Blast Injuries: Essential Facts

Key Concepts

- Bombs and explosions can cause unique patterns of injury seldom seen outside combat.
- Expect half of all initial casualties to seek medical care over a one-hour period.
- Most severely injured arrive after the less injured, who bypass EMS triage and go directly to the closest hospitals.
- Predominant injuries involve multiple penetrating injuries and blunt trauma.
- Explosions in confined spaces (buildings, large vehicles, mines) and/or structural collapse are associated with greater morbidity and mortality.
- Primary blast injuries in survivors are predominantly seen in confined space explosions.
- Repeatedly examine and assess patients exposed to a blast.
- All bomb events have the potential for chemical and/or radiological contamination.
- Triage and life-saving procedures should never be delayed because of the possibility of radioactive contamination of the victim; the risk of exposure to caregivers is small.
- Universal precautions effectively protect against radiological secondary contamination of first responders and first receivers.

Blast Injuries

- Primary: Injury from over-pressurization force (blast wave) impacting the body surface.
  - TMI rupture, pulmonary damage, and air embolization, below-voice-level injury
- Secondary: Injury from projectiles (bomb fragments, flying debris).
  - Penetrating trauma, fragmentation injuries, blast missile
- Tertiary: Injuries from displacement of victim by the blast wind.
  - Blunt/penetrating trauma, fractures, and traumatic amputations
- Quaternary: All other injuries from the blast.
  - Crush injuries, burns, asphyxia, toxic exposures, exacerbations of chronic illness

Primary Blast Injury

- Lung Injury
  - Signs usually present at time of initial evaluation, but may be delayed up to 48 hrs.
  - Vortices from scattered particles to confluent hemorrhages.
  - Suspect in patients with byopnea, cough, hemoptysis, or chest pain following blast.
  - CXR: “butterfly” pattern.
  - High flow O2 sufficient to prevent hypoxemia via NRB mask, CPAP, or ET tube.
  - Fluid management similar to pulmonary contusion; ensure tissue perfusion but avoid volume overload.
  - Endotracheal intubation for massive hemoptysis, impending airway compromise or respiratory failure.
  - Consider selective bronchial intubation for significant air leaks or massive hemoptysis.
  - Possible pressure may risk alveolar rupture or air embolism.
  - Prompt decompression for clinical evidence of pneumothorax or hemothorax.
  - Consider prophylactic chest tube before general anesthesia or air transport.

- Abdominal Injury
  - Gas-filled structures most vulnerable (esp. colon).
  - Bowel perforation, hemorrhage, peritonitis to large hematomas.
  - Suspect in anyone with abdominal pain, nausea, vomiting, hematemesis, rectal pain, tenesmus, nausea, unexplained hypovolemia.
  - Clinical signs can be initially subtle until acute abdomen or sepsis is advanced.

- Ear Injury
  - Tympanic membrane most common primary blast injury.
  - Signs of ear injury usually evident on presentation (hearing loss, tinnitus, vertigo, bleeding from external canal, otorrhea).

Other Injury

- Traumatic amputation of any limb is a marker for multi-system injuries.
- Concussions are common and can be overlooked.
- Consider delayed primary closure for grossly contaminated wounds, and assess tetanus immunization status.
- Compartiment syndromes, diaphragmatic rupture, and acute renal failure are associated with structural collapse, prolonged extrication, severe burns, and some poisonings.
- Consider possibility of exposure to incendiary (CO, CS, Methyl) in both industrial and terrorist explosions.
- Significant percentage of survivors will have serious eye injuries.

Disposition

- No definitive guidelines for observation, admission, or discharge.
- Discharge decisions will also depend upon associated injuries.
- Admit 2nd and 3rd trimester pregnancies for monitoring.
- Close follow-up of wounds, head injury, cys, arc, and stress-related complaints.
- Patients with ear injury may have tinnitus or deafness; communications and instructions may need to be written.

This fact sheet is part of a series of materials developed by the Centers for Disease Control and Prevention (CDC) on blast injuries. For more information, visit CDC on the Web at: wwwemergency.cdc.gov/BlastInjuries (http://wwwemergency.cdc.gov/BlastInjuries)