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Emergency Preparedness and Response

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
- For those with injuries resulting in nonintact skin or mucous membrane exposure, hepatitis B immunization (within 7 days) and age-appropriate tetanus toxoid vaccine (if not current)

Blast Injuries

- Primary: Injury from over-pressurization force (blast wave) impacting the body surface
  - TM rupture, pulmonary damage and air embolization, hollow viscus injury
- Secondary: Injury from projectiles (bomb fragments, flying debris)
  - Penetrating trauma, fragmentation injuries, blunt trauma
- 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
  - Reported to be more common in patients with skull fractures, >10% BSA burns, and penetrating injury to the head or torso
  - Varies from scattered petechiae to confluent hemorrhages
  - Suspect in anyone with dyspnea, 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
    - Positive 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
  - Air embolism can present as stroke, MI, acute abdomen, blindness, deafness, spinal cord injury, claudication
    - High flow O2; prone, semi-left lateral, or left lateral position
    - Consider transfer for hyperbaric O2 therapy
- **Abdominal Injury**
  - Gas-filled structures most vulnerable (esp. colon)
  - Bowel perforation, hemorrhage (small petechiae to large hematomas), mesenteric shear injuries, solid organ lacerations, and testicular rupture
  - Suspect in anyone with abdominal pain, nausea, vomiting, hematemesis, rectal pain, tenesmus, testicular pain, 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, otalgia, vertigo, bleeding from external canal, otorrhea)

Other Injury

- Traumatic amputation of any limb is a marker for multi-system injuries
- Concussions are common and easily overlooked
- Consider delayed primary closure for grossly contaminated wounds, and assess tetanus immunization status
- Compartment syndrome, rhabdomyolysis, and acute renal failure are associated with structural collapse, prolonged extrication, severe burns, and some poisonings
- Consider possibility of exposure to inhaled toxins (CO, CN, MetHgb) 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, eye, ear, 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: www.emergency.cdc.gov/BlastInjuries (http://www.emergency.cdc.gov/BlastInjuries)

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