Emergency - Quality, Education and Safety Teleconference

E-QuEST

24th September 2019

Dr Paris Ramrakha and Dr Louisa Ng | Advanced Trainee | Emergency Care Institute

Thanks for joining

House rules

Confidentiality

Respect

AGENDA

- Case reviews
- Underlying causes
- Clinical context
- NSW Health guidance

Participation encouraged throughout

(But please turn off camera & mute mic when not talking)

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An unexpected fall

Triage 0350 30/5/20** 59 yr old Male

Level 4 facility

Triage presenting information

Back pain R under scapula – fall 2/7, mechanical in bath and landed on side of bath, denies loc/HI, sb gp and for x-ray today, states pain increasing, took endone/targin poor effect, unable to take large breath or cough, sharp pain

Observations at triage

Respiratory Rate : 16 brpm
Oxygen Saturation : 97 %
Room Air or Oxygen at Triage : Room air
Peripheral Pulse Rate : 83 bpm
Systolic Blood Pressure : 161 mmHg
Diastolic Blood Pressure : 84 mmHg
Mean Arterial Pressure : 110 mm/Hg
Temperature, Oral : 37 DegC
Update patient weight : No
Pain : Assessed
Blood Glucose Level, Bedside : 7.3 mmol/L

Pain Score Rest/Movement
Pain (0-10) - Rest : 8
Pain (0-10) - Movement : 9

Thoughts so far?
Triage category?

History by MO

- 2 nights ago had some back pain and ran a bath
- Slipped getting into bath and fell onto posterior ribs thoracic region
- Bruised and painful now
- Difficulty taking deep breaths and coughing
- GP started 5mg endone QID, regular Panadol, and Targin BD
- Worsening pain tonight despite this
- Bowels opening normally
- Otherwise well
- No other injuries or complaints
- SHx: Lives with wife and is a truck driver

Red Flags (back pain?)

- No leg weakness
- No saddle anaesthesia
- No bowel/bladder dysfunction

PMH

- Diabetes
- Hep C and liver cirrhosis from previous blood transfusion

Exam

RS – chest clear, good ae throughout

CVS – HSDNA

Neuro – GCS 15, LL limb power 5/5 bilaterally, normal gait, normal sensation

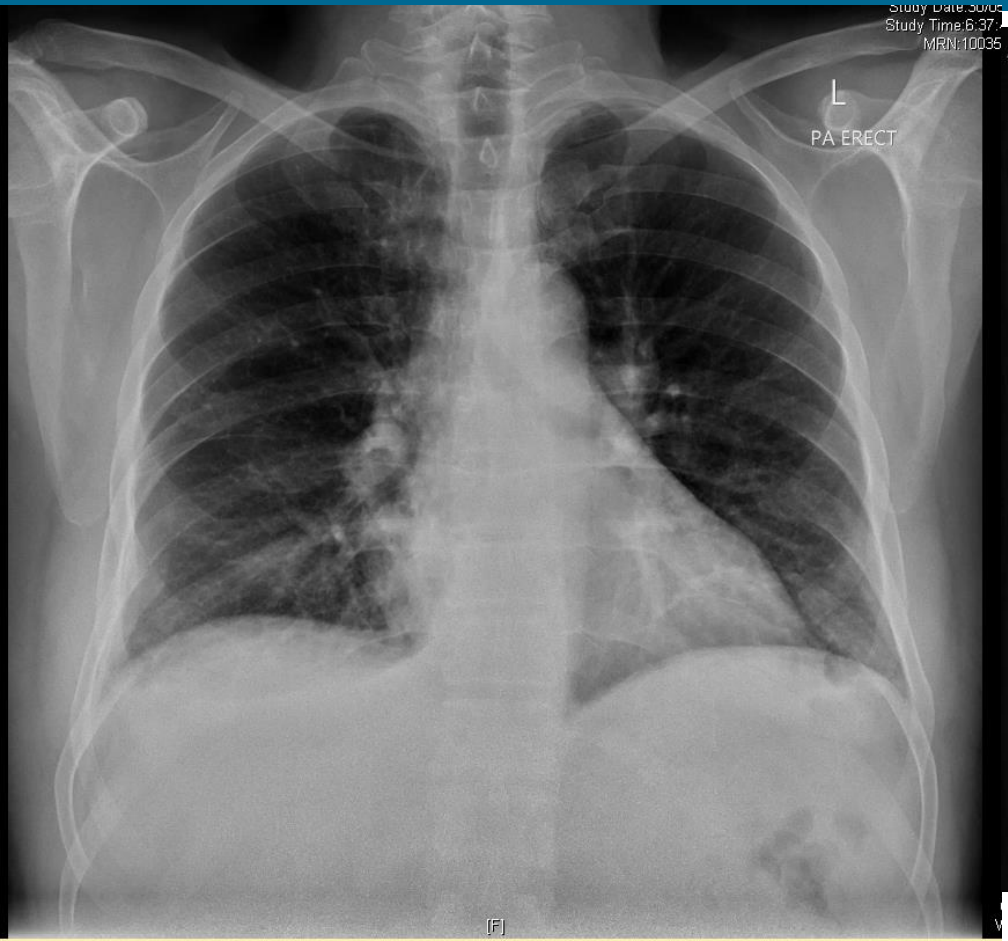
Exposure – no central spinal tenderness or paraspinal tenderness on palpation, no c-spine tenderness

Bruising over left thorax, tender on palpation

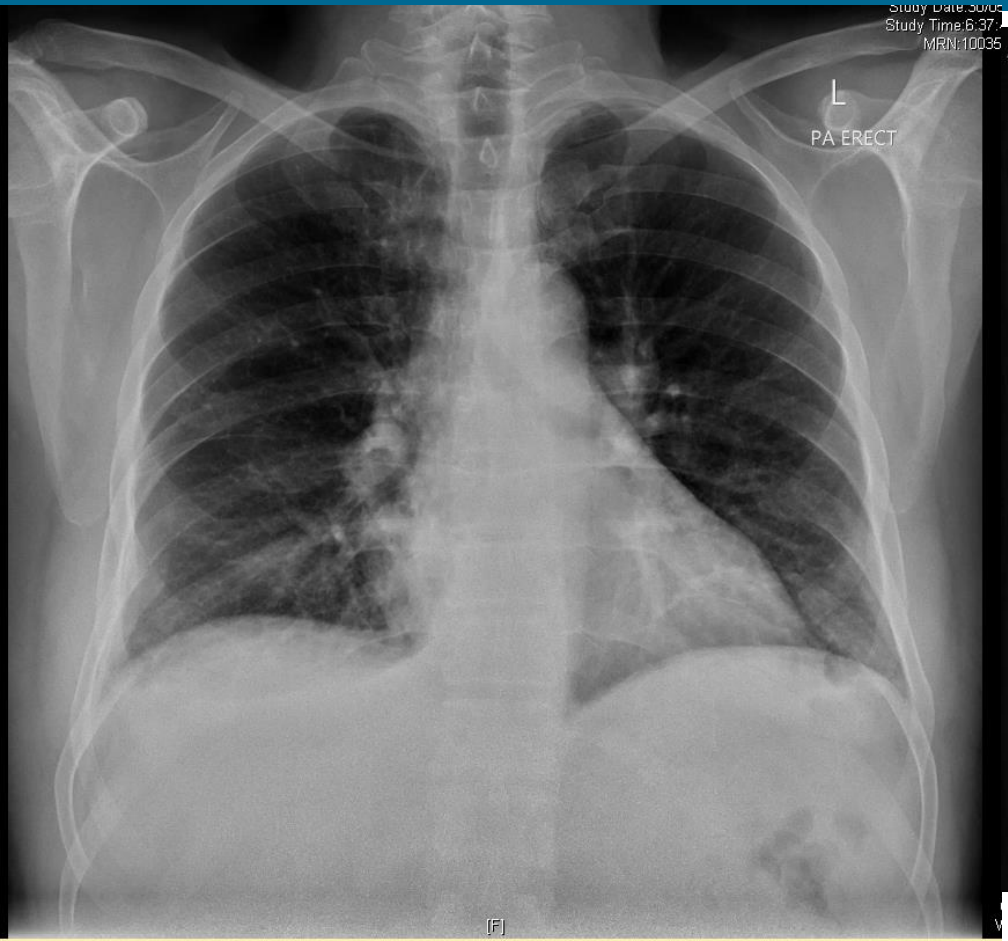
Abdomen soft non tender

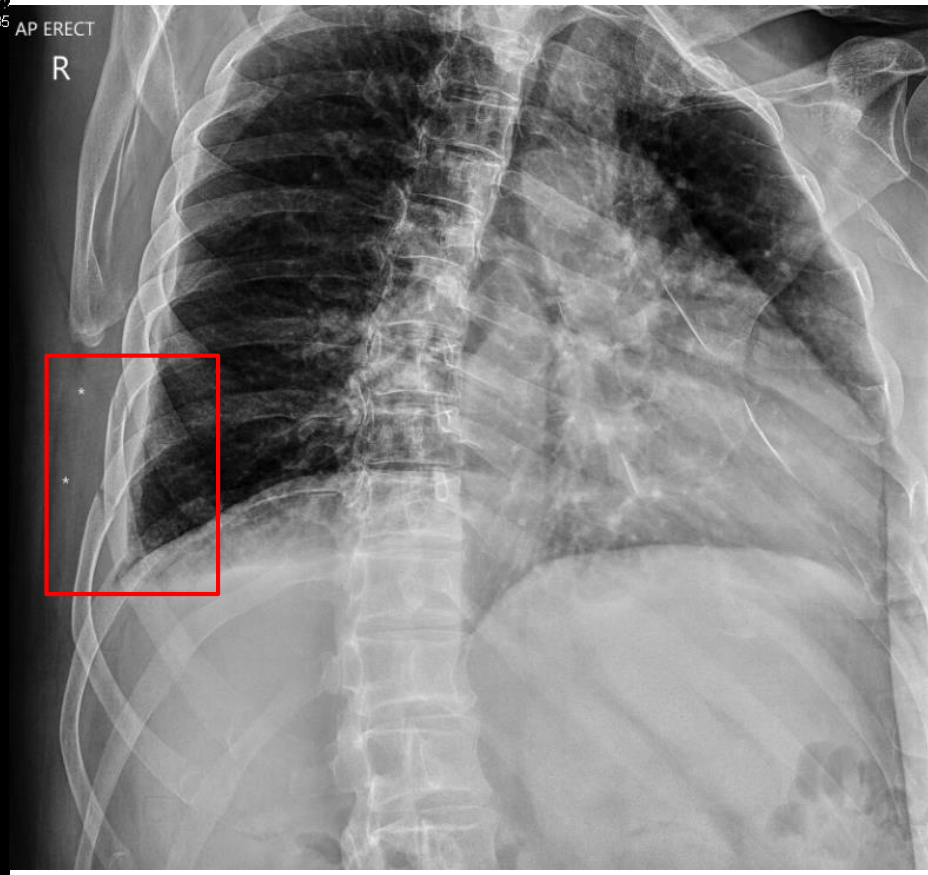
Thoughts? Any concerns or red flags?
What would be your next step?

Investigations



Investigations





Observations whilst in ED

36.9 DegC	36.8 DegC	36.8 DegC	37 DegC
63 bpm	68 bpm	76 bpm	83 bpm
16 brpm	16 brpm	16 brpm	16 brpm
149 mmHg	143 mmHg	149 mmHg	161 mmHg
66 mmHg	65 mmHg	70 mmHg	84 mmHg
			110 mm/Hg
94 mm/Hg	91 mm/Hg	96 mm/Hg	
98 %	96 %	97 %	97 %
	Pain (0-10)	Pain (0-10)	
			Assessed
	3	7	8
			9

https://en.wikipedia.org/wiki/Nursing_assessment

Discharged at 7am in the morning

- To seek follow up with GP to extend sick note, and advised not to drive
- Continue endone and targin
- Add in Panadol 1g QID
- Add in ibuprofen 400mg with food for the next 5 days
- Ensure deep breathing
- Please can GP refer for chest physiotherapy
- To seek medical attention if unable to take deep breaths/fevers/productive cough

Would you add anything else?

What are your thoughts on rib fractures requiring large amounts of oral opiates?

THOUGHTS ON THE CASE so far?

Blunt Chest Trauma

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Blunt Chest Trauma

- Majority of blunt chest trauma patients we see in Australia are MVA related, assault, sports, and falls
    - The elderly/frail/chronically ill is a big group from minor trauma!
- Literature is primarily on patients major significant injuries and not minor injuries such as isolated rib fracture and as a result it is largely unknown

Blunt Chest Trauma

Life threatening injuries:

Tension pneumothorax

Hyperesonance, tachypnoea, decreased or absent air entry to affected side, decreased chest movement, tracheal deviation (late sign)

- Immediate finger thoracostomy, then reassess. An Intercostal catheter can be performed later.

Massive haemothorax

Dullness to percuss, decreased or absent air entry

- Insertion of intercostal catheter

Open pneumothorax

Open 'sucking wound", decreased air entry

- 3 sided occlusive dressing followed by insertion of intercostal catheter.

Flail chest & Pulmonary contusions

Paradoxical chest movement

- Adequate analgesia / oxygenation / consider early intubation and ventilation.

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Assessment and Examination

- Systematic: ABCDE

Primary Survey

AIRWAY / C-SPINE

- Rapidly assess airway stability & for major injuries affecting patency
- Be prepared for a difficult intubation
- Maintain full spinal precautions

BREATHING

- Identify any life threats & treat immediately
- Assess RR, work of breathing, SpO_2 & symmetry
- Oxygen therapy to maintain SpO_2 between 94-98%
- $ETCO_2$ monitoring if intubated

CIRCULATION

- Insert x 2 large bore IV cannulas
- IO access if required
- Assess HR / BP / JVP / Cap refill
- Initial management of hypovolaemia - cystalloid fluids, 20mL/kg, then consider blood products

DISABILITY

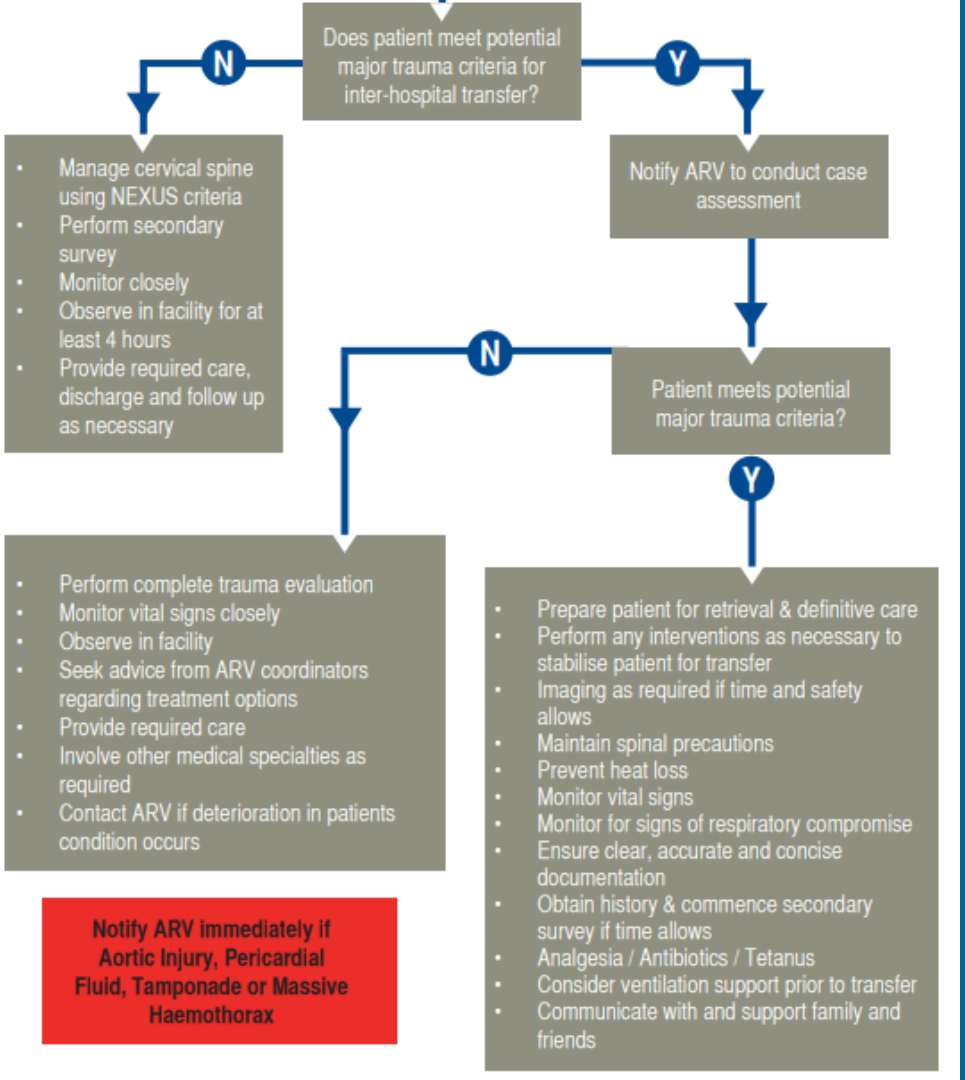
- Assess conscious level - AVPU
- Check pupils
- Test BSL

EXPOSURE / ENVIRONMENT

- Fully expose and inspect patient
- Prevent heat loss
- Log roll

ADJUNCTS

- FAST scan
- Analgesia
- X-ray: Chest, Pelvis
- Bloods – FBE, X-match, U&E, Lactate, ABG, Troponin
- 12 lead ECG
- Orogastric tube if intubated
- AMPLE mnemonic



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Look, Listen, and Feel approach to chest trauma Ax

LOOK:

- Adequate exposure (NB: prevent hypothermia)
- Respiratory rate and effort
- Asymmetric or paradoxical chest wall movements, or accessory muscle use
- Signs such as a seat-belt bruising raise concern for pulmonary or aortic injury

LISTEN:

- Air entry, hyper-resonance, lack of breath sounds

FEEL:

- Palpate the entire chest wall for areas of tenderness, crepitus or deformity
    - Pain and tenderness along the lower ribs, especially when associated with abdominal pain, are at higher risk for intra-abdominal injuries

Diagnostic Imaging

- In general, chest x-ray imaging is a mandatory component of the primary trauma assessment
- CT assessment, according to ATLS guidelines, is for “severe” mechanisms and/or special populations

Severe MOIs[26]
Falls
- Adults: > 20 ft (one story is equal to 10ft)
- Children: > 10 ft or 2-3 times the height of the child
High-risk Auto Accident
- Intrusion (including roof): > 12 in occupant site; > 18 in any site
- Ejection (partial or complete)
- Death in the same passenger compartment
- Vehicle telemetry data consistent with a high risk injury
Auto vs. pedestrian/bicyclist thrown, run over, or with significant (> 20 mph) impact
Motorcycle crash > 20 mph

Special Populations[26]
Older Adults
- Risk of injury/death increases after age 55
- SBP < 110 might represent shock after age 65 years
- Low impact mechanism (i.e. ground-level falls) might result in severe injury
Anticoagulation or Bleeding Disorders
Pregnancy > 20 weeks

But what if I am worried about a major injury following a non severe blunt thoracic injury?

Tracheobronchial Injury:

Persistent pneumothorax following chest tube placement, collapse of the lung away from the hilum (“fallen lung sign”), over-distention/herniation of the endotracheal balloon, or clinical concern for tracheobronchial injury => CT (+ bronchoscopy).

Oesophageal Injury:

CT oesophagram

Thoracic Aortic Injury:

All patients receive a screening CXR.

Abnormal CXR concerning for aortic injury or unstable patient suspected of having a traumatic aortic injury => CT aortagram

But what if I am worried about a major injury following a non severe blunt thoracic injury?

Pulmonary Parenchymal Injury:

Pulmonary contusion and pulmonary laceration

- CT: delineates alternative etiologies (aspiration, atelectasis, cardiogenic/non-cardiogenic pulmonary edema).

Pneumothorax, Pneumomediastinum, or Hemothorax:

CT if CXR non-diagnostic and patient symptomatic. CT demonstrates high sensitivity, is capable of differentiating between a pneumothorax and pneumomediastinum, and detects small hemothoraces.

Thoracic Skeletal Injuries:

CT chest if signs and symptoms suggestive of more than simple rib fractures

If sternoclavicular dislocation is identified => CT angiography

If a thoracic spinal fracture is identified on chest CT => thoracic spine CT

Diaphragmatic Injury:

If CXR fails to demonstrate herniation of bowel contents and suspicion remains high => Chest CT.

- +/- exploratory laparotomy.

We are going to return to the case…

Questions?

Let’s keep going… 3/6/20** 59 Male - Batphone

540am

Handover the phone

Increased SOB with R postural rib pain

Fall and head strike at 0200 am?

Tachypnoeic +++

Hypotensive --- we will be with you in 10 minutes

Into Resus - Observations

Triage Cat: 1

Triage Date/Time : 03/06/2018 5:53
Triage Visit Reason : Unwell
Type of Visit : Emergency Presentation
Respiratory Rate : 40 brpm (>HHI)
Oxygen Saturation : 89 % (<LLOW)
Room Air or Oxygen at Triage : Room air
Peripheral Pulse Rate : 112 bpm
Peripheral Pulse Rate Regularity : Regular
Systolic Blood Pressure : 68 mmHg (<LLOW)
Update patient weight : No

General Neurological Assessment
GCS Eyes Open : 4 - Spontaneously
GCS Best Verbal Response : 5 - Oriented
GCS Best Motor Response : 6 - Obeys commands
Glasgow Coma Score : 15

Definitely not what you want to see at the end of night shift – a patient in respiratory extremis

What friends are you going to call and how would you organise your team?

ABCs

A: Own, requiring 15L NRB

B: reduced breath sounds on the right side, and left breath sounds present

No obvious tracheal deviation, or distension of neck vessels

C: HSD, haemodynamics as per obs, hypotensive

D: Unable to speak but eyes opening and tracking, and nodding to questions

E: large bruise right posterior thorax

G: Abdomen soft, no obvious flank bruising

Patient sitting up right and in pain +++ abdomen and chest

Diaphoretic +++

Wife in attendance assisting with collateral history

What differentials are going through your mind as a clinician?

What interventions post primary survey of an acutely unwell patient who could be a trauma/medical cat 1?

What things or support will this patient require ie ICU? HDU? Further intervention?

Bit more background from wife:

- Had a fall a few days ago (not tonight!)
- Been on multiple pain killers and felt like things were not particularly getting better
- Woke up early this morning and was grey looking, sweaty and complaining of abdominal pain

In the meantime….

What can I do for this guy?

Pain relief -

Fentanyl

Hypotensive and tachycardic -

Bolus of fluid – how much?

IV access

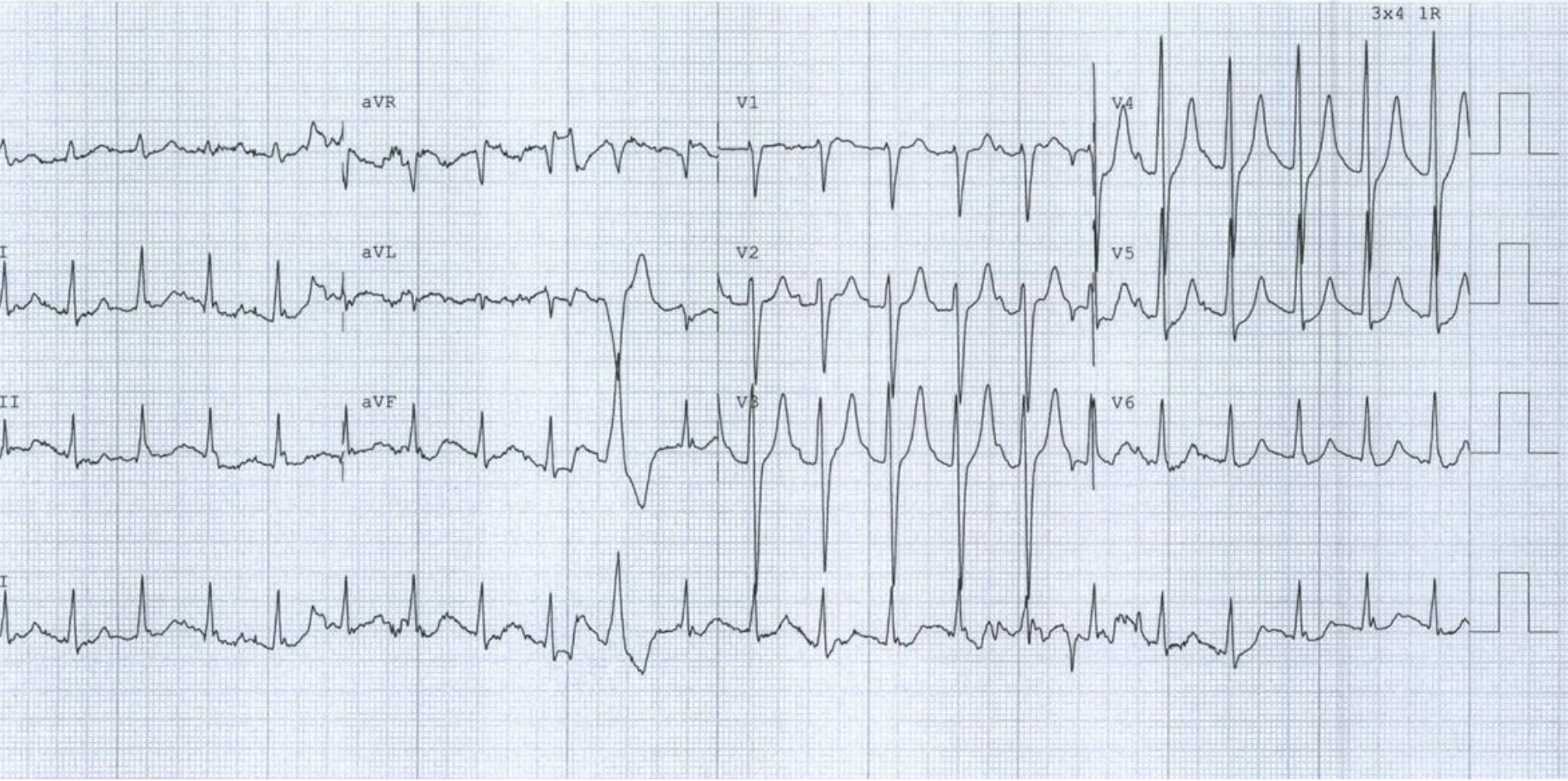
Bedside US of lungs – showed possible effusion on the right

VBG and ECG and baseline bloods

Mobile chest x-ray – busy in ICU and will attend as soon as they can

VBG interpretation?

Blood Gas pH	7.12 C
Blood Gas PCO2	42 mmHg
Blood Gas PO2	28 mmHg
Blood Gas Bicarbonate	13 mmol/L L
Blood Gas Base Excess	No Res mmol/L
Blood Gas O2 Saturation	25 % L
Blood Gas Sodium	143 mmol/L
Blood Gas Potassium	4.9 mmol/L H
Blood Gas Ionised Calcium	1.15 mmol/L
Blood Gas Calcium Ionized pH Corrected	No Res mmol/L
Blood Gas Creatinine	189 umol/L H
Blood Gas Lactate	11.7 mmol/L C
Blood Gas Glucose	8.9 mmol/L H
Blood Gas Haemoglobin	62 g/L C
Blood Gas Oxyhaemoglobin	25 % L
Blood Gas Deoxyhaemoglobin	73 %
Blood Gas Carboxyhaemoglobin	0.9 %
Blood Gas Methaemoglobin	1.2 %
Blood Gas FIO2	21.0
	Venous


3x4 1R
aVR
V1
V4
aVL
V2
V5
aVF
V3
V6

Revisit the ABCs

A and B: Able to wean oxygen down 2L np with saturations between 94-99%

C: Remains hypotensive and tachycardic but better

D: GCS 15

36.1 DegC
129 bpm
Regular
28 brpm
91 mmHg
63 mmHg
72 mm/Hg
92 %

What else can we fix?

What imaging do I need to work out what is going on?

What in the world do we think is going on?

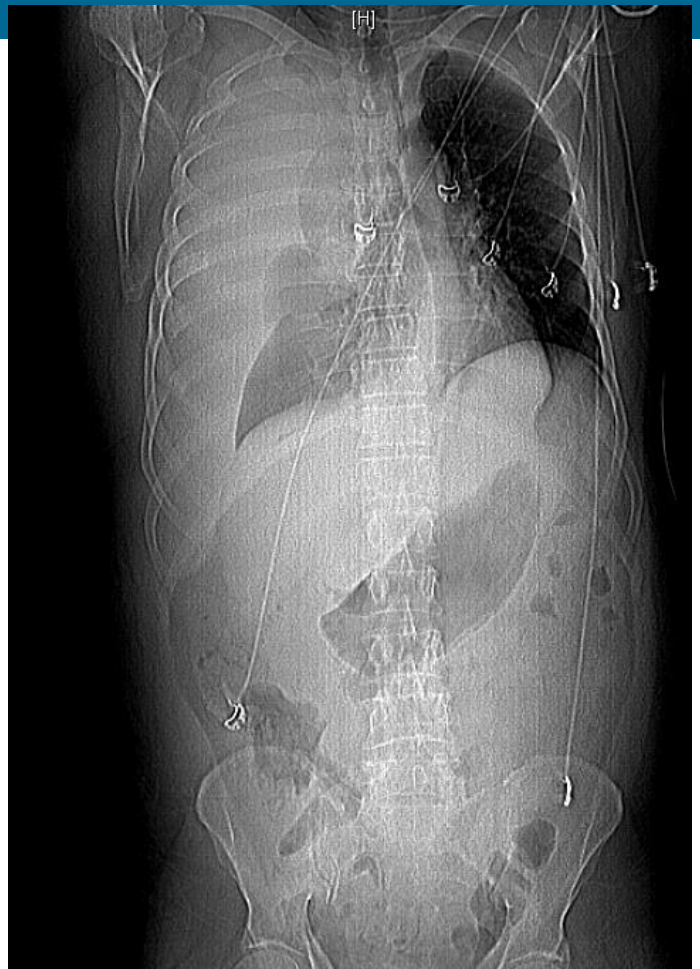
Activate massive transfusion protocol – he is bleeding or has bled

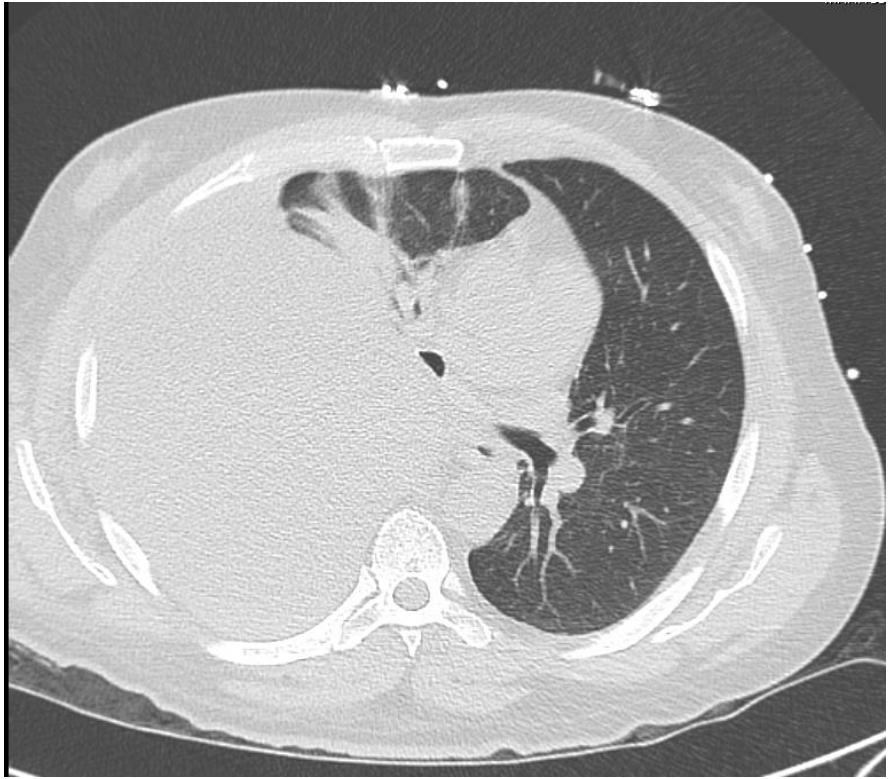
?Dissection in the context of both chest and abdominal pain

?Massive internal blood loss

Tranexamic acid 1g given

In CT what did we see?





[H]

Now some thinking time

Why is this patient bleeding?

What can we do to optimise the situation?

Who do we need to talk to imminently for help and disposition of this patient?

Would you put a chest drain in?

Some bloods

White Cell Count	Final (c)
Haemoglobin	6.9 x10^9/L (c)
Platelet Count	60 g/L C (c)
Red Cell Count	60 x10^9/L L (c)
Hct	1.56 x10^12/L ...
MCV	0.18 L/L L
Mean Cell Hb	117 fL H
Mean Cell Hb Conc.	38 pg H
RDW	328 g/L
MPV	16.7 % H
	10.0 fL
	Verified (c)
	5.4 x10^9/L (c)
	0.9 x10^9/L L
	0.6 x10^9/L
	0.0 x10^9/L
	0.0 x10^9/L
	FBC Comment
PT	31.8 second(s)...
INR	3.2
APTT	43.8 second(s)...
	1.21 g/L L
Fibrinogen	

Sodium	142 mmol/L
Potassium	4.9 mmol/L
Chloride	110 mmol/L
Bicarbonate	13 mmol/L C
Urea	8.9 mmol/L H
Creatinine	185 umol/L H
Anion Gap	24 mmol/L H
Estimated GFR (CKDEPI)	34 mL/min/1.7...
	Estimated GF...
Bilirubin (Total)	84 umol/L H
Total Protein	50 g/L L
Albumin	18 g/L
Globulin	32 g/L
Alkaline phosphatase	109 unit/L
Gamma glutamyltransferase	46 unit/L
Alanine aminotransferase	19 unit/L
Aspartate aminotransferase	55 unit/L H
Calcium	2.10 mmol/L
Phosphate	2.50 mmol/L
Magnesium	2.73 mmol/L H
	1.04 mmol/L

Formal report of the CT scan

There is a massive right-sided extrapleural haematoma which is actively bleeding. There is a haematocrit level present within the extrapleural haematoma. There are foci of active haemorrhage seen on the arterial and venous phases probably due to lacerated intercostal vessels and / or intercostal musculature. There are acute displaced fractures of right ribs 8 and 9. The extrapleural haematoma measures approximately 16 x 26 x 13 cm. It is causing shift of the heart and mediastinal structures from right to left. There is quite marked compression of the SVC as a result of the haematoma and there is near complete collapse of the right lung as a sequela. There is marked compressive mass effect on the right atrium.
Specialist review without delay is recommended.
CONCLUSION:

There is a massive right-sided extrapleural haematoma which is actively bleeding. There is a haematocrit level present within the extrapleural haematoma. There are foci of active haemorrhage seen on the arterial and venous phases probably due to lacerated intercostal vessels and / or intercostal musculature. There are acute displaced fractures of right ribs 8 and 9. The extrapleural haematoma measures approximately 16 x 26 x 13 cm. It is causing shift of the heart and mediastinal structures from right to left. There is quite marked compression of the SVC as a result of the haematoma and there is near complete collapse of the right lung as a sequela. There is marked compressive mass effect on the right atrium.
Specialist review without delay is recommended.

What friends I called

Disposition: ICU

Cardiothoracic surgeon: Imminent drain

Haematology: Address the coagulopathy

Source control: IR? Hope it tamponades

Coagulopathic patient haemodynamically unstable secondary to blood loss from a traumatic haemothorax (fractured ribs 8 and 9).

Haemothorax has mass effect causing IVC compression and on the right atrium, and collapse of the right lung.

118 bpm	127 bpm
Regular	Regular
22 brpm	21 brpm
103 mmHg	81 mmHg
51 mmHg	63 mmHg
68 mm/Hg	69 mm/Hg
95 %	91 %

Spoken to cardiothoracics agreed would need a chest drain at some stage but should tamponade eventually

Said I could attempt as the MO or get general surgery to do it as scrubbed in theatre with an acute aortic dissection

What would you do?

DISCUSS

- What went well?
- What could have gone wrong?
- How can this help local management?

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Just to give you an idea of how this all seems so slow in fact not too much time passes…

Progress Note
PROGRESS WHILST IN CT:
x2 MO and x2 RN ESCORT PRESENT.

0610hrs: Given IV fentanyl 50mcg for pain ++.
0612hrs: Given further IV metaraminol 0.5mg for hypotension.
0620hrs: CT completed, given further IV fentanyl 50mcg to aid transfer back to trauma trolley.
0622hrs: Returned to RR1, commenced first unit of PRBC with component number 5838490 O neg.
0630hrs: Given IV tranexamic acid 1g in IV n/s 100mls infusion and run over 10mins.
Also started 2nd unit of PRBC with component number 5838865 O neg.
0640hrs: 3rd unit of PRBC component number 6039920 O neg commenced..
IV fentanyl 50mcg for pain.
0650hrs: Commenced first unit of FFP component number 4721107 AB pos.
0652hrs: IV fentanyl 50mcg given.
0700hrs: IV vitamin K 10mg also given.
0705hrs: Wife brought in and given update on pt's condition.

CLINICAL TOOLS AND GUIDELINES

NSW GOVERNMENT
INNOVATION

CLINICAL TOOLS AND GUIDELINES – ITIM resources

Government of Western Australia
East Metropolitan Health Service

Royal Perth Bentley Group

Diagnosis of Potential Delayed Haemothorax /Pneumothorax in Blunt Thoracic Trauma: Clinical Guideline

Scope

Site	Department, Division or Operational Area	Applicable to
Royal Perth Hospital	Trauma Service	Medical, Nursing and Allied Health

Links to Relevant Documents

- Appendix I: Algorithm – Haemothorax/Pneumothorax

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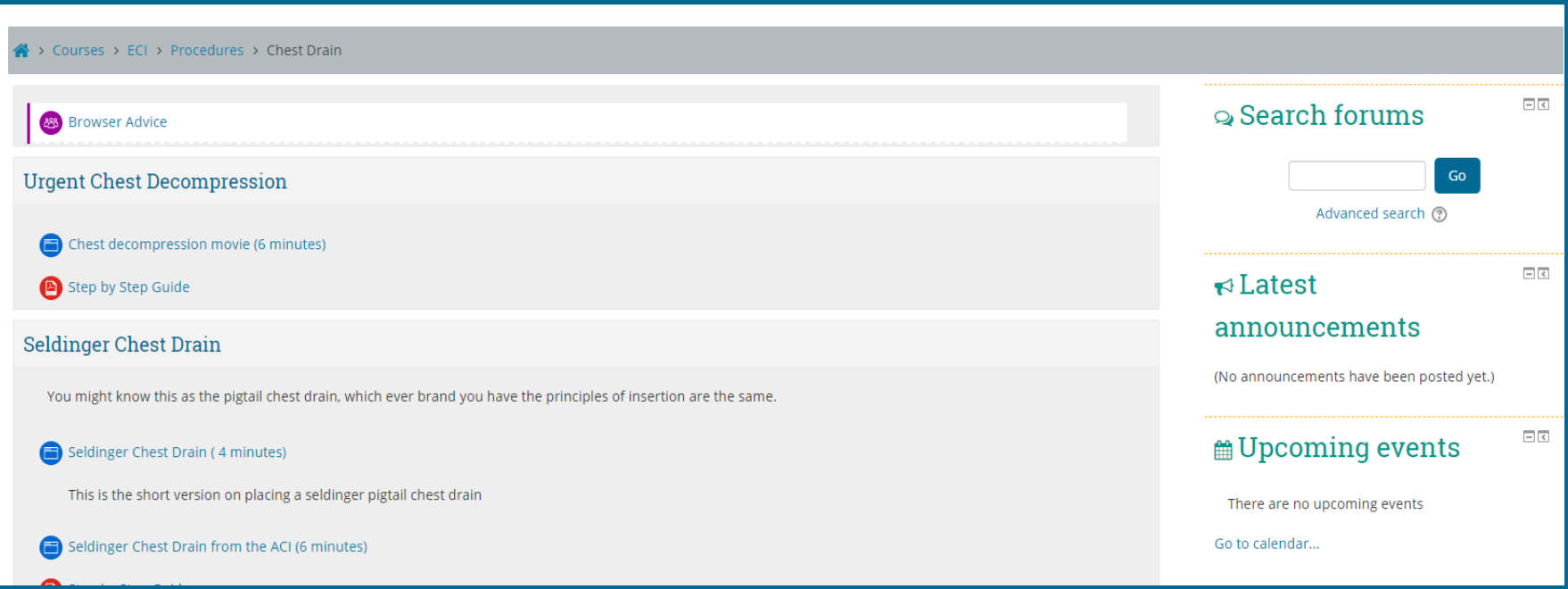
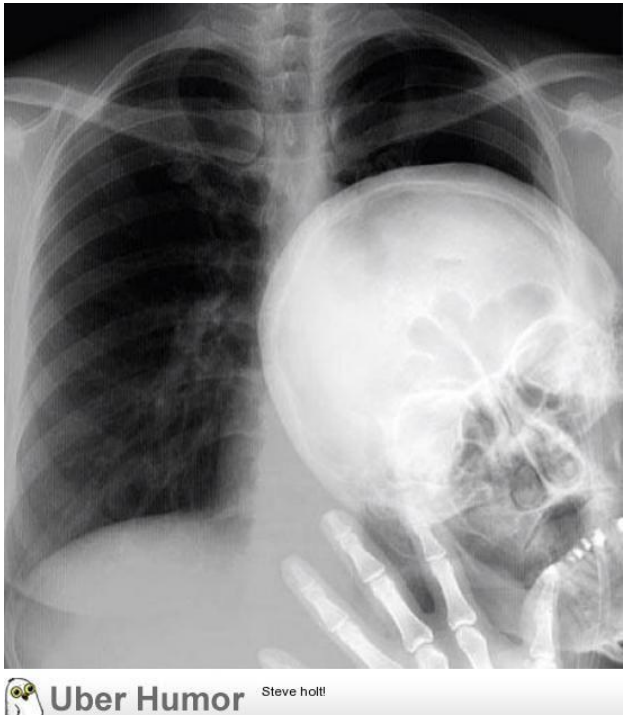
Chest Drains, Catheters and Urgent Decompression

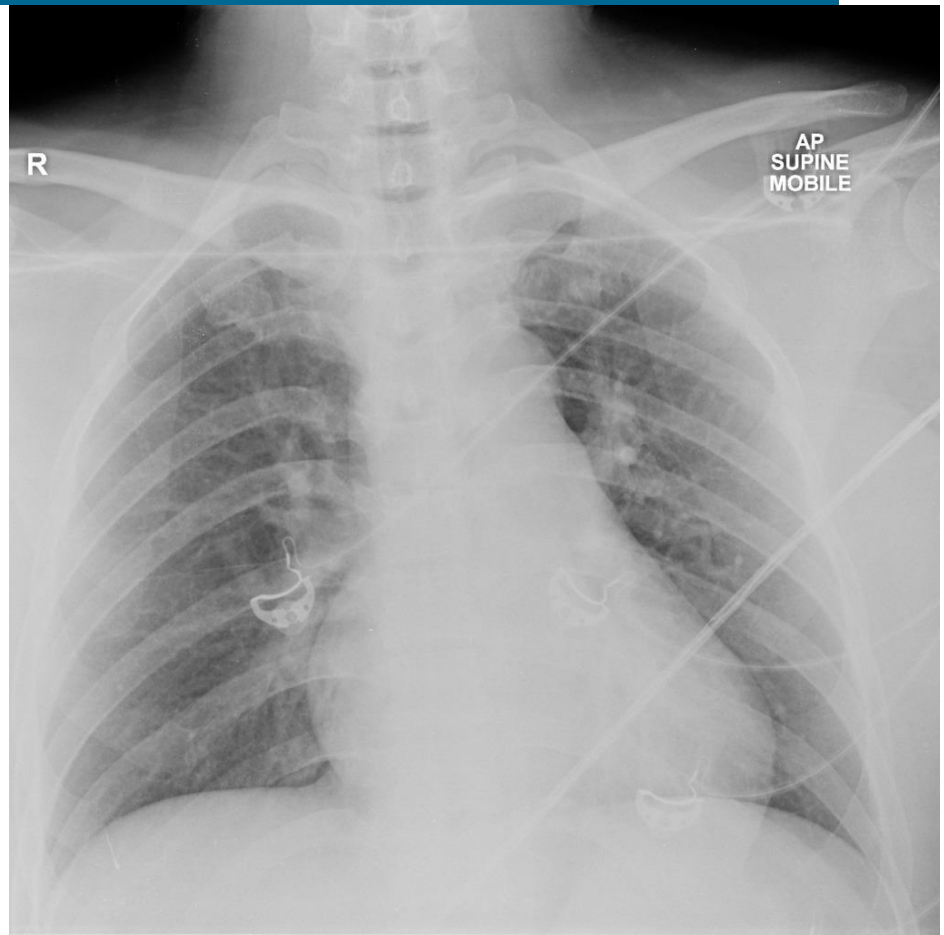


https://aci.moodlesite.pukunui.net/course/view.php?id=87

Chest x-ray in trauma – cases from Radiopaedia

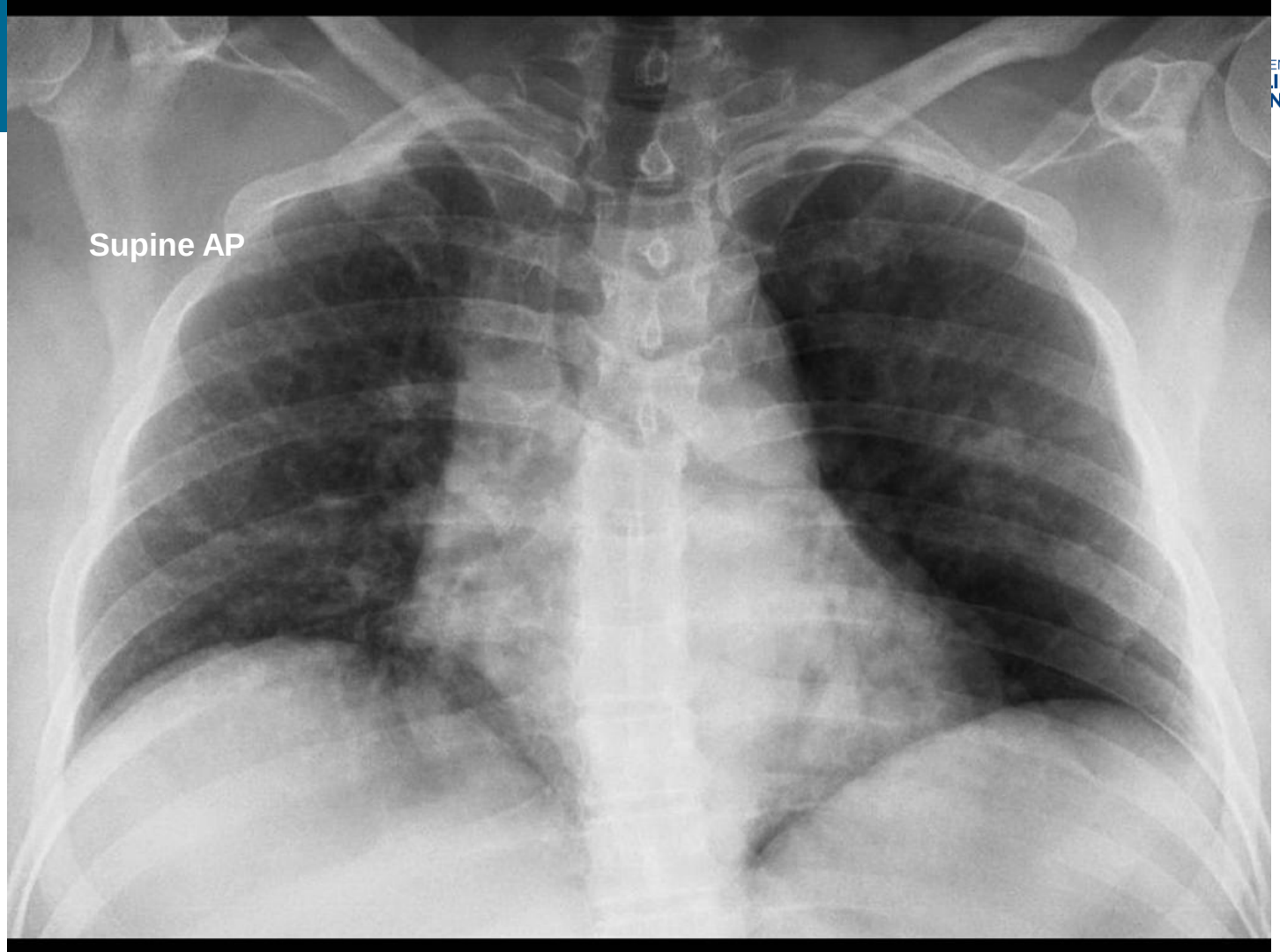


normal supine trauma chest x-ray



Stand up to be counted

34yo woman, pushbike accident, left-sided blunt chest trauma from handlebar


Supine AP

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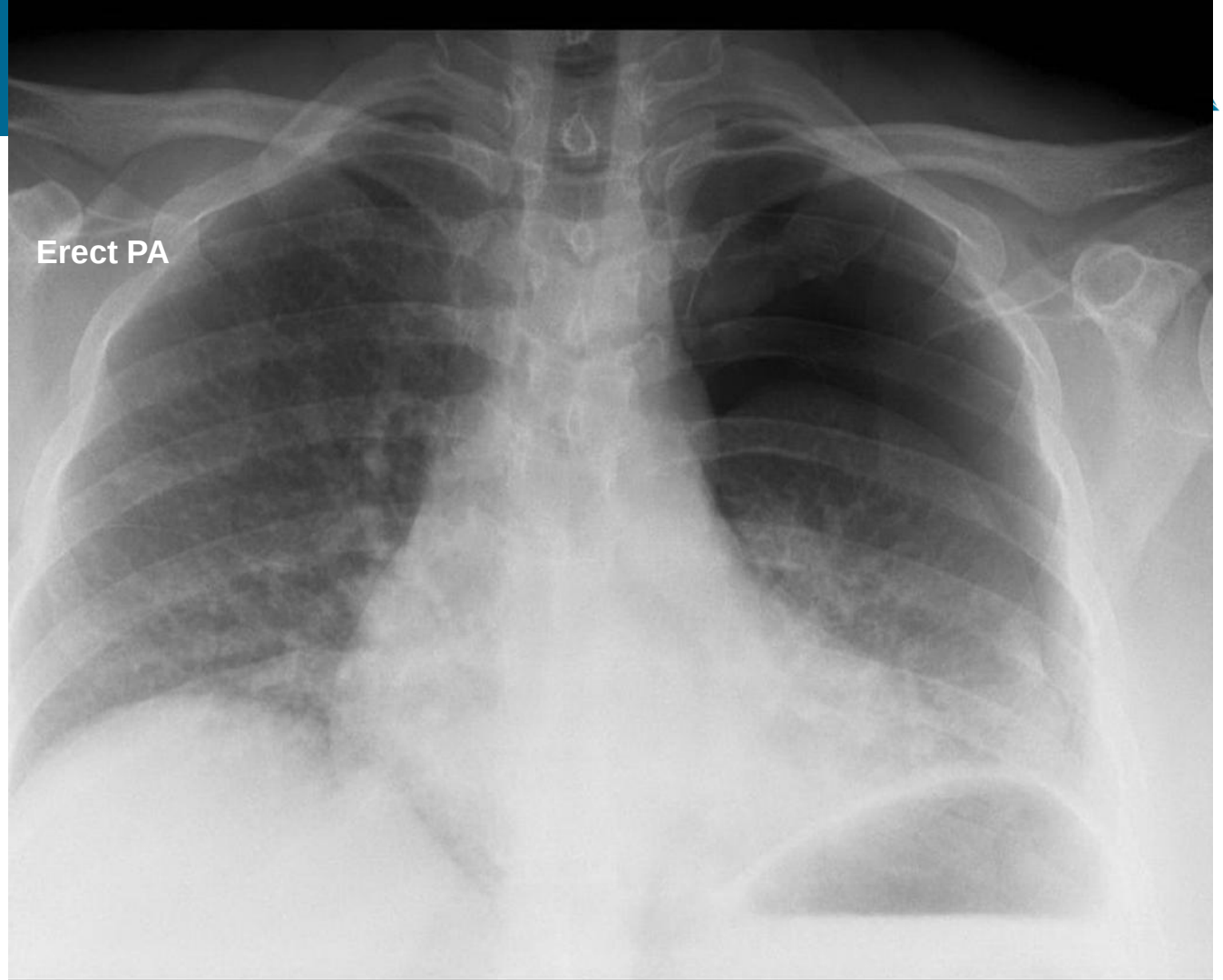
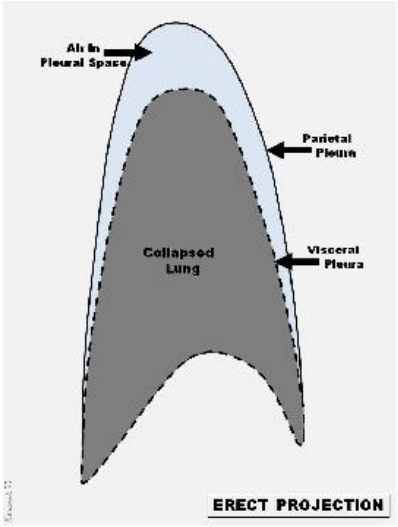
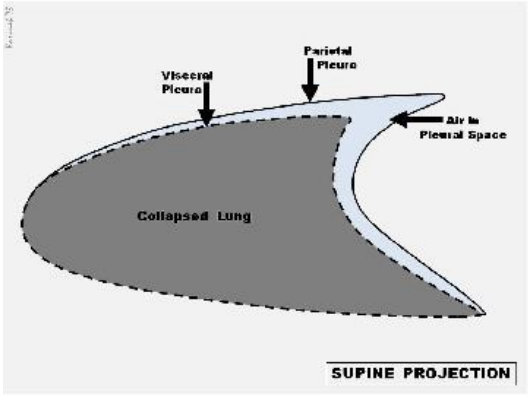


Pneumothorax

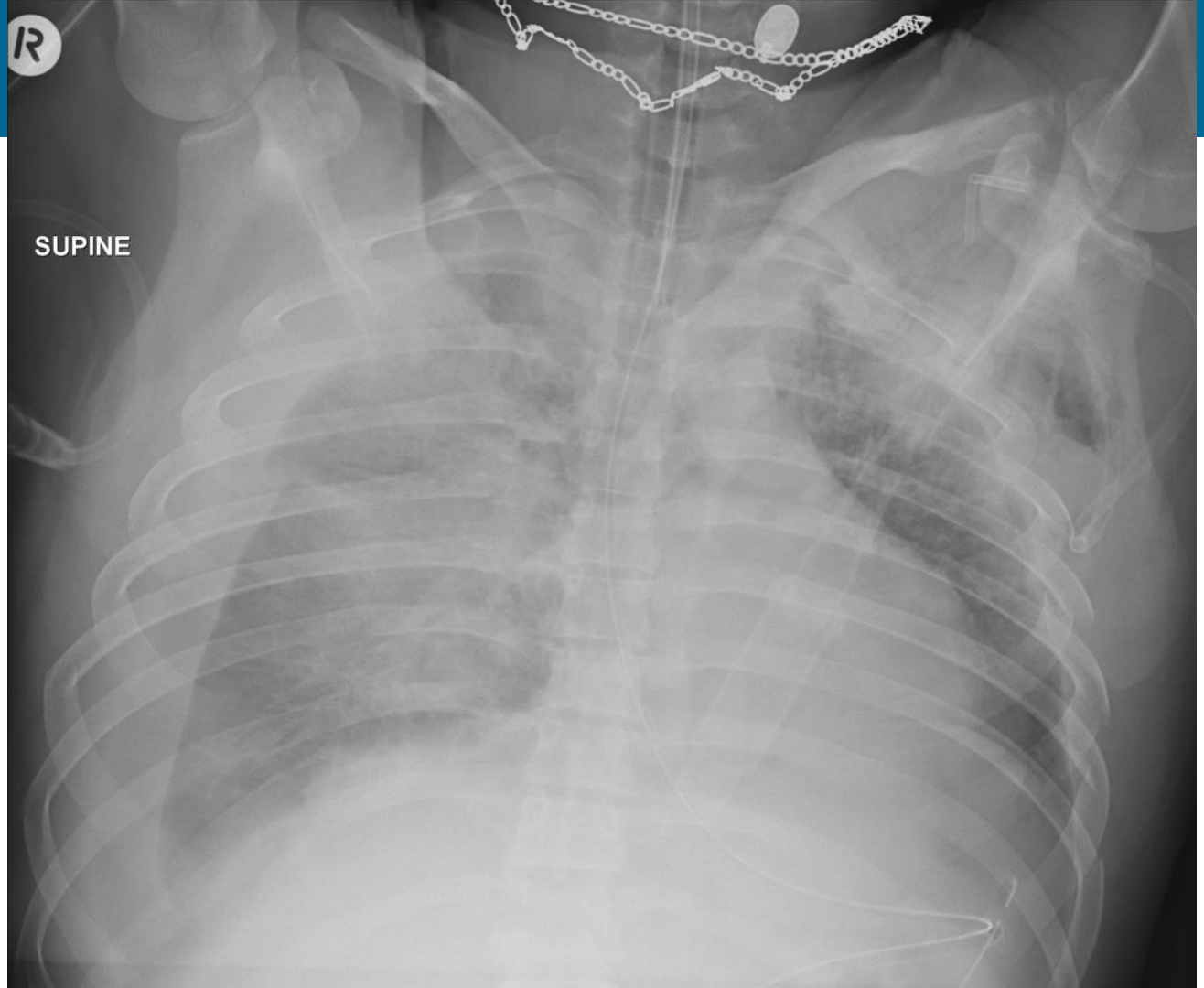
https://radiopaedia.org/cases/traumatic-pneumothorax-1





Thinly Veiled

30yy man, MVA.



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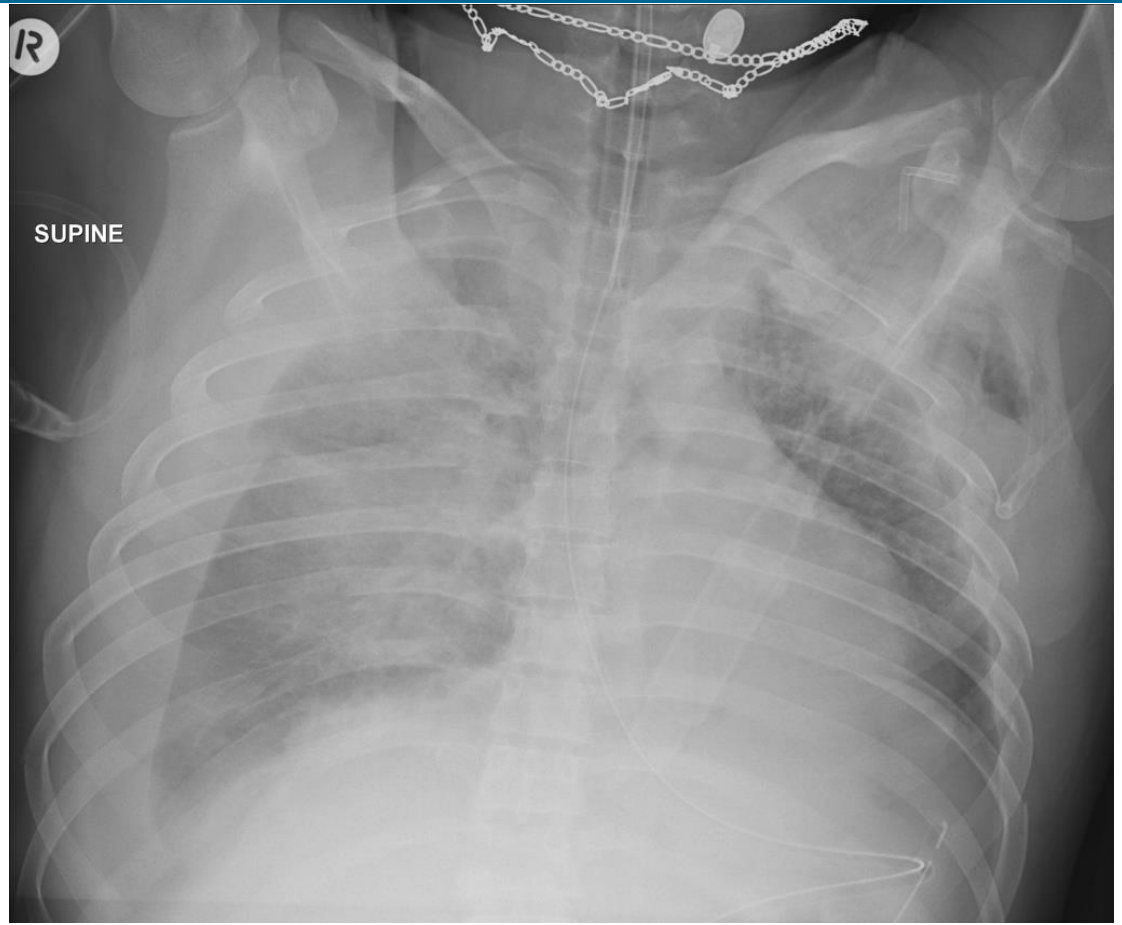
Thinly Veiled

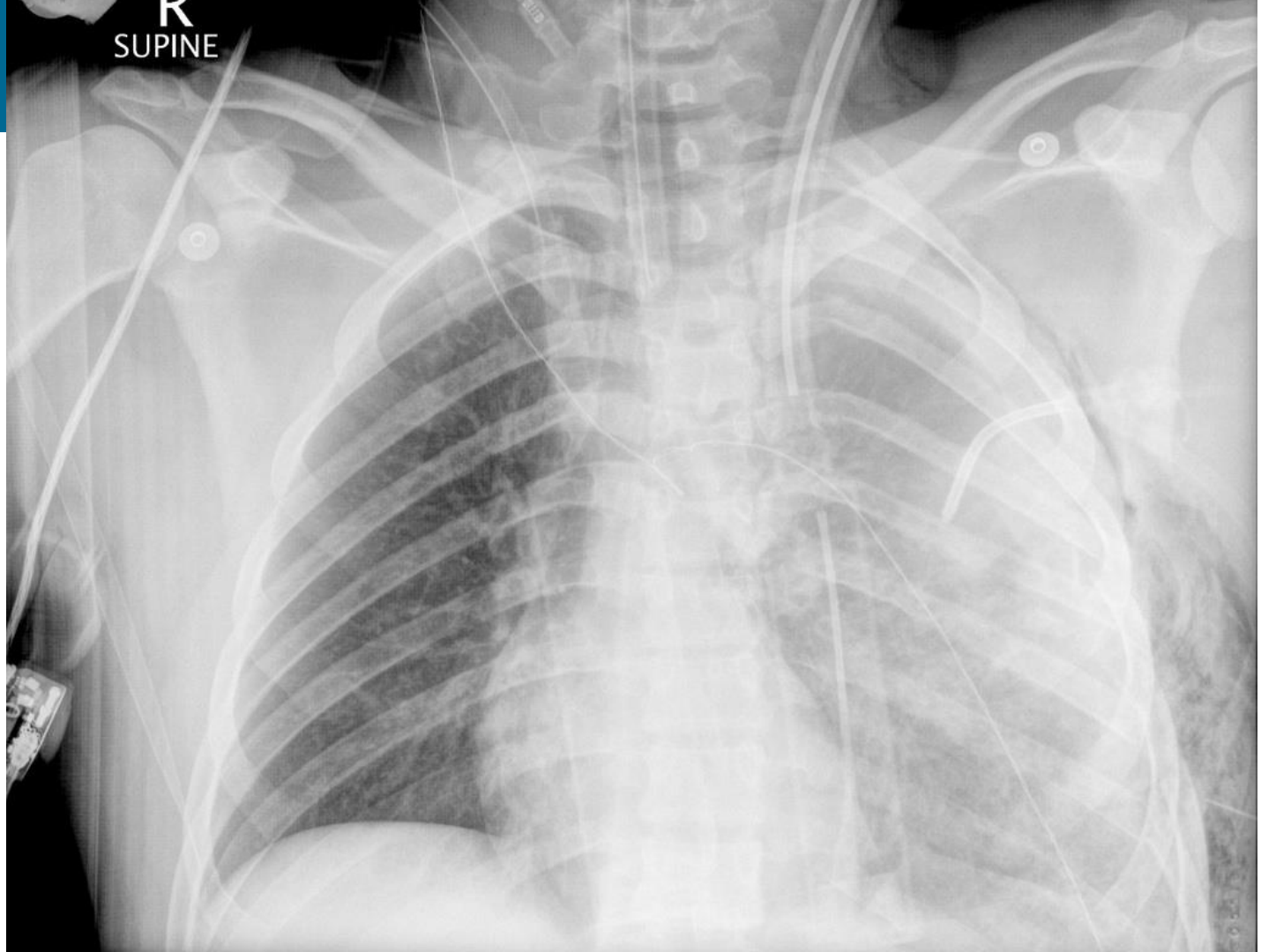
https://radiopaedia.org/cases/large-traumatic-haemothorax?lang=us



1. Veil-like opacity due to right sided haemothorax with mass effect – needs urgent finger thoracostomy and formal trauma chest drain
2. Left sided pneumothorax – also needs a chest drain
3. Bilateral rib fractures
4. Contusion

Snap

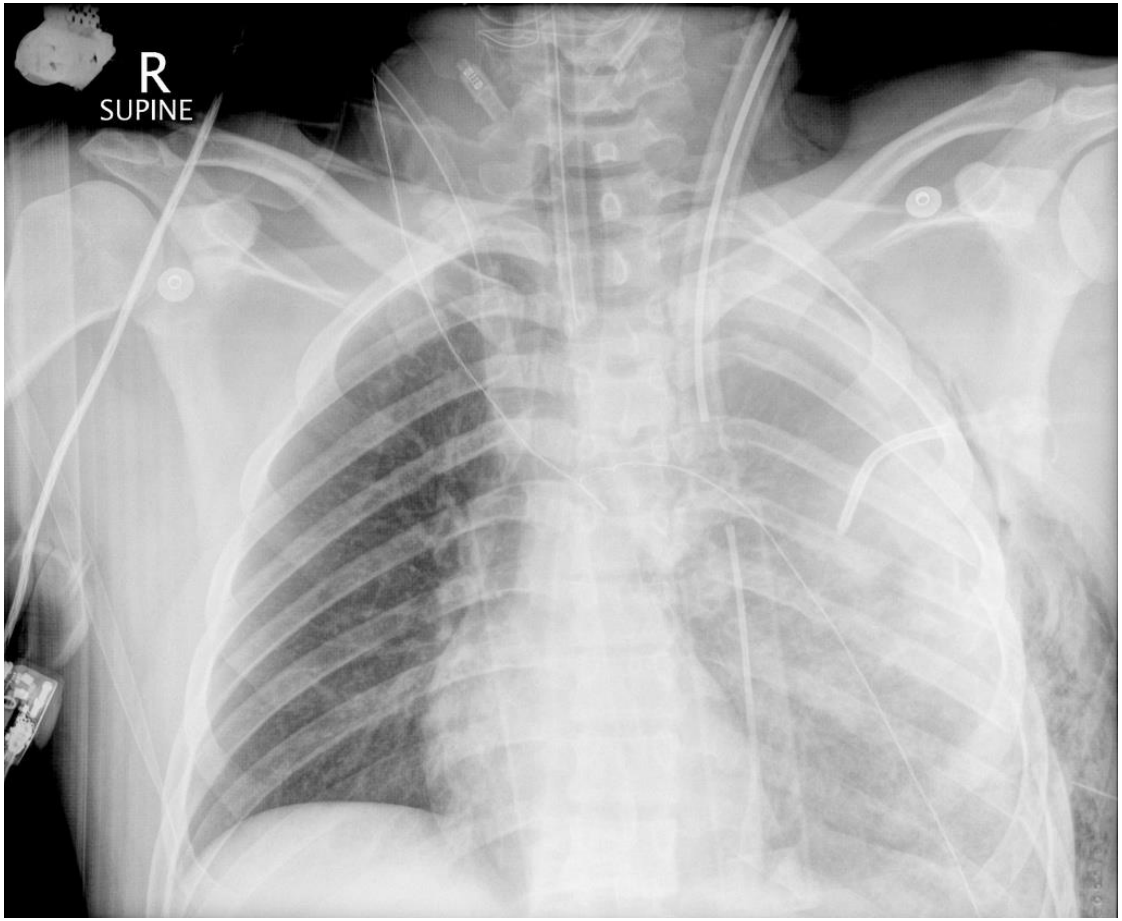
20yo man, high speed MVA



AGENCY FOR CLINICAL INNOVATION

Snap

https://radiopaedia.org/cases/multitrauma-chest-x-ray?lang=us



1. Flail Segment: fractures in two or more places, in three or more consecutive ribs

2. Haemothorax: veil-like opacity of the left hemithorax

Crackle

80yy woman, MVA.

AFTER I/O ETT AND ICCX2
SUPINE
R

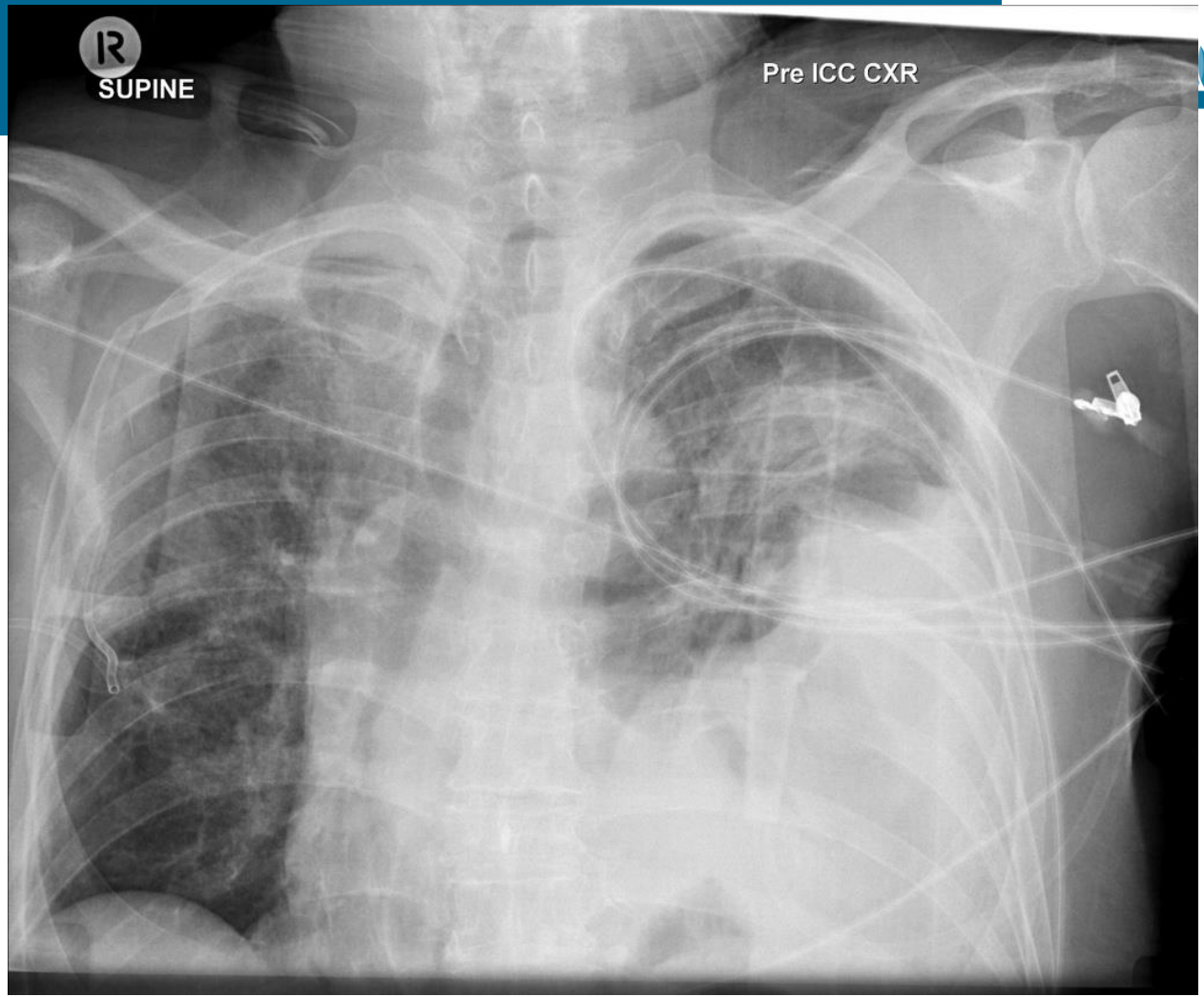
Crackle: sub-cut emphysema, abnormal mediastinum, rib

https://radiopaedia.org/cases/trauma-chest-x-ray-with-rib-fractures-and-subcutaneous-emphysema?lang=us

1. ETT needs to be retracted
2. Bilateral rib fractures
3. Subcutaneous emphysema
4. Abnormal mediastinum with left sided apical capping (CT Ao reassuring)

Pop

75yy male, MVA.



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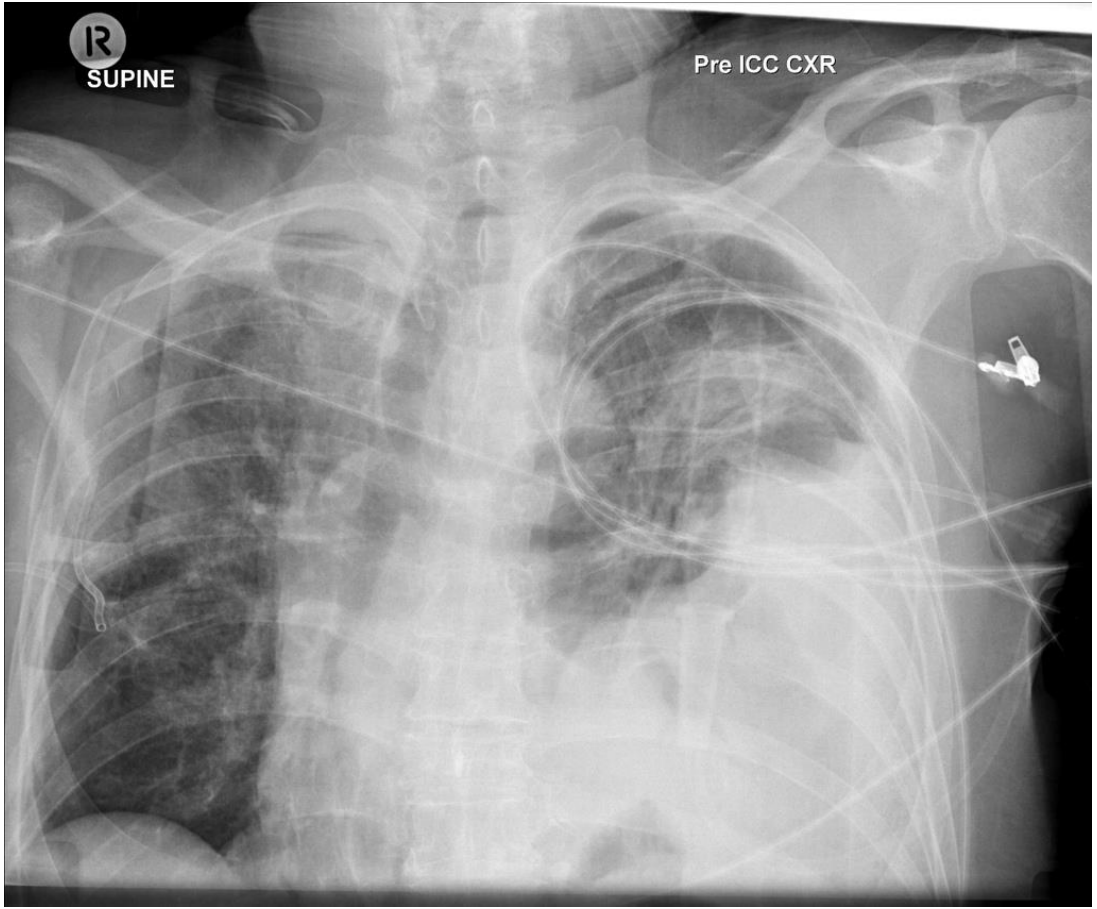
Pop

https://radiopaedia.org/cases/diaphragmatic-rupture-5?lang=us

1. Left sided diaphragmatic rupture
2. Rib fractures

NB: clinical diagnosis of diaphragm rupture is difficult!

Incidence around 1% for abdominal blunt trauma, far more common in penetrating trauma



Some of our E-QuESTs so far …

- Burns
- Head and neck trauma
- Atypical Chest Pain - ACS
- Sepsis in the elderly
- Abdominal pain in the elderly - AAA & Ischaemic gut
- Scrotal emergencies
- Deadly headaches
- Paediatric deterioration
- Head injuries
- Opthalmological emergencies

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Looking to next month, please…

- Share your cases
- Share your patient safety actions
- Spread the word with your colleagues

What would you like to see / hear about?

NSW GOVERNMENT | AGENCY FOR CLINICAL INNOVATION

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Many thanks!

Next E-QuEST
29th October 2:30pm

Look out for our email survey
We need your responses to guide future work

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