopher and Whitelaw Naomi. The Surgical Management of Postpartum Haemorrhage. Cambridge University. Fetal and Maternal Medicine Review 2006; 17:2 105-123
18. E. Mavrides, etal. Prevention and Management of Postpartum Haemorrhage. BJOG 2016;124:e126-e149
19. Edhi, et al. Postpartum Haemorrhage: Cause and Management. BMC Research Notes 2013, 6:236.
20. Singer, M. et al. The third international consensus definitions for sepsis and septic shock(sepsis-3). JAMA - J. Am. Med. Assoc. 315, 801–810 (2016).
21. Mehta RL, Kellum JA, Shah SV, Molitoris BA, Ronco C et al. Acute kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. Critical care2017,11:R31
22. Thachil, J. & Toh, C. H. Disseminated intravascular coagulation in obstetric disorders and its acute haematological management. Blood Rev. 23, 167–176 (2019).
23. Al Wattar et al. Management of Obstetric Postpartum Hemorrhage: a National Service Evaluation of Current Practice in the UK. Risk Management and Healthcare Policy. 11 January 2017.
24. Yamashita Y, et.all. Intra-aortic Balloon Occlusion without Flouroscopy for Life-threatening Post-partum Haemorrhage. De Gruyter. Med. 2016;5(1): 19- 22
25. Himmelfarb J, Joannidis M, Molitoris B, Schietz M, Okusa MD, Warnock D et al. Evaluation and Initial Management of Acute Kidney Injury. Clin J Am Soc Nephrol 3:962-967,2018