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Ass. Prof. & Consultant of Cardiothoracic Surgery Sohag university Chest trauma Items to be covered: □ Introduction Anatomy Pathophysiology **Common injuries** □Initial management Definite (individual injuries) management

Chest trauma Introduction:

- Chest trauma is a significant source of morbidity and mortality worldwide.
- <u>Chest Trauma</u> is the leading cause of death, morbidity, hospitalization, and disability in people under 50 years .
- Directly responsible for more than 20% of all traumatic deaths (regardless of mechanism).

Chest trauma introduction

> Majority of deaths are preventable.

> Third of RTAs has a significant chest trauma.

> Approximately 80% are blunt.

<10% of blunt injures require surgical intervention opposed to 15-30% of penetrating injuries.

Chest trauma Introduction:

 Most thoracic injuries (90% of blunt and 70% to 85% of penetrating) can be managed without surgery (non operatively):

- ✓ Management of airway / oxygenation
- ✓ Analgesia
- ✓ Intubation and ventilator support if needed
- Chest tubes if needed for pneumothorax or hemothorax

Penetrating



Blunt trauma:Acceleration/deceleration injury:MVAFalling from a heightsports

Compression:AP or Transverse

> Blast Injuries.

Penetrating Injuries high velocity: Fire arm Gun shot

Low velocity:stab

Penetrating trauma



Penetrating trauma



CHEST TRAUMA



Acceleration : Deceleration Injuries

CHEST TRAUMA Penetrating injuries: Gunshot wounds Stabbing wounds

Penetrating injury (Low Energy)



Penetrating injury (Low Energy)



Penetrating injury (low Energy)



Blunt trauma



Chest trauma Anatomy

- Injury to the chest can affect any one or all components of the chest wall and thoracic cavity.
- O These components include:
- 1. The bony skeleton (ribs, clavicles, scapulae, sternum)
- 2. Lungs and pleurae
- 3. Tracheobronchial tree
- 4. Esophagus
- 5. Heart, great vessels of the chest, and
- 6. The diaphragm

Chest wall and ribs Lungs and pleura **Great and** thoracic vessels **Heart and** mediastinal structures Diaphragm



Chest trauma Mechanism of injury

Blunt thoracic injuries

- Forces distributed over a large area
 - Deceleration:
 - Body in motion strikes a fixed object
 - Blunt trauma to chest wall
 - Internal structures continue in motion
 - Compression (crush):
 - Body is compressed between an object and a hard surface
 - Direct injury of chest wall and internal structures

Penetrating thoracic injuries

- Forces are distributed over a small area.
- Organs injured are usually those that lie along the path of the penetrating object.

Pathophysiology of Thoracic Trauma

Penetrating Trauma

O Low Energy:

- Arrows, knives, handguns
- Injury caused by direct contact and cavitation

High Energy:

- Military, hunting rifles & high powered hand guns
- Extensive injury due to high pressure cavitation

Pathophysiology of Thoracic Trauma

Penetrating Injuries (cont.)

- Shotgun
 - Injury severity based upon the distance between the victim and shotgun & caliber of shot
 - Type I: >7 meters from the weapon
 Soft tissue injury
 - Type II: 3-7 meters from weapon
 - Penetration into deep fascia and some internal organs
 - Type III: <3 meters from weapon
 - Massive tissue destruction

Chest trauma pathophysiology

Impairment in cardiac output
Blood loss
Increased intrapleural pressures
Blood in the pericardial sac
Myocardial valve damage
Vascular disruption

Chest trauma pathophysiology

Impairment in gas exchange
Atelectasis
Contused lung tissue
Disruption of the respiratory tract

*Common Injuries*Rib fractures
Open or Closed Pneumothorax
Hemothorax
Hemopneumothorax
Sternal fractures

CHEST TRAUMA

- I. Initial management (first aid measures)(general management):
- a. <u>ABC</u>: (Ressuscitation)
 - Airway, Breathing, Circulation
- b. Primary survey:
 - Identify & treat immediately life threatening Injuries.
- c. Emergency thoracotomy.

II. Specific (Real) management (Definite therapy).

- I. Initial management (first aid measures)(general management):
- a). ABCDE: (Ressuscitation)
- Airway, Breathing, Circulation
- A:airway: Clear and maintain patent airway
- Removal of any FB, blood clots, aspiration of fluids and secretions.
- Chin left and jaw thrust.
- > Forward traction of the tongue.
- In unconscious patient may need endotracheal intubation or tracheostomy.
- > (why air way patency is very important?)

Chest trauma <u>ABCDE</u>: (Ressuscitation)

B: breathing

Check if the lung is expanded or not.
Inspection of the chest for movement.
Inspect for equality in both sides.
Examine for any abnormality (flail segment, wounds, lost segment, sucking wound etc..).

Mouth to mouth or, Ambu bag breathing

Chest trauma <u>ABCDE</u>: (Ressuscitation)

C: Circulation Restore volume and maintain BP > Pulse and BP. \geq 1 or 2 wide bore cannula. > Blood grouping and cross matching. > Compression of any site of bleeding. > Restore volume in major bleeding or hypotension (fluids or blood).

Chest trauma <u>ABCDE</u>: (Ressuscitation) :

D:Disabilities

Splinting and fixation of any suspected fracture specially the spine and long bones.

> To avoid injury to the neurovascular structures,

E: exposure

- Complete exposure of the injured patient:
- 1. Medicolegal aspect.
- 2. facilitate rapid and detailed examination.

I. Initial management (first aid measures)(general management):

b). Primary survey:

 Identify & treat immediately life threatening Injuries.

- <u>Potentially acutely lethal injuries of the chest and</u> <u>their management:</u>
- o Life threatening injuries:
- 1. Air way obstruction
- 2. Tension pneumothorax.
- 3. Massive intrathoracic hemothorax.
- 4. Cardiac tamponade.
- 5. Open pneumothorax
- 6. Massive flail chest with pulmonary contusion.
- 7. Tracheobronchial rupture.
- 8. Diaphragmatic rupture with visceral herniation.
- 9. Esophageal perforation.
- 10. Traumatic aortic rupture

Life threatening injury	management
Air way obstruction	Intubation, airway, bronchoscopy
Tension pneumothorax	Tube thoracostomy
Massive intrathoracic hemothorax.	Tube thoracostomy, blood trasfusion, operative repair
Cardiac tamponade	operative repair
Massive flail chest with pulmonary contusion	Intubation, pain control, fluid restriction
Tracheobronchial rupture	ICT, bronchoscopy, operative repair
Diaphragmatic rupture with visceral herniation	Operativerepair
Esophageal perforation	Operative repair

□ Function of the ED:

- 1. Early detection and immediate management of life threatening injuries.
- 2. Resssuscitation (ABC).
- 3. Detailed examination of the patient and arrange the injuries in the order of priority.
- 4. Transfer the patient to the site of definite therapy.

Chest trauma Indications of Thorcotomy in Chest trauma

- A). Emergency (immediate, early) thoracotomy:
- 1. Massive hemothorax (>1500 cc).
- 2. Continuous bleeding (>300 cc/h. for > 3 hs)
- Massive pneumothorax with lung collapse for > 7 days.
- 4. Cardiac arrest (open cardiac massage).
- 5. Cardiac tamponade.
- 6. Tracheobronchial injury (rupture trachea or bronchus).

Indications of Thorcotomy in chest trauma

- A). Emergency (immediate, early) thoracotomy:7. Massive lung laceration (hemothorax, massive air leak).
- 8. Traumatic diaphragmatic hernia.
- 9. Traumatic injury of the diaphragm.
- 10. Sternum (displaced fracture, lost segment).
- 11. Chest wall (lost segment >10 cm posterioly and 5 cm anterioly).
- 12. Others (thoracoabdominal injuries, mediastinal structure injuries).

indication of thorcotomy in chest trauma

B). Late thoracotomy:

- 1. Neglected diaphragmatic hernia.
- 2. Pyopneumothorax.
- 3. Empyema
- 4. Clotted hemothorax.
- 5. Organized hemothorax (frozen chest).
- 6. Retained FB.
- 7. Traumatic cardiac valves injuries (MVR).
- 8. Traumatic septal defects (ASD, VSD)
- 9. Traumatic aortic aneurysm.

Contraindications of ERT:

- NO signs of life in the field or hospital.
- Asystole and no pericardial tamponade.
- CPR>15 minutes.
- Massive NON survivable injures.
- NO thoracic or trauma surgeon within 45 minutes.

Signs of life

- Spontaneous breathing.
- Palpable carotid pulse.
- Measurable BP.
- Electric cardiac activity.
- Pupillary light response.
- Spontaneous extremity movements.

Thank you