

INTEGRATED POST GRADUATE TEACHING

MASS CASUALTY INCIDENT

PANEL

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What is an MCI

- Defined as an incident that results in multiple casualties that *overwhelm local resources* and that may involve natural, biological, chemical, nuclear, or other agents.

Ref -**Training of Hospital Staff to Respond to a Mass Casualty Incident**

Prepared by The Johns Hopkins University Evidence-based Practice Center

July 2004

What is Disaster Epidemiology

- Minor trauma and non trauma cases predominate
- Most common traumatic entities are – soft tissue injuries
- Most casualties are in hospital by 1to 2 hrs
- Minor injuries continue into clean up period

CLINICAL SITUATION

- ✧ A train travelling from Chennai to Hyderabad meets with an accident, when the train is hit by an oncoming goods train on the same track. It is learnt that four(4) bogies of the passenger train have derailed and over turned.
- ✧ The incident took place at about 6:00 pm approximately 50 kilometers from Narketpally.
- ✧ The site of the accident is inaccessible as there are no roads up to the accident site. The information of the accident is received in our hospital by 7:00 pm it has already become dark and there is no report on the number of people and injured.
- ✧ We discuss the challenges of Administration; Triage, casualty evaluation & role of radiology in such a clinical situation.

Scope of Discussion

- ✧ Involvement of Specialties.
- ✧ Discussion is not comprehensive
- ✧ Discussion on
 - a) Administration issues
 - b) Triage & casualty evaluation
 - c) Role of Radiology in such situations

What is Triage?

- **Triage:-** is a French verb meaning to separate; sort out or select.
- “ getting the right patient to the right place at the right time”**

What is the necessity for Triage?

- ✧ An MCI can demand upto 200% of available resources.
- ✧ Triage helps to prioritize treatment based on severity of condition.
- ✧ It helps proper allocation of available resources (man power, medical equipment, consumables, investigations & transport) effectively.
- ✧ Effective triage influences outcomes.
- ✧ Triage depends on:-
 - a) No of patients
 - b) Rate of arrival of casualties
 - c) Resupply of stores
 - d) Availability of trained staff

What is the Distribution of Injuries?

✍ As per WHO the distribution usually involves:

- a) Extremities – 65%
- b) Spinal injuries – 17%
- c) Chest & Abdomen – 8%
- d) Crush syndromes – 4%
- e) Others – 6%

Who is responsible for Triage?

☞ Triage responsibility rest upon:

- a) First responders
- b) Paramedical staff
- c) Hospital & emergency medical staff
- d) Ambulance drivers
- e) Police officers
- f) Fire fighters
- g) Rail way staff
- h) NGOs
- i) NDMA team
- j) Media

What is the role of Triage team?

- ✧ Pre Hospital evaluation(First echelon of care) consists of (simple triage and rapid treatment) START
- ✧ Assessment of respiration, perfusion and mental status(RPM)
- ✧ Each patient is assessed for one minute and allotted priorities.

- ✧ Minor cases –Green color code
- ✧ Delayed cases – Yellow color code
- ✧ Immediate cases – Red color code
- ✧ Deceased cases – Black color code

Similarly Triage should be done at each echelon of care

What is Disaster Planning

- Old paradigm
 - Hospital, critical trauma and EMD focused
- New paradigm
 - Maximum use of local and non hospital medical assets
 - Anticipate mass care of minor and non trauma cases
 - Maximum use of all resources in hospital

What are issues in Onsite management

**Expected confusion and chaos
caused by**

Emergency Personnel
Good Samaritans
Relatives
Spectators
Media
MIPs

How is field working area arranged

Field Working Areas

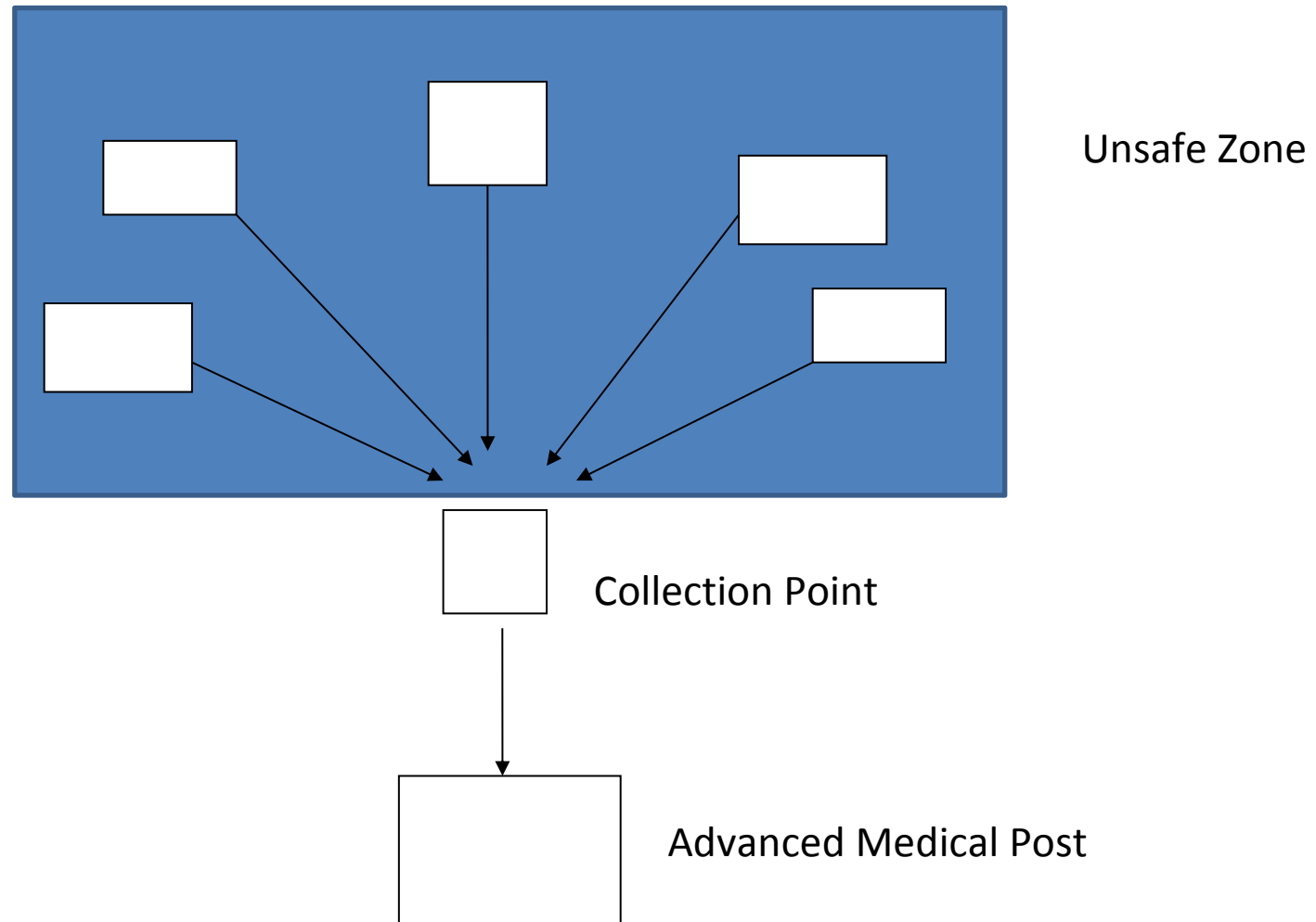
Impact zone (rescue operation)

Restricted zone (command, care)

Collection point

Reserved zone (MIPs, media, ...)

Onsite management



What are the echelons of care?

✍ Second echelon of care (Trauma centre/ emergency care)

The following actions are taken:

- a) Reassessment of Triage
- b) Intubation & ventilation
- c) Starting IV fluids
- d) Stabilisation of limb fractures

✍ Third echelon of care (definitive hospital care)

The following actions are taken:

- a) Reassessment of Triage
- b) Detailed investigations
- c) Definitive surgery

CLINICAL SCENARIO

- 25 YR male involved in the accident
- Only minor head injury sustained
- Conscious , alert, GCS 15, stable vitals
- One episode of vomiting,
- Amnesia lasting for few minutes
- Minor lacerations over scalp
- Neurologically intact
- Would you perform a CT brain for this patient
- There are other patients who are in need of CT

ANSWER

- CT not required in this scenario

Canadian CT Head Rule

CT head is only required for minor head injury patients with any one of these findings:

High Risk (for Neurological Intervention)

1. GCS score < 15 at 2 hrs after injury
2. Suspected open or depressed skull fracture
3. Any sign of basal skull fracture*
4. Vomiting \geq 2 episodes
5. Age \geq 65 years

Medium Risk (for Brain Injury on CT)

6. Amnesia before impact \geq 30 min
7. Dangerous mechanism ** (pedestrian, occupant ejected, fall from elevation)

***Signs of Basal Skull Fracture**

- hemotympanum, 'raccoon' eyes, CSF otorrhea/rhinorrhea, Battle's sign

**** Dangerous Mechanism**

- pedestrian struck by vehicle
- occupant ejected from motor vehicle
- fall from elevation \geq 3 feet or 5 stairs

Rule Not Applicable If:

- Non-trauma cases
- GCS < 13
- Age < 16 years
- Coumadin or bleeding disorder
- Obvious open skull fracture

Stiell IG, et al. The Canadian CT Head Rule for Patients with Minor Head Injury. Lancet 2001;357:1391-96.

CLINICAL SCENARIO

- 22 YR MALE involved in accident
- alert and oriented.
- BP 140/70 mm Hg and a PR 88/ minute.
- Extensive lacerations to the throat, chin, mouth, and lips.
- Neurologic examination demonstrated no apparent deficit
- Because the patient was reported to have been unconscious at the scene of the accident, an initial CT BRAIN was performed and it was normal
- The patient reported pain and tenderness in the upper cervical region .
- Routine xrays of cervical spine were normal
- What radiological investigation you would like to do and what condition would you like to exclude

ANSWERS

- CT CERVICAL SPINE
- ATLANTO AXIAL SUBLUXATION /
DISLOCATION

ATLANTO AXIAL DISLOCATION



POST REDUCTION CT



What is the Role of Hospital in MCI

- Hospitals play a critical role in health care infrastructure.
- They also provide 24x7 emergency care service and hence public perceive it as a vital resource
- Hospitals are central to provide emergency care and hence when a disasters strike the society falls back upon the hospitals to provide immediate succor.

What constitutes a MCI for a hospital

- Whenever a hospital or a health care facility is confronted by a situation where it has to provide care to a *large number* of patients in *limited time*, which is beyond its normal capacity, this constitutes a MCI / disaster for the said hospital.

How is Hospital Networking done

- District Health Authority
- Identification of PHCs, CHCs, Area Hospitals, District HQ Hospitals
- District Revenue and Municipal Authorities
- District and local Police
- Ambulance Services and EMS
- Public Transport service
- Railway authorities
- Red Cross
- NGOs
- Private hospitals and Diagnostic centers
- Regional Blood banks

How to organize In-Hospital Management

1. The Alerting Process

Administration

Medical Staff

Nursing Staff

Security

Pharmacy

Supplies

Operating Rooms

Social Services

Engineering

Kitchen

House keeping

Others

How to organize In-Hospital Management

2. Areas To Be Activated

Command Post

Accident and Emergency Department

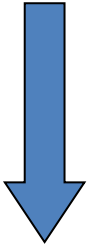
Operating Theatres

Surgical Wards

Intensive Care Units

3. Disaster Deactivation & Debriefing

SITE



SITE



Triage
Area

EMD

Hospital



✧ Fourth echelon of care (super speciality & Rehabilitation)

The following actions are taken:

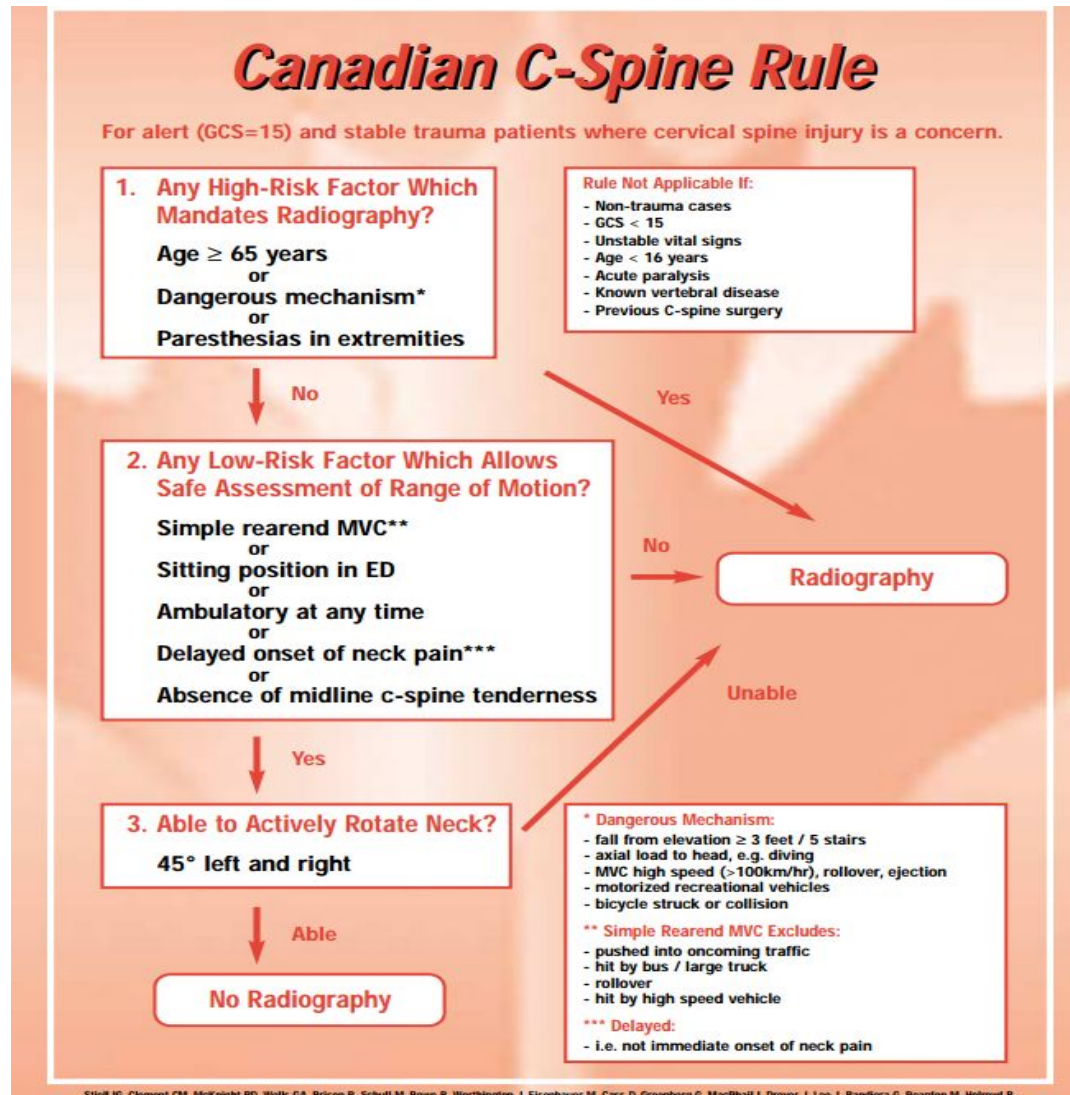
- a) Long term treatment
- b) Prolonged ventilatory support
- c) Provision of artificial Limbs
- d) Counselling and psychiatric support

CLINICAL SCENARIO

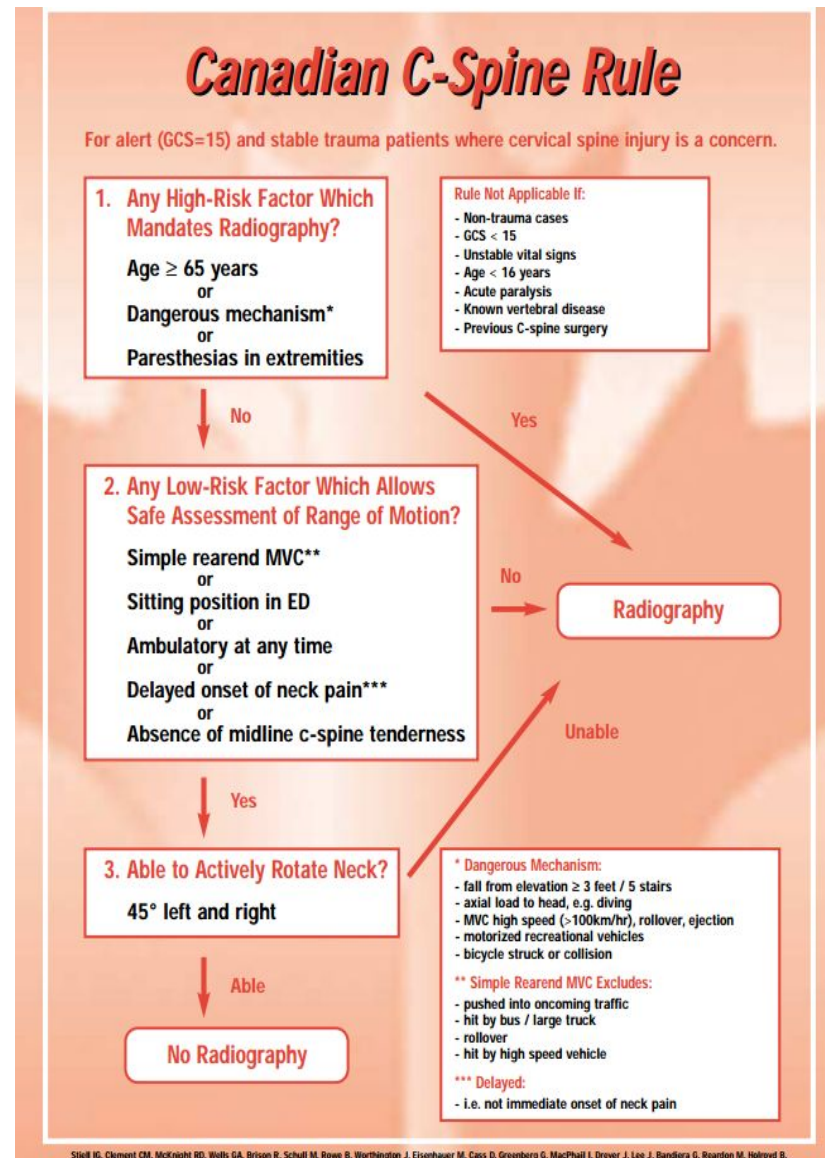
- 68 yr male involved in the accident
- Stable and alert .
- Reports no injury to cervical spine but c/o paraesthesia in extremities of hand
- Triage shows no injuries except for minor bruises
- Your colleagues are attending other patients. There are several other patients waiting for xray
- Would you consider C spine xrays or would you manage without xrays

ANSWER

- yes , he needs radiography



- If a patient has any high risk factors (Age > 65, a defined dangerous mechanism or paresthesias in the arms or legs) then they require c-spine imaging.
- If a patient has no high risk factors but meets none of the defined low risk criteria (see list), they require c-spine imaging.
- If a patient has no high risk factors, has neck pain, but meets even one low risk factor, then it is safe to assess whether the patient is able to rotate their neck 45 degrees to the left and right. If they can do this (even with some pain or discomfort), then they do not require further imaging. If they cannot rotate their neck 45 degrees in both directions then c-spine images are indicated.



CLINICAL SCENARIO

A 20-year-old woman

Initially the patient was alert but disoriented, with a Glasgow Coma Score of 14.

Physical examination revealed evidence of blunt trauma to the jaw and neck

Within the first few hours , **developed right central facial weakness, right hemiparesis, expressive aphasia, and rightward deviation of her tongue and constricted pupils**

Initial CT scanning of the brain were normal except for facial fractures

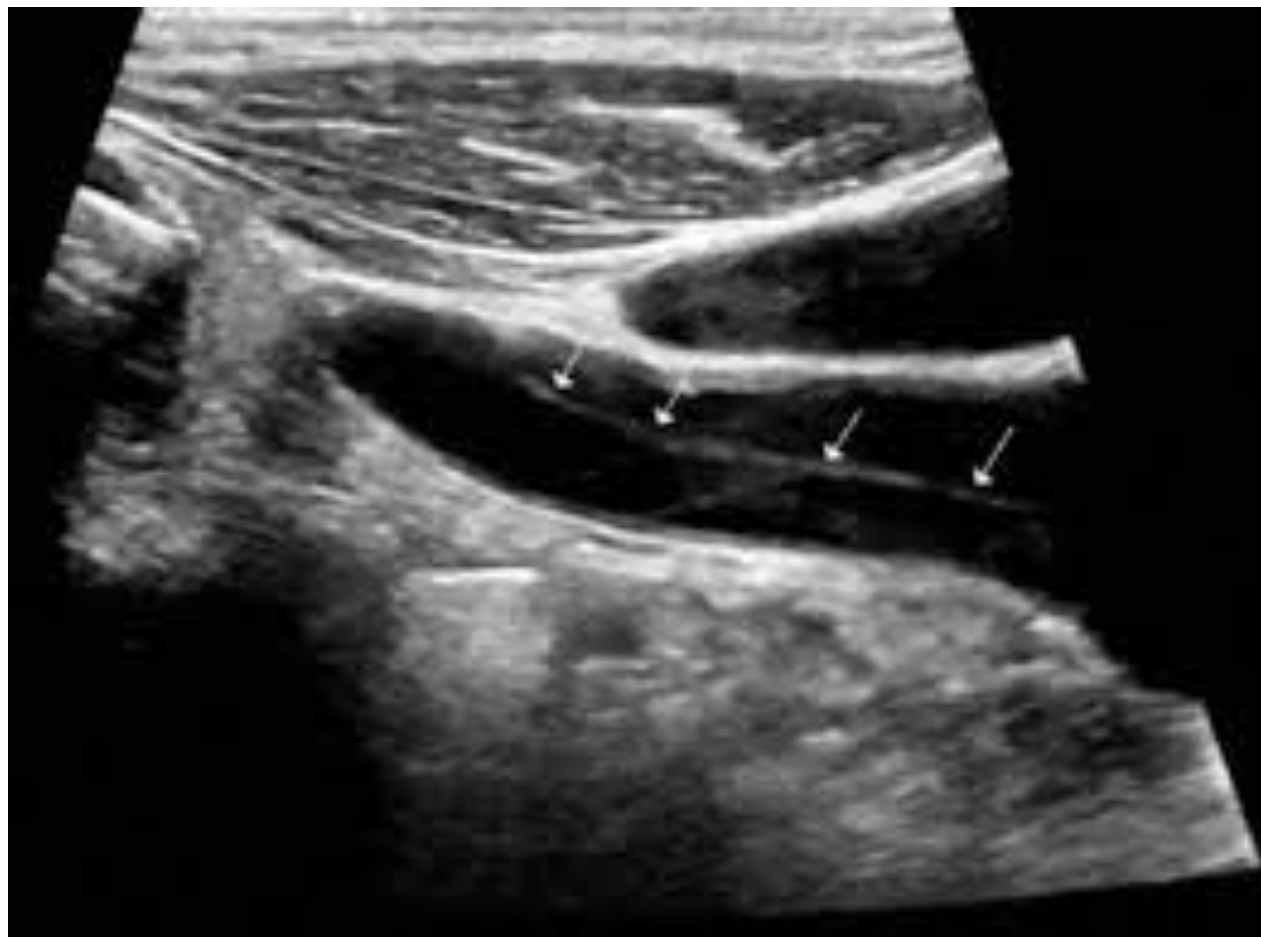
What radiological investigation would you like to do next and to rule out what condition

ANSWERS

✍ Doppler sonography of carotid arteries to rule out carotid dissection

✍ Angiography is confirmatory

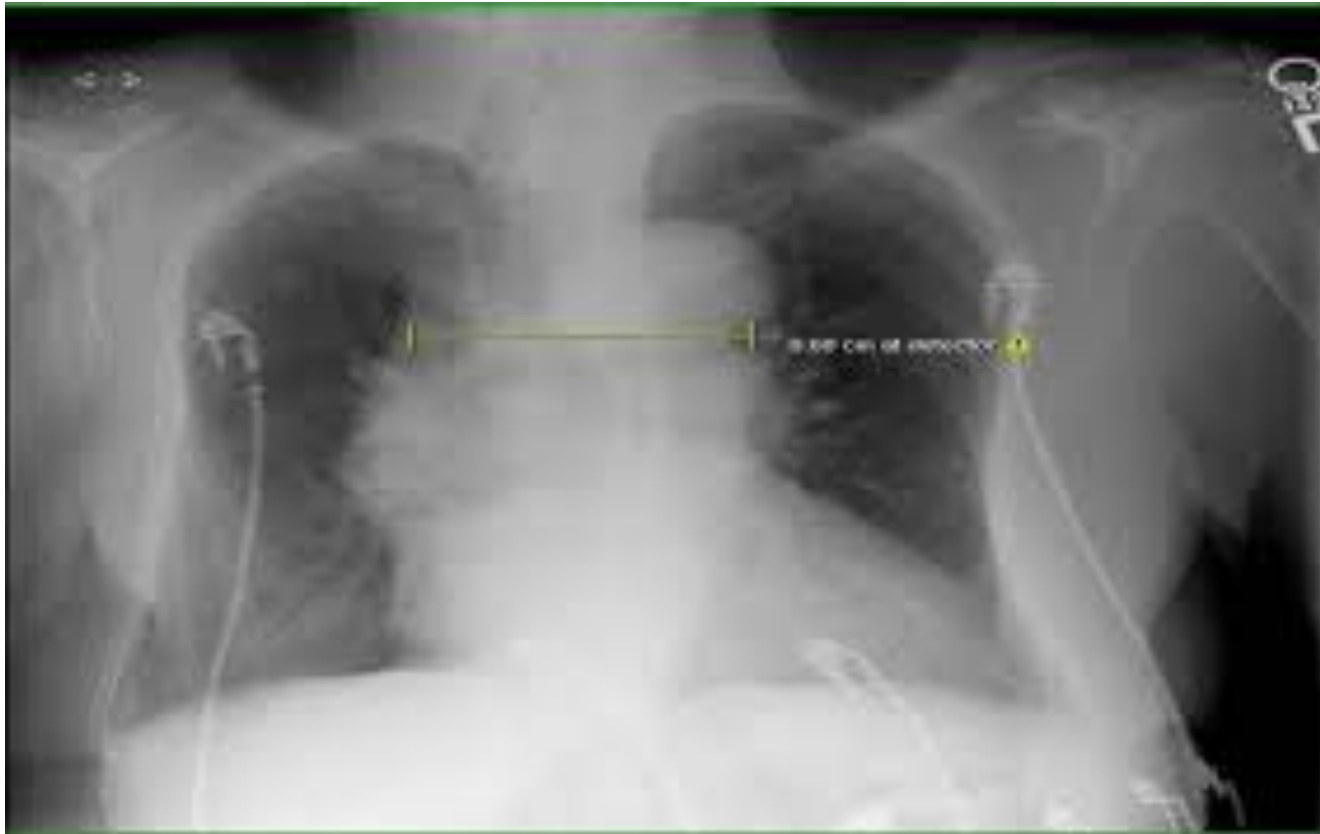
CAROTID DISSECTION



CLINICAL SCENARIO

- 25 yr male involved in the accident
- During transfer, his vital signs remained stable.
- On arrival in our ED, he had normal vital signs, with a pulse rate of 76 beats per min, blood pressure of 125/58 mmHg, and oxygen saturation of 100% on room air.
- He was noted to be confused and did not respond to questions.
- Auscultation of the chest was unremarkable. There were superficial bruises over the face and left arm,
- . There were no other obvious injuries found on physical examination. There were no external signs of injury to the chest.
- Extended focused assessment with sonography in trauma (E-FAST) showed minimal bilateral pleural effusions.
- CXR showed widened mediastinum

CLINICAL SCENARIO



CLINICAL SCENARIO

- What one important condition would you like to exclude



ANSWER

- TRAUMATIC AORTIC INJURY

TRAUMATIC AORTIC INJURY



TRAUMATIC AORTIC INJURY

- Most blunt aortic injury occurs in the thoracic aorta and 90% occur at the site of attachment of the ligamentum arteriosum.
- The findings on chest x-ray are that of mediastinal haematoma which has a high sensitivity but low specificity because most mediastinal haematoma in trauma is due to other causes.
- CT has a close to 100% sensitivity and specificity and is the investigation of choice because it delineates the aortic injury itself.
- Conventional angiography is rarely used due to widespread availability of high quality CTA

How to improve outcomes?

- a) Assessment of incident
- b) Early command decisions
- c) Initial search and rescue
- d) Triage and treatment
- e) Incident escalation
- f) Lessons learnt

Thank You