
ED Approach to Trauma

Dr. Dave MacKinnon, Dr. Natalie Wolpert

Presented by: Dr. Cori Atlin (cori.atlin@utoronto.ca)



Global Health
Emergency Medicine

This session will be recorded

- We are recording this Zoom session so that it can be watched again at your convenience, and so that we can share it with your colleagues who were not able to join us today.
- If you would prefer that this recording **not** be shared with your EM colleagues, please email amcknight@ghem.ca within 24 hours of the session.
- We will share the presentation slides and other materials (journal articles, etc.) by email; you will have access to all materials regardless of whether the recording is shared.



Please also note:

- The information in this presentation and the video recording is up to date as of the date it was recorded (September 22, 2020).
- It has not been updated to include any subsequent advances in practice, and the information presented in this video does not replace hospital, health centre, or governmental guidelines.



Learning Objectives

- To develop an initial approach to the trauma patient
- To discuss workup and management of the trauma patient
- Case based approach



Trauma in Ethiopia

- WHO: in Addis Ababa 28% of ER visits are for trauma or injury
- 2003: 1800 people died in Ethiopia due to road traffic injury



Trauma in Ethiopia

- Ethiopia recently had the highest fatality rate per vehicle in the world (180 fatalities per 10,000 vehicles)
- Most deaths in the city were vulnerable road users and pedestrians



ED Approach to Trauma

- In North America, trauma is leading cause of death in pts age <45
- Organized approach to the trauma pt key to avoiding “missed injuries”

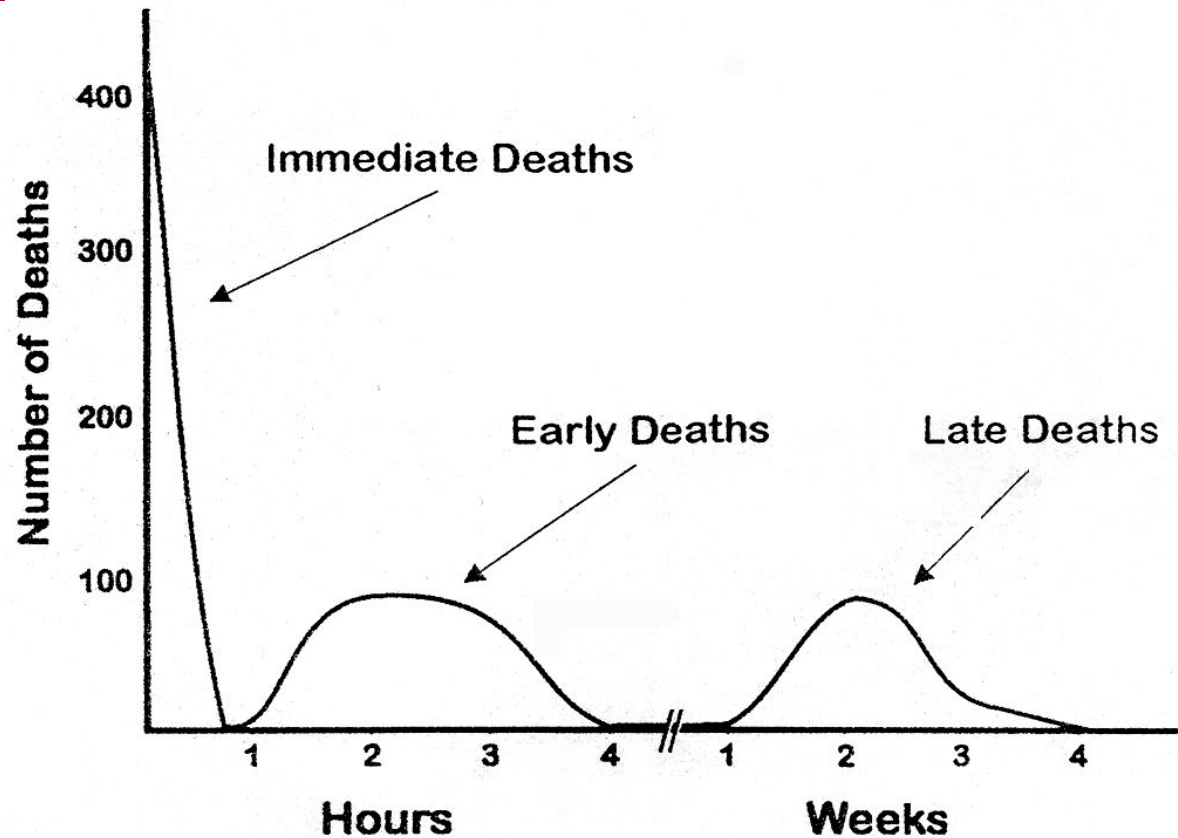


ED Approach to Trauma

- Trimodal distribution of trauma deaths:
 1. Immediate deaths (on scene): massive HI, aortic disruption, etc
 2. Early deaths (1st 1-2 hours): HI, chest trauma, abdo injuries, pelvic injuries most common >>> gives rise to the concept of the “golden hour”
 3. Late deaths (hours-days-weeks): from secondary insult – pneumonia, PE, sepsis, coagulopathy



Trauma Death by Time of Injury



Trauma Systems

- Recognition of early deaths & the concept of “*the golden hour*” led to development of trauma systems
- Significantly injured pts would be directed to “trauma centers” early in their care for early & readily available intervention
- Studies: ~15% reduction in mortality due to presence of trauma systems



Case 1

- 13:00 >> 28 yo male construction worker fell from 6th floor
- Landed on back
- At triage: HR 130, BP 78/p, GCS = 12
- IV fluids started



Case 1: Quiz Question 1

You should:

- a) Panic
- b) Ask your staff if it's OK to go for lunch
- c) Both a) and b)
- d) Use the following systematic approach to trauma to manage the pt in an organized manner



Trauma Room

- Inherently “chaotic”: ++ people, ++ noise
- Strategies to deal with this?
 1. “Team” based approach
 2. Systematic approach >> ATLS
- The goal is to turn chaos into “***organized chaos***”



Trauma Room: *Team Approach*

Nursing

- O₂
- 2 large bore IVs,
- Vital signs, cardio-resp monitor
- Labs, ?Rx, ?Td

Techs

- X-rays



Trauma Room: Team Approach

MD's

- ABCs,
- Brief Hx
- Head to toe exam
- Log roll
- Other - splinting/lacerations



ATLS

- Advanced Trauma Life Support
- A universal systematic approach to trauma patients



ATLS

1. Primary Survey (ABCDE)
2. Resuscitation
3. Secondary survey (head to toe)
4. Investigations
5. Ongoing/definitive care



ATLS

- 1. *Primary Survey (ABCDE)***
- 2. Resuscitation**
- 3. Secondary survey (head to toe)**
- 4. Investigations**
- 5. Ongoing/definitive care**



Primary Survey

- Airway** (while c-spine protection)
- Breathing**
- Circulation** (with control of hemorrhage)
- Disability** (document GCS, neuro deficits)
- Exposure**



Primary Survey - Airway

- If intubation required, RSI is method of choice *in the appropriate pt*
- Considerations in trauma: C-spine precautions, bloody airway, foreign body (teeth, etc), facial/airway swelling, full stomach
-more in your “Airway” lectures



Primary Survey - Breathing

Examine for:

- = air entry (PTX)
- Midline trachea (tension PTX)
- Paradoxical chest movement (flail chest)



Case 2

- 35 yo male in MVC with HI, chest & abdo injuries
- Intubated for HI, going to OR
- CXR pre-intubation is as follows:



Case 2



Case 2

- Do you have any concerns regarding intubation given this CXR?



Case 2

- ***Trauma pearl:*** In intubated pts, beware of +ve pressure ventilation with PTX --- may develop into tension PTX!
- This pt requires L chest tube placement



Primary survey - Circulation

- Pulse check, initial vitals important
- Control external hemorrhage with direct pressure
- ***Trauma pearl:*** don't "clamp" vessels!
 - too tedious (= more bleeding)
 - can damage repairable vessel (= annoy the vascular surgeon)



Primary survey - Circulation

- 2 large bore peripheral IVs (for sig injured pts)
- If fluid resuscitation needed, start with NS (no proven benefit of RL/other!)
- After 2 L if ongoing hypotension => **start PRBCs**



Causes of Hypotension in Trauma

1. Hemorrhagic
2. Hemorrhagic
3. Hemorrhagic
4. Obstructive
5. Neurogenic
6. Cardiogenic
7. Other



Causes of Hypotension in Trauma

1. Hemorrhagic
2. Hemorrhagic
3. Hemorrhagic
4. **Obstructive**
 - tension PTX, cardiac tamponade, etc.
5. Neurogenic
6. Cardiogenic
7. Other



Causes of Hypotension in Trauma

1. Hemorrhagic
2. Hemorrhagic
3. Hemorrhagic
4. Obstructive: tension PTX, cardiac tamponade, etc
- 5. Neurogenic**
 - high c-spine injury with loss of sympathetic trunk => clue hypotension + bradycardia
6. Cardiogenic
7. Other



Causes of Hypotension in Trauma

1. Hemorrhagic
2. Hemorrhagic
3. Hemorrhagic
4. Obstructive: tension PTX, cardiac tamponade, etc
5. Neurogenic: high c-spine injury with loss of sympathetic trunk => clue hypotension + bradycardia
- 6. Cardiogenic**
 - massive blunt myocardial injury - rare
7. Other



Causes of Hypotension in Trauma

1. Hemorrhagic
2. Hemorrhagic
3. Hemorrhagic
4. Obstructive: tension PTX, cardiac tamponade, etc
5. Neurogenic: high c-spine injury with loss of sympathetic trunk => clue hypotension + bradycardia
6. Cardiogenic: massive blunt myocardial injury - rare
7. **Other:**
 - Non-traumatic- eg MI, sepsis, anaphylaxis, etc, may have “caused” the trauma- “medical trauma”



Primary survey - Circulation

Hypotension

- Need to rapidly find the source and fix it!
- Think of hypotension causes
 - By System
 - By Source



Sources of Hypotension in Trauma

1. Head (only if massive HI with herniation or significant scalp laceration)
2. Neck (penetrating)
3. Chest
 1. Aortic injury
 2. Cardiac tamponade
 3. Tension pneumothorax
 4. Hemothorax
 5. Large blunt myocardial injury
4. Abdomen
 1. Liver hemorrhage
 2. Splenic hemorrhage
 3. Other bleeding (eg retroperitoneal)
5. Pelvis
 1. Arterial
 2. Venous
6. Long bone # (femur)
7. External hemorrhage
8. Neurogenic



.....back to Case 1

- 28 yo M construction worker fell from 6th floor
- Landed on back
- At triage HR 130, BP 78/p, GCS = 12
- IV fluids started
- Pt placed in C spine collar



Case 1 - Quiz time

- What are the 3 most important investigations *in the trauma room* for the multiple-injured *hypotensive* trauma patient?



Answer

1. CXR
2. eFAST (U/S)
3. AP pelvis



Hypotensive Trauma Pt

These 3 will help guide our initial management

- **CXR:** look for hemothorax => chest tube
- **FAST U/S:** if +ve => fluid resuscitation +/- PRBCs, **OR**
- **AP pelvis:** if #, pelvic binder => consider urgent angiography/embolization or OR



Case 3

- 50 yo female, pedestrian struck by car
- HR 140, BP 70/40, SaO₂ 90% on 100% O₂
- AP pelvis –ve, FAST (U/S) –ve
- CXR.....





Global Health
Emergency Medicine

Case 3

- ***Trauma pearl:*** you should never have a CXR with a tension PTX => means it was missed clinically!!!
- This is an example of *obstructive hypotension*
- After treatment, be sure to continue to look for other causes of hypotension



Case 4

- 40 yo male driver in rollover MVC
- HR 50, BP 60/40, SaO2 98%
- ++ neck pain
- CXR, AP pelvis, FAST all –ve
- Lat C-spine:





Global Health
Emergency Medicine

Case 4

- What is his source of hypotension?



Case 4

- Neurogenic shock!
- Clue is ↓ BP **and HR**
- Usually in pts *with high spinal injury*
- Loss of sympathetic tone (T2-T6)



Case 4

- Still important to look for other causes of hypotension (hemorrhage!) => usually significant mechanism associated with this injury
- Tx with IV pressor (eg. Dopamine)



Primary survey - Circulation

Bonus question:

- What is permissive hypotension?



Primary survey - Circulation

- The concept of *not aggressively fluid/blood resuscitating* patients unless OR available relatively soon as may cause more hemorrhage at site (eg spleen)
- Controversial
 - one study showed better outcomes with permissive hypotension but far from universally accepted



Primary Survey: Disability

- GCS is useful tool to follow neuro status
- Simpler assessment: “AVPU”
 - **A**lert vs responds to **V**erbal stimuli vs responds to **P**ain vs **U**nresponsive
- GCS < 8 --- **consider** intubation
- ...more in “Head & C-spine Injury” module



Primary Survey: Exposure

- Reminds us to examine the pt completely – *cut off clothes + log roll*
- **Trauma Pearl:** in penetrating trauma, rapid log roll very important! A stab to the back (esp. cardiac box) important to detect **early** --- may significantly change management



ATLS

1. Primary Survey (ABCDE)
2. **Resuscitation**
3. Secondary survey (head to toe)
4. Investigations
5. Ongoing/definitive care



Resuscitation

- Guided by findings in the primary survey
- May include: intubation, chest tube, IV fluid, PRBCs, thoracotomy



ATLS

1. Primary Survey (ABCDE)
2. Resuscitation
3. **Secondary survey (head to toe)**
4. Investigations
5. Ongoing/definitive care



Secondary Survey

- Brief, focused Hx (“AMPLE” – Allergies, Meds, Past hx, Last meal, Events surrounding the trauma)
- Then essentially a “head to toe” exam with log roll to examine T&L spine +/- rectal exam



ATLS

1. Primary Survey (ABCDE)
2. Resuscitation
3. Secondary survey (head to toe)
4. **Investigations**
5. Ongoing/definitive care



Investigations

- The important initial investigations in a significantly injured are
 1. CXR
 2. eFAST U/S
 3. AP pelvis
- Extremity x-rays as necessary



Investigations

- At this stage, disposition should be addressed
- Observation vs. CT vs. angiography vs. OR



ATLS

1. Primary Survey (ABCDE)
2. Resuscitation
3. Secondary survey (head to toe)
4. Investigations
5. **Ongoing/definitive care**



Ongoing/Definitive Care

- Trauma patients should be continuously reassessed --- change in condition common
- ***Trauma pearl:*** If change in condition/vitals --- remember to **start back at the ABCs** (may be something as simple as a kinked ETT!)



ED Approach to Trauma

- Let's try to put it all together.....



Case 5

- 45 year old male
- MVC, T-boned on driver's side
- Belted passenger, airbag deployed
- 40 minute extrication
- Driver dead on scene



Case 5

- Awake, A&O
- c/o L sided CP & AP
- HR 130, BP 75/50, RR 20, SaO₂ 92%
- **O/E**: = A/E, moderate L chest & LUQ tenderness, tender pelvis, rest -ve

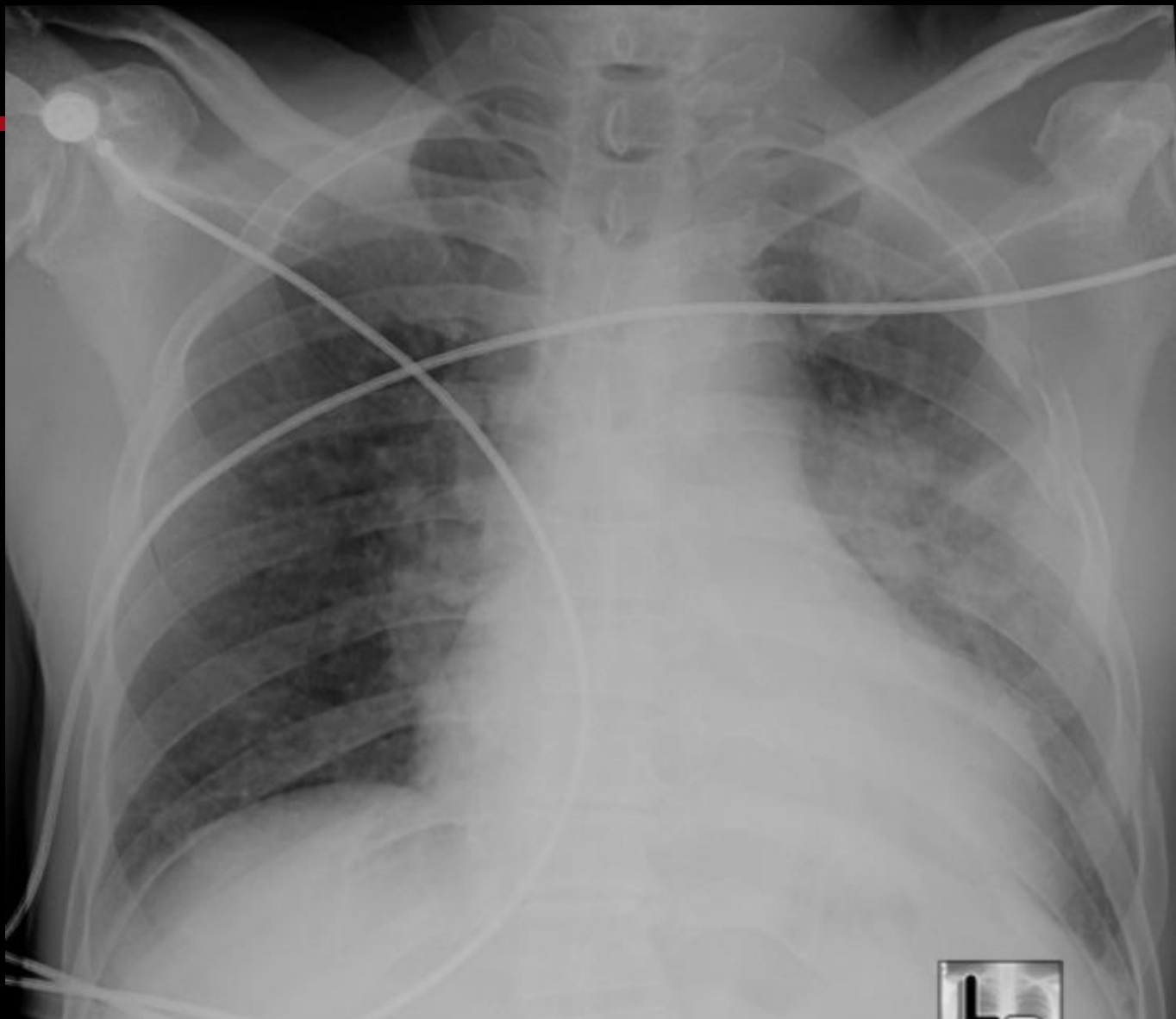


Case 5

CXR:



Case 5



Case 5

- AP pelvis:



Case 5

Name
II
E
E 8/5/27/2005
Time 1:08:17 PM
No. 2
x 0.4

Inst ST MICHAEL'S HOSPITAL
Model CR950



MarkOnFilm

791-9408e
C: 02046

Case 5

- FAST +ve spleno-renal space & in pelvis
- HR 130, BP 75/50
- Where to?



Case 5

- Tricky.....
- Hypotensive >>>> needs intervention
- ?OR for +ve FAST in LUQ
- ? Angio for bleeding pelvis



Case 5

- *If available*, most would choose angio because:
 1. Can embolize pelvic vessels & splenic vessels
 2. Difficult to stop pelvic bleeding in OR (packing of pelvis not very effective if arterial bleed)
- But also consider longer time to angio or availability



Summary

- A systematic approach to Trauma and focused Trauma care centers improve patient outcomes
- Resuscitation of trauma patients is *done in conjunction* with assessment
- Important investigations in trauma include CXR, Pelvic XR and FAST
- Remember full exposure of patients (including log roll) and head-to-toe exam



Reference Readings

- Emergency Medicine: A Comprehensive Study Guide – 7th Ed. Tinitinalli J et al. Chapter 251 – Initial Approach to Trauma
- Marx: Rosen's Emergency Medicine, 7th ed. Marx J et al. Chapter 33 – Multiple Trauma
- ATLS Manual

