Clinical Practice Guidelines: Other/Haemorrhage control

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Haemorrhage control

February, 2021

Haemorrhage is a potentially life-threatening emergency that requires the early identification of actual and/or potential bleeding sources. Prompt interventions at the scene and early rapid transport to definitive care positively impact patient outcomes.

Although haemorrhage may be visible, in many cases it may be concealed (e.g. solid organ injuries in trauma) or difficult to quantify (e.g. post-partum haemorrhage in the context of a water birth).

Internal and *external* haemorrhage may present in isolation or concurrently. Regardless, the goals of treatment remain the same:

1. Minimize ongoing haemorrhage
2. Restore tissue perfusion
3. Anticipate complications of fluid resuscitation (haemodilution, hypocalcaemia, impaired clotting)
4. Treat potential coagulation defects (e.g. fibrinogen deficiency, hyperfibrinolysis)

The most common causes of critical bleeding likely to be encountered by clinicians is haemorrhage secondary to trauma and obstetric complications.

There are essentially six sites of bleeding in the injured patient:

- head
- intra-thoracic
- intra-abdominal
- pelvic
- long bones
- externally

Clinical features

General signs of hypovolaemic shock:

- Tachycardia
- Hypotension
- ALOC
- Pale, cool peripheries
- Prolonged capillary refill

High risk mechanisms of injury include:

- Gunshot wounds
- Stab wounds
- Blast injuries
- Fall > 3 metres
- High speed acceleration/deceleration injuries
- High mechanism RTC

High risk signs for internal haemorrhage include:

- Significant abdominal or chest wall bruising
- Flail segment
- Abdominal distension/rigidity
- Haemoptysis
- Haematemesis
- Haematuria
- Vaginal or rectal haemorrhage

Minimize ongoing haemorrhage

This is the most important goal, as decreasing further blood loss and subsequent hypoperfusion will decrease the need for fluid management and its complications.

In trauma context this includes:

- The appropriate use of splints, including traction devices
- Applying pressure to sites of external bleeding
- Application of tourniquets for life-threatening haemorrhage.

In the late obstetric context this includes:

- Active management of the third stage of labour (oxytocin administration)
- Fundal massage
- Encouraging bladder emptying
- External aortic compression/bimanual compression for life-threatening haemorrhage.

It is essential to ensure that patient normothermia and urgent transport to definitive care are expedited.

Restore tissue perfusion

Adequate perfusion is assessed using a variety of clinical signs including mentation, peripheral pulses and blood pressure. The perfusion target will be dictated by the pathology being addressed. In the context of trauma and obstetric haemorrhage the aim is to maintain a radial pulse, but in the context of adult traumatic brain injury a systolic BP of 100–120 mmHg is the target.

Early blood use is preferable in haemorrhagic shock,[1] but if this is not available, boluses of 250–500 mL sodium chloride 0.9% should be used. Ideally, sodium chloride 0.9% should be minimised in all cases except major burn resuscitation.

If blood products are available, they should be administered through a warming device and if possible, a 1:1 ratio of packed red blood cells (PRBC) to plasma should be administered.[2]

Vasoactive agents (epinephrine (adrenaline)) and metaraminol) should be considered after initial fluid bolusing if spinal trauma is strongly suspected. In addition, the use of adrenaline aliquots (10 microg/min) should be considered in circumstances where perfusion is not responsive to blood transfusion.[1]

In cases of severe traumatic brain injury with localising signs, hypertonic saline should be considered not only to treat raised intracranial pressure, but also to aid in improving perfusion.

Anticipate complications of fluid resuscitation

Fluid administration with cold or room temperature fluids causes a decrease in body temperature[3] which may lead to impairment in clotting function. The administration of crystalloids may cause electrolyte disturbances and dilution of clotting factors.

In addition to the dilutional and electrolyte disturbances, the administration of blood products is associated with hypocalcaemia.[4] Calcium is essential to normal clotting function and hypocalcaemia is associated with increased mortality.[4] Hypocalcaemia in the presence of blood transfusions may be due to the body's decreased ability to metabolise citrate when the liver is hypoperfused.[5] The monitoring and replacement of calcium is recommended in patients receiving blood transfusions.[1,6,7]

Clinical features

Treat potential coagulation defects

The nature of coagulopathy seen in traumatic haemorrhage is poorly understood,[8] but fibrinogen is a key player.[9] Attention to fibrinogen levels is also important in obstetric haemorrhage.[6]

Hypofibrinogenaemia is an independent predictor of death in traumatic injury.[10] In the pre-hospital setting it is feasible to replace fibrinogen with fibrinogen concentrate in select patients,[11] as there does not seem to be a benefit if it is given indiscriminately. The administration of fibrinogen concentrate may reverse coagulopathy within 30 minutes after one dose. [12]

Tranexamic acid has been shown to be of benefit in both traumatic [13] and post partum haemorrhage [14] if given within three hours. The exact mechanism through which tranexamic acid provides benefit is uncertain, but it may be due to preventing hyperfibrinolysis.

Risk assessment

Despite significant blood loss, trauma patients may appear well with normal vital signs, due to various factors including:

- β blocker medication
- Coagulopathic patient (aspirin, clopidogrel, warfarin)
- The usually hypertensive patient
- Compensating pregnant/paediatric patient

Additional information

- The effectiveness of direct/indirect pressure in assisting to stem bleeding should not be underestimated.
- Temperature regulation in the multi-system trauma patient is vital to prevent/reverse coagulopathy and shock – maintain normothermia.
- Posturing to reduce airway complications attributed to ongoing bleeding must be prioritized over spinal motion restriction (i.e. position the patient lateral with head raised).
- To reduce the risk of clot dislodgment during extrication, patient movement should be minimized and coordinated with maximum angle of 15° during log rolls and transport on the scoop/CombiCarrier®II. The use of a CombiCarrier®II should be limited to short timeframes.
- Penetrating or embedded objects must not be removed in the prehospital environment, due to the risk of increased bleeding and/or clot dislodgment.
- Re-alignment and extension of long bone fractures minimizes the tissue space into which bleeding may occur.
- Correct anatomical positioning of a Prometheus pelvic splint stabilizes the pelvic ring and reduces the pelvic volume and space into which bleeding may occur.