Hospital Preparation, Response & Management
ADVANCED EXPLOSIONS & BLAST INJURIES

Hospital Preparation
- External disaster plan
- Hospital Incident Command System
- Security
- Triage
- Decontamination and detection
- Surge capacity
- Supplies and resources

Resources-Staff
- Emergency Physicians
  - Medical Toxicologists
- Surgeons
- Orthopedists
- Pulmonary and Critical care specialists
- Internal Medicine
- Nephrologists
- Social workers
- Chaplains
- Psychiatrist and Psychologists
- Physician assistant and nurse practitioners
- Security officers
Resources-Supplies

- IVF
- Blood
- Ventilators
- Tetanus toxoid
- Antibiotics
- Analgesics
- Bicarbonate
- Local anesthetics

- Splints
- Suture material
- Bandages and gauze
- Cyanide antidote
- Dialysis

Predictor of Injury Severity

- Triage at the hospital

Triage and Predictor of Injury Severity

- Sample entropy
- Extended-FAST used in Boston Marathon Bombing

Predictor of Injury Severity - Not for Triage

- Injury Severity Score (ISS)
  - Each of the six body systems' injuries are given an Abbreviated Injury Scale (AIS) from 1-5
  - The most severe injury in each body system is used for the Injury Severity Score
  - ISS = A² + B² + C²
  - Major Trauma > 15

TM Perforation

- Keep dry
- Prophylactic topical antibiotic
  - Gentamicin suspension
- Outcome is good
  - Mixed frequency hearing loss with good subjective recovery
  - High frequency sensorineural hearing loss may be more persistent
  - Severity inversely proportional to distance from bombing

TM - Perforation

- Follow up is needed:
  - Assess for middle-ear damage
  - Audiometry
  - Cholesteatoma
  - Perilymphatic leak in patients with vertigo
Blast Lung Injury

- Should not rely on TM rupture to predict lung injury:
  - TM perforations are found in only 60% of patients with clinically significant injuries
  - Clinically significant injuries are present in less than 30% of patients with TM perforations

Blast Lung Injury

- Patients with normal CXR and ABGs, who have no complaints that would suggest BLI, may be discharged after a brief observation period


Blast Lung Injury

- Management similar to pulmonary contusions
- Complex fluid management
- Mechanical ventilation will increase the risk of air embolization
Management of Primary Visceral Injuries

- Surgical resection of contused or perforated segments of the intestine

Management of Secondary Injuries - Tourniquet

- If not applied on the scene
- Shown to improve survival in combat casualties

Management of Secondary Injuries - Tourniquet Evidence

- Tourniquet application prevents shock which improves mortality
- Prehospital application better than ED application
- Potential complication: Nerve palsy in 1-2%
- No limb loss from tourniquet use

Survival with emergency tourniquet use to stop bleeding in major limb trauma
Management of Secondary Injuries

- Assess for vascular injuries.
- Solid organs or bone injuries.
- Watch for unusual shrapnel such as nails and bolts.
- Role of CT scan.

Decisions for Limb Salvage or Amputation

Table 1: Management of Severe Limb Injury (MESS vs. LLSS)

<table>
<thead>
<tr>
<th>MESS</th>
<th>LLSS</th>
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<tbody>
<tr>
<td>0-5</td>
<td>&gt;5</td>
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- MESS <= 6 – Limb salvageable

Bombing Victim
Management of Tertiary Injuries

Source: www.TheDenverClinic.com

Management of Tertiary injuries

- As per trauma protocols
- Look for crush syndrome especially in structural collapse:
  - Myoglobinurea
  - Renal failure
  - Hyperkalemia

Management of Crush Syndrome

- IVF:
  - Start in the field
- Urinary alkalization:
  - Myoglobinurea: Urine pH > 7
- Mannitol
- Hemodialysis:
  - Anuric patients, acidemic patients
  - Correction of electrolyte abnormalities
  - Advanced planning is needed for surge capacity
Management of Quaternary Injuries

- Inhalational injuries
- Carbon monoxide
- Hydrogen cyanide
- Chemical bombs or explosions
- Contamination with radionuclides and exposure to gamma radiation
- Mental health

Questions or Comments?