**Obstetric haemorrhage – Key points and updates**

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Obstetric haemorrhage is the leading cause of maternal mortality all over the world. Upto one fourth of all maternal death is due to haemorrhage and its complications. A blood loss of 500ml in vaginal delivery and 1000ml in caesarean section is well tolerated by the parturient due to the physiological changes of pregnancy.

The causes of obstetric haemorrhage can be divided into antepartum, intrapartum and postpartum factors.

*Table 1. Causes of haemorrhage*

|  |  |  |
| --- | --- | --- |
| Ante partum | Intra partum | Post partum |
| Placenta praeviaVasa praeviaPlacental abruptionUterine rupture | Placenta accretaUterine inversionAtony Coagulation disorders | AtonyRetained productsTraumaCoagulation disorders |

The bulk of the cases are due to postpartum causes which can be remembered by the four Ts- Tone, Thrombin, Tissue and Trauma.

Patients can be categorized into high, moderate and low risk for developing postpartum bleeding.

*Table 2. Risk stratification*

|  |  |  |
| --- | --- | --- |
| High risk | Medium risk | Low risk |
| Previous LSCSPlacenta previaSuspected accretaHaematocrit < 30Platelets < 10,000Already bleedingCoagulation disordersSevere PIH | Previous LSCSMultigravidaMore than 4 vaginal deliveriesFoetal weight > 4KgBMI >35Large fibroidPIH | No previous uterine incisionPrimiLess than 4 vaginal deliveriesNo bleeding disorder |

**Estimates of blood loss**

Clinical signs of bleeding like tachycardia, tachypnea and wide pulse pressure can be misleading due to physiological changes of pregnancy. Modified scoring systems like MEOWS are more specific for obstetric emergencies. They are not specific to haemorrhage and has low positive predictive value.

*Table 3 Modified Early Obstetric Warning System. (MEOWS)*

|  |  |  |
| --- | --- | --- |
| Parameter | Red trigger | Yellow trigger |
| Temperature  | <35 or >38 | 35-36 |
| Systolic pressure | <90 or >160 | 150-160 or 90-100 |
| Diastolic pressure | >100 | 90-100 |
| Heart rate | <40 or >120 | 100-120 or 40-50 |
| Respiratory rate | <10 or >30 | 21-30 |
| Saturation | <95% |  |
| Pain score |  | 2-3 |
| Neurologic response | Unresponsive | To voice |

Estimation of intravascular volume by central venous pressure is not reliable. Dynamic parameters like pleth variability index, pulse pressure variation and stroke volume variation has been proposed as alternatives. Ultrasonographic assessment of inferior vena cava diameter at the bedside can be a useful tool in assessing volume status of pregnant individuals. However, obesity and increased intra-abdominal pressure might hamper the accuracy.

Volume resuscitation is important in ante partum haemorrhage as adequate uterine perfusion ensure fetal well-being. Supplemental oxygen and left lateral tilt should be provided where applicable. In postpartum bleeding a haemostatic goal directed resuscitation might be followed. This implies avoiding excess crystalloids and maintaining a low normal blood pressure and haematocrit during active bleeding. The late endpoints are aimed for after the bleeding is controlled.

*Table 4. Goal directed fluid management in obstetric bleeding*

|  |  |
| --- | --- |
| Early end points | Late end points |
| Systolic 80-100mm HgHct 25 – 30%Platelets > 50000Normal CalciumNormal LactateTemperature >35No further acidosis | Systolic > 100mmHgHct > TriggerCoagulation profileCorrect TemperatureElectrolytesReverse Acidosis |

**Choice of blood components.**

Management of blood transfusion and volume replacement is the corner stone of managing obstetric haemorrhage from the anaesthesiologist’s perspective. In massive blood loss which is defined in various terms- a loss of more than 2000ml, or 150ml/min, or 50% blood volume loss in 3 hours, or a transfusion of more than 4 units RBC, or a fall of more than 4g/dl of haemoglobin. .

A 1:1:1 ratio of red cells: plasma: platelets is recommended by most guidelines. The American society of obstetrics and gynaecologist guidelines, 2016 is as follows.

**Table 5. Massive obstetric transfusion protocol.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | PRBC | FFP | PLATELETS | CRY0 |
| Round 1 | 6U | 6U | 6U | 10 |
| Round 2 | 6U | 6U | 6U | 10 |
| Round 3 | Tranexamic acid 1g over 10min |
| Round 4 | 6U | 6U | 6U |  |

Cryoprecipitate is a rich source of fibrinogen and fibrinogen plays an important role in obstetric haemorrhage. The degree of fall in fibrinogen correlates with the severity of the obstetric haemorrhage.

Rapid infusion systems like Level 1 and Belmont systems are very useful as the rate of blood loss can be in excess of 500ml/min and it is impossible to achieve such flow rates with pressure bags. The rapid infusors also warm the fluids, which is helpful in preventing hypothermia. Hypothermia can cause acidosis and coagulopathy by itself. Monitoring for coagulopathy can be achieved by point of care devices like Thromboelastogram (TEG), Rotational thromboelastometry (ROTEM) and FIBTEM. These tests are not validated in obstetric haemorrhage and their role in improving outcomes is uncertain.

**Drugs**

Uterotonic drugs are the first line drugs in managing obstetric bleeding. Tranexamic acid has been shown to decrease the severity of postpartum haemorrhage. A worldwide maternal antifibrinolytic trial (WOMAN) is underway.

*Table 6. Drugs in obstetric haemorrhage*

|  |  |  |
| --- | --- | --- |
| Oxytocin | 10U in 500ml, 60drops/minMaximum of 60U | TachycardiaHypotensionMyocardial ischemiaWater retentionconvulsions |
| Ergometrine | 0.2mg IM or slow IVMaximum 1.0mg | VomitingHypertensionCerebrovascular accidentsCoronary vasospasm |
| Prostaglandin F2 | 0.25mg IMMaximum 2mg | Fever, chillsVomitingBronchoconstrictionPulm hypertension |
| Tranexamic acid (antifibrinolytic) | 4g over 1 hour1g over next 6 hours | HeadacheNasal stuffinessMuscle crampsThromboembolism  |

**Updates in surgical techniques.**

The following methods are approved by WHO to manage postpartum haemorrhage. Bimanual uterine compression, uterine balloon tamponade by Bakri balloon, percutaneous arterial embolization where facilities permit, manual internal aortic compression as a temporary measure and compression sutures like B-Lynch. If these methods fail step wise devascularisation and obstetric hysterectomy remains the last resort.

**Anaesthesia principles**

General anaesthesia is the technique of choice for obstetric bleeding. In select cases where the bleeding has stopped like placenta praevia a rapid sequence spinal might be acceptable. It should be remembered that whenever regional is administered the possibility of need for general anaesthesia exist. Induction of general anaesthesia in a patient who is bleeding along with the sympathetic blockade of a regional anaesthesia is hazardous. In a recent report, 5 out of 38 patients died at the time of induction in such scenario. Also, the problem of exposure and experience to administer general anaesthesia in high risk obstetric population remain. Even though the incidence of difficult airway is not more in obstetric population as previously thought, the effects of failed intubation/ventilation is more.

Pre-oxygenation and establishing proper intravenous access and adequate volume resuscitation by blood products or crystalloids are necessary. Cardio stable drugs like etomidate and ketamine are used for induction. Rapid sequence intubation can be achieved with succinylcholine or rocuronium. Opioids can be administered after baby delivery and inhalational agents are kept to the minimum – less than 1 MAC to prevent uterine atony. Awareness can be prevented by benzodiazepines. Adequate amount of blood products and a proper rate of transfusion plays the most important role. Temperature should be maintained and clotting should be monitored for abnormalities. Warm whole blood is preferred if products like cryo, platelets are not available in adequate amounts. Post-operative ventilation is usually required to allow normalization of acid base status, temperature and electrolytes. Complications like deep venous thrombosis, transfusion reaction and coagulopathy should be looked for in the post-operative period.

*Table 7. Specific conditions and considerations*

|  |  |
| --- | --- |
| Placenta previa | Regional can be considered if bleeding has stopped after a single episodeGA must for ongoing lossesCan turn to placenta accreta and need hysterectomy |
| Placental abruption | Can present with shockConcealed haemorrhage can be as high as 2 litresUSG misses 40% of haemorrhageCoagulopathy incidence is 50% with fetal demise |
| Obstetric hysterectomy | 56% morbidity and 2.6% mortalityAverage blood loss is 2.5 litres!Internal aortic compression can be done during induction of GA to prevent collapse. |

**Further reading**

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