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NEWSLETTER

PAKISTAN SOCIETY OF ANAESTHESIOLOGISTS
KARACHI - CHAPTER

Volume 15:
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EDITOR'S NOTE

Trauma is the leading cause of death worldwide. Haemorrhagic shock accounts for 80% of deaths in the operating theatre and up to 50% of deaths in the first 24 h after injury.

With the increasing incidents of terrorist activities the number of injured in Pakistan and especially in Karachi have increased significantly over the last few years. Therefore it is imperative that hospitals, not only teaching but even smaller and private sector hospitals develop protocols directed at improving management of massive haemorrhage in trauma patients.

Anaesthesiologists are an integral part of the trauma teams and should take the initiative to better understand the priorities in specific situations and develop an effective teamwork and communication essential for the success of trauma resuscitation.

Dr Madiha Hashmi
Editor, PSA News Letter

CHOICE OF FLUID THERAPY IN TRAUMA PATIENTS

The primary goal of resuscitation in patients coming with trauma is to restore circulating plasma volume, identify the source of hemorrhage and control it as rapidly as possible. The “ideal” fluid replacement regimen in trauma patients is still controversial. Aside from blood, several non-blood alternativesincluding crystalloids, hypertonic solutions, albumin, and non-protein (synthetic) colloidsare available to correct hypovolaemia in trauma patient.

The composition of fluid administered to the actively haemorrhaging patient is as important as the rate and quantity. While isotonic crystalloid solutions are important for making up 'third space' losses, and are inexpensive and readily available, they do not adequately replace the whole blood that the patient is losing, also the intravascular persistence of these solutions is low, with estimates of as little as 12% of an administered bolus of 0.9% saline remaining in the circulation 30 minutes later. Colloidal solutions, such as hypertonic saline and dextran, have been recommended for early resuscitation; however, so far, there has been no definitive evidence of benefit.

Early transfusion therapy with red cells, plasma and platelets is thus essential to successful resuscitation. While in the long term blood transfusion has been associated with an increased incidence of organ system failure and death as well as profound immune suppression. Early replacement of oxygen-carrying capacity, in the form of red blood cells, may be life-saving.

Early transfusion of plasma and platelets is similarly advantageous, as coagulopathy complicating haemorrhagic shock is easier to prevent than to reverse. For the patient who requires a transfusion of >1 blood volume (approximately 10 units of red blood cells) in a short period, dilutional coagulopathy is almost certain and in that situation packed red cell, plasma and platelet concentrates - 1 : 1 : 1 ratio of blood components is recommended. Once haemorrhage has been controlled, further transfusion therapy can be managed in a much more conservative fashion and titrated to specific levels of haemoglobin, prothrombin time and platelet concentration. Haemoglobin as low as 6 gm/dl is now routinely tolerated in an asymptomatic patient, while plasma and platelets are rarely given to the stable patient without evidence of haemorrhage.

Electrolyte concentration should be followed closely during early resuscitation, with particular attention to the blood calcium concentration. Rapid transfusion can lead to

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UPCOMING CONFERENCES / MEETINGS / SYMPOSIUMS

10TH Annual Critical Care Symposium
April 25-26, 2013
Manchester, UK

IARS 2013 Annual Meeting
May 4-7, 2013
San diego, USA

Euroanaesthesia 2013
June 1-4, 2013
Barcelona, Spain

3RDInternational Conference on Interventional Pain Medicine &Neuromodulation
June 14-15, 2013
Warsaw, Poland

Intensive Review of Pediatric Anesthesia
Aug 23-25, 2013
Rosemont, USA

12th Annual Symposium on Regional Anesthesia, Acute Management and Perioperative Medicine
September 21-22, 2013
NY, USA

5th International Congress of Obstetric Anaesthesia and Perinatal Medicine
Oct 3-5, 2013
Poland

NORTHWEST ANESTHESIA SEMINARS
Continuing Education for Medical professional
http://www.nwas.com/full-schedule.html

Anesthesia Update: Emphasis on Trauma
June 23-28, 2013
Grand Cayman, Cayman Islands

Current Anesthesia Practice
June 29-July 6, 2013
Florida

Applied Pharmacology in Anesthesia
August 1-4, 2013
Portland, Oregon

Pediatric Anesthesia Update
July 11-14, 2013
South Carolina

intravascular chelation of free calcium (with a negative effect on myocardial performance) because banked blood components are packaged with citrate to prevent clotting. Respiratory acidosis should be managed by adjustment of mechanical ventilation, while metabolic acidosis can only really be treated by control of haemorrhage and restoration of adequate intravascular volume. The use of bicarbonate to elevate serum pH has been advocated in the past, but has not been found beneficial in the treatment of haemorrhagic shock. Although not much evidence is available, tight glycemic control is an emerging standard of care in most centres.

Future efforts will be on improving outcomes from haemorrhagic shock by focusing on more rapid diagnosis and control of bleeding (as with recombinant Factor VIIa or various topical haemostatic agents), better monitoring of the shock state allowing more precise limitation of fluid administration during active haemorrhage and active manipulation of the inflammatory cascade.

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2. Gonzalez E, Pieracci FM, Moore EE, Kashuk JL .Coagulation abnormalities in the trauma patient: the role of point-of-care thromboelastography. SeminThrombHemost. 2010 Oct;36(7):723-37.

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DAMAGE CONTROL SURGERY IN TRAUMA

Damage control surgery is the type of surgery used by trauma surgeons in patients with multiple, severe and unstable injuries. This proposed strategy of trauma surgery puts more emphasis on early recognition and prevention of the trauma related triad of death, rather than correcting the anatomy. This approach is generally indicated when severity of the injury seriously impairs the ability of body to maintain homeostasis. The common underlying root cause is severe uncontrolled hemorrhage leading to metabolic acidosis, hypothermia, and coagulopathy. This phenomenon is referred to as the trauma triad of death.

The most important issue in damage control surgery is the early recognition of trauma patients who will need this approach. The procedure comprises of three different steps taken sequentially. In the first step, a laparotomy is performed to control hemorrhage and contamination from the perforated bowel. This will typically be a short procedure, usually lasting no longer than one hour. After immediate life threats have been surgically managed, the abdomen is covered temporarily and the patient sent to an intensive care unit. In the second step, the patient is adequately resuscitated to help restore a physiologic balance, especially with regards to their temperature, oxygenation, coagulation and pH level. This phase generally lasts for one to two days. In the third step, the patient is brought to the operating room again, and undergoes definitive surgery under optimized and controlled conditions.

The technique of damage control surgery was first used by Stone[1] in 1983. This approach to trauma surgery is based on the advancements in understanding the pathophysiology of the severely injured trauma patients. The concept is now well established and has been expanded from the operating room to the resuscitation of trauma patients in the emergency room. The so-called 'damage control resuscitation' consists of permissive hypotension and hemostatic resuscitation[2]. Both these concepts have demonstrated enhanced outcomes for massively injured patients.

References:

1. Stone HH, Strom PR, Mullins RJ: Management of the major coagulopathy with onset during laparotomy. Ann Surg 1983;197;5:532-535.
2. Jansen JO, Thomas R, Loudon MA, Brooks A. **Damage control resuscitation for patients with major trauma.** *BMJ* 2009;338:b1778.

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TRAUMA AND THE ANAESTHETIST

Trauma gains significance from being the third leading cause of death in the world mainly amongst the young and healthy entailing a heavy burden on the health care costs of any country. Anaesthesiologists play a key role in the management of trauma patients due to their knowledge base in medicine and physiology and skills in airway management and resuscitation.

Trimodal distribution of death pattern is observed. Out of those who die, 50% die in the first few seconds because of lethal nature of the injuries, 30% die in the next few hours from hemorrhage and brain injury and the rest in the weeks to follow, from sepsis and MODS. Hence there is ample opportunity to save the trauma victim by correct and timely interventions.

Developing simple and adaptive protocols on the lines of **ATLS guidelines** have proven to improve outcomes and reduce morbidity and mortality. Triage, Primary Survey and Resuscitation, Secondary survey and Resuscitation followed by definitive care are simple steps that need to be followed.

Triage: Helps in categorizing patients. It optimizes, care and fund utilization. The categories are:
1. **Green**: Walking wounded
2. **Orange**: Urgent care
3. **Red**: Immediate care
4. **Blue**: Dead/irretrievable

Think-Trauma Approach reduces the chances of missing out on injuries. Quick evaluation of the type and extent of injury, whether blunt, penetrating, burns, crush or a combination of these will dictate the measures to be taken. Similarly which organs or part of the body has what kind of injury, e.g. TBI, tension pneumothorax, flail chest, major vascular injury or cardiac tamponade, myocardial or pulmonary contusion, gut perforation, splenic/liver rupture, long bone/ pelvic fracture, help in prioritizing the steps to be taken.

Hematologic and radiologic support with **F**ocused **A**bdominal **S**onography in **T**rauma (FAST) or diagnostic peritoneal lavage (DPL), might be some of the urgent diagnostic tools required to help in evaluating the injury status.

Resuscitation: this is to be undertaken hand in hand with the primary survey. Resuscitation goals in a trauma patient should aim at eliminating tissue acidosis, restoration of aerobic metabolism and repaying of oxygen debt.

1. Effective Airway: its establishment requires prioritization. Cervical spine injury, full stomach and a difficult airway are important considerations. Jaw thrust, Manual in line stabilization, MILS, Rapid sequence induction, RSI and a ready to use difficult intubation trolley are mandatory measures.
2. Breathing: 100% oxygenation, oral intubation, Checking correct placement of the tube, requirement of IPPV and a chest tube insertion might be required. Base of skull fracture and full stomach preclude the use of nasal tube and LMA unless as a savior.
3. Circulation: Hemorrhage and coagulopathies make major contributions to morbidity and mortality in trauma. Initial **"Hypotensive Resuscitation"** with crystalloids maintains perfusion to vital organs minimizes haemodilutional coagulopathies and prevents dislodgement of clots preventing further bleed. Appropriate use of Colloids, blood, blood products and the use of recombinant factor VII-a andtranxaminic acid help in restoring body physiology. Warming of fluids to be transfused, use of pressure bags and rapid infusing systems are necessary trauma armamentariums.
4. Monitoring: Compromised airway, unstable hemodynamics, changing volume and hematologic status mandate vigilant monitoring. It may be challenging because of the type and site of injuries e.g. burns. Invasive monitoring of blood pressure, central venous pressure, PCWP and blood gases may be required in addition to routine noninvasive monitoring of Spo2, ETCO2 and ECG. Urine output is a good indicator of renal status esp.in cases of rhabdomyolysis and myoglobinuria due to burns or crush injury.
5. Anaesthesia and Analgesia: Dose of induction agent is more important than the choice of induction agent. Ketamine and STP seem more suitable compared to Propofol because of hemodynamics. Dose titration is essential. Suxamethonium or Rocuronium in intubating doses are suitable muscle relaxants to facilitate intubation. Opioids should be used optimally and inhalational anesthetics should be used with caution.
6. Postoperative Care: Depending on the extent of injuries these patients are best shifted to ICU for post-operative management for continuum of care and resuscitation.

Special considerations include hypothermia, acidosis and coagulopathy which make the **"lethal triad".** While gastric tonometry is the regional marker for gut perfusion, serum lactate and base deficit are the best "Global markers" of perfusion since and haemodynamic variables like a stable blood pressure and heart rate are deceiving and should not be relied upon. A base deficit of less than 15 denotes severe hypo-perfusion.

While the anaesthesiologist provides care-in-total to the patient, definitive care of the injuries by the surgical specialties dictates the final outcome and quality of life.

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Blood transfusion and the anaesthetist: management of massive haemorrhage **Summary of Guidelines**

Association of Anaesthetists of Great Britain and Ireland (AAGBI)

1. Hospitals must have a major haemorrhage protocol in place and this should include clinical, laboratory and logistic responses.
2. Immediate control of obvious bleeding is of paramount importance (pressure, tourniquet, haemostatic dressings).
3. The major haemorrhage protocol must be mobilized immediately when a massive haemorrhage situation is declared.
4. A **fibrinogen <1 g.l)**1 or a **prothrombin time** (PT) and **activated partial thromboplastin time(aPTT) of > 1.5 times normal** represents established haemostatic failure and is predictive of microvascular bleeding. Early infusion of fresh frozen plasma **(FFP;15 ml.kg**) should be used to prevent this occurring if a senior clinician anticipates a massive haemorrhage.
5. Established coagulopathy will require more than 15 ml.kg)1 of FFP to correct. The most effective way to achieve fibrinogen replacement rapidly is by giving **fibrinogen concentrate** or **cryoprecipitate** if fibrinogen is unavailable.
6. **1:1:1 red cell:FFP: platelet regimens**, as used by the military, are reserved for the most severely traumatized patients.
7. A minimum **target platelet count of 75 x10^{9}/l** is appropriate in this clinical situation.
8. **Group-specific blood** can be issued without performing an antibody screen because patients will have minimal circulating antibodies. **O negative blood** should only be used if blood is needed immediately.
9. In hospitals where the need to treat massive haemorrhage is frequent, the use of locally developed **shock packs** may be helpful.
10. Standard **venous thromboprophylaxis** should be commenced as soon as possible after haemostasis has been secured as patients develop a prothrombotic state following massive haemorrhage.

This is a consensus document produced by expert members of a Working Party established by the Association of Anaesthetists of Great Britain and Ireland (AAGBI).

Membership of the Working Party: D Thomas and M Wee, Joint Chairmen; P Clyburn; I Walker; K Brohi; P Collins; H Doughty; J Isaac; PF Mahoney; L Shewry

10TH SAARC-AA CONFERENCE, DHAKA, BANGLADESH
22-24 February 2013

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