

Initial assessment and Resuscitation

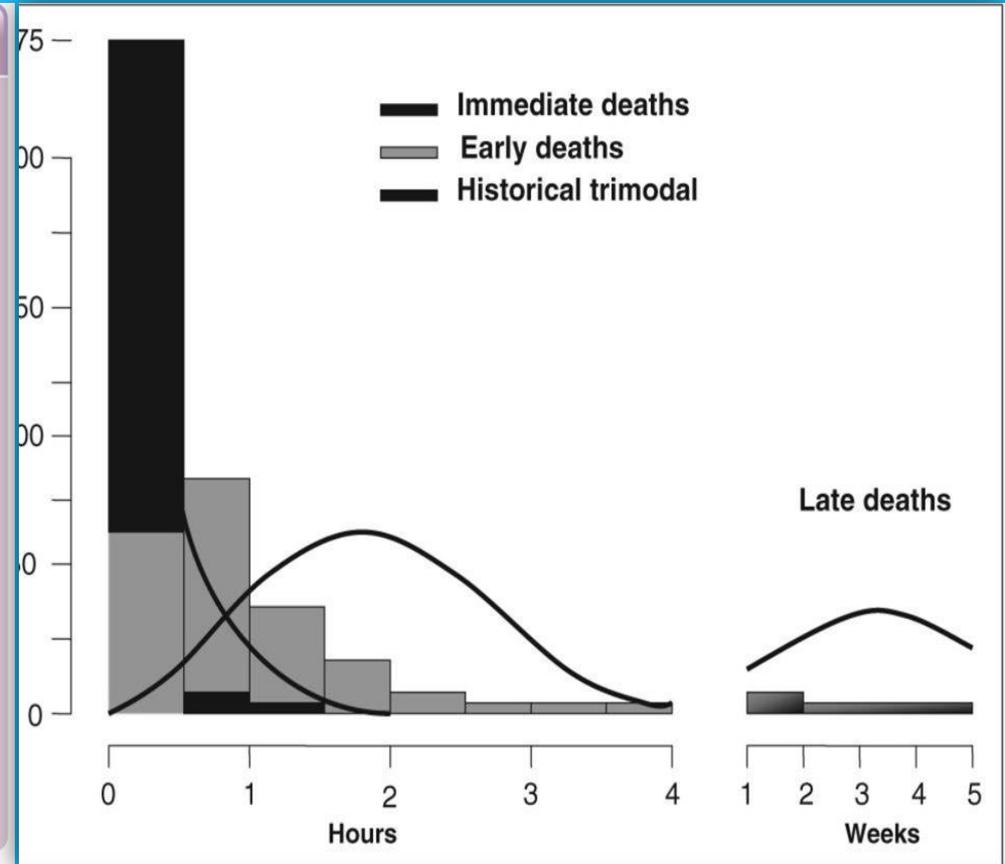
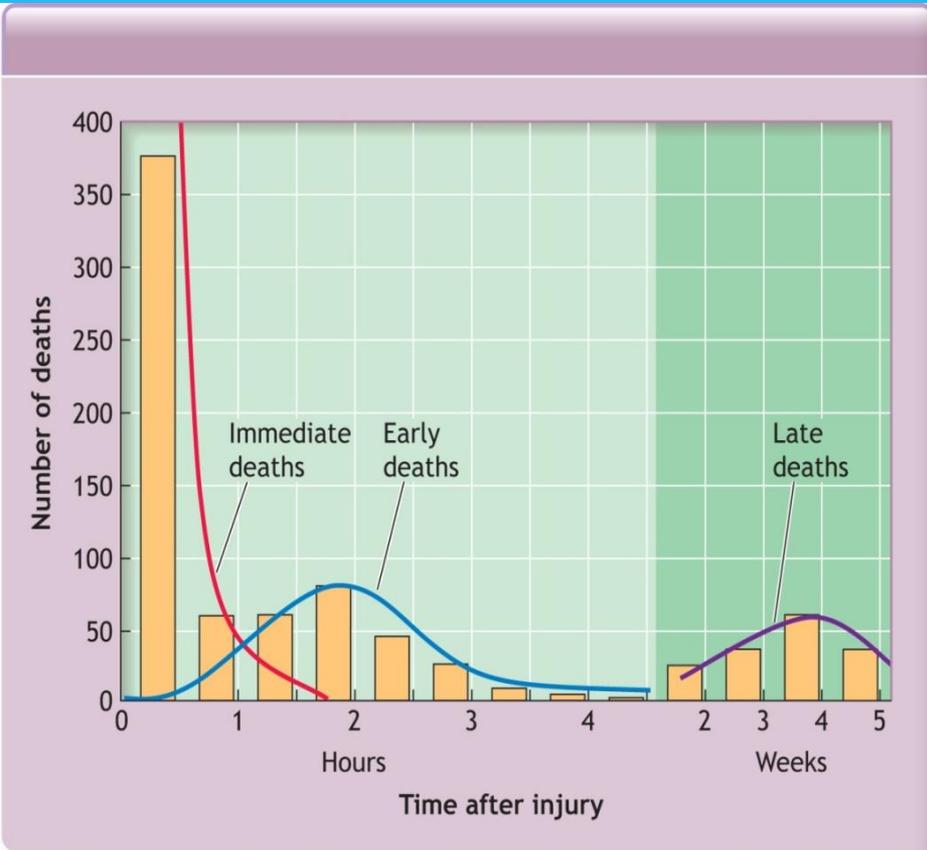
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Tri-to-Bimodal Death Distribution



Principle of Trauma Surgery

Save **life** first

then save **organs**

and restore **functions**

cosmetic appearance is the last concern

DO

NO

HARM !!!!!

Role of Trauma Care

Pre-hospital care

In-hospital care

Follow up

Education and Research

Prevention

Registry and Surveillance

Assurance and Evaluation

Management

Preparation

Triage

Primary survey

Resuscitation

Secondary survey

Definite care

Transfer

Pre-hospital Phase

- Pre-hospital personnel → the receiving hospital
- **Emphasize on** : Spine protection
 - : Airway maintenance
 - : Oxygenation
 - : Control external bleeding and shock
 - : Immobilization
- **Transport to the** **closest and appropriate facility**





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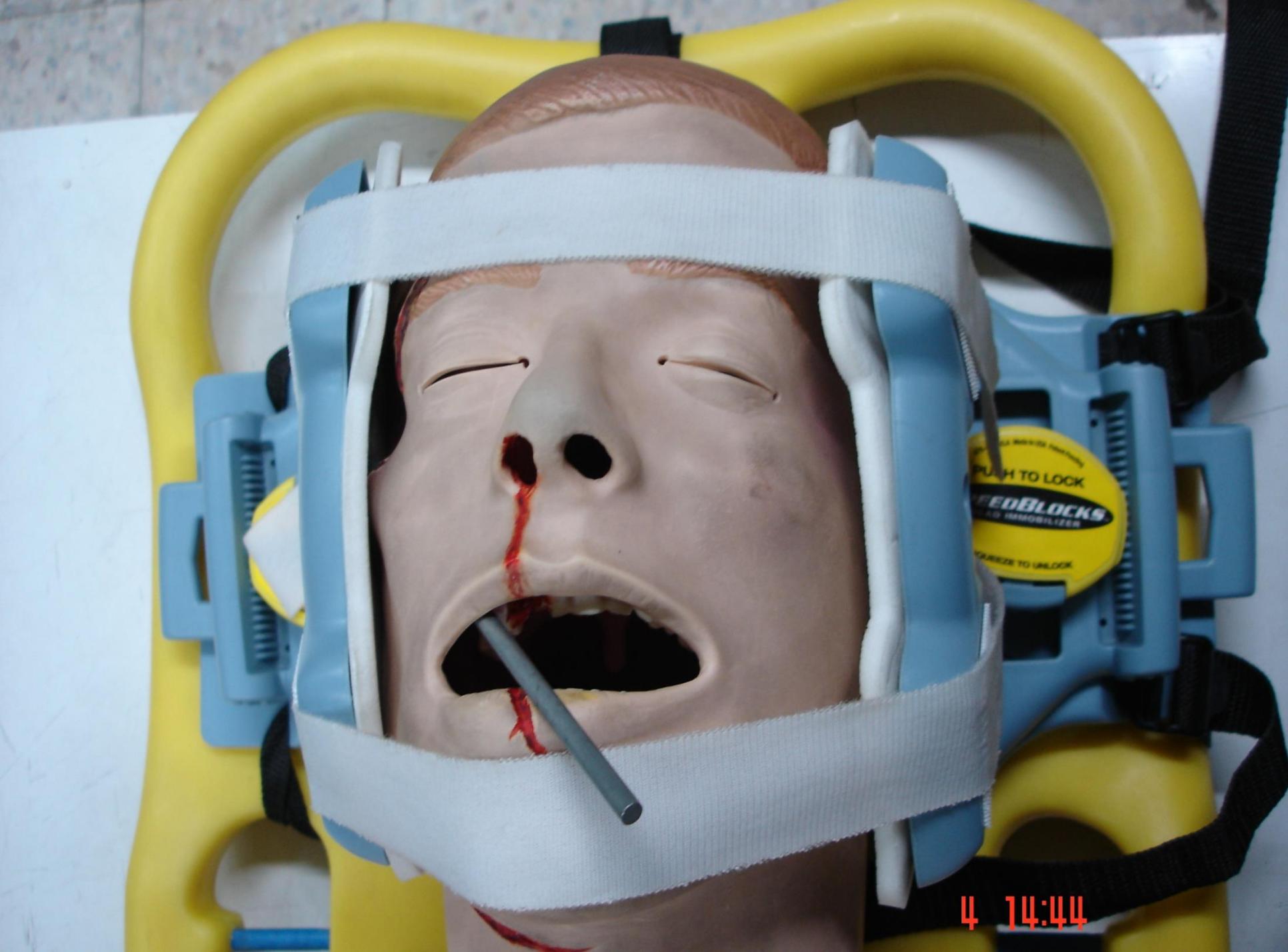
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In hospital Phase

- **Standard Precautions :**

Cap , gown , gloves , mask

Shoe covers , goggles/face shields

- Preplanning
- Equipment, Personnel, Services
- **Document**
- Transfer agreement

Initial Assessment and Management

- Primary Survey
- Resuscitation
- Secondary Survey
- Definite Care

Primary Survey

A : Airway maintenance **with** cervical spine restriction

B : Breathing and ventilation

C : Circulation with hemorrhage control

D : Disability : neurologic status

E : Exposure and Environmental control

Resuscitation

Upper airway obstruction

Tension pneumothorax

Open pneumothorax

Severe flail chest

Cardiac tamponade

Massive hemorrhage

Traumatic brain injury

The **earliest** priorities in managing the injured patient are to ensure an **intact airway** and recognize a **compromised airway**.

Airway management

Protect C-spine first !!

“ manual in line “

Then Collar

Evaluate airway : patent or compromised ?

Maintain airway : Chin lift & Jaw thrust

Assisted airway : Devices

Definite airway : Tube with cuff

Surgical airway : Cricothyroidotomy

Airway Obstruction

Hoarseness of voice

Stridor

Bleeding or secretion

Swelling or palpable fracture

Subcutaneous emphysema

Large expanding hematoma

Inhalation burn

Indications for definite airway

- Protect airway
- Pulmonary toilet
- Preoperative (general anesthesia)
- Positive ventilator (respiratory failure)

Airway Management

Surgical airway

Needle



Surgical



Early preventable deaths

- Failure to adequately **assess** the airway
- Failure to recognize the need for airway **intervention** or **ventilation**
- **Inability** to establish an airway
- **No** backup plan
- Failure to recognize **complications**
- Failure to call for **HELP**





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4 14:59



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Breathing & Ventilation

“ Look , feel , palpate and listen “ for

Tension pneumothorax

Open pneumothorax

Severe flail chest

Resuscitation

Oxygenation : $FiO_2 > 0.85$

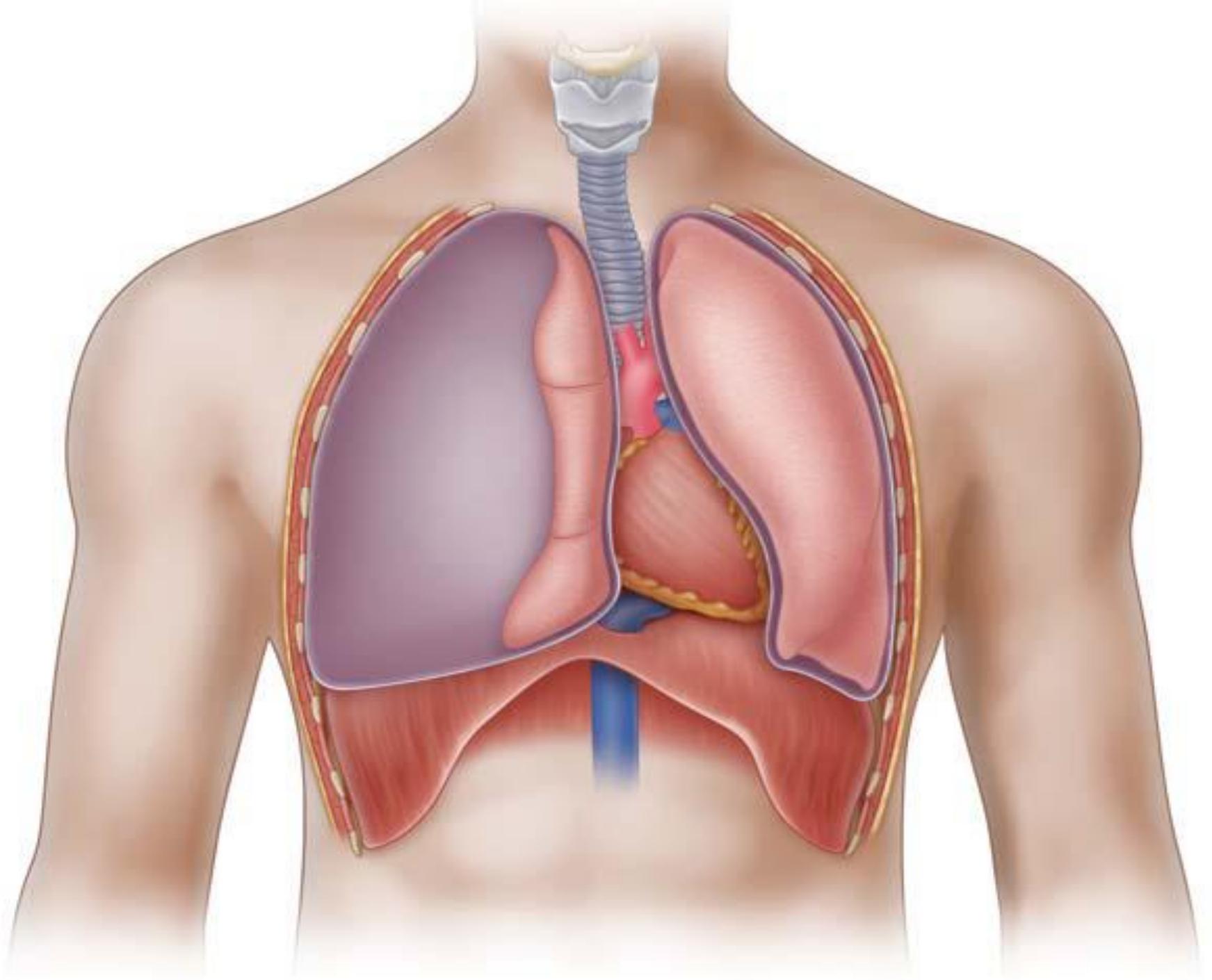
Inadequate Ventilation

- Tachypnea , Tachycardia
- Altered mental status
- Dyspnea , Nasal flaring
- Diminished breath sound
- Low oxygen saturation

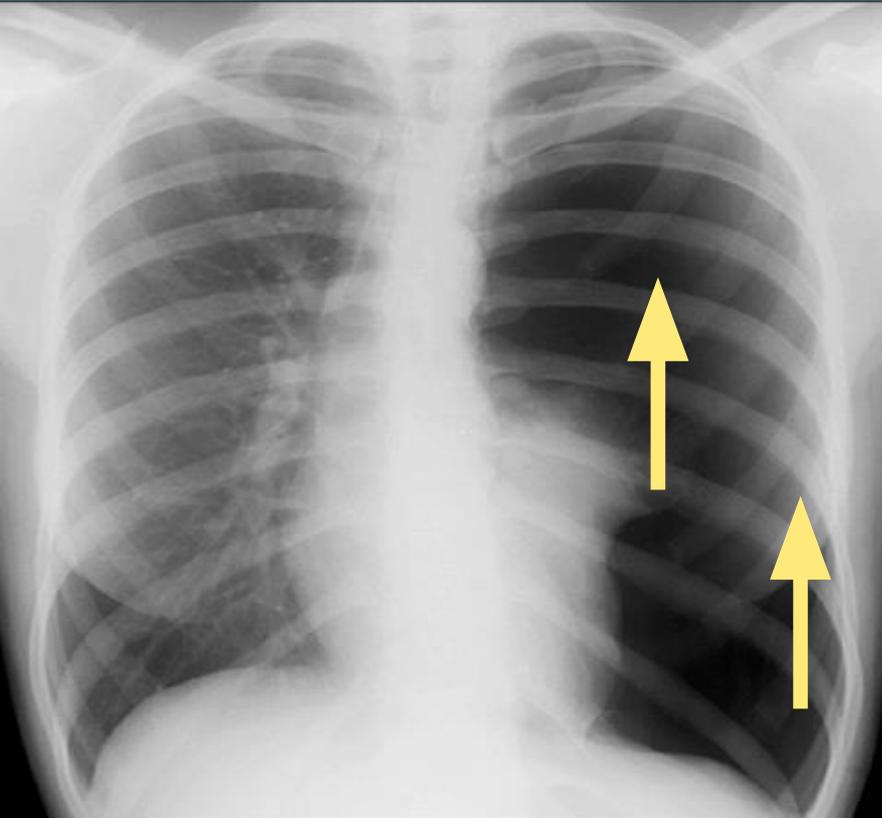
Tension pneumothorax

High pressure pneumothorax causing cardiovascular compromised status

- * chest injury
- * dyspnea & tachypnea
- * distended neck vein
- * deviated trachea
- * hypotension
- * tympanic on percussion
- * absent breath sound



Breathing



Needle thoracostomy

Needle no. 16G 8 cm

Location

- **2nd ICS MCL (pediatric)**
- **4th-6th ICS anterior axillary line**
- **(ICD position)**



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Open pneumothorax

Abnormal connection between pleural cavity and atmosphere causing inability to ventilate the lungs

Resuscitation: three-sided occlusive dressing

: ICD

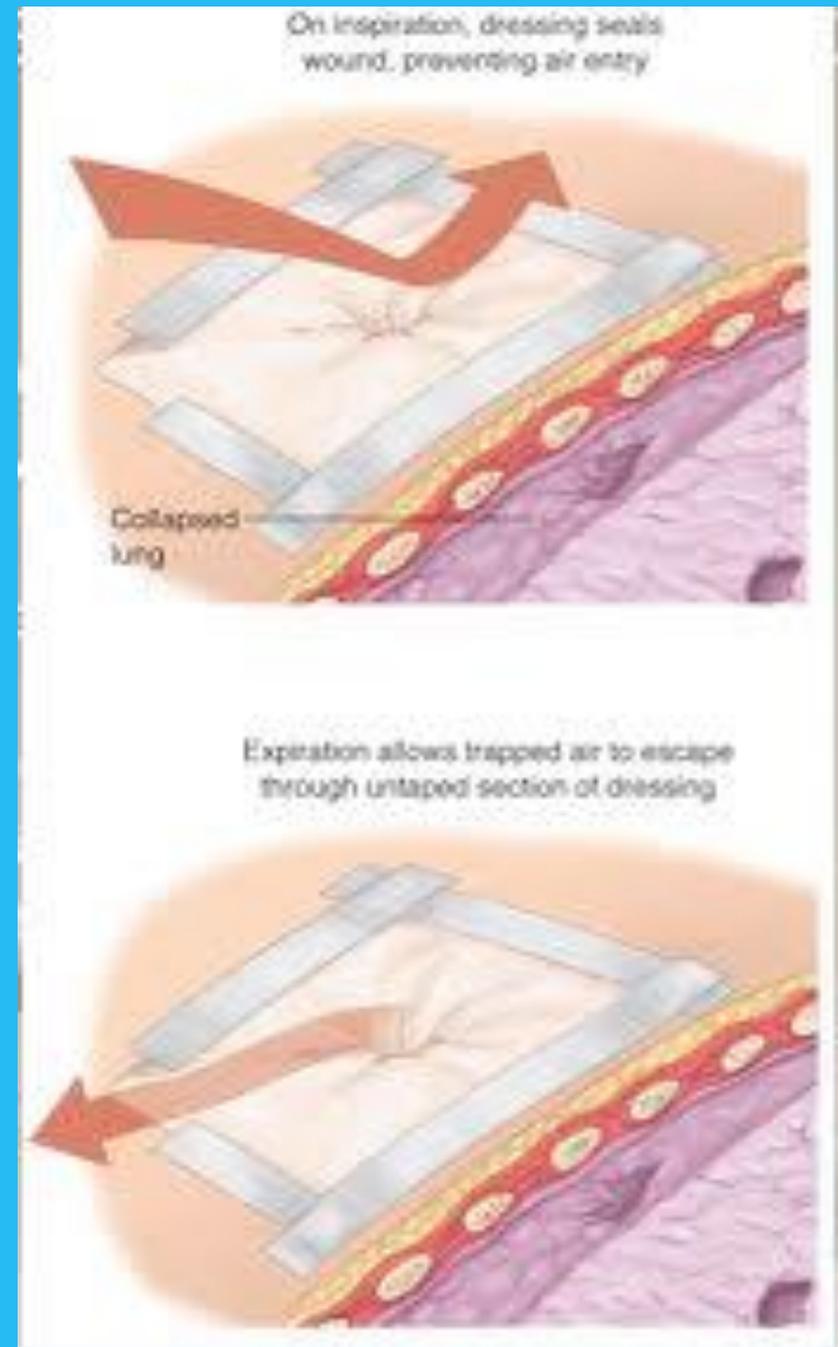
: Oxygen

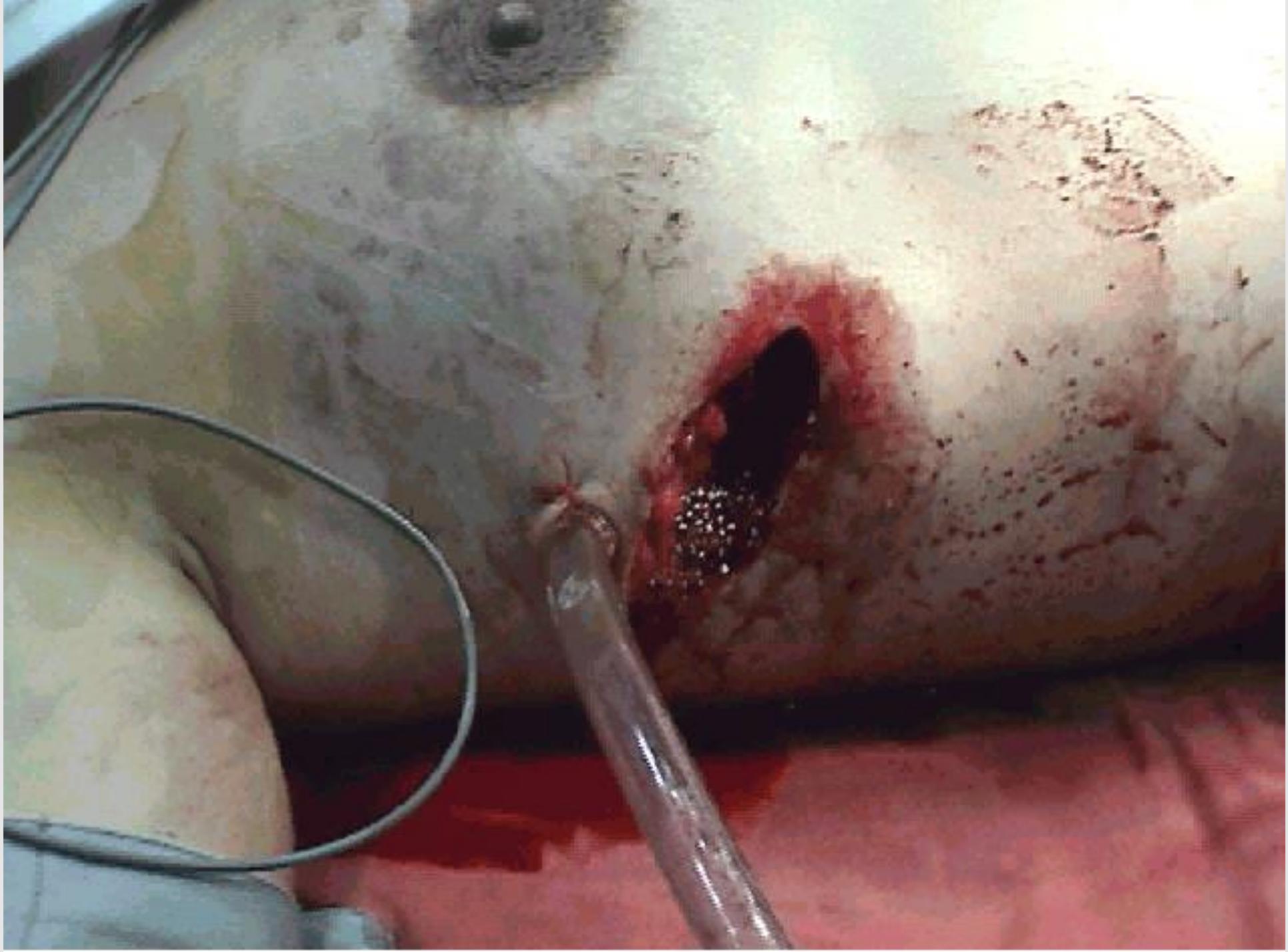
A close-up photograph of a person's chest showing a sucking chest wound. The wound is a jagged, vertical laceration with visible internal organs and bright red blood. A hand is holding a white gauze pad over the wound. A blue speech bubble with white text is overlaid on the right side of the image.

Sucking chest
wound

Breathing

- **Open pneumothorax**
 - Ineffective ventilation
 - Sucking chest wound
 - Injury size $> 2/3$ of trachea
- **Rx**
 - Three-sided dressing
 - ICD





Severe flail chest

Segmental separation of chest wall causing inability to breath and ventilate the lungs

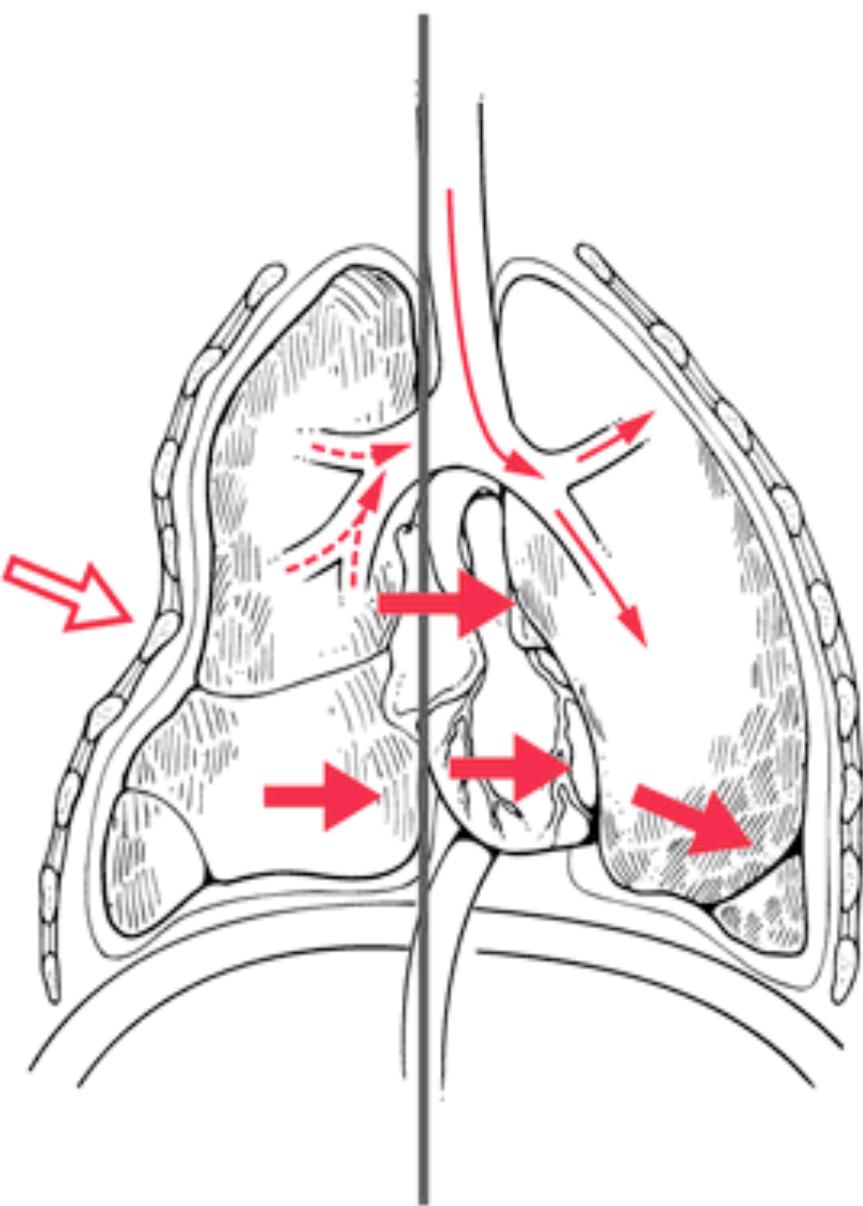
- * dyspnea & tachypnea
- * paradoxical movement
- * decreased breath sound

Resuscitation : intubation & ventilator
: oxygen
: pain control
: breathing exercise
: surgery



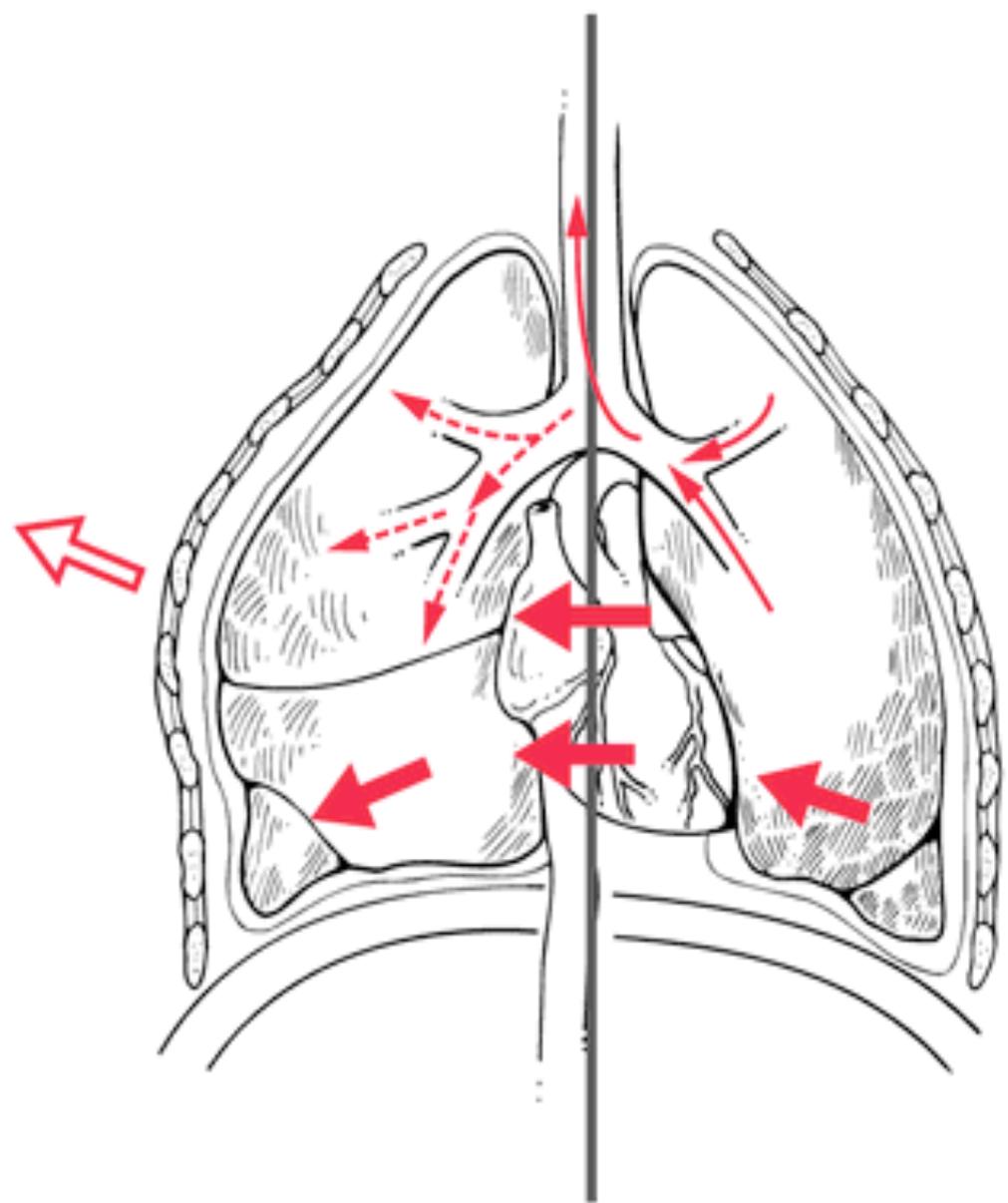


Midline



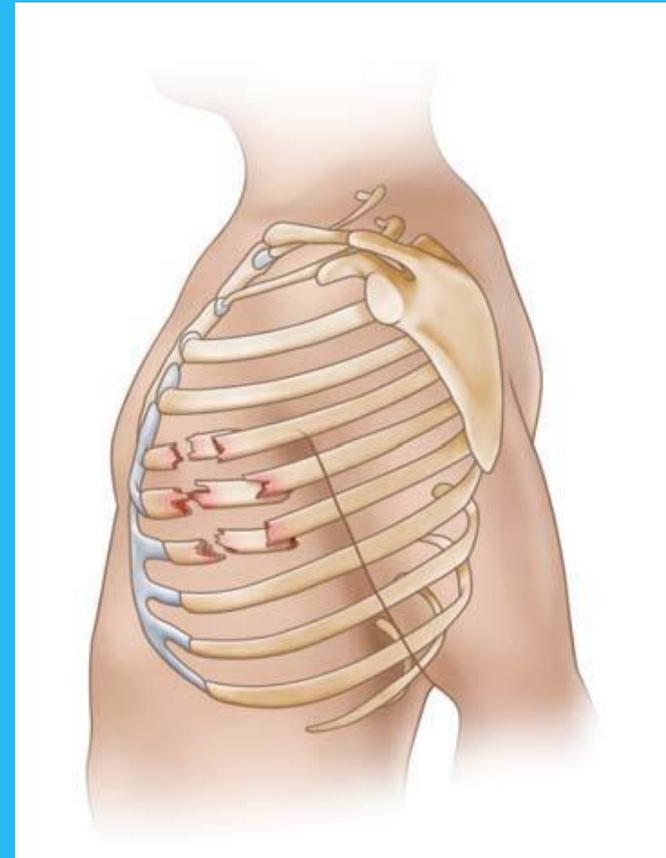
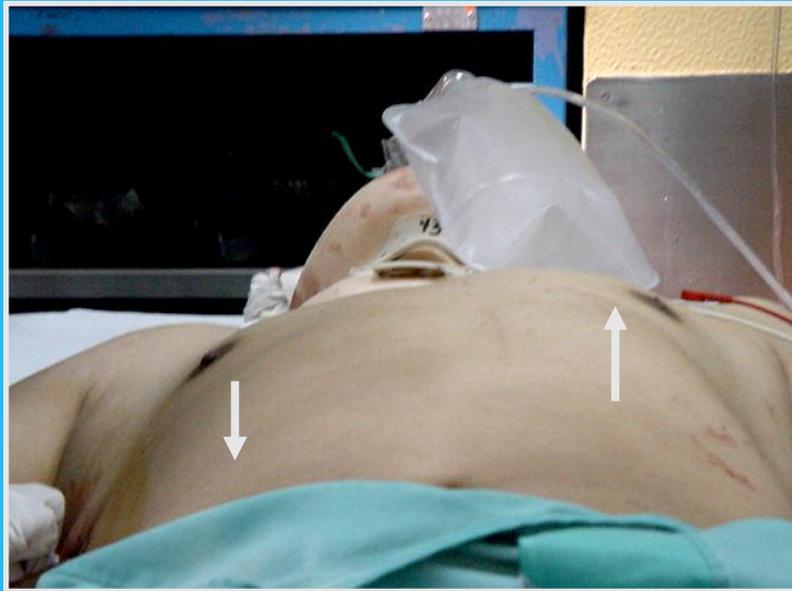
A Inspiration

Midline



B Expiration

Flail Chest and Pulmonary Contusion



✘ Flail chest with lung contusion

✘ Respiratory support

✘ ICD

✘ Pain control

✘ Complications from lung contusion

Shock

Inadequate tissue perfusion and oxygenation

- * tachycardia & vasoconstriction
- * tachypnea
- * hypotension
- * oliguria
- * alteration of consciousness
- * **adult blood volume 70cc / kg**
- * **child blood volume 80cc / kg**

Clinical signs of shock

CVS : tachycardia , vasoconstriction

Skin : pale , cool

RS : tachypnea

GI : decreased movement

MS : decreased blood supply and tone

KUB : decreased urine output

CNS : agitation , confuse , drowsy , coma

“ circulatory arrest “

Shock

Hemorrhagic

external bleeding

internal bleeding

* chest

* abdomen

* pelvis

* long bone

Non-hemorrhagic

tension pneumothorax

cardiac tamponade

cardiac contusion

neurogenic

septic

anaphylactic

Circulation & Hemorrhage control

Stop external bleeding !!

Signs of shock

Grading of shock

Cause(s) of shock

Resuscitation and Oxygenation



Cardiac Tamponade

Obstructive shock

Beck's triad: Hypotension

: Distant heart sound

: Engorged neck vein

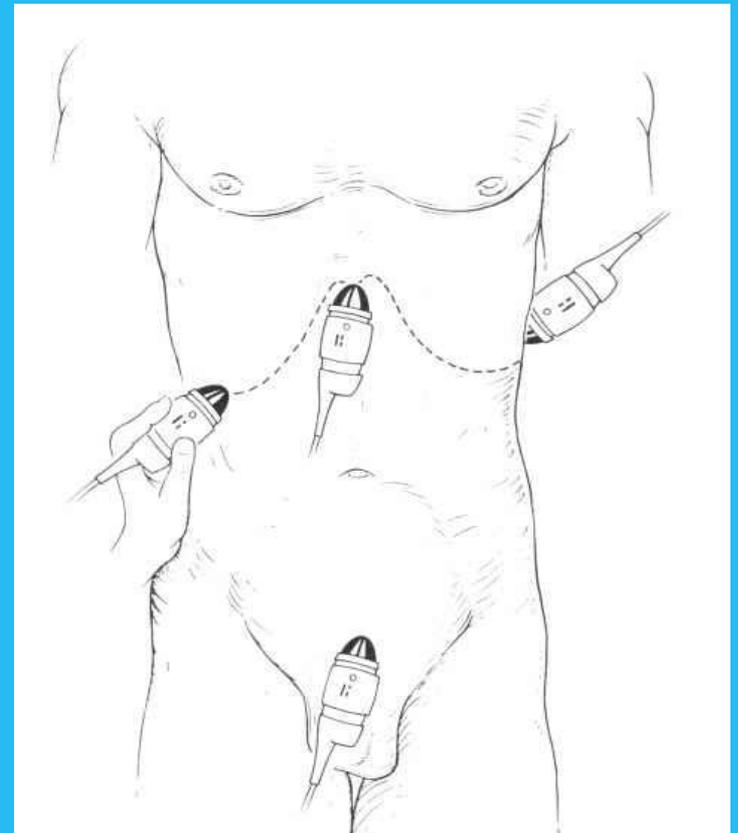
Pericardiocentesis

Median sternotomy

How is FAST done?

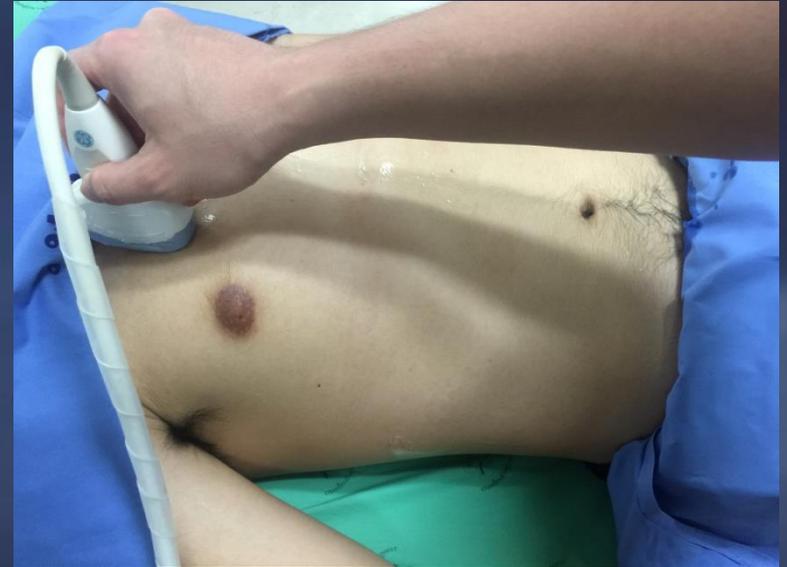
Sequential examination of four areas:

- Right upper quadrant (Morrison's pouch)
- Left upper quadrant (splenorenal recess)
- Pelvis
- Pericardium



eFAST

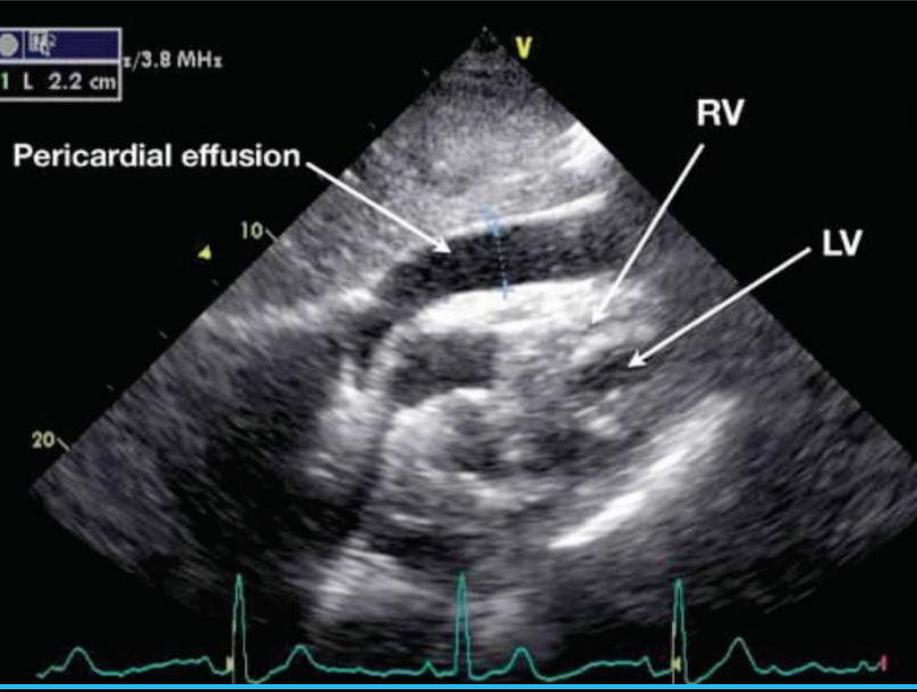
- Anterior approach for detection of pneumothorax
 - 2nd-4th ICS midclavicular line
- Posterior approach for detection of hemothorax
 - 8-10th ICS mid to posterior axillary line



E-FAST

- Hemothorax





Circulation



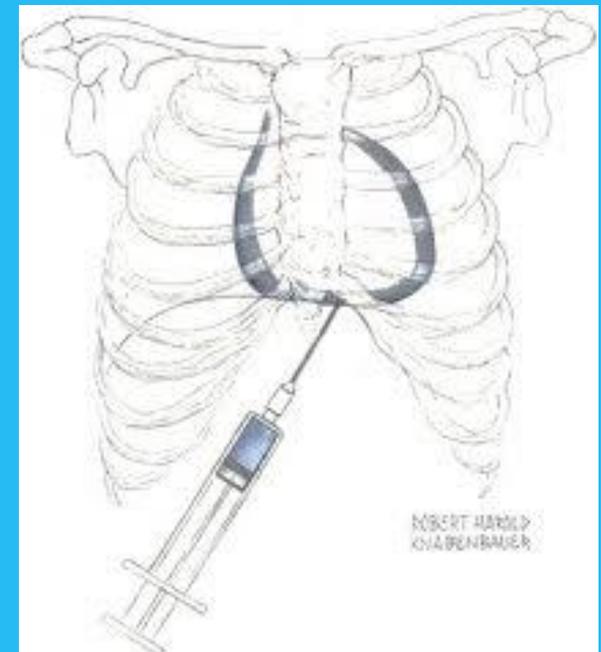
Managements

Pericardiocentesis

Gastric decompress

Sub-xyphoid window

Operation





PELVIGRIP



Classes of Shock

	class I	class II	class III	class IV
Blood loss	<15%	15-30%	30-40%	>40%
BP	normal	normal	SBP<90	SBP<70
Pulse	<100	100-120	120-140	>140
Mental	anxiety	anxiety	confused	lethargic
Urine	>30	20-30	<20	negligible
Fluid	crystalloid		crystalloid+blood	

- Adult blood : 70ml/kg
- Child blood : 80ml/kg

TABLE 3-1 SIGNS AND SYMPTOMS OF HEMORRHAGE BY CLASS

PARAMETER	CLASS I	CLASS II (MILD)	CLASS III (MODERATE)	CLASS IV (SEVERE)
Approximate blood loss	<15%	15–30%	31–40%	>40%
Heart rate	↔	↔/↑	↑	↑/↑↑
Blood pressure	↔	↔	↔/↓	↓
Pulse pressure	↔	↓	↓	↓
Respiratory rate	↔	↔	↔/↑	↑
Urine output	↔	↔	↓	↓↓
Glasgow Coma Scale score	↔	↔	↓	↓
Base deficit ^a	0 to -2 mEq/L	-2 to -6 mEq/L	-6 to -10 mEq/L	-10 mEq/L or less
Need for blood products	Monitor	Possible	Yes	Massive Transfusion Protocol

^a Base excess is the quantity of base (HCO_3^- , in mEq/L) that is above or below the normal range in the body. A negative number is called a base deficit and indicates metabolic acidosis.

Data from: Mutschler A, Nienaber U, Brockamp T, et al. A critical reappraisal of the ATLS classification of hypovolaemic shock: does it really reflect clinical reality? *Resuscitation* 2013,84:309–313.

Shock

Stop external bleeding first!

Fluid challenge test : 1000 cc in 15 minutes
(20 cc/kg in children)

2x blood lost for cross-match

Uncross-matched blood : O PRC Rh -ve

Warming fluid (39 degree)

Hypothermia < 35 degree

Disability

Neurological status

Glasgow Coma Scale : E4V5M6

Pupillary size and response

Lateralization

Exposure & Environmental control

Undress

Log-roll

Missed areas

P.R.

Keep warm !!!!



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Adjuncts to primary survey and resuscitation

Monitoring : V/S , EKG , Pulse oximeter , GCS , I/O

Investigations : portable CXR and Pelvis

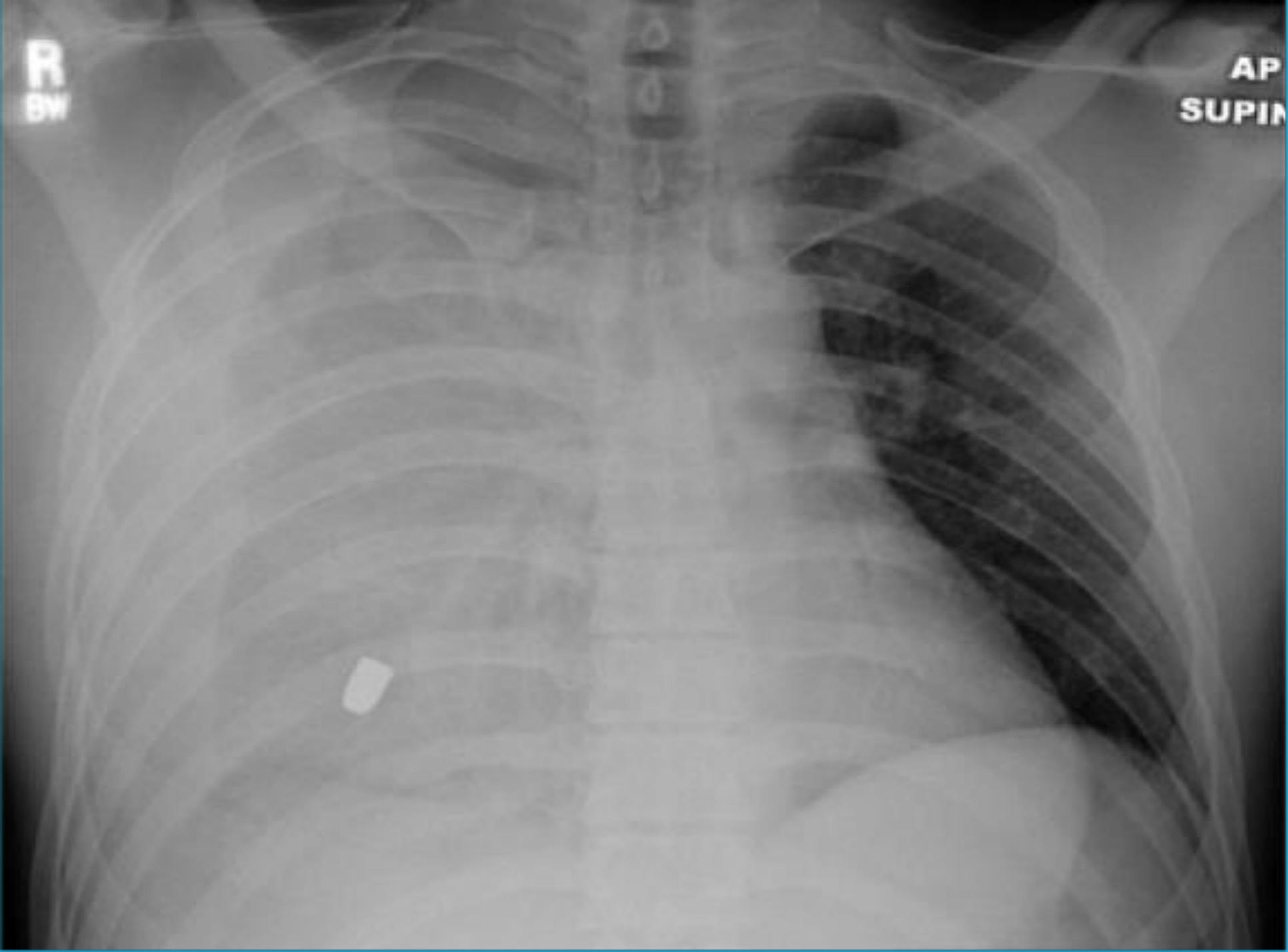
: FAST

Catheters : Foley , N-G (any contraindications?)

Re-evaluation !!

R
BW

AP
SUPIN



PORTABL



Consult ?
&
Refer ?

Secondary Survey

When?

1. Complete primary survey and resuscitation
2. Re-evaluation = stable condition
3. More time

Secondary survey

History : **AMPLE**

P.E. : Head
: Maxillofacial
: C-spine and neck
: Chest
: Abdomen
: Pelvis and perineum
: Extremities
: **Neurological function**

AMPLE

- **A** : allergy
- **M** : medical illness , medication
- **P** : personal history , past history , pregnancy
- **L** : last meal
- **E** : event (mechanism of injury)

Mechanisms of Injury

Chief complaint and duration

Causes (how and why)

Protections

Loss of consciousness

Blood loss and death

First aid

Intoxication

Adjuncts to secondary survey

Monitoring

Catheters

Investigations

Re-evaluation !!

Definite care

O.R.

ICU

IPD

OPD

Consult

Refer

Transfer to Definite Care

No longer should the trauma patients be transferred to the closest hospital, but rather to the **closest appropriate** hospital, preferably a verified trauma center.

Transfer Responsibilities

1. Referring Doctor
2. Receiving Doctor
3. Modes of transportation
4. Information to transferring personnel
5. Documentation

Prior to Transfer

1. Airway
2. Breathing and Oxygenation
3. Circulation
4. Central nervous system
5. Diagnostic studies : should not delay transfer
6. Wounds and Fractures

Management During Transport

The **appropriate** personnel should transfer the patient, based on the **patient's condition and potential problems**

1. Monitoring vital signs and pulse oximetry
2. Continued support of cardiorespiratory system
3. Continued blood volume replacement
4. Use of appropriate medication
5. Maintenance of communication with doctor during transfer
6. Maintenance of accurate records during transfer

Summary

- Save life , organs , functions , cosmetic
- Preparation
- Triage
- Primary survey & Resuscitation
- Secondary survey
- Definite care
- Transfer