

# Trial Exam Marking Guide

## QUESTION 1 :

A 17 year old man presents after an assault he has jaw pain.

*a. List 3 abnormalities seen on the OPG (3 marks)*

1. \_\_\_right para-symphaseal # - mildly displaced
2. \_\_\_# body mandible left-displaced
- 3.malocclusion teeth



*b. List 6 important physical findings that you should document (3 marks, 0.5 marks each)*

1. degree of mouth opening
2. occlusion of teeth/ loose or missing teeth
3. ? open fracture into mouth
4. haematoma floor mouth
5. swelling/bruising
6. evidence other facial fractures clinically
7. inferior alveolar nerve parasthesia

c. List 4 aspects of your initial ED management (with specifics) (4 marks)

1. Antibiotics –benzylpenicillin 1.2g QID + metronidazole 500mg BD IV
2. ADT if not up to date
3. Analgesia- IV titrated opiates (name one)
4. mouthwashes- QID hydrogen peroxide
5. NBM + IV fluids

## **Question 2 :**

A 57 year old male is referred in by his GP with a hot, tender, painful left knee.

His vitals are as follows

Pulse 96

BP 120/70

Temp 37.6

A.

List 5 diagnostic categories and one example of each as a cause for this hot red knee (5 marks)

|          | <b>Diagnostic category</b> | <b>Examples</b>   |
|----------|----------------------------|---|
| <b>1</b> | Septic                     | Staphylococcus, gonococcal, overlying cellulitis                        |
| <b>2</b> | Crystal,                   | Gout, pseudogout  |
| <b>3</b> | Trauma                     | Iatrogenic- surgical/ injection, traumatic injury, fracture, CL rupture |
| <b>4</b> | Degenerative               | OA  |
| <b>5</b> | Reactive,                  | IBD, gonococcal, Reiter's,  |
| <b>6</b> | Inflammatory               | Rheumatoid, SLE, Psoriatic, (atypical for knee), Bursitis               |

2. List five investigations you might perform and one pro and con for each (5 marks)

|                  | <b>Investigation</b> | <b>Pro</b>   | <b>Con</b>  |
|------------------|----------------------|--|---|
| <b>Bedside 1</b> | BSL                  | Pick up undiagnosed DM as a risk factor  | non specific for joint pathology                                      |
| <b>2</b>         | US                   | quick and easy, readily available in most ED, can detect effusion, may aid in aspiration | operator dependent, need equipment available- costs, possibly painful |
| <b>3</b>         | UA                   | Might pick up DM, possible UTI   | non specific for joint pathology                                      |
| <b>Lab 4</b>     | FBC                  | raised WCC may aid diagnosis, low WCC may diagnose neutropaenia                          | non specific for joint pathology, may be falsely reassuring           |

|                   | Investigation                                | Pro   | Con   |
|-------------------|--|---|---|
| 5                 | EUC  | raised creatinine may be found indicating concomitant renal disease as part of systemic disease DM,SLE.<br>low Bicarbonate - acidosis in sepsis | non specific for joint pathology  |
| 6                 | Urate  | Possibly raised in gout   | non specific for joint pathology  |
| 7                 | CRP  | Maybe vey high supporting septic joint  | non specific for joint pathology, may be falsely reassuring                     |
| 8                 | ESR  | maybe high supporting septic joint  | non specific for joint pathology, may be falsely reassuring                     |
| 9                 | Urethral swab                                | important if history suggestive, and for adequate treatment   | non specific for joint pathology, take time to get result                       |
| 10                | <b>Joint aspirate MCS including crystals</b> | <b>May give diagnosis for crystal or septic joint. Directs (antibiotic) therapy, can direct future preventative measures</b>                    | <b>Painful, risk of introducing infection, operator dependent</b>               |
| <b>Imaging 11</b> | Xray   | May pick up fractures, effusion, chnages (Rh A, OA etc)   | radiation , non specific for inflammatory conditions, may not pick up fractures |
| 12                | Formal US                                    | NO radiation,Might pick up effusuion, FB, ligamentous injury, bursitis  | Availability, cost, may not give specific answer                                |
| 13                | CT   | Can show occult fractures, direct operative Mx  | expensive, radiation exposure, availability                                     |
| 14                | MRI  | Can show occult fractures/ ligamentous injury, no radiation   | expensive, availability   |

Must mention Joint aspiration and MCS, otherwise cannot pass question - maximum 2/5

otherwise 0.5 each for pro and con for each, no mark for simply naming an Investigation/5

Question 3 :

A 6 year old boy is brought to the ED after falling from his bunk. He has an isolated leg injury

a. List 2 features of the XRay ( 2 marks )

1. \_spiral # distal 1/3 femur\_\_\_\_\_

2. \_splint /POP insitu\_\_\_\_\_



b. Describe 4 ways you would deal with his analgesic requirements (give specifics) ( 4 marks)

1. Opiate analgesia- IN fentanyl 1.5mcg/kg (est weight 20kg), IV morphine 0.1mg/kg
2. Oral analgesia- paracetamol 15-20mg/kg, Ibruprofen 10mg/kg or codeine based
3. Femoral nerve block/ FIB
4. Non pharmacological- splint- Thomas splint/ traction
5. Reassurance/ distraction by parents- (NOT adequate as only answer)

c. Describe in stepwise fashion the details of performing a femoral nerve block. Include doses (4 marks)

1. consent- parents verbal/written- **ESSENTIAL**
2. EMLA to site (ideally if no rush)
3. Calculate mix of LA- (est wt 20kg) – lignocaine 1% + bupivacaine 0.5%- **safe doses in mls**
4. **Locate landmarks**- U/S or landmark technique –nerve lateral to artery
5. **Inject + aspirate**- nerve stimulator needle
6. **Document in notes**

**Question 4:**

45 yo male is hit in the eye with a tennis ball while having a friendly match with his neighbour.

1. Describe the abnormalities in the photo ( 1 mark )

Irregular pupil, hyphaema, conjunctival injection and oedema, bruise to the inner upper eyelid, presence of fluorescein

2. List 3 things that should be examined or assessed: (3 marks)

Visual acuity, light reflex / RAPD

Globe pressure , slit lamp examination of anterior chamber and pupil

3. What grade is this hyphema? ( 1 mark)

Grade 2

4. List 4 complications that may occur? (4 marks)

Rebleed, traumatic iritis, glaucoma, corneal staining

Three days after being discharged home with outpatient ophthalmology review, he represents with throbbing eye pain, tearing and photophobia.

5. What is the most likely diagnosis? (1 mark)

Traumatic iritis

**Question 5 :**

Elderly female presented after being found on the floor of her bathroom. Her family found her lying on her left side. On arrival to ED, GCS 10, HR 85, BP 140/90

Brain CT, axial images



1. Describe the brain CT findings (1 mark)

- *Acute right MCA territory infarct*



- *No haemorrhagic complications*
2. List 3 clinical signs that would be expected based on the CT brain findings (3 marks)
- *Contralateral hemiplegia*
  - *Hemisensory loss*
  - *Homonymous hemianopia*
  - *Eyes deviated to side of lesion*
  - *Dysphasia*
3. What would be your management priorities? (4 marks)
- *Airway protection – ETT vs NP/OP airway depending on GCS*
  - *Circulatory control – maintain adequate BP, decrease if systolic BP consistently > 220 mmHg or diastolic BP > 120 mmHg and aim for 10-15% decrease in BP*
  - *Thrombolytic therapy – likely contraindicated due to unknown time of symptoms onset*
  - *Maintain normal temp*
  - *Pressure area care*
  - *Seizure control and prophylaxis if required*
  - *IV hydration*
  - *Stroke Unit admission*
4. List 2 features on CT brain that are associated with a poor outcome from thrombolytic therapy? (2 marks)
- *Cortical hypodensity in >1/3 of MCA territory*
  - *Sulcal effacement*
  - *Mass effect*
  - *Cerebral oedema*

**Question 6 :**

Question submitted by Andrea Bell (TSH ED)

1. A 40yo female presents complaining of a one week history of malaise, myalgia, arthralgia and a non-productive cough.

Over the last 4 days she has developed a rash initially commencing on her face and upper body.





**1. List 4 important features of the rash that you need to assess for (2 marks)**

- involvement of more than one mucosal surfaces (can include conjunctival, oral, genital, GIT and respiratory tract)
- presence of vesicles, blisters, bullae, skin erosions
- Nikolsky's sign (mechanical pressure on erythematous areas results in epidermal detachment)
- estimated TBSA involvement of any blisters, bullae, skin erosions or skin detachment/desquamation
- presence of target lesions (usually double circles not triple)

**2. Give a differential diagnosis listing your most likely differential diagnosis first ( 3 marks)**

- Steven Johnsons syndrome, Toxic epidermal necrolysis
- erythema multiforma
- disseminated viral infection eg HSV, parvovirus
- drug induced hypersensitivity syndrome
- syphilis

**3. List 5 important potential complications that need to be identified and managed( 5 marks )**

- systemic involvement including multi-organ failure
- haemodynamic instability, shock
- fluid and electrolyte imbalance
- impaired thermal regulation and temperature maintenance
- secondary bacterial infection including skin, mucous membranes, lungs and septicaemia
- pain relief
- ocular involvement

**Question 7 :**

A 55-year old man presents to ED with sudden onset of severe chest and interscapular back pain with diaphoresis.

Vital signs are as follows:

|    |     |     |
|----|-----|-----|
| HR | 105 | bpm |
|----|-----|-----|

|    |        |      |
|----|--------|------|
| BP | 190/95 | mmHg |
|----|--------|------|

|                  |     |          |
|------------------|-----|----------|
| SaO <sub>2</sub> | 95% | room air |
|------------------|-----|----------|

**A CTPA is performed, which is shown below.**



i. What is the diagnosis? ( 0.5 marks)

**Type A aortic dissection**

ii. List four (4) signs that you might expect to see on physical examination.  
(4 marks)

- **Pulse deficits – loss of pulses.**
- **Acute neurology – e.g. stroke (carotid / vertebral involvement), paraplegia (due to spinal ischaemia).**
- **Murmur of aortic regurgitation.**
- **Muffled heart sounds / Beck’s triad (tamponade)**
- **BP difference between the two arms (= non-specific)**
- **Significant patient distress – diaphoresis, pallor, tachycardia (already indicated in the stem)**

iii. List and justify three (3) investigations for this patient (1.5 marks, 0.5 each)

- **Dedicated CT angiogram – confirm diagnosis and extent of aortic / branch artery involvement, plan surgery (current study is a poorly opacified CTPA likely inadequate for these purposes).**
- **Bedside echo / TOE - look for evidence of tamponade / aortic regurgitation.**
- **ECG – look for evidence of coronary artery involvement / secondary myocardial ischaemia.**
- **Bloods (FBC, UEC, coags, crossmatch) – routine pre-op.**

iv. What is the definitive treatment for this condition? (1 mark)

**Urgent cardiothoracic surgery with aortic root repair (e.g. Bentall's procedure)**

v. List three (3) drugs you would administer in ED, along with a therapeutic indication for each. (3 marks)

**Opiates (e.g. fentanyl, morphine)**

**Analgesia**

**Beta-blockers (e.g. metoprolol, esmolol)**

**Reduce  $\Delta P / \Delta T$**

**Vasodilators (e.g. SNP, TN, hydralazine)**

**Reduce BP**

**NB. Only AFTER beta-blockade**



### **Question 8:**

A 68-year old female presents to ED following a brief syncopal event at church. She is now asymptomatic.

i. List five (5) features on history that would suggest a specific cause of syncope (5 marks)

| <b><u>Historical Feature</u></b> | <b><u>Diagnosis</u></b>      |
|----------------------------------|------------------------------|
| Orthostatic dizziness            | ? postural hypotension       |
| Prolonged standing               | ? vasovagal                  |
| Preceding palpitations           | ? dysrhythmia                |
| Pacemaker in situ                | ? pacemaker dysfunction      |
| Antihypertensive therapy         | ? medication related         |
| Diarrhoea, reduced oral intake   | ? dehydration / hypovolaemia |
| Melaena                          | ? GI bleed                   |
| Chest pain / SOB / leg swelling  | ? PE                         |

Any sensible answer – should include postural hypotension and medication-related syncope.

ii. List five (5) physical signs that you would examine for (2.5 marks)

- BP – lying and standing
- Heart rate - ? dysrhythmia, bradycardia ?increased on standing
- Volume status - ? dehydrated
- Pallor suggesting anaemia / blood loss

- PR for melaena
- Presence of pacemaker
- SaO<sub>2</sub> – e.g. hypoxia in content of PE (unlikely if patient now asymptomatic)

iii. List and justify five (5) investigations for this patient. (2.5 marks)

- ECG – dysrhythmia, AV block, PPM dysfunction
- Blood sugar - ?hypoglycaemia
- Electrolytes / VBG - ?electrolyte dysfunction
- Urea & creatinine - ?evidence of dehydration
- Hb - ?anaemia, MCV - ?evidence of chronic blood loss (low MCV)
- Pacemaker check
- Holter monitor – could be arranged on discharge if concerns re dysrhythmia
- CT brain – if severe headache (e.g. ?SAH) or concerns that this was a seizure rather than syncope – unlikely given clinical stem.

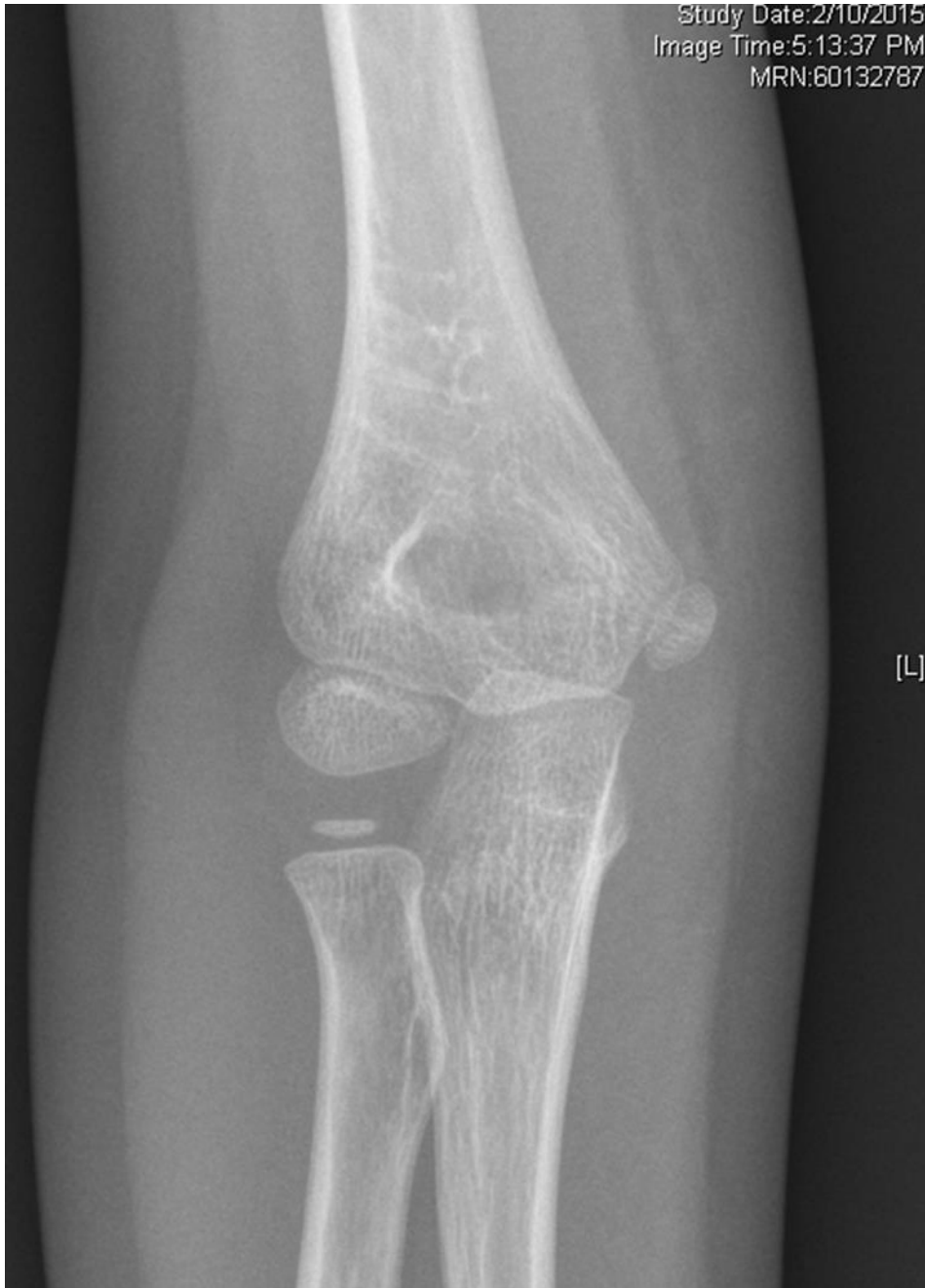
**Question 9 :**

A 7yr girl presents following a fall onto her outstretched hand and is reluctant to bend her elbow due to pain.

**1. Describe 4 key features of this xray and state diagnosis (4 marks)**

- Anterior (normal) and posterior (abnormal) fat pad visible: therefore joint effusion
- Cortical disruption over posterior humeral surface at level of olecranon fossa on lateral film
- Angle of humeral articular surface normal at 45 degrees indicating no backwards tilt
- No varus or valgus deformity on AP film
- Non displaced supracondylar fracture right elbow





**2. What are the 6 potential complications of this injury? (3 marks)**

- SHORT TERM:
- Brachial artery compromise/damage
- Neurological : radial, median or ulnar nn damage
- Compartment syndrome
- LONG TERM:
- Cubitus varus or valgus
- Volkmanns ischemic contracture
- Myositis ossificans

**What are the 6 indications for operative reduction of this type of injury? (3 marks)**

- Any reduction in pulse volume ie brachial aa pressure/injury
- Any skin compromise from fracture end, or open injury
- Any nerve compromise
- Backward tilting of distal fragment by  $\geq 15$  degrees
- Any varus or valgus deformity: normal carrying angle elbow 10 degrees
- Displacement with  $>50\%$  loss bony contact
- Any rotational deformity

## **Question 10 :**

A 62 year old male presents to your small rural Emergency Department with 30 minutes of central heavy chest pain with some radiation into the throat and some belching. His ECG is attached.

a) Identify the abnormalities on the ECG (4 marks)

- *Sinus Tachycardia*
- *LA Hypertrophy*
- *ST elevation in aVR 1mm, T inversion aVR.*
- *ST depression v2 to v6, Lead I and II.*

b) Where are the most likely areas of concern in the coronary arteries. (2 marks)

*Answer*

***Left Main Coronary Artery***

***Proximal left anterior descending artery (LAD)***

*Severe triple-vessel disease (3VD)*

*Diffuse sub-endocardial ischaemia*

*Must include answers in bold or maximum score 1.*

c) What are the four priorities in managing this case? (4 marks)

*Answer*

- Initial stabilisation including pain control***
- Medication for Non STEACS – aspirin, clopidogrel, heparin.***
- Exclusion of contraindications to fibrinolysis*
- Close monitoring and serial ECGs to avoid missing a STEMI*
- Urgent transfer out to interventional cardiology***

*Must include options in bold or maximum score is 2/4*

## **Question 11:**

A 32yo female is brought into ED by her husband in the third stage of labour.

Her husband advises you that she is 40 weeks pregnant and that this is her third pregnancy.

Whilst in the ED she delivers a baby boy.

Your colleague is assessing the mother.

### **1. Describe your initial management and assessment of the baby boy (2 marks)**

- clamp umbilicus
- prevent heat loss, keep baby warm, warm towel dry under heat source,
- gentle stimulation (rubbing back, flicking soles of the feet)
- assess APGAR score (initial cry, respiratory effort, heart rate, colour and tone)
- ensure open airway

Despite your initial management the baby has not yet established adequate respiratory efforts and you commence face mask rescue breathing

### **2. What initial rate of face-mask ventilations should you be administering (1 mark)**

- rate of 40-60 breathes/minute

### **3. What are the two most important indications for commencing chest compressions in a newborn child (2 marks)**

- absent pulse
- heart rate <60bpm despite adequate assisted ventilations for 30 seconds

### **4. List the two methods for determining the heart rate of newborns (2 marks)**

- Feel for pulsations at the base of the umbilicus
- Listen to the heart

Despite your initial management and face mask ventilations you need to commence cardiac compressions.

**5. What is the ratio of and frequency of chest compressions to ventilations in the newborn (1 mark)**

- 3 chest compressions to one ventilation

- rate of approximately 120 events/minute (90 compressions, 30 breaths/minute)

You need to get vascular access and you decide to cannulate the umbilical vein

**6. Describe how you determine which vessel is the umbilical vein ( 2 marks)**

- umbilical vein is the larger thin walled single vessel compared to the paired thicker walled umbilical arteries



## **Question 12:**

A 32 yr old female presents 6 hours after ingesting 20 x 240mg SR verapamil tablets.

She is vomiting and listless, GCS 14

HR 40 BP 75/40

**(a) What is your risk assessment of this patient ? (1 mark)**

Potentially lethal overdose, already showing signs of ingestion and toxicity.

**(b) What are the pathotoxicological mechanisms of this agent ? (2 marks)**

Prevents opening of L-type Ca channels, decreases Ca influx into cells and decreases contractility

Negatively inotropic and chronotropic

Peripheral vasodilatation

Impairs insulin release (therefore early sign of OD is raised BSL).

**(c) Her BSL is 12, what is the significance of this?**

Shows toxicity, Ca channels blocked in pancreas causing impaired insulin release and high BSL, therefore early sign of OD is raised BSL

**(d) As you assess her, she deteriorates further, has a poorly palpable pulse, GCS drops to 9/15.**

**Repeat ECG shows a junctional rhythm at 30 bmp. Outline your management steps (give doses of any medications used) (6 marks)**

ABC

IV fluid bolus

Ca Boluses : 10-20ml CaCl<sub>2</sub>, or 30-60ml Ca gluconate

Inotropes : - adrenaline, noradrenaline

High dose insulin/dextrose:

Bolus 50ml 50% dextrose, plus bolus insulin 0.5-1 unit/kg.

Infusion 0.5-1 unit/kg/hour, plus infusion of 25-50ml 50% dextrose/hr

Monitor BSL every 20mins for 1<sup>st</sup> hour, then hourly. (hypoglycaemia is rare)

Replace K + and Mg++

(note : insulin/dextrose takes 15-45 mins to work, therefore need noradrenaline initially , then can wean noradrenaline)

## **QUESTION 13**

A 55-year old African man presents to a rural ED with priapism of 2 hours' duration. He is extremely distressed with severe penile pain.

i. List four (4) possible causes of priapism in this patient ( 2 marks)

- Drugs
  - Impotence treatment - e.g. sildenafil (Viagra), papaverine, PGE1
  - Vasodilators - e.g. prazosin, hydralazine.
  - Antipsychotics
- Haematological
  - Sickle cell disease
  - Haematological malignancies (e.g. CML)
  - Procoagulant states.
- Neurogenic
  - Spinal cord injury
  - Redback spider venom

ii. **Outline five (5) key management steps for this patient. (5 marks)**

- Pain relief and anxiolysis - e.g. IV opiates, sedation, dorsal penile block.
- Systemic vasoconstrictor - e.g. pseudoephedrine immediate release 120mg PO or terbutaline 0.25-0.5 mg SC.
- Urgent urology consultation.
- Cavernosal aspiration - using 19-21G needle, aspirate 20-30ml blood initially (+/- saline washout). Send for VBG.
- Cavernosal injection of vasoconstrictor:
  - Dilute adrenaline (1-2 ml of 1:100,000 every 5 minutes, max 10ml) or
  - Phenylephrine (0.5 - 1 mg every 5 mins)
- O2 and fluids (if sickle cell crisis)

iii. What is the most significant complication of priapism? (0.5 marks)

- **Irreversible erectile dysfunction due to penile ischaemia**

iv. What are two (2) important factors in determining prognosis? (1 mark)

- **Duration of erection – risk of impotence starts at 4 hours, at 50% by 24 hours and ~100% by 72 hours.**
- **Ischaemic vs non-ischaemic**

v. **List and justify three (3) investigations for this patient (1.5 marks, 0.5 mark each)**

- **Sickle cell screen**
- **Corporal blood gas - ? ischaemic vs non-ischaemic priapism**
- **FBC - ? polycythaemia / thrombocytosis, ?evidence of haematological malignancy**
- **Coags / thrombophilia screen - ? clotting disorder**

## **Question 14 :**

A 2 month old little boy is brought in by his parents from the GP with increased Work of breathing. You are concerned he has bronchiolitis.

1. List 6 factors which would categorise him as having moderate bronchiolitis (3 marks)

- SOB on feeding
- feeding >50 %
- moderate WOB
- Sao2 <94%
- Corrects with O2
- Brief apnoeic episodes
- Lethargy
- mild dehydration
- expiratory wheeze

2. List 4 potential factors which would increase his risk of apnoeas ( 4 marks)

- < 3/12
- prematurity
- LBW
- comorbidities
- immunodeficiency
- Chronic lung disease

3. List and justify 2 investigations you could undertake (2 marks)

Urine – 3-5% chance of SBI

NPA – if < 2/12, having apnoea , severe, atypical, uncertain diagnosis, in hospital infection control

CXR – if severe, atypical presentation or suspected complication

Bloods – Temp > 38.5, requiring IV rehydration – FBC/UEC/BS/VBG

4. List 2 causes of Bronchiolitis (1 mark)

- RSV 40-70%
- Bocavirus 12%
- Rhinovirus 9%
- Metapneumovirus 2%
- Parainfluenza 1%
- Coronavirus 0.5%
- Adenovirus

## **Question 15 :**

A 60 year female presents to your ED with a clinical history and examination suggesting acute pancreatitis.

### **1) List 6 potential aetiologies of this condition (3 marks)**

- Gallstones
- EtOH
- Idiopathic
- Dyslipidaemia
- Hypercalcaemia
- Sphincter of Oddi dysfunction
- Drugs (azothiaprine, septrin)
- Toxins
- Post ERCP
- Traumatic
- Post-operative

### **2) List 1 biochemical severity scoring systems used to predict this condition with 4 criteria (4 marks)**

#### **Scoring system**

| <b>RAISON'S (&gt;3 severe)</b> | <b>GLASGOW (&gt;3 severe)</b> |
|--------------------------------|-------------------------------|
| Age > 55 years                 | PaO2 <60 mmHg                 |
| Glucose >10mmol/L              | Albumin <32 g/L               |
| WCC >16,000/mm <sup>3</sup>    | Calcium <2mmol/L              |
| LDH >350 IU/L                  | WCC >15, 000/mm <sup>3</sup>  |
| ALT >250 IU/L                  | AST >200 IU/L                 |
|                                | LDH >600 IU/L                 |
|                                | Glucose >10 mmol/L            |
|                                | Urea > 16mmol/L               |

### **3) List 3 local and 3 systemic complications of this condition (3 marks)**

| <b>LOCAL</b>            | <b>SYSTEMIC</b>         |
|-------------------------|-------------------------|
| Pancreatic pseudocyst   | Shock/SIRS              |
| Abscess                 | Hypocalcaemia           |
| Ileus                   | Metabolic acidosis      |
| Splenic vein thrombosis | Pleural effusion        |
| Duodenal obstruction    | ARDS                    |
| Chronic Pancreatitis    | Multi-organ dysfunction |

## **Question 16 :**

A 48 year old woman with a history of thyrotoxicosis and presents with fever and confusion.

You are concerned she may have thyroid storm.

### **What are three diagnostic criteria for thyroid storm ( 3 marks)**

Fever

Tachycardia disproportionate to fever

CNS disturbance

### **What factors may have precipitated this episode ( give six examples, 3 marks)?**

Inadequate treatment or non compliance with treatment

Acute illness- sepsis, AMI, DKA

Surgery- thyroid, other surgery

Iodine- radioactive or iodine contrast

### **Describe four specific treatments for thyroid storm and their mechanism of action (4 marks)**

PTU- Inhibition of thyroid hormone synthesis, decrease peripheral conversion of T4 to T3

Iodine- inhibition of thyroid hormone synthesis, needs to be given after PTU to prevent uptake of iodine to form more thyroid hormone

Propranolol- blocks cardiac and peripheral effects, blocks sympathetics, slows conversion of T4 to T3

Corticosteroids decrease peripheral conversion of T4 to T3, decreases metabolic demands



### **Question 17 :**

A 30-year old recreational diver is brought by ambulance to a small coastal ED. He collapsed shortly after emerging from the water and suffered a generalised seizure lasting 2-3 minutes. On examination, he is drowsy with a right-sided hemiparesis. The nearest tertiary hospital is 300km away by road.

Vital signs are as follows:

HR            110            min

BP            90/50 mmHg

GCS           11            E4, V2, M5 (not moving right arm)

SaO<sub>2</sub>        89%        room air

**His chest x-ray is below**



i. **List two diagnoses for this patient and a unifying aetiology (2 marks – take off 1 mark for each thing missed, if misses 2 gets zero, no negative marking !)**

Cerebral arterial gas embolism causing stroke

Left-sided pneumothorax

Unifying Aetiology = decompression illness / rapid ascent from depth

ii. Outline your management of this patient (5 marks).

- **Keep supine / avoid head-up position**
- **High flow O<sub>2</sub>**
- **IV fluids**
- **Drain pneumothorax – intercostal catheter**
- **Urgent retrieval for hyperbaric treatment**
- **Consider need for intubation prior to retrieval (preferable to deterioration en route requiring precipitous airway intervention)**

iii. Complete the table below, listing three (3) possible methods of retrieval for this patient. Give one (1) advantage and one (1) disadvantage of each method ( 3 marks)

#### **Road ambulance**

- **Advantages – Sea level (depending on terrain)**
- **Disadvantages – Slower than air transport.**

#### **Helicopter**

- **Advantages – Rapid, usually able to land close to referring and receiving hospitals.**

- **Disadvantages - Unpressurised cabin, may need to refuel for longer missions (shouldn't be an issue for 300km).**

### **Fixed Wing**

- **Advantages - Pressurised cabin, relatively rapid, better for long distances (longer range, less need for refuelling during mission).**
- **Disadvantages - Ability to land at referring hospital limited by proximity of local air strips; need for secondary road transfer.**

### Question 18:

You are the duty consultant in charge of an urban ED. A 55 year old gentleman is brought to your resuscitation bay after being rescued after the gas from a barbeque exploded in his face. His estimated weight is 80 kg.



1) What clinical signs and symptoms would you actively look for in this patient? (2.5 marks)

- **Facial or oral burns**
- Singed nasal hairs
- Swollen lips
- Singed eyebrows/eyelashes
- Signs of other trauma
- Oedema (laryngeal, facial etc.)
- Tachypnoea
- Wheeze
- Stridor

2) List 5 investigations you would perform in this patient (2.5 marks)

- **Carboxyhaemoglobin level**
- UEC
- Glucose
- ABG
- Creatinine Kinase
- CXR
- ECG

3) On exposure of the patient you estimate he has sustained **10%** deep dermal burns.

Calculate this patient's fluid requirements in the first 8 hours (1 marks)

Total fluid based on Parkland formula (Hartmann's solution) =  $4\text{ml} \times 80\text{kg} \times 10\% = 3.2\text{ L fluid}$ .

Therefore, give 1.6 L over first 8 hours.

4) List 8 criteria requiring transfer to a specialised burns unit (4 marks)

- Mid to deep dermal burns in adults >10% TBSA (total body surface area)
- Full thickness burns in adults >5% TBSA
- Mid-dermal, deep dermal or full thickness burns in children >5% TBSA
- Burns to the face, hands, feet, genitalia, perineum and major joints
- Chemical burns
- Electrical burns including lightning injuries
- Burns with concomitant trauma
- Burns with associated inhalation injury
- Circumferential burns of the limbs or chest
- Burns in patients with pre-existing medical conditions that could adversely affect patient care and outcome
- Suspected non-accidental injury including children, assault or self-inflicted
- Pregnancy with cutaneous burns
- Burns at the extremes of age – infants and frail elderly

### **Question 19 :**

A 30 yr old man presents to the emergency department with fever of 38.5 and chest pain and SOB. He reports that he is an IVU. On examination he has bibasal crepitations and a murmur which was not present of previous presentations.

#### **1. What is the most likely diagnosis? ( 1 mark)**

Infective endocarditis

#### **2. List 4 components of Dukes Criteria (4 marks)**

Major

2x positive BC of typical MO >12 hrs apart

Mobile echodense intracardiac mass on echo

periannular abscess

Partial dehiscence of prosthetic valve on echo

New regurg on echo

Minor

IVU/Congenital heart disease

Temp >38

Vascular Phenomena

Immunological phenomena

+ ive BC/echo not meeting major criteria

either 2 major or 1 major and 3 minor or 5 minor

#### **3. Name 2 of the most common organisms which cause this pathology in the IVU population. ( 2 marks)**

Staph Aureus

Streptococcal species – Strep Viridans

Pseudomonas aeruginosa

Fungi – candida

Mixed organism

**5. What antibiotics would you use to treat it? (3 marks)**

Ceftriaxone

Vacomycin

Gentamicin

Sources – Campbell and Dunn



## **Question 20 :**

A 17 yr old girl is brought to the emergency department by her parents as they are concerned she isn't eating enough. On examination she is extremely pale and thin. Her weight is 42 kg and her height is 173 cm.

(1) What are 4 of the diagnostic criteria for anorexia nervosa ? (4 marks)

- (i) BMI < 17.5 (or body weight < 85 % expected)
- (ii) Weight loss is self induced
- (iii) One or more of :
  - Body image distortion (delusional belief of being overweight, even when dramatically thin).
  - Self induced vomiting or purging
  - Excessive exercise
  - Associated endocrine disorders (eg amenorrhoea for >3 consecutive months for post-menarche females)

(2) Give 4 **medical** indications for admission for patients with severe eating disorders (4 marks)

- (i) Heart rate < 40
- (ii) BP <90/60
- (iii) Symptomatic hypoglycaemia
- (iv) K<sup>+</sup> < 3
- (v) Dehydration
- (vi) Other cardiovascular abnormalities
- (vii) Temp < 36

(3) Give 2 long term complications of eating disorders (2 marks)

(any 2 of the below )

- (i) Osteoporosis
- (ii) Short stature
- (iii) Abnormalities of cognition (loss of grey matter during starvation may persist)

- (iv) Higher miscarriage rate
- (v) Renal calculi
- (vi) Stress fractures

**Question 21:**

A 31-year old male with a history of alcoholism and IVDU is found collapsed on the street during winter. He is brought to ED by ambulance.

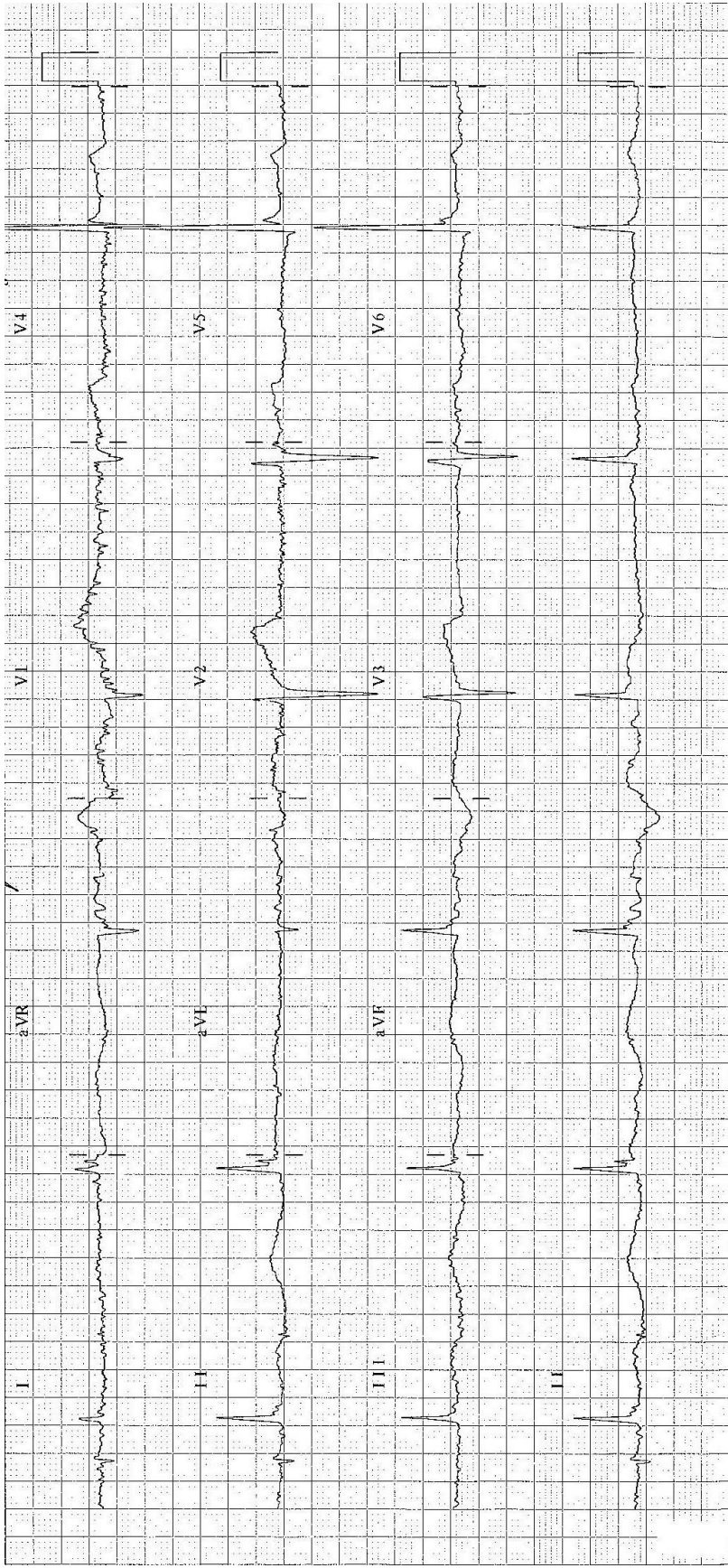
His vital signs are:

|     |   |            |
|-----|---|------------|
| GCS | 7 | E2, V1, M4 |
|-----|---|------------|

|    |       |      |
|----|-------|------|
| BP | 90/50 | mmHg |
|----|-------|------|

|             |    |    |
|-------------|----|----|
| Temperature | 29 | °C |
|-------------|----|----|

**His ECG is on the following page.**



i. List four (4) abnormal ECG findings that are consistent with a diagnosis of hypothermia (2 marks)

- Bradycardia with HR ~36 bpm.
- Osborne waves / J waves – especially seen in V4-6.
- Very long QT interval ~600ms in lead II, V5-6.
- Shivering artefact.
- Rhythm is difficult to confirm as baseline is obliterated by shivering artefact, but is likely to be slow AF.

ii. List four (4) methods of rewarming this patient (2 marks)

- Passive – remove wet clothes, warm blankets, space blanket. Unlikely to be effective given very low body temp.
- Bair Hugger / warming blanket.
- Warmed IV fluids.
- Warmed humidified air (if intubated).
- Body cavity lavage – bladder, peritoneum, pleural cavity (uncommonly used and inferior to bypass).
- Cardiopulmonary bypass / ECMO if arrested or hypothermic coma refractory to other measures.

iii. List three elements of supportive care for this patient (3 marks)

- Core temperature monitoring (oesophageal / rectal probe)
- Airway management
- IV fluids – consider cold diuresis.
- Pressure area care – at risk of pressure sores.
- Treatment of underlying toxidrome – e.g. naloxone for opiate coma.
- Careful handling – theoretical risk of VF (controversial and risk probably overstated).
- Consider need for thiamine, AWS, benzos etc. once rewarmed.

The patient suffers a sudden VF arrest.

iv. List three (3) modifications to the standard advanced life support algorithm, with rationale for each modification. (3 marks)

- Defibrillation – withhold until temp > 30 degrees C (ineffective in hypothermia)
- Drugs – withhold until temp > 30 degrees C, then double the interval between doses.
- Duration – good survival with extended periods of CPR (e.g. 2 hours), continue until patient warm.
- Heroic measures – consider early institution of ECMO CPR / cardiopulmonary bypass.

## **Question 22:**

Your registrar brings you the ecg of a 46M who has presented with palpitations. He is in resus bay and being monitored. His condition is stable with BP 120/80, sats 99% RA, RR18, and gcs 15.

**What are 4 features of VT that you look for in making a diagnosis ? (2 marks)**

1. wide complex QRS  $>0.12\text{mm}$
2. regular rhythm
3. rate 140-200 but this is not conclusive
4. presence of fusion or capture beats
5. concordance in precordial leads from V1-V6 either positive OR negative

**The ECG shows a wide complex tachyarrhythmia. What else could this be (apart from VT) (2 marks)**

1. SVT with aberrancy
2. SVT with wpw

What are 3 treatment options for this man with pros and cons of each ( 6 marks)

Do nothing: he is clinically stable and this may resolve> may deteriorate while waiting if VT

Vagal manouuvres: no adverse event, simple, quick to try. Unlikely to work as accessory pathway not affected by this.

Drug treatment to reduce automaticity: amiodarone: but may impair future EPS studies (half life 60 /7) if VT.

Adenosine: quick, effective, needs proximal access : C/I in WPW

DC CV: requires sedation, may not work at such high rates in synch mode, may need to use in non synch risking R/T phenomenon outcome. Risks aspiration if not fasted.

### **Question 23:**

A 16 year old male presents after falling from his push-bike. He has a sore shoulder but no other injuries.

**Describe the injury seen in the X-ray (1 marks)**

- Fracture mid-shaft left clavicle
- Comminuted
- Displaced/shortened



List 4 complications for each of the types of clavicular injury in the table (4 marks)

|   |                               |
|---|-------------------------------|
| Posterior sterno-clavicular dislocation | Mid-shaft clavicle fracture   |
|   |                               |
| Subclavian vessel injury                | Non-union                     |
| Mediastinal compression                 | Mal-union/deformity           |
| Pneumothorax                            | Vascular injury               |
| Oesophageal injury                      | Gleno-humeral joint stiffness |
| Brachial plexus injury                  | Skin compromise/tenting       |

|                          |  |
|--------------------------|--|
| Tracheal injury          |  |
| Thoracic outlet syndrome |  |

**3. List 3 absolute & 3 relative indications for operative fixation of mid-shaft clavicle fractures (3 marks)**

| Absolute                          | Relative                |
|-----------------------------------|-------------------------|
|                                   |                         |
| Open fracture                     | Comminution             |
| Skin tenting/compromise           | Shortening              |
| Subclavian vein/artery compromise | Active/athletic patient |
| “Floating” shoulder               | Poly-trauma             |
| Neurological injury               | Cosmesis                |

**4. List 4 complications of ORIF for a displaced mid-shaft clavicle fracture (2 marks)**

- Anaesthetic complications
- Complications of skin incision – e.g. patch of numb skin below incision, cosmesis of scar
- Hardware prominence causing irritation/cosmetic problems & requiring plate removal
- Neurovascular injury – subclavian vessel penetration or thrombosis
- Non-union
- Infection
- Pneumothorax
- Adhesive capsulitis



## Question 24:

A 4 yr old girl presents with her parents with a limp and not wanting to run as usual over the last 2 days. Her initial observations are

Temp 38.0C

HR 105

SaO2 99%RA

On examination she has pain on internal rotation and abduction and has a noticeable limp on walking.

1. List 4 potential causes for her limp ( 2 marks)

- transient synovitis
- septic arthritis
- Perthes
- HSP
- Haemophilia
- Juvenile Arthritis
- Fracture
- NAI

2. Justify 3 potential investigations which would aid your diagnosis (3 Marks)

- FBC – raised WCC more likely SA/TS
- ESR – markedly raised( 50-70) more likely SA
- Ultrasound – may show effusion/collection – more likely SA/TS/Haemophilic bleed

- Xray – would help rule out fracture, may show femoral head destruction of Perthes or joint effusion could also mention bone scan, MRI, CRP

You are concerned that she may have partially treated septic arthritis as he parents state that she is just finishing a course of Amoxicillin for a febrile illness prescribed by the GP.

3. List 3 causative organisms for Septic Arthritis. (3 marks)

- Staph Aureus
- MRSA
- Strep
- gram –ve bacilli
- Hib

4. What is the most appropriate empiric IV antibiotics for septic arthritis? ( 2 Marks)

- IV Vancomycin and Clindamycin

## **Question 25 :**

A 48 year old female presents with GCS 15 complaining of rapid onset pain, initially in the back of the neck then escalating in intensity over 15 minutes and becoming bilateral and frontal. She is otherwise well.

- a) Beyond a careful and thorough history and physical examination the three (3) most efficient investigations indicated in this case are – (1.5 marks)

*Answer*

*CT scan*

*Lumbar Puncture*

*CT angiogram*

- b) You are discussing lumbar puncture with the patient. What 4 risks must be highlighted in the consent process? (4 marks)

*Answer -*

- ***Back pain***
- ***Headache – post LP***
- *Infection*
- ***False positive results***
- *Haemorrhage*
- *Failed procedure*

*Must have answers in bold or maximum score is 2.*

- c) List 3 (three) evidence based strategies to minimise post LP headache. (1.5 marks)

- ***Atraumatic needle (e.g. Sprotte/Whitacre)***
- ***Small needle calibre***
- *Early mobilisation*
- ***Replacement of the stylet before removal of the needle***

*Must include answers in bold or maximum score is 1.*

- d) Complete the table below with three (3) options (of different classes) for analgesia in this case and include a pro and a con for each ( 3 marks)

| Medication                                     | Pros   | Cons   |
|--|--|--|
| <i>Opiates –<br/>Morphine/Fentanyl/Codeine</i> | <i>Dosing titratable<br/><br/>Good general analgesic</i>   | <i>Respiratory depressant<br/><br/>Limited efficacy in headache<br/><br/>Dependence</i>                |
| <i>Anti- emetics -<br/>Prochlorperazine</i>    | <i>Effective in migraine and tension type headaches.<br/><br/>Additional antiemetic effect.</i>                              | <i>High incidence of akathisia<br/><br/>Technically should only be administered IM rather than IV.</i> |
| <i>Anti-emetics - Droperidol</i>               | <i>Proven efficacy in headache management for migraine and tension<br/><br/>No respiratory depression<br/><br/>Lowers BP</i> | <i>Hypotension<br/><br/>Sedation<br/><br/>Akathisia</i>  |
| <i>Anti- emetics<br/>Chlorpromazine</i>        | <i>Proven efficacy in headache management for migraine and tension<br/><br/>No respiratory depression<br/><br/>Lowers BP</i> | <i>Hypotension<br/><br/>Sedation<br/><br/>Akathisia</i>  |
| <i>Paracetamol</i>                             | <i>Additive effect with other avenues of analgesia<br/><br/>Minimal side effect profile</i>                                  | <i>Limited potency of analgesia</i>  |
| <i>Non Steroidal Anti inflammatory Drugs</i>   | <i>Additive effect with other analgesics.<br/><br/>Efficacy in majority of migraine headaches</i>                            | <i>Limited potency<br/><br/>Potential anti platelet effect</i>   |

## **Question 26 :**

26 yo male presents after a domestic dispute with this injury. He is confused and agitated. Vital signs are BP 85/-40, PR 130, sats 94% on RA, GCS 13, RR 28. He looks grey and sweaty.



**(i) List 3 possible life threatening injuries: (2 marks – take off one mark for each one missed, no negative marking)**

Pericardial tamponade

Tension pneumothorax

Laceration of great vessels including aorta

After the placement of 2 x16G IVC and 500ml of IV crystalloid he becomes progressively more hypotensive and has a PEA arrest.

**2. List 2 indications of emergency thoracotomy (1 mark)**

a. penetrating chest trauma with witnessed arrest (signs of life prior to arrest ) and procedure can be done in 5 minutes

b. In blunt thoracic trauma associated with rapid exsanguination out of ICC (>1500ml) or persistently hypotension (<70mmHg)

**3. List 4 contraindications to performing an emergency thoracotomy (4 marks)**

Unwitnessed cardiac arrest blunt or traumatic

Severe head injury

Penetrating abdominal injury

Absence of cardiothoracic back up

**4. List 3 procedures that can be performed once the chest is opened (3 marks)**

Repair of ventricular injury

Open cardiac massage

Cross clamp the aorta

## QUESTION 27

An 89 yr old lady presents with generalised weakness ,nausea and diarrhoea . She had a fall 3 days earlier and had broken her humerus, and was discharged for orthopaedic follow up as an outpatient. She appears dehydrated, BP 140/80, pulse 80 regular, and is afebrile.

Her venous blood gas is below :

|                                       |              |
|---------------------------------------|--------------|
| Venous Blood pH POCT                  | 7.073        |
| Venous Blood pO2 POCT                 | 23.8 mmHg    |
| Venous Blood pCO2 POCT                | 48.2 mmHg    |
| Venous Blood O2 Saturation POCT       | 33.2 %       |
| Venous Blood HCO3 POCT                | 13.4 mmol/L  |
| Venous Blood Base Excess POCT         | -14.8 mmol/L |
| Venous Blood Oxyhaemoglobin POCT      | 32.8 %       |
| Venous Blood Inspired Oxygen POCT     | 21 %         |
| Venous Blood Haemoglobin POCT         | 97 g/L       |
| Venous Blood Reduced Haemoglobin POCT | 66.0 %       |
| Venous Blood Methaemoglobin POCT      | 0.4 %        |
| Venous Blood Carboxyhaemoglobin POCT  | 0.8 %        |
| Venous Blood Creatinine POCT          | 179 umol/L   |
| Venous Blood Sodium POCT              | 126 mmol/L   |
| Venous Blood Potassium POCT           | 3.2 mmol/L   |
| Venous Blood Chloride POCT            | 100 mmol/L   |
| Venous Blood Calcium Ionised POCT     | 1.25 mmol/L  |
| Venous Blood Glucose POCT             | 5.6 mmol/L   |
| Venous Blood Lactate POCT             | 1.1 mmol/L   |

**(a) Please interpret the blood gas results, what are the likely causes of her acidosis ? (5 marks)**

Answer :

Anion gap :  $126 + 3.2 - 13.4 + 100 = 15.8$  , therefore mildly raised anion gap ( however, ?unlikely that this is the only cause of severe acidosis, ?co-existent non-anion gap metabolic acidosis)

Likely acute on chronic renal failure (causing mild HAGMA + also co-existent diarrhoea causing low potassium + normal anion gap metabolic acidosis)

**(b) List 5 further investigations you feel are indicated, justify your responses ? (5 marks – need to justify, otherwise no mark for that particular answer).**

Further Ix of fall : CT brain – as lethargy and vomiting

Ix of hyponatraemia : - formal UEC, serum and urine osmo , urine sodium

Ix of diarrhoea : ?stool culture .

MSU

CXR

ECG – hypokalaemia

## **Question 28 :**

A 23 year old woman presents having fallen 5m off a balcony. She has landed on her feet and is complaining of ankle pain.

What are the three indications for an ankle Xray as described by the Ottawa ankle rules (2 marks):

1. Bone tenderness along the distal 6cm of the posterior edge of the tibia or tip of the medial malleolus OR
2. Bone tenderness along the distal 6cm of the posterior edge of the fibula or tip of the lateral malleolus OR
3. An inability to bear weight both immediately and in the emergency department for four steps

In addition what are the three indications for a foot Xray as described by the Ottawa foot rules (2 marks):

- a. Bone tenderness at the base of the fifth metatarsal
- b. Bone tenderness at the navicular
- c. Inability to weight bear both immediately and in the emergency department for four steps

Describe two abnormalities in the Xrays attached ( 2 marks):

1. Minimally displaced anterior aspect distal tibia with intra-articular extension
2. Mortise irregularity laterally on AP film (accept Pilon #)

List four other injuries associated with falls from a height if landing on the feet (4 marks):

1. Calcaneus fracture
2. Vertical shear pelvic fractures
3. Thoracolumbar fractures
4. Retroperitoneal injuries
5. Intracranial injuries







## **Question 29 :**

A 30 yr old female who is 30 weeks pregnant, presents to the ED with PV bleeding for the previous 6 hours. It is her second pregnancy. Her observations are pulse 110 bpm, BP 100/50mmHg, and RR 24.

**(1) What are the 2 common causes of vaginal bleeding in later pregnancy ? ( 1 marks)**

- (i) Placenta praevia
- (ii) Placental abruption

**(2) Give four clinical features which would help distinguish between the two causes you gave above (4 marks)**

Placenta praevia : painless, non-tender uterus, no signs of foetal distress, shock in proportion to PV loss

Placental abruption: constant pelvic pain, tense tender uterus on exam, foetal distress, shock out of proportion to PV loss (bleeding is intrauterine).

**(3) What examination must be avoided and why ? (1 mark)**

Digital vaginal exam should be avoided as if placenta praevia is present then it may promote more bleeding.

**(4) Give 4 important early management steps in the ED (4 marks).**

- (i) 2 large bore IV cannulae, fluid resuscitation
- (ii) High flow oxygen
- (iii) Cross match 6 units, transfuse as necessary
- (iv) Urgent o&g consultation
- (v) Bloods for FBC, coags, G&H, UEC
- (vi) CTG monitoring of foetus

### **Question 30 :**

A 55-year old man is brought to ED by ambulance after being found collapsed on a golf course. He received bystander CPR for 5-10 minutes at the scene. On arrival to ED, he is haemodynamically stable, spontaneously ventilating and alert but slightly confused.

Vital signs:

|     |         |            |
|-----|---------|------------|
| HR  | 120     | /min       |
| BP  | 190/100 | mmHg       |
| GCS | 14      | E4, V4, M6 |
| RR  | 26      | /min       |

**A photograph of the patient is below.**

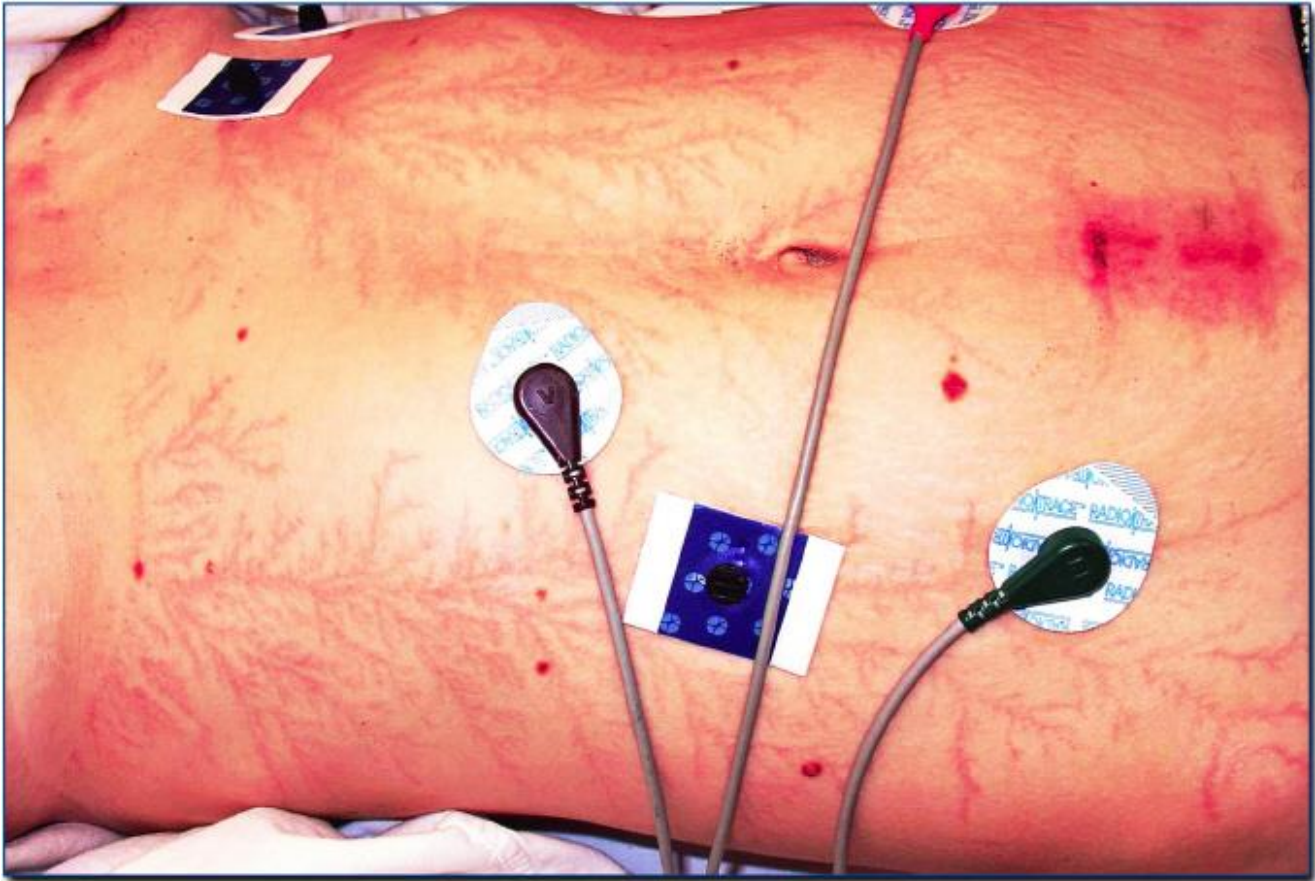


Image reproduced from Dunn's Emergency Medicine Manual, 6<sup>th</sup> edition

**i. What is the most likely diagnosis? List two (2) features from the photograph that support this diagnosis ( 2 marks)**

Diagnosis

- Lightning strike

Clinical features

- Lichtenberg figures (ferning / feathering)
- Burns from belt buckle

**ii. List four (4) immediate complications that you would assess for (4 marks)**

- Keraunoparalysis – transient limb paralysis or sensory changes with vascular spasm (reversible distal limb ischaemia).
- Muscle injury - compartment syndrome, rhabdomyolysis.
- Neurological injury – seizures, LOC, hemiplegia, peripheral nerve injury.
- Eye injury – e.g. corneal burns, retinal detachment, optic nerve injury, delayed cataracts.
- Ears – ruptured tympanic membranes (in 50%), sensorineural deafness.
- Burns
- Blast injury, secondary trauma
- Hypoxic brain injury post CPR

**iii. List one (1) important delayed complication requiring specialty follow-up (1 mark)**

- Eye complications – particularly cataracts.
- Burns
- Neurological syndromes – e.g. paralysis, neuropathies.

**iv. List and justify three (3) investigations for this patient. (3 marks)**

- CT brain - ? CNS injury
- ECG - ? arrhythmia
- CK - ? rhabdomyolysis
- UEC - ? potassium
- Urine dip - ? myoglobinuria
- Others – troponin (?AMI), nerve conduction studies, audiometry