

mMOET statement on updates to trauma within the course

mMOET trauma review group (R. Burns, J. Elton, B. Hayden, D. Walter) December 2018

Recent mass casualty incidents in the UK have included pregnant trauma victims (Grenfell fire, London Bridge terrorist attack) and highlight the relevance for obstetric teams in keeping trauma skills up to date.

Following a review of selected literature, and with input from Trauma experts, the mMOET trauma review group has updated the Trauma Demo and Trauma Simulations to reflect up to date practice in trauma management. There are new ideas for obstetric teams to embrace if they are to provide the best care for the pregnant trauma patient in the resuscitation room.

The advent of Trauma Networks in England centralising trauma care, plus the knowledge gained from recent military experience, has led to changes in trauma management in the UK.

These changes include the principle of “first clot is best clot”, changes in fluid management in the initial resuscitation, hemodynamic goals, radiological investigation by trauma CT, the role of damage control surgery and interventional radiology to control haemorrhage.

The recommendations below are based on evidence and guidelines for non-pregnant trauma patients. There is no specific evidence for the **very rare** scenario of a pregnant multiply- injured patient.

Preparation

If there is advanced warning of the patient arriving, it is good human factors practice to prepare the team by performing introductions, establishing roles and seniority, and allocating tasks.

Handover from prehospital team

The **ATMIST** handover tool in trauma is in widespread use in the UK between the pre - hospital and hospital teams.

Age and gestational age

Time of incident, and estimated time of arrival

Mechanism of injury

Injuries seen or suspected

Signs, and if improving or deteriorating

Treatment pre -hospital

Multiply- injured pregnant women may arrive on a spinal board if extracted from a vehicle, or on a scoop stretcher if found on the ground. **Pelvic binders** are used to minimise movement of suspected unstable pelvic fractures. Patients are moved off spinal boards in the resuscitation room as soon as it is safe to do so.

The skills of applying a cervical collar and log rolling have been removed from the course, as it is thought that members of the in - hospital obstetric team would not be required to initiate cervical spine

immobilisation. The decision to log roll would be made by the trauma team lead in the Emergency Department, where the benefits of log rolling require to be weighed up against the risk of disturbing clot.

Streamlined assessment

Massive haemorrhage accounts for over a quarter of all trauma deaths, so the trauma team must be focused on the early *identification* of bleeding and rapid *effective haemostasis* by *targeting* life saving interventions. Effective use of diagnostic modalities will lead to faster and more accurate diagnosis of the source of bleeding:

- Immediate total body CT for the bleeding patient if haemodynamically stable and responding to resuscitation.
- If haemodynamically *unstable and not responding to fluid resuscitation*, do CXR/ X - ray pelvis/FAST.

Damage Control Resuscitation

Modern trauma management targets **early haemorrhage control and preservation of coagulation**.

It is now widely believed that large volumes of crystalloid/colloid are associated with worse outcomes in major trauma, and that **blood loss is best replaced with warmed red cells, plasma and platelets**.

The volume resuscitation strategies of the past using crystalloid and colloid have focused on restoring perfusion and eliminating oxygen debt, but this has proven to be harmful. Attempts to volume resuscitate not only fail to reach these targets in multiply - injured patients, but also cause haemodilution, coagulopathy, hypothermia, tissue oedema, abdominal compartment syndrome, organ dysfunction and death.

In major trauma centres, the pre -hospital team call a "Code Red" major haemorrhage protocol in the haemorrhagic shock situation, enabling a "shock pack" of O negative red cells and FFP to be available on arrival of the patient in the ED. Once the patient's blood group has been determined, the blood transfusion laboratory will issue "type specific" blood products.

The "2 litres of warmed Hartmanns" has been removed correspondingly from the trauma scenarios. If blood is not immediately available 250ml boluses of warmed crystalloid, up to a maximum of 1000mls, are recommended while awaiting urgent blood products in the trauma haemorrhagic shock situation. Near patient testing of haemoglobin and coagulation can help guide the transfusion of blood products.

The strategy of "permissive hypotension" described in the NICE guidelines for actively bleeding multiply injured non pregnant trauma patients implies accepting an adequate (to maintain central circulation) blood pressure **for as short a time as possible** during active bleeding until haemostasis is achieved. During this period of lower mean arterial pressure during active bleeding crystalloid fluid resuscitation should be limited to preserve coagulation.

This is *controversial for obstetric team*, who know that pregnant women show signs of shock late, and that placental blood supply depends on mean arterial pressure.

The 2016 NICE trauma guidelines do not include pregnancy, but modify the blood pressure advice if there is a traumatic brain injury. The brain (like the placenta) relies on an adequate mean arterial pressure to maintain cerebral perfusion:

- “If haemorrhagic shock is the dominant condition, continue restrictive volume resuscitation OR
- If traumatic brain injury is the dominant condition, use a less restrictive volume resuscitation approach to maintain cerebral perfusion.”

The obstetric team will have to consider, in the **very rare scenario** of an **actively bleeding multiply injured pregnant trauma patient**, that the blood pressure and volume *resuscitation strategy most likely to result in the survival of the mother is the strategy the trauma team will follow.*

In **all other circumstances** (for example a pregnant woman with an isolated femoral fracture) **maintenance of placental perfusion by ensuring a normal maternal blood pressure is the appropriate management.** The fetus is vulnerable in any situation where there is potential for maternal haemodynamic instability and should be appropriately monitored. Placental vasoconstriction can occur following trauma in the presence of normal/near normal maternal observations. Therefore fetal monitoring can provide important information about the adequacy of maternal resuscitation.

“Turning off the tap” at C

Non - fluid responsive haemorrhagic shock is managed by early recourse to “damage control surgery” as part of damage control resuscitation in modern trauma management. Emptying the uterus may form part of the damage control surgery at **C**, if the patient remains haemodynamically unstable and is not responding to volume resuscitation. The indications for emptying the uterus in multiple trauma remain the same:

1. Cardiac arrest
2. Placental abruption
3. Uterine rupture/ penetrating injury
4. To enable surgical access for haemorrhage control within the abdomen/ control bleeding from an unstable pelvis.

The cardiac arrest situation aside, the order of surgical priorities to stop bleeding will require the obstetric team to be part of the surgical team planning the damage control surgery.

Interventional Radiology

The 2016 NICE trauma guidelines recommend the following:

Use interventional radiology techniques in patients with active arterial pelvic haemorrhage, unless immediate open surgery is needed to control bleeding from other injuries. Consider interventional radiology techniques in patients with solid organ (spleen, liver or kidney) arterial haemorrhage. Consider a joint interventional radiology and surgery strategy for arterial haemorrhage that extends to surgically inaccessible regions. Use an endovascular stent graft in patients with blunt thoracic aortic injury.

Tranexamic Acid is recommended for pregnant trauma patients within three hours of injury. The monitoring of blood lactate from regular arterial blood gas sampling can provide additional information about the adequacy of volume resuscitation. Hypocalcaemia should be corrected to optimise coagulation.

Embedding trauma updates:

It has been agreed by the mMOET working group that the best way of introducing the mMOET candidates to the way a modern trauma team works would be by commissioning a film to demonstrate good practice with up to date teams and equipment.

Updates to the trauma manual chapters MCQ, teaching material and testing are completed to reflect the above changes.

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