

ارزیابی و مراقبتهای اولیه از بیماران ترومایی

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گروه طب اورژانس- دانشگاه علوم پزشکی اصفهان



- 1 Identify the correct sequence of priorities for assessment of a multiply injured patient.
- 2 Apply the principles outlined in the primary and secondary evaluation surveys to the assessment of a multiply injured patient.
- 3 Apply guidelines and techniques in the initial resuscitative and definitive-care phases of treatment of a multiply injured patient.
- 4 Explain how a patient's medical history and the mechanism of injury contribute to the identification of injuries.

Advanced Trauma Life Support

(ATLS)

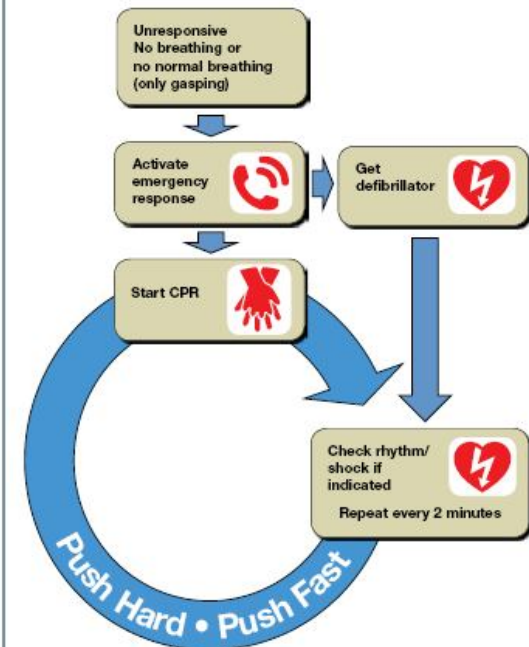
Rule-Using Process

ALGORITHMIC METHOD

- In the algorithmic method, algorithms or flow charts are used to simplify the decision making process into a series of Steps. (ACLS ,ATLS , ...)

- The recognition of the pattern, however, is a prerequisite to applying the correct rule.

Figure 2
Simplified Adult BLS Algorithm



-To save considerable time and anxiety when clinicians must make rapid decisions in life-threatening situations.

-For the optimal use of these protocols, physicians must familiarize themselves with the scientific basis behind the algorithms.
Still in many situations, the algorithmic approach considerably improves efficiency in the ED.



Advanced Trauma Life Support

(ATLS)

Eight Edition

Levels Of Trauma Centers

- *There are 4 trauma center levels:*

Level 1 ; The Highest Level

Level 2 ;

Level 3 ;

Level 4 ; Primary Treatment

Essential Characteristics of Trauma Centers

❖ Level IV

- Initial care capabilities only
- Mechanism for prompt transfer
- Transfer agreements and protocols

❖ Level III (not required of level IV trauma centers)

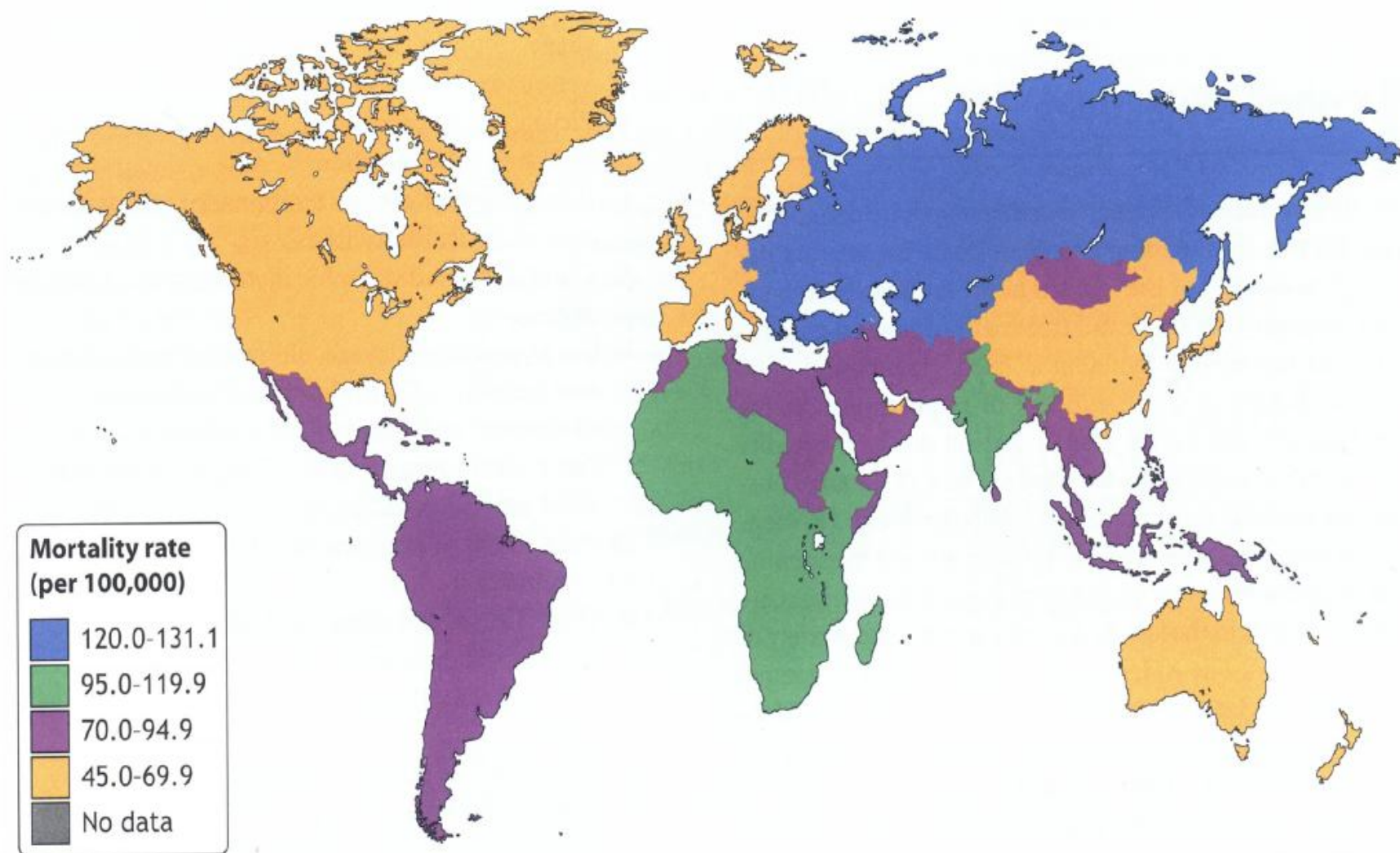
- Trauma and emergency medicine services
- 24-h radiology capability
- Pulse oximetry, central venous and arterial catheter monitoring capability
- Thermal control equipment for blood and fluids
- Published on-call schedule for surgeons, subspecialists
- Trauma registry

❖ Level II (not required of levels III and IV trauma centers)

- Cardiology, ophthalmology, plastic surgery, gynecologic surgery available
- Operating room ready 24 h a day
- Neurosurgery department in hospital
- Trauma multidisciplinary quality assurance committee

❖ Level I (not required of levels II, III, and IV trauma centers)

- 24-h availability of all surgical subspecialties (including cardiac surgery/bypass capability)
- Neuroradiology, hemodialysis available 24 h
- Program that establishes and monitors effect of injury prevention/education efforts
- Organized trauma research program



■ **Figure 1** Global Injury-Related Mortality.

Trauma is a major source of morbidity and mortality in the United States and world-wide.

the World Health Organization estimates that over 5 million people died of traumatic injury in the year 2000, accounting for 9% of global mortality and 12% of the global disease burden.

Trauma is the first cause of death in ages 1-44 years old.

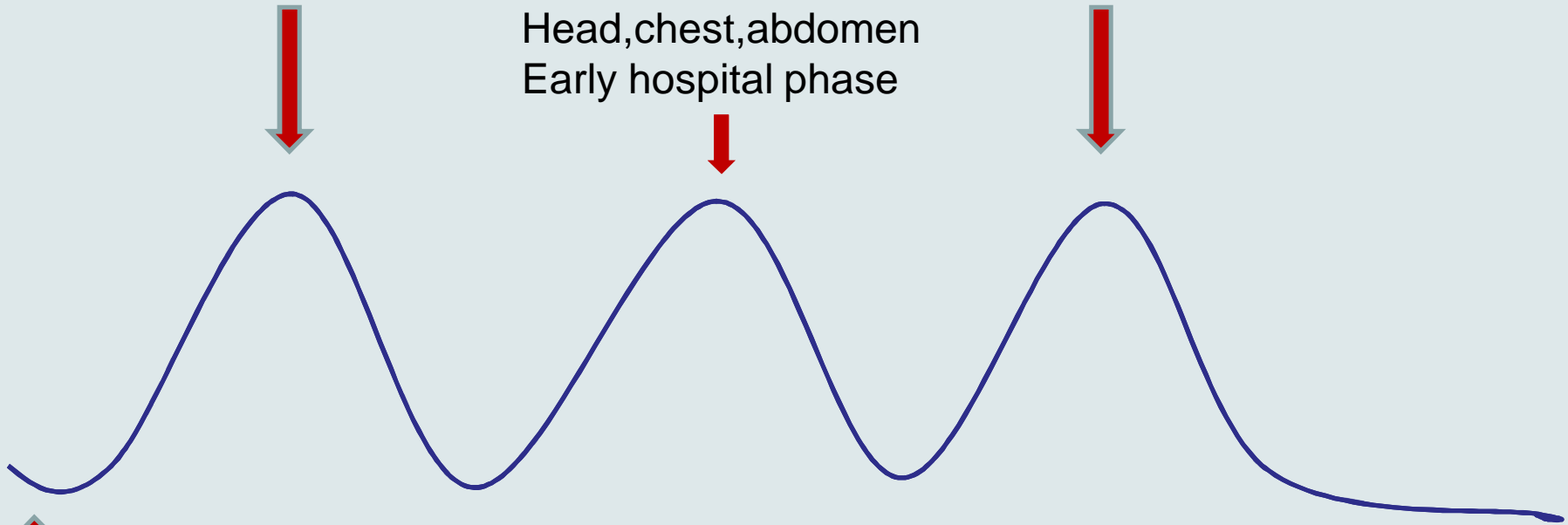
Trimodal death distribution

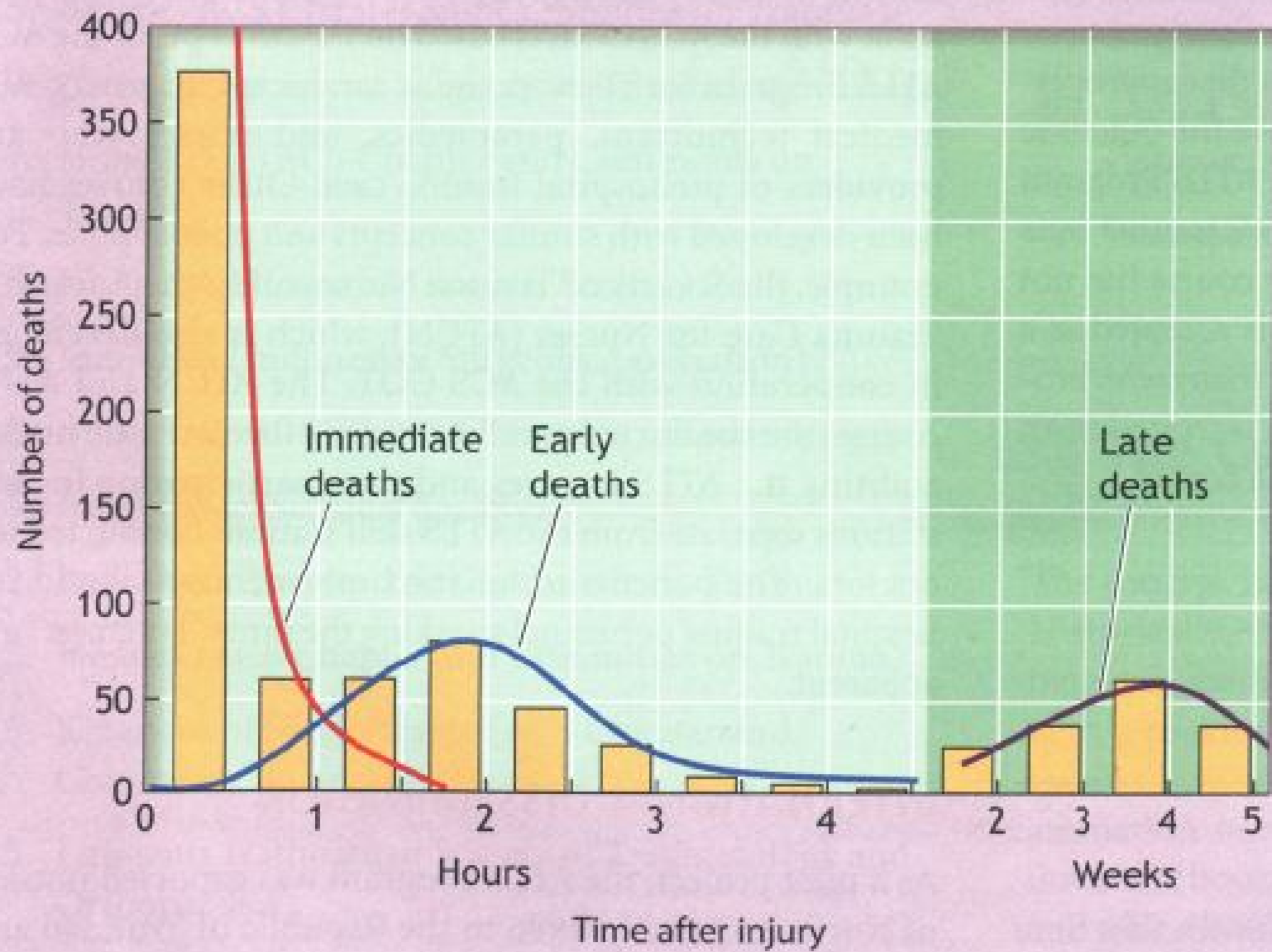
Head&Major vascular injury
Pre hospital phase

Head,chest,abdomen
Early hospital phase

ICU
Late hospital phase

Trauma





- ***part 1. Initial Assessment and Management***

Initial Assessment and Management

- Preparation
- Triage
- Primary survey (ABCDEs)
- Resuscitation
- Adjunct to Primary survey and Resuscitation
- Secondary survey
- Adjunct to Secondary survey
- Continued post resuscitation monitoring and reevaluation
- Definitive care

Preparation

- Prehospital phase:

Rapid transport

Rapid triage

Notification



Triage

ISS ;(Injury Severity Score)

PTS;(Pediatric Trauma Score)

Weight, A.WAY,BP,GCS,Wounds,Fractures

RTS;(Revised Trauma Score):

GCS,BP,RR

AIS Scores

1 — minor, 2 — moderate, 3 — serious, 4 — severe, 5 — critical, 6 — maximum (fatal)

Body Region

- A. Head/neck
- B. Face
- C. Chest
- D. Abdomen/pelvic contents
- E. Extremities/pelvic girdle
- F. External (skin)

Injury Severity Score

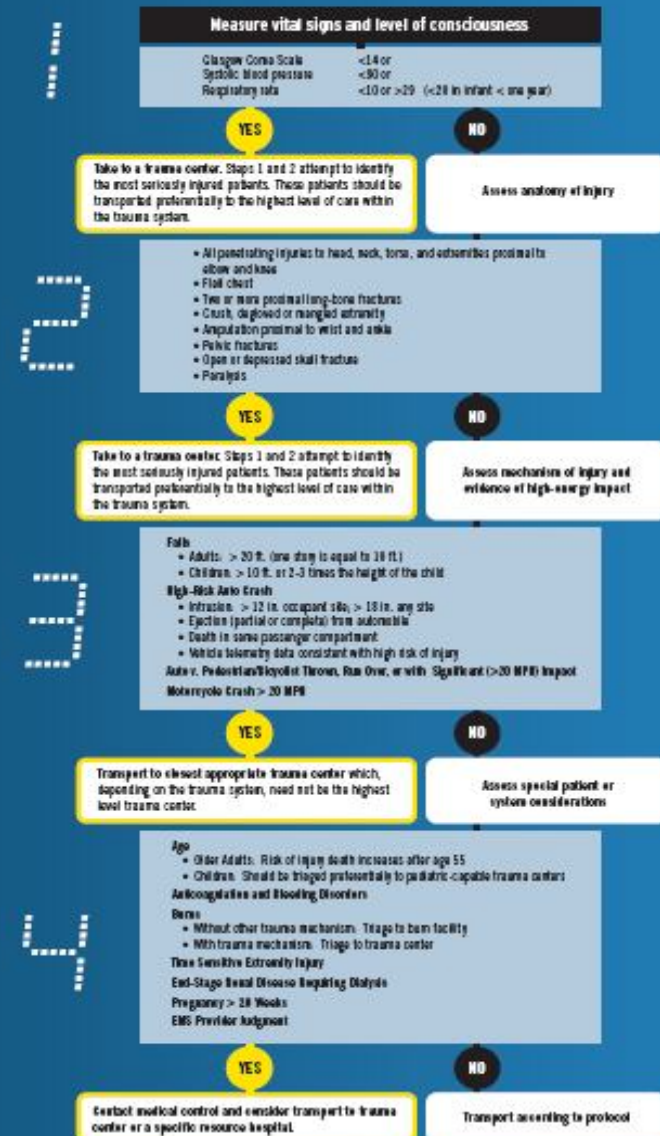
- Sum of the squared AIS scores of the three most severely injured body regions
- A score of 6 in any region is automatically assigned an injury severity score (ISS) of 75
- >20% blood loss generally raises the score by 1 in the most severely injured region
- Example: A patient with a grade 4 splenic laceration, closed femur fracture, and hand laceration:

$$D^2 + E^2 + F^2 = 4^2 + 3^2 + 1^2 = 26$$

الگوی تصمیم گیری تریاژ در صحنه:

پروتکل ملی تریاژ تروما

FIELD TRIAGE DECISION SCHEME: THE NATIONAL TRAUMA TRIAGE PROTOCOL



When in doubt, transport to a trauma center.

For more information on the Decision Scheme, visit: www.cdc.gov/FieldTriage

ارزیابی علائم حیاتی و سطح هوشیاری

- مساوی یا کمتر از 13 یا GCS
- فشارخون سیستولیک کمتر از 90 یا
- تعداد تنفس کمتر از 10 یا بیشتر از 29 (زیر 20 در شیرخواران)
- نیاز برای حمایت تهویه ای

بله

خیر

بله: اعزام به یک مرکز تروما.
هدف قدم اول و دوم شناسایی شدیدترین جراحات بیمار.
این بیمار باید به مجهزترین مرکز تروما منتقل شود.

خیر: ارزیابی آناتومی آسیب

**قدم اول: شاخص های فیزیولوژیک
تهدید کننده حیات**

- کلیه زخمهای نافذ سر، گردن، تنه و اندامها (بالاتر از سطح آرنج یا زانو).
- قفسه سینه ناپایدار تغییر شکل یافته (از جمله قفسه سینه مواج).
- شکستگی دو یا بیشتر در استخوان های پروگزیمال بلند.
- اندامهای له شده، پرس شده یا کنده شده یا اندام های بدون نبض.
- قطع اندامها بالاتر از ناحیه مچ پا یا مچ دست.
- شکستگی لگن.
- شکستگی باز یا دپرس استخوان جمجمه.
- فلج اندام ها.

بله

بله: اعزام به یک مرکز تروما.
قدم اول و دوم شناسایی شدیدترین جراحات بیمار.
این بیمار باید به مجهزترین مرکز تروما منتقل شود.

خیر

خیر: ارزیابی شواهد
دال برمکانیسم وقوع حادثه
و صدمات با انرژی زیاد

قدم دوم: شاخص های آناتومیک

- سقوط
- برای بزرگسالان < 20 فوت (1 طبقه معادل 10 فوت در نظر گرفته می شود).
- کودکان < 10 فوت یا 2 تا 3 برابر قد کودک
- تصادفات خودرو با ریسک بالا
- فرورفتگی در محلی که مسافر نشسته < 12 اینچ ویا فرورفتگی در هر محل < 18 اینچ
- پرت شدن یا زیر گرفته شدن مصدوم توسط خودرو
- وجود فوتی در خودرو
- ارتباط مستقیم بین اطلاعات تله متری ماشین و صدمات با ریسک بالا
- **(Vehicle telemetry data consistent with high risk of injury)**
- برخورد وسیله نقلیه با عابر پیاده/ پرت شدن دوچرخه سوار،
- زیر گرفتن ویا برخورد با وسیله نقلیه با سرعت < 20 مایل در ساعت

بله

بله: انتقال به مرکز ترومای مناسب،
البته نیازی به مجهزترین مرکز تروما نمی باشد.

خیر

نه : ارزیابی شرایط یا
بیماران خاص

قدم سوم: شاخص های مکانیسم حادثه

توجه

- منظور از کودک سن کمتر از 15 سال است
- فرورفتگی در سقف خودرو بسیار مهم است
- در مصدومین با شکستگی باز یک استخوان
- یا شکستگی با آسیب های عصبی و عروقی

- سن بالا منظور بالای 55 سال
- سن بالای 55 سال بیشتر در معرض مرگ و میر قرار دارند-
- فشار کمتر از 110 در سن بالای 65 ساله و سقوط در سطح همتر از-
- اطفال: باید به یک مرکز مجهز به مدیریت ترومای اطفال منتقل شوند-
- مشکلات انعقادی یا خونریزی دهنده بخصوص با آسیب سر
- سوختگی ها:
- بدون همراهی با تروما: انتقال به مرکز سوختگی
- همراه با تروما: انتقال به مرکز تروما
- بارداری < 20 هفته
- EMS قضاوت بالینی مراقبین

بله

بله با مرکز کنترل بیماریها تماس بگیرید
و به مرکز تروما و یا بیمارستان دارای بخش های
لازم انتقال دهید.

خیر

نه : انتقال طبق پروتکل

قدم چهارم: موارد خاص

ترياز بيماران ترومايي در صحنه

اندازه گيري علايم حياتي و بررسي سطح هوشياري

يا تعداد تنفس کمتر از 20 در شيرخواران $RR < 10$ يا $SBP < 90$ يا $GCS < 14$

انتقال به مرکز تروما

بله

خير

آسيبهاي آناتوميک شديد

بله

خير

مکانيزم آسيب قابل توجه

بله

خير

سن بيشتر از 55 سال يا کمتر از 5 سال، حاملگي بالای 20 هفته
سوختگي، دياليزي، آسيب به ارگانهاي حساس به زمان،
اختلال خونريزي دهنده و ...

بله

خير

مشاوره با پزشک مشاور

Preparation

- **Prehospital phase:**

Rapid transport - Rapid triage - Notification

Mechanism of injury ,
Anatomic sites of injury
Air way ,
Pulse & Respiration ,
GCS,
Immobilization,
Iv line ,



- Inhospital phase :

- *Before patient arrival*

- -Trauma code
 - Assign tasks to team members
 - Check and prepare medical equipment.



Initial Assessment and Management


- Preparation
- Triage
- Primary survey (ABCDEs)
- Resuscitation
- Adjunct to Primary survey
- Secondary survey
- Adjunct to Secondary survey

Primary survey

(ABCDE)

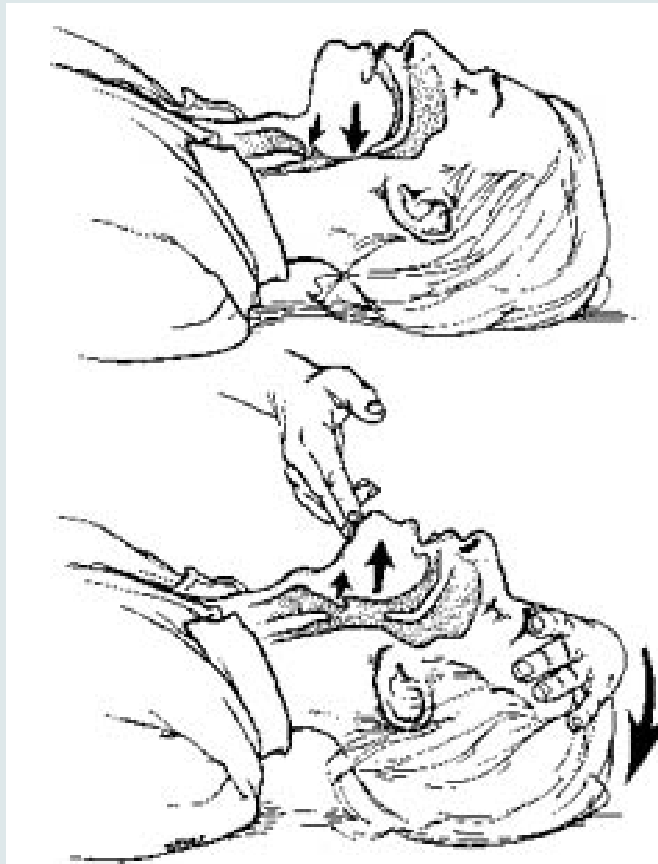
- **A**irway and **C**ervical spine protection
- **B**reathing and **V**entilation
- **C**irculation with control of external **H**emorrhage,
- **D**isability: *Brief neurologic evaluation*
- **E**xposure/**E**nvironment: *Completely undress the patient, but prevent **hypothermia***

A. Airway + Cervical Spine Protection

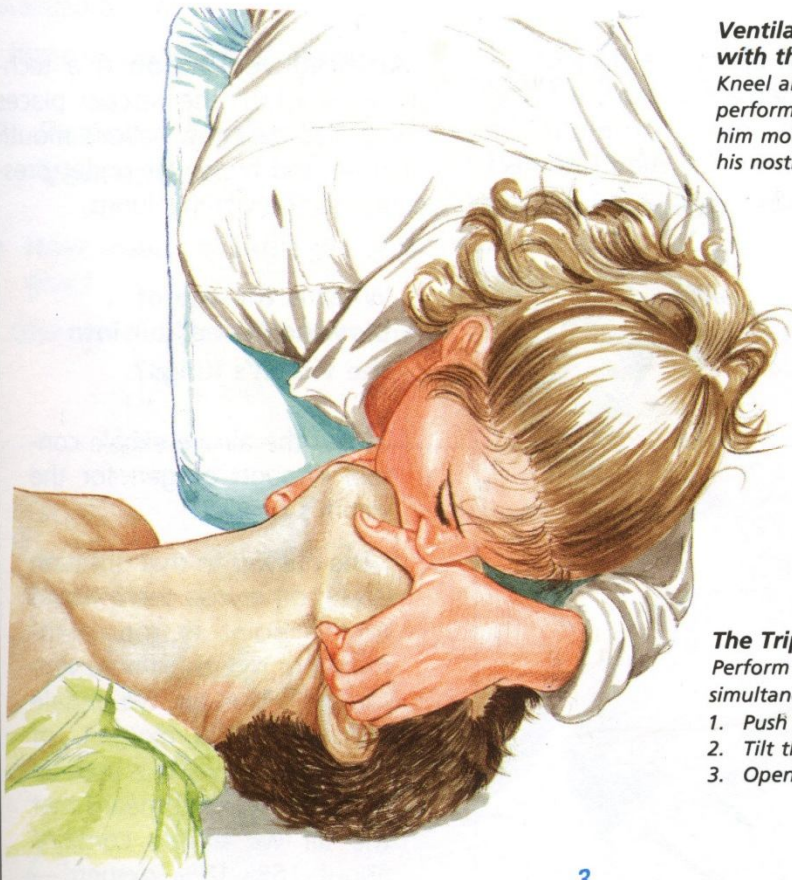
- **1. Assessment**
 - a. Ascertain patency
 - b. Rapidly assess for airway obstruction
- **2. Management**  **Establish a patent airway**
 - A. Clear the airway of foreign bodies
 - B. Perform a chin lift or jaw thrust maneuver
 - C. Insert an oropharyngeal or nasopharyngeal airway
 - D. Establish a definitive airway
 - Orotracheal or nasotracheal intubation
 - Surgical cricothyroidotomy
 - E. Describe jet insufflation of the airway, noting that it is only a temporary procedure.

3. Maintain the cervical spine in a neutral position with manual immobilization as necessary when establishing an airway.
4. Reinststate immobilization of the c-spine with appropriate devices after establishing an airway.

Clear and Suction

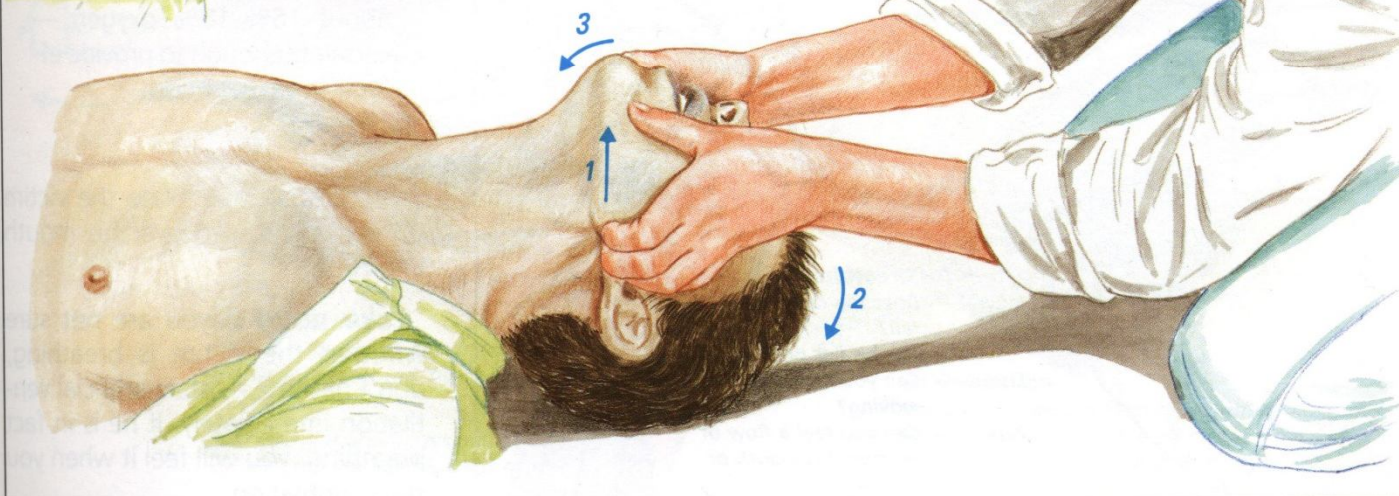


Ventilation while tilting the head with the triple airway maneuver
Kneel alongside the victim and perform the triple maneuver. Ventilate him mouth-to-mouth while blocking his nostrils with your cheek.



The Triple Airway Maneuver
Perform three movements simultaneously:

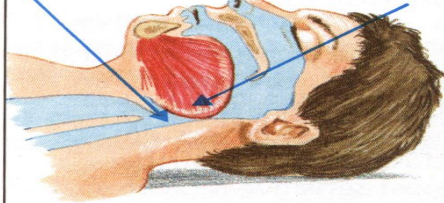
1. Push the lower jaw forward.
2. Tilt the head back.
3. Open the mouth slightly.



Airway



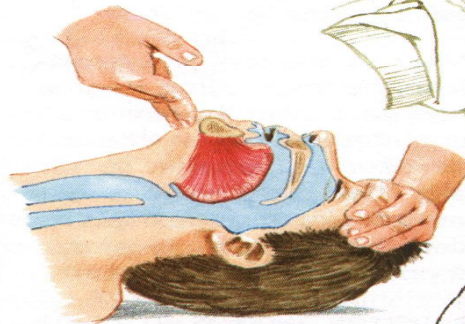
The passage of air to the lungs is blocked.



Airway obstruction by the tongue

The head is bent forward and the chin is tucked down. As a result, the back of the tongue falls back and obstructs the airway.

4
The back of the tongue falls back and obstructs the airway.



Relieving the obstruction by tilting the head

Tilting the head back and lifting the chin elevates the tongue and relieves the obstruction.

Opening the airway (head-tilt/chin-lift maneuver)

Place one hand on the victim's forehead and your other hand under his chin. Tilt the victim's head backward while lifting the chin and opening his mouth.



B+V

Breathing- Ventilation , Oxygenation

- **1. Assessment**

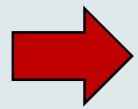
- a. Expose the neck and chest: Assure immobilization of the head and neck.
- b. Determine the rate and depth of respirations.
- c. Inspect and palpate the neck and chest for tracheal deviation, unilateral and bilateral chest movement, use of accessory muscles, and any signs of injury.
- d. Percuss the chest for presence of dullness or hyperresonance.
- e. Auscultate the chest bilaterally.

- **2. Management**

- a. Administer high concentrations of oxygen.
- b. Ventilate with a bag-valve-mask device.
- c. Alleviate tension pneumothorax.
- d. Seal open pneumothorax.
- e. Attach a CO2 monitoring device to the endotracheal tube.
- f. Attach the patient to a pulse oximeter.

Tension Pneumothorax

- Should be a clinical diagnosis



- Treat before X-ray

C+H

Circulation with Hemorrhage Control

- **1. Assessment**
 - a. Identify source of external, exsanguinating hemorrhage.
 - b. Identify potential source (s) of internal hemorrhage.
 - c. Pulse: Quality, rate, regularity, paradox.
 - d. Skin color.
 - e. Blood pressure.

- **2. Management**

- a. Apply direct pressure to external bleeding site.
- b. Consider presence of internal hemorrhage and potential need for operative intervention, and obtain surgical consult.
- c. Insert two large-caliber intravenous catheters.
- d. Simultaneously obtain blood for hematologic and chemical analyses, pregnancy test, type and crossmatch, and arterial blood gases.
- e. Initiate IV fluid therapy with warmed **crystalloid** solutions and blood replacement.
- f. Apply the pneumatic antishock garment or pneumatic splints as indicated to control hemorrhage.
- **g. Prevent hypothermia (increase mortality)**

- Consider **FAST**

(Focus Assessment Sonography Of Trauma)

eFAST

- بررسی وضعیت قلب و پریکارد
مایع پریکارد
- شکم و لگن (فضا های هیپاتورنال – اسپلنورنال و لگن)
مایع آزاد شکم و لگن
- ریه ها
پنوموتوراکس و هموتوراکس

D. Disability: Brief Neurologic Examination

- Determine the level of consciousness using the **AVPU** method or GCS Score.
- Assess the **pupils** for size, equality, and reaction .
- Symmetric **movement** (SPI injury)

Disability

- Pupils
- Check awareness(loc) : *AVPU*
 - *A* Awake
 - *V* Responds to verbal command
 - *P* Responds to pain
 - *U* Unresponsive

Resuscitation

- ***Oxygenation*** and ventilation
- Shock management: intravenous lines, warmed crystalloid solution.
- Management of life-threatening problems identified in the primary survey is continued

F. Adjuncts to Primary Survey and Resuscitation

- Obtain arterial blood gas analysis and respiratory rate.
- Attach the patient to an ECG monitor.
- Insert urinary and gastric catheters unless contraindicated and monitor the patient's hourly urinary output.
- Consider the need for and obtain:
(1) AP chest x-ray, (2) AP pelvis x-ray, (3) lateral, crosstable cervical spine

G. Reassess the Patient's
ABCDEs and Consider Need for
Patient Transfer

Very important

If Patient Becomes Unstable



Reassessment of ABCDE

II. SECONDARY SURVEY AND MANAGEMENT

Secondary Survey

- Head
- Maxillofacial
- Neck
- Chest
- Abdomen
- Perineum/rectum/vagina
- Musculoskeletal
- Complete neurologic examination

AMPLE History and Mechanism of Injury

- Obtain **AMPLE** from patient, family, or prehospital personnel:
 - **A**llergy
 - **M**edication History
 - **P**ast Illness/Pregnancy
 - **L**ast Meal
 - **E**vent

Head and Maxillofacial

- **1. Assessment**

- a. Inspect and palpate entire head and face for lacerations, contusions, fractures, and thermal injury.
- b. Reevaluate pupils(miosis- mydriasis).
- c. Reevaluate level of consciousness and GCS Score.
- d. Assess eyes for hemorrhage, penetrating injury, visual acuity, dislocation of the lens, and presence of contact lens.
- e. Evaluate cranial nerve function.
- f. Inspect ears and nose for cerebrospinal fluid leakage, hematoma
- g. Inspect mouth for evidence of bleeding and cerebrospinal fluid, soft-tissue lacerations, and loose teeth.

- **2. Management;**

- a . Maintain airway, continue ventilation and oxygenation as indicated.

- b. Control hemorrhage.

- c. Prevent secondary brain injury;

Hypotension: SBP>90

Anemia: HB>10

Hypoxia:spo2>95%

- d. Remove contact lenses.

Cervical Spine and Neck

- **1. Assessment**

- a. **Inspect** for signs of blunt and penetrating injury, tracheal deviation, and use of accessory muscles.
- b. **Palpate** for tenderness, deformity, swelling, subcutaneous emphysema, tracheal deviation, symmetry of pulses.
- c. **Auscultate** the carotid arteries for bruits
- d. Obtain a lateral, cross table cervical spine x-ray.
(**nexus criteria ?**)

NEXUS criteria

- Cervical midline tenderness
- Distracting injury
- Abnormal level of consciousness ,cognition
- Intoxication
- Focal Neurologic Deficit(FND)

- **2. Management:**

Maintain adequate in-line immobilization and protection of the cervical spine.

Chest

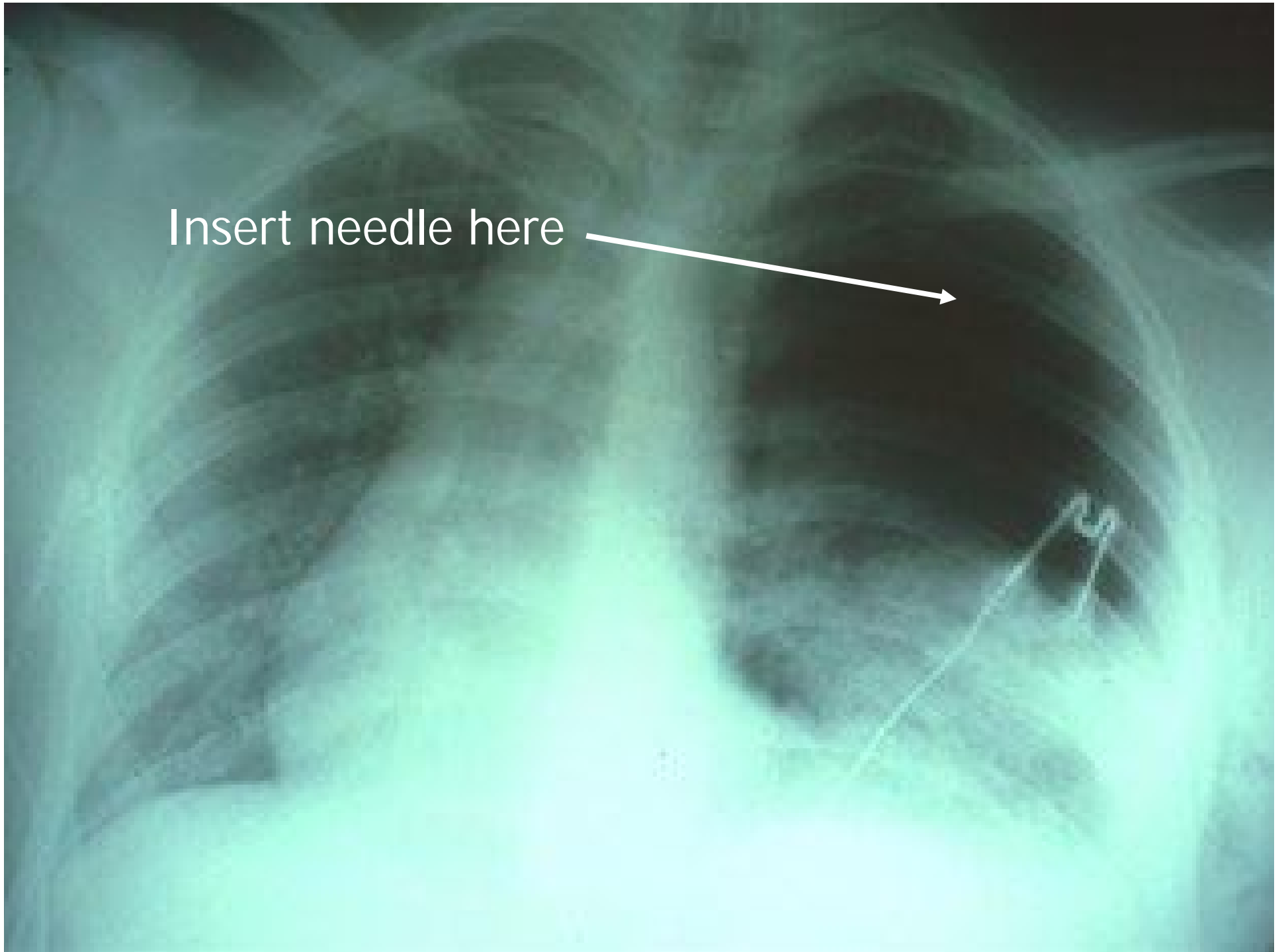
- 1. Assessment

- a. **Inspect** the anterior, lateral, and posterior chest wall for signs of blunt and penetrating injury, use of accessory breathing muscles, and bilateral respiratory excursions.
- b. **Auscultate** the anterior chest wall and posterior bases for bilateral breath sounds and heart sounds.(pediatric ?)
- c. **Palpate** the entire chest wall for evidence of blunt and subcutaneous emphysema, tenderness, and crepitation.
- d. **Percuss** for evidence of hyper resonance or dullness.

Seat belt injury



Insert needle here

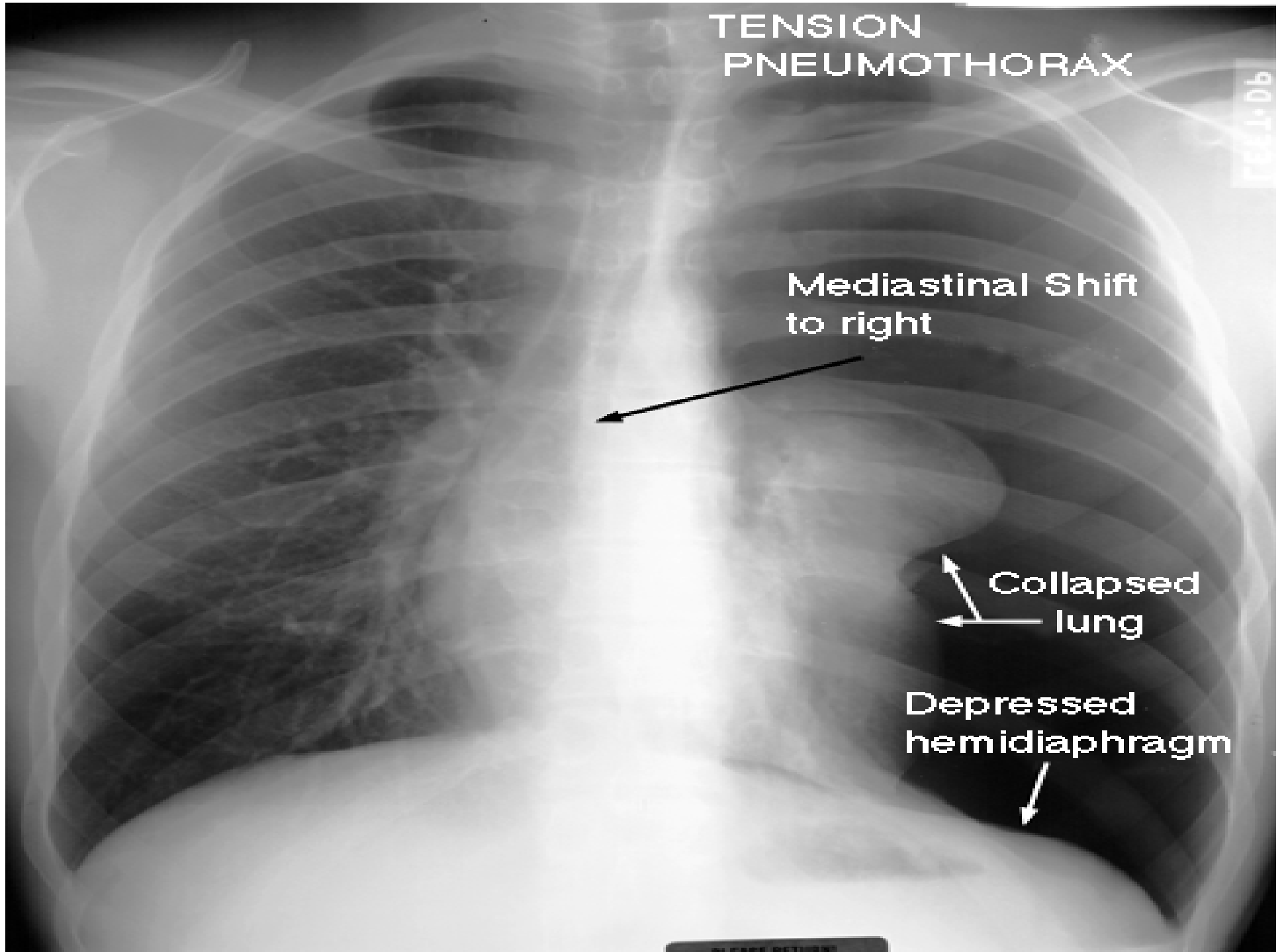


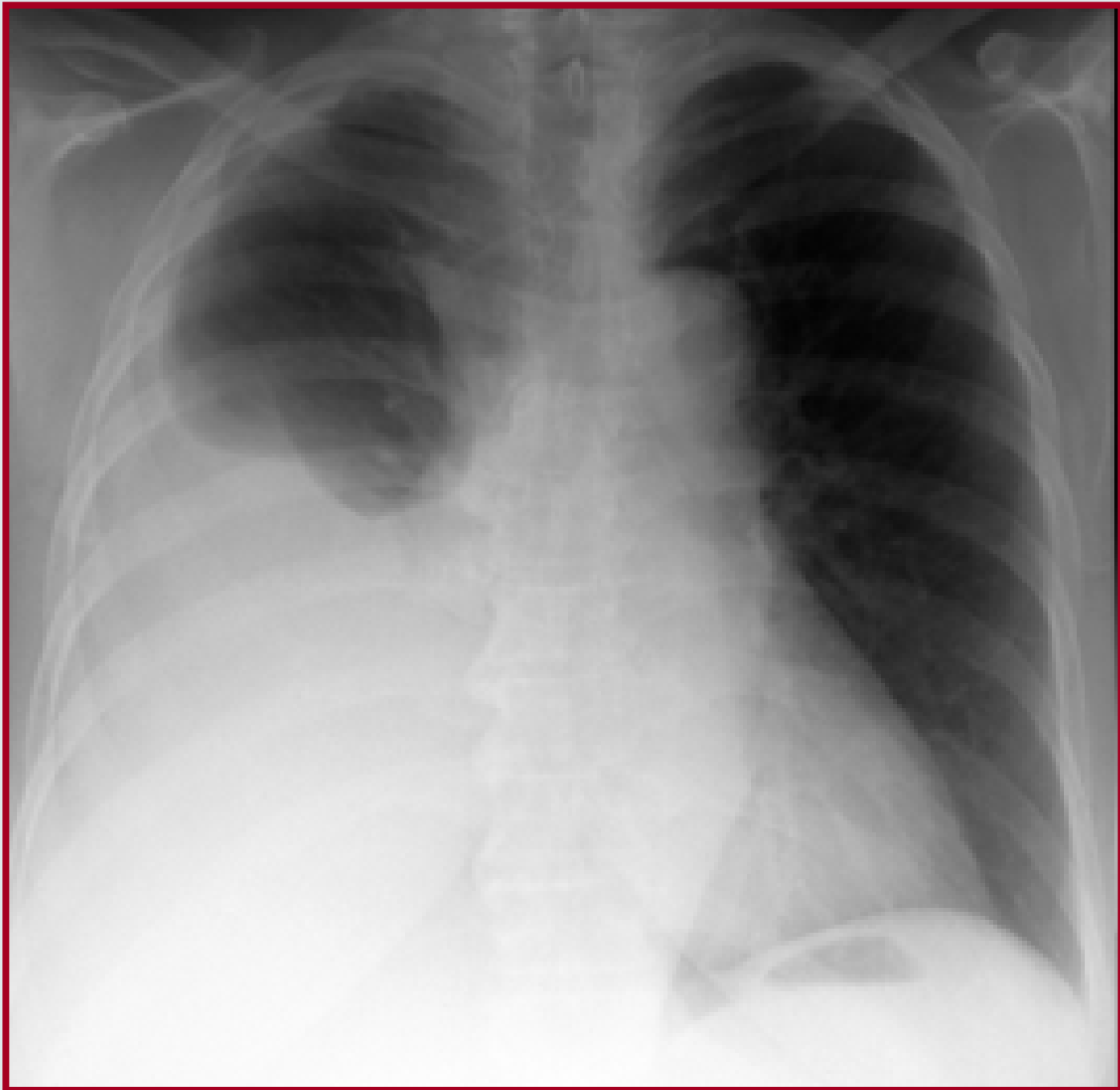
**TENSION
PNEUMOTHORAX**

**Mediastinal Shift
to right**

**Collapsed
lung**

**Depressed
hemidiaphragm**





- **2. Management**

- a. Needle decompression of pleural space or tube thoracostomy, as indicated
- b. Correctly dress an open chest wound& sucking wound
- c. Pericardiocentesis, as indicated

Abdomen

- 1. Assessment

- a. **Inspect** the anterior and posterior abdomen for signs of blunt and penetrating injury and internal bleeding.
- b. **Auscultate** for presence/absence of bowel sounds.
- c. **Percuss** the abdomen to elicit subtle rebound tenderness.
- d. **Palpate** the abdomen for tenderness, involuntary muscle guarding, unequivocal rebound tenderness, ***gravid uterus.***

Abdominal Trauma

- Common site of injury
- Assessment can be difficult

Site of “hidden haemorrhage”

- Continual reassessment important
- Early surgical consultation if possible



- **2. Management**

- a. Transfer the patient to the operating room, if indicated.
- b. Apply the pneumatic antishock garment, if indicated, for the control of hemorrhage from a pelvic fracture
- c. Obtain a pelvic x-ray.

Remember

Intra-peritoneal cavity extends

Up to 4th intercostal space in thorax and
to

7th vertebra from posterior

Perineum/Rectum/Vagina

- 1. Perineal assessment
 - a. Contusions and hematomas
 - b. Lacerations
 - c. Urethral bleeding
- 2. Rectal assessment
 - a. Rectal blood
 - b. Anal sphincter tone
 - c. Bowel wall integrity
 - d. Bony fragments
 - e. Prostate position
- 3. Vaginal assessment
 - a. Presence of blood in the vaginal vault
 - b. Vaginal lacerations

Musculoskeletal

- **1. Assessment**

- a. Inspect the upper and lower extremities for evidence of blunt and penetrating injury, including contusions, lacerations, and deformity.
- b. Palpate the upper and lower extremities for tenderness, crepitation, abnormal movement, and sensation.
- c. **Palpate all peripheral pulses** for presence, absence, and equality.
- d. Assess the pelvis for evidence of fracture and associated hemorrhage.

- e. Inspect and palpate the thoracic and lumbar spine for evidence of blunt and penetrating injury, including contusions, lacerations, tenderness, deformity, and sensation (**log rolling**)
- f. Evaluate the pelvic x-ray for evidence of a fracture.
- g. Obtain x-rays of suspected fracture sites as indicated.

Secondary Survey

Don't forget the back!



Secondary Survey

Log Roll

- 4 people(at least 3 people)
- Airway/neck controller in charge
- Clear timing and instructions
- Allows back examination

Secondary Survey; Log Roll

- This examination concentrates on the back of the head, neck, back, and buttocks, and includes a rectal examination.
 - The first person stabilizes the head and neck and manages the airway.
 - The second and third turn the patient.
 - The fourth inspects and palpates the back .

Secondary Survey; Log Roll



Musculoskeletal cont'

- **2. Management**

- a. Apply and/or readjust appropriate **splinting devices** for extremity fractures as indicated
- b. Maintain immobilization of the patient's thoracic and lumbar spine.
- c. Apply the pneumatic antishock garment if indicated for the control of hemorrhage associated with a pelvic fracture, or as a splint to immobilize an extremity injury
- d. Administer tetanus immunization.
- e. Administer medications as indicated or as directed by specialist.
- f. Consider the possibility of compartment syndrome.
- g. Perform a complete neurovascular examination of the extremities

Neurologic

- **1. Assessment**

- a. Reevaluate the pupils and level of consciousness.
- b. Determine the GCS Score.
- c. Evaluate the upper and lower extremities for motor and sensory functions.
- d. Observe for lateralizing signs.

- **2. Management**

- a. Continue ventilation and oxygenation.
- b. Maintain adequate immobilization of the entire patient.

I. Adjuncts to the Secondary Survey

- Additional spinal x-rays
- Extremity x-rays
- CT of the head, chest, abdomen, and/or spine

New updates

- 1- in patient with hemorrhagic shock 1 liter crystalloid instead of 2 liters
- 2- whole blood infusion if no response to crystalloid (1.1.2)
- 3-fibrinogen level is more important.
(below 100 micg/dl)

summary

- 1** The correct sequence of priorities for assessment of a multiply injured patient is preparation; triage; primary survey; resuscitation; adjuncts to primary survey and resuscitation; consider need for patient transfer; secondary survey, adjuncts to secondary survey; reevaluation; and definitive care.
- 2** The principles of the primary and secondary surveys are appropriate for the assessment of all multiply injured patients.
- 3** The guidelines and techniques included in the initial resuscitative and definitive-care phases of treatment should be applied to all multiply injured patients.
- 4** A patient's medical history and the mechanism of injury are critical to identifying injuries.
- 5** Pitfalls associated with the initial assessment and management of injured patients must be anticipated and managed to minimize their impact.

