

Ultrasound and CT Answers

SAQ 16

A 78 yo gentleman presents to your major metropolitan Emergency Department after slipping over whilst putting out the bins. X-Rays reveal a left sided subcapital fractured neck of femur, however, fortunately there are no other injuries.

Your registrar decides to use an ultrasound guided femoral nerve block to help manage the patient's pain and asks for your help supervising.

a) Using the US image obtained (**PROP**) name the numbered structures. (3 marks)

1. **Femoral Vein**
2. **Femoral Artery**
3. **Femoral Nerve**

b) Which structure is most lateral ? (1 mark)

Femoral Nerve

c) List the steps involved in performing an ultrasound guided femoral nerve block. (8 marks)

- Consent – include alternatives, risks including failure of block and LA toxicity. Involve family / NOK if not competent.
- Sterile technique including probe cover on US, chlorhex prep to area
- Prepare LA and dilute to 20 – 30mL with saline for volume block
 - max 3mg / kg ropivacaine
 - max 2mg / kg bupivacaine
 - may choose to inject small amount of lignocaine to skin (ie skin wheal), but not necessary. If do use lignocaine, have to factor this in to total LA dose for toxicity calculations.
- Identify anatomy with US
- In plane or out of plane technique with nerve block needle – ensure needle tip visualised at all times.
 - if needle tip lost, hold probe still, manipulate needle gently whilst looking at screen to find needle (can reverse this, with principle being that you only ever move one of the 2 (probe or needle) at a time to re-establish orientation.
 - must not inject if needle tip not seen.
- When needle visualised near nerve, aspirate to ensure not in vessel, then inject local slowly, aspirate every 3-5mL to document no vessel entry, aim for 'donut' of LA around nerve.
- Review possible signs of LA toxicity with patient and ensure nursing staff aware of these and to check patient for them and block effectiveness closely in the next 15 minutes.
- Document procedure.

QUESTION 2 (15 marks)

A 65 year old male presents with severe sudden onset left flank pain. He is pale, sweaty and agitated.

Vital signs: GCS 14
Automated BP 160/145mmHg, palpable brachial pulse (but not radial)
P 130 bpm
RR 27 bpm
Central CR 5 sec

i. List 4 differential diagnoses (4 marks)

- Lumbar back pain
- Epidural abscess with septic shock
- Ruptured AAA
- Aortic dissection with rupture
- Renal colic
- Spontaneous retroperitoneal haemorrhage
- Perforated DU

ii. Why is there discrepancy between palpable pulses and automated BP and what is your action (3 marks)

- The automated oscillometric BP is unreliable in very low BP and will often give extraneous results
- Action: perform manual BP and/or site arterial line at appropriate time

- iii. You suspect a ruptured abdominal aortic aneurysm. List 2 pros and 2 cons for ultrasound and CT imaging (8 marks)

Ultrasound

- Pro: fast, no radiation, bedside, rapidly rule in other diagnoses
- Con: requires training, specificity/sens level not as good as CT, not good for detecting type/extent of AAA or surgical planning in terms of EVAR/open repair

CT

- Pro: high sensitivity/specificity, accurate-extent/type of aneurysm, allows planning for vascular surgeons. Accurate at ruling in/out other diagnoses
- Con: radiation, logistics-potential deterioration in CT scanner, potential for AKI if already severe renal impairment although not critically important. Lag time to images and interpretation/report

SAQ 1 (9 Minutes)
(Total 18 marks)

Candidate name:

Passmark; 12

A 28 yr old female is brought to your emergency department following a collapse in the street. She is pale, diaphoretic and complaining of abdominal pain.

1. List the top three differentials for her presentation. (3 Marks)

Pregnancy related complication- ectopic

Intraabdominal sepsis- appendicitis, pyelonephritis

Gynaecological – ovarian torsion, DUB

2. On review her vital signs are:

GCS 15/15

HR 110

BP 90/60

sats 100% RA

RR 22

She is tender in her left iliac fossa with peritonism.

- List the investigations that should be performed immediately: (3 Marks)

Pregnancy test- bedside on urine/blood
--

X-match

Bedside USS for free intraperitoneal fluid
--

Other lab investigations- FBE, Chem20, VBG
--

3. You perform a bedside USS. List and interpret the main findings shown.

(3 Marks)

Free fluid in Morrisons space (Hypo echoic)

Free fluid in Splenorenal angle (Hypo echoic)

Interpretation:

Intraabdominal free fluid in young female of reproductive age. Likely ectopic pregnancy, confirm with bHCG
--

4. Outline 4 management priorities:

(4 Marks)

Urgent O&G involvement for surgical management
--

Haemostatic resuscitation/large bore iv access
--

Analgesia/symptomatic management

Provision of psychological support to patient/family
--

Anti-D if Rh negative

5. You have been tasked by your director to outline a local guideline for the use of bedside ultrasound in early pregnancy. What inclusion/exclusion criteria will be included.

(3 Marks, 0.5 for each box)

Inclusion	Exclusion
Known IUP	Pregnancy of unknown location
8-14/40 gestation	<6-8/40
HD stable	HD unstable

6. Outline the preferred technique for fetal wellbeing assessment using POCUS in the <14/40 population: (2 Mark)

Fetal heart rate assessment in <14/40:
M mode preferred as PWD likely to cause thermal injury to fetus from heating of tissues

Question 9

What are the biochemical features of a pleural effusion that suggest empyema? (3 marks)

Purulent pleural fluid

1 or more of following:

- + gram stain / culture
- WCC > 50,000
- Pleural fluid glucose <3
- Pleural fluid pH <7.2
- Pleural fluid LDH >1000

You perform a bedside lung ultrasound and in the right lower zone, you obtain the image below

Describe 2 important features of this ultrasound (2 marks)

Effusion

Loculated

Consolidated lung

What is the likely diagnosis? (1 mark)

Empyema

Outline the medical and surgical management for this condition (5 marks)

Supportive:

- Supplemental O2
- Analgesia
- Fluids/nutrition (considering SIADH / catabolism etc)

Specific (Medical):

- IV Abs Broad Spectrum (Piperacillin-Tazobactam or Cefotaxime + Vancomycin if MRSA suspected)
- Large Bore Chest drain (large size) ~20Fr

Specific (Surgical Options):

- Fibrinolytics via chest drain
- VATS – video-assisted thoracoscopic surgery
- Open thoracotomy

QUESTION 11 (16 marks)

- i. In the pre-hospital setting, list 3 advantages and 3 disadvantages of ultrasound in confirming pneumothorax (6 marks)

- Pros: Fast, no radiation, portable, accurate with training (high spec. + sensitivity), potentially avoids unnecessary intervention
- Cons: Requires training, ambient bright light may make interpretation difficult, patient access may be challenging, subcutaneous emphysema may cause artefact

- ii. Write brief notes on the pros and cons of needle decompression vs finger thoracostomy (6 marks)

Needle decompression	Finger thoracostomy
Rapid, can be done whilst patient trapped	Need 360 degree access, not rapid
Temporising only, may be ineffective	Definitive
Landmark accuracy prone to error	Landmarks also prone to error but larger area of safety of insertion
Can cause iatrogenic vascular injury and bleeding	Can be associated with iatrogenic intercostal vessel/nerve injury and bleeding
Lower level of training required to perform	Requires training to perform
Patient doesn't require sedation for procedure	Patient requires at least LA and often some sedation for procedure

iii. List 4 clinical signs or symptoms of a tension pneumothorax (4 marks)

- Hypoxia, hypotension, agitation, dyspnoea, shock, ipsilateral dullness to percussion, ipsilateral decreased air entry, contralateral hyper-expansion appearance
- Tracheal deviation not a reliable localising sign

QUESTION 17 (15 marks) - Contact Person - Dr John Shirley, Reviews by Dr Kenny Yee

i) List three (3) recognised GENERAL uses of POCUS in the assessment of an adult patient in Cardiac Arrest (3 marks)

- CARDIAC - Cardiac Output, and Cardiac Standstill
- CARDIAC - Tamponade
- LUNGS - Tension Pneumothorax
- ABDOMEN - Free Fluid in Abdomen - trauma and AAA
- CHEST - Aortic Dissection
- CARDIAC/LUNGS - DVT, PE

ii) In the following table list eight (8) readily reversible causes of Cardiac Arrest (8 marks)

<u>Hypoglycemia</u>	<u>Tablets or toxins</u>
<u>Hypovolemia</u>	<u>Cardiac tamponade</u>
<u>Hypoxia</u>	<u>Tension pneumothorax</u>
<u>Hydrogen ions (acidosis)</u>	<u>Thrombosis (myocardial</u>
<u>Hyperkalemia or</u>	<u>infarction)</u>
<u>hypokalemia</u>	<u>Thromboembolism</u>
<u>Hypothermia</u>	<u>(pulmonary embolism)</u>

iii) For two (2) of the caused listed in Question (ii), list two (2) sonographic findings you would look for on your POCUS (4 marks)

Cause of Cardiac Arrest	SPECIFIC Sonographic Finding on POCUS exam
Tamponade	RV diastolic collapse, Effusion size
PTx	Sliding, Comet Tails (Absence), Pearl/Bead sign
Trauma / AAA	Free Fluid in FAST locations AAA, rupture
Hypovolaemia	Kissing Ventricle, IVC collapse/size
DVT/PE	Non compressible femoral vein, RV>LV, thrombus seen

QUESTION 21 (11 marks)

Ambulance officers bring a 68 year old man with severe back pain to your ED. He is shocked (BP 80/50mm Hg). Your trainee has performed a bedside ultrasound and obtained this image.

A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 12

i. Describe the image. (2 marks)

- Abdominal aortic aneurysm (AAA) approx 8cm (essential)
- Likely to be a bleed into the wall as well (clotted blood appears bright on US)

ii. List the most likely diagnosis and one differential diagnosis. (2 marks)

- Ruptured AAA is most likely in this patient
- DDx includes all other causes of shock and back pain (eg pyelonephritis with sepsis) with a coincidental, and as yet unruptured, AAA.

The on-call vascular surgical registrar has asked you to continue to resuscitate the patient and get an urgent CT while he organises theatres.

iii. What is the role of CT scanning in this setting? (2 marks)

- This depends on the institution & the established practice of the vascular team.
- In centres where emergency AAA repairs are done by endo-vascular approach a CT scan is essential for planning/sizing of stent (even if some patients die in CT).
- In centres where open laparotomy is the only approach, a CT scan is essentially contraindicated as it delays OT. In this latter setting this should be explained to the vascular registrar +/- his/her boss

iv. List the key steps in your ongoing resuscitation and preparation for theatres (5 marks)

- Prepare for OT: urgent cross match/ platelets/ FFP. (These will be required in OT.) (essential)
- In the meantime, permissive hypotension: keep BP high enough just to perfuse the brain eg 90mm Hg. (essential)
- Analgesia: eg small aliquots of IV morphine (essential)
- Explanation to patient & family

QUESTION 7 (15 marks)

A 62 year old male is brought to ED by ambulance after falling 4 metres from a ladder, sustaining a head injury. Primary survey is unremarkable apart from a significant head injury. There is an obvious swelling to the left side of his face and it is difficult to open his left eye.

Observations are:

HR 100

BP 100/60

SaO₂ 99% RA

RR 16

GCS 6

- i. You elect to undertake an RSI to secure his airway prior to imaging. Complete the table below:

a) List 2 possible sedative drugs and doses you could use to facilitate RSI (4 marks)

- Suggest ketamine and thiopentone most appropriate answer
- Propofol inappropriate as more likely to cause hypotension
- Other answers could be accepted if rationalised

b) List one potential positive and one potential negative aspect of each drug's pharmacodynamics in this patient (4 marks)

Drug	Ketamine	Thiopentone
Dose	Suggest lower end of dose spectrum as drowsy – probably 1mg/kg	3-5mg/kg, suggest lower end
Positive pharmacodynamics specific to head injured patient	Maintains BP which is important in head injury. As even one episode of hypotension associated with worse outcome	Cerebroprotective function Anticonvulsant

Negative pharmacodynamics specific to head injured patient	Some statement re previous concern about possible increased ICP with ketamine. Although good candidates would state that more recent evidence would suggest probably safe (reflecting current common use in retrieval medicine especially)	Significant chance of hypotension especially if inappropriate large dose used May need to use vasopressor post induction eg metaraminol
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- ii. List 4 positive findings from the 2 axial CT images (4 marks)

2 AXIAL IMAGES OF A CT BRAIN ARE SHOWN IN THE PROPS BOOKLET, PAGE 5 & 6

- Large right sided parieto-occipital subdural haematoma
- Significant midline shift with effacement of ventricles
- Left zygomatic fracture, nasal bone fractures, fractures through walls of left maxillary sinus
- Left facial swelling and proptosis, difficult to appreciate from single image but significant retrobulbar haemorrhage

- iii. Neurosurgery review the patient and are keen to take the patient to theatre urgently. A lateral canthotomy is also suggested. List 3 signs in an unconscious patient that would suggest a need for urgent lateral canthotomy (3 marks)

- Raised intra ocular pressure >40mmHg in unconscious patient with retrobulbar haemorrhage (normal pressure is 10-21)
- RAPD
- Dilated pupil in absence of central cause and CT suggesting retrobulbar haematoma
- Normal indications of decreased acuity, significant pain and ophthalmoplegia – not appropriate answers for this question as patient has low GCS

Question 19

1. For the venous blood gas, calculate, showing your workings, the anion gap (2 marks)

$$\begin{aligned}\text{Anion Gap} &= \text{Na} + \text{K} - \text{HCO}_3 - \text{Cl} \\ &= 138 + 6 - 13 - 108 \\ &= 144 - 121 \\ &= 23\end{aligned}$$

Therefore, this is a HIGH Anion Gap Metabolic Acidosis

2. List 3 likely causes of the metabolic derangement in this patient (3 marks)

Lactic acidosis from shock – tissue hypoperfusion and possible sepsis

Uraemia/renal failure – pre-renal acute kidney injury

Other toxic effect of overdose, such as Metformin or salicylates etc (less likely)

3. What is the MOST likely unifying diagnosis in this patient, and what are the supporting features? (4 marks)

Sepsis with multi-organ failure, likely urinary source

Supporting features:

Evidence of multi-organ failure

Deranged LFTs

Haemodynamic compromise

Renal Failure

Thrombocytopenia – likely DIC

Elevated WCC – supports infective process/sepsis

Likely urinary source – lower abdominal pain, renal failure

A single slice of the patient's CT scan is shown. List 1 positive and 2 negative features, relevant to this patient's presentation (3 marks)

Positive Feature

Radio-opaque density in distal ureter at VUJ likely to represent stone – some evidence of dilated ureter proximal to this

Negative features

Aorta normal calibre – unlikely AAA

No evidence free gas or pneumatosis coli – unlikely ischaemic gut/perforation

Must get stone for full marks

Any other reasonable negative feature acceptable

4. List your 3 main management priorities, with justification, for this patient (6 marks)

Likely urosepsis with infected obstructed kidney

1. Fluid resuscitation/inotropic support aim MAP >65 in patient with severe sepsis
2. Broad spectrum ABs – early administration reduces mortality
3. Urgent operative intervention with Urology to insert stent/relieve obstruction – source control

SAQ 9: (9 Minutes)
(Total 18 marks)

Pass mark 12/18

A 60 year old lady presents to ED with generalised abdominal pain. She was about to have dinner when she noticed onset of constant severe pain. This is associated with nausea without vomiting.

She denies any change in bowel motions or complaints of melaena. She has been well of late with no fevers, chills, rigors or sweats. She has no complaints of urinary symptoms. She has a past medical history of paroxysmal atrial fibrillation, insulin dependent diabetes mellitus and chronic obstructive airway disease. On clinical examination, she is generally tender with no evidence of peritonism. Bowel sounds were present and normal.

Her regular medications include:

- Aspirin 100mg PO OD
- Lantus 30 units SC NOCTE
- Novorapid 10 - 15 units SC TDS
- Salbutamol INH PRN
- Salmeterol/Fluticasone INH BD

Her observations are;

Temp	37.3 degrees
BP	160/80 mmHg
Pulse	110 bpm
O2 Sats.	92% RA
RR	22 breaths/min
GCS	15/15

I. **Based on the assessment above, what is the MOST LIKELY diagnosis?**

(1 mark)

- Mesenteric Ischaemia/Bowel Infarct

An initial abdominal XRAY was performed. Refer to prop booklet. (Image A)

II. Based on this XRAY, list 2 relevant positive and negatives.

(2 marks, 0.5 mark each)

- Positives - Dilated small bowel loops, Thickened bowel wall with "Thumbprint sign"
- Negatives - No portal venous gas, No pneumatosis intestinalis, No faecal loading

III. List three (3) other differential diagnoses that should be considered?

(3 marks)

Needs to be relevant to stem

- Ruptured Abdominal Aortic Aneurysm
- Acute bowel obstruction
- Bowel perforation
- Acute appendicitis
- Renal colic
- Biliary colic

IV. List five (5) important aspects to the management of this patient. (5 marks)

- Supportive care - Analgesia, Keep NBM, IV fluids, NG tube insertion
- Antibiotics - appropriate antibiotic choice
- Heparin infusion
- Early surgical input for laparotomy
- Consideration of interventional approaches - Endovascular stenting, Catheter directed thrombolysis, Intra-arterial vasodilators

A CT abdomen has been performed. Refer to prop booklet (Image B)

V. On this axial image, what does the arrow indicate?

(1 mark)

- Pneumatosis intestinalis

VI. List 3 other causes of this CT finding. (3 marks)

- Primary - Benign idiopathic conditions 15% of cases - Submucosal/Subserosal cysts
- Secondary - Infectious enteritis, COPD, Coeliac disease, Leukaemia, AIDs, Amyloidosis, Post-Chemotherapy enteritis, Connective tissue disorders

VII. Apart from the above CT finding, list 3 other findings on assessment which would indicate poor prognosis. (3 marks)

- Presence of bloody diarrhoea
- Lactic acidosis
- Presence of portal venous gas
- Thickened bowel wall on imaging

SAQ 24: (13 marks)

Passmark = 8/13

- 1. Name the significant finding on this CT image and any relevant associated features. (4 marks)**

Displaced Chance type fracture of T12 vertebra

- Ventral displacement of distal vertebral column
- 3 column fracture (ie unstable)
- Likely retropulsion into spinal canal
- S3 fracture

- 2. List 4 clinical features you would expect to find in neurogenic shock. (4 marks)**

Warm peripheries
Hypotensive
Relative bradycardia
Poikilothermia

- 3. List your management priorities for neurogenic shock (5 marks)**

IV fluid resuscitation 20-40 ml/kg of Normal Saline
Early inotropic support with aim of MAP > 85mmHg to ensure adequate organ perfusion Will accept either noradrenaline or adrenaline at 0 – 20 ml/hr
Respiratory support as needed, especially if high C spinal cord injury
Early escalation of surgical decompression of spinal canal within 8 hours of injury (Can also include the definitive surgical management of other traumatic injuries)
Full spinal precautions when managing patient with 30 degrees head up
Other supportive measures 1. Thermal protection 2. Nasogastric tube 3. Urinary catheter 4. Rule out other causes of shock such as hypovolaemia

SAQ 25: (16 Marks)

Passmark = 10/16

- 1. Complete the following table in regards to risk stratification of TIA patients with the ABCD2 score. (7 marks)**

Symptom or Risk Factor	Score Weighting
Age > 60	1
Blood Pressure > 140 / 90	1
Clinical Features 1. Unilateral Weakness 2. Speech impairment without weakness	2 1
Duration of symptoms 3. > 60 minutes 4. 10 – 59 minutes	2 1
Diabetes Mellitus	1

(0.5 marks for each part of answer – symptom & score)

- 2. Name the finding seen on this CT image. (1 mark)**

Left sided dense middle cerebral artery (MCA) sign or hyperdense MCA sign

- 3. List 6 absolute contraindications for thrombolytic therapy for acute stroke. (6 marks)**

1. Uncertainty about time of stroke onset (eg patient awaking from sleep)
2. Coma or severe obtundation with fixed eye deviation and complete hemiplegia
3. Only minor stroke deficit which is rapidly improving
4. Seizures observed or known to have occurred at onset of stroke
5. Hypertension: SBP > 185mmHg or DBP >110mmHg on repeated measures prior to study.
6. Clinical presentation suggestive of subarachnoid haemorrhage even if the CT scan is normal.
7. Presumed septic embolus
8. Patient having received heparin in last 48 hours and has elevated PTT or has a known hereditary or acquired haemorrhagic diathesis (eg PT or APTT greater than normal)
9. INR > 1.5

- 10. Platelet count < 100 000 uL
- 11. Serum glucose < 2.8mmol/L or >22mmol/L

- 4. In 2016 the Australasian College for Emergency Medicine commissioned an independent literature review by researchers from the University of Canberra Health Research Institute. What was the conclusion of this review? (2 marks)**

Current evidence shows that IV thrombolysis with rTPA, particularly within 3 hours of symptom onset, increases the odds of a better functional outcome, but also increases the risk of sICH and early death by ICH.

QUESTION 2 (13 marks)

A 38 year old male patient presents to your urban ED with sudden onset occipital headache and vomiting whilst lifting weights at the gym.

Vital signs GCS 14
 P 100 bpm
 BP 180/70 mmHg
 Temp 36 deg C

i. Interpret the CT images (4 marks)

CT IMAGES ARE SHOWN IN THE PROPS BOOKLET, PAGE 3

- Extensive SAH in the suprasellar cistern (-> prepontine cistern) -> foramen magnum & brainstem
- Left greater than right suprasellar cistern
- Consistent with circle of Willis aneurysm rupture
- Early temporal horn dilatation indicative early hydrocephalus
- Risk / early obstructive hydrocephalus (given temporal horn dilatation or presence of blood around brainstem / FM)

ii. Outline 5 management priorities (5 marks)

- Place in resus/monitoring and 15 min neuro obs
- Analgesia, antiemetic - appropriate
- NBM

- Aggressive BP control – aim < 140 systolic, appropriate agent – hydralazine example
- Head up 30 degree
- Euglycaemia, euthermia
- Discussion with neuro surgical centre
- Liaise with retrieval
- Prepare for intubation

iii. List 4 strategies to minimize abnormalities in intracranial pressure if this patient was intubated (4 marks)

- Head up 30 degrees
- Avoid ETT tube tie - tape instead
- Fentanyl premed prior to intubation
- Normal oxygenation / sodium
- Avoid hypo/hyperventilation
- Mannitol / hypertonic saline
- Thiopentone coma
- Ca channel blockers to avoid vasospasm

SAQ 20 (9 marks)

A 24 year old man with a history of hydrocephalus presents with headache, malaise and fever. He has a ventriculoperitoneal shunt.

Aside from the peritoneal cavity, list 2 other potential sites for the drainage limb of a ventricular shunt (2 marks)

1. Pleural cavity, right atrium, ureter, gall bladder (2 marks)

Apart from infection, list 3 causes of shunt obstruction (3 marks)

1. Prox: tissue debris, choroid plexus, clot, infection, catheter tip migration, localized immune response to tubing
Distal: Kinking/disconnection of tube, pseudocyst formation, infection

What is the most commonly cultured micro-organism in CSF shunt infections? (1 mark)

Staph epidermidis

What is the role of lumbar puncture in a patient with a ventriculoperitoneal shunt? (1 mark)

No role, May be negative in presence of shunt infection.

His CT image is attached. What is the diagnosis (2 marks)

1. Slit ventricle syndrome (2 marks). often presents with waxing and waning symptoms. The CT is often helpful in distinguishing it from other causes of malfunction. Overdrainage and the slit ventricle syndrome are seen in approximately 5% of patients with shunts. Because of overdrainage, the tissues actually occlude the orifices of the proximal shunt apparatus. As intracranial pressure increases, the same occluding tissue is disengaged, which allows drainage to resume. This phenomenon is cyclical and is responsible for the episodic or waxing and waning aspect of the presenting complaint. Patients present with episodes of elevated intracranial pressure caused by a transient obstruction of the ventricular catheter from a collapsed ventricle. Decreased cerebral compliance may prevent the ventricles from fully expanding as intracranial pressure and volume increase, which further contributes to ventricular collapse. The rate of this complication is lower for currently used shunt systems with antisiphon devices and programmable shunt valves

SAQ 27: (9 Minutes)**(Total 18 marks) Passmark 13/18**

A 56-year-old female is brought in to your ED after a generalized tonic-clonic seizure. On your assessment, you note that there is right-sided weakness and history reveals frequent falls and headache in recent months.

She has no significant past medical history and as part of the ED assessment, you have performed a CT brain, which is included in the Props booklet.

The patient is now GCS 15 and complaining of a headache. Her vital signs are as follows:

Temp	37.5C
HR	65
BP	135 / 85
RR	15
O2 Sats	97%

Questions:

1. List 3 pertinent findings on this CT. (3 Marks)

- Large ring enhancing lesion to left frontoparietal hemisphere
- Surrounding vasogenic oedema is evident
- Mild mass effect with a minor degree of midline shift
- Irregular thick margins with hyperattenuation (or heterogenous enhancement of the margin)

2. List 5 differential diagnoses for these radiological findings. (5 Marks)

- Primary malignancy (Glioblastoma Multiforme most likely, others include anaplastic astrocytoma)
- Cerebral metastasis (Lung, Breast,
- Cerebral abscess
- Primary CNS lymphoma
- Cerebral toxoplasmosis
- Cerebral Tuberculosis
- Subacute cerebral infarction
- Tumefactive demyelination

3. List your management priorities in the Emergency Department (5 Marks)

- Analgesia with dose
- Steroid Therapy (Must name drug and dose and route)
Dexamethasone 4-8mg stat then 4mg QID IV
- Consultation with neurosurgery team for admission and further management
- Seizure prophylaxis
Will accept either phenytoin load 15-20mg/kg or leviteracetam 20-30mg/kg
- Social support for patient and family

4. State 5 important aspects to breaking bad news to this patient. (5 marks)

Any of the below

- Appropriate setting: quiet area is desirable
- Ask if she wants any family or NOK present
- Having other support staff present: Senior RN or Social Worker
- Use of a 'Warning Shot'
- Explain findings on the CT and the likely diagnoses in layman terms
- Explain the next step in her treatment will be guided by the neurosurgical team
- Use of silence for news to sink in
- Offer tissue and water
- Social worker to assist with any social issues
- Answer any questions posed by patient and family

Will accept any combination of the above

Pass Mark is 13/18

Q22

1.

Left small VUJ ureteric stone

Mild hydroureter / hydronephrosis

2.

Fat stranding around left kidney

Enlarged left renal pelvis / ureter

Small stone at left VUJ / bladder wall

3.

Investigation	Justification
Urine dipstick or M/C/S	Exclude urinary infection which would require urgent stent
Urea / creat	Exclude significant renal impairment especially in someone with chronic renal failure (as a complication)

4.

Pain well controlled

No urinary infection

Tolerating oral intake

Follow up arranged

(probably also renal function acceptable)

SAQ 7: (15 marks)

Passmark = 9/15

1. What is the diagnosis ? (1 mark)

Type A THORACIC AORTIC DISSECTION – No mark if Type A not specified.
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2. List 5 risk factors for this condition. (5 marks)

Hypertension
Congenital cardiovascular disorders eg Coarctation of aorta
Aortic stenosis
Bicuspid aortic valve
Marfan's syndrome /Ehlers-Danlos syndrome/Turner syndrome
Iatrogenic - recent angioplasty / previous bypass or valve surgery
Arteritis (eg Takayasu's or Giant Cell)
Catecholamine induced Hypertension eg cocaine use

3. List 5 radiological features on a plain CXR that may be seen with this diagnosis. (5 marks)

Widening of superior mediastinum
Dilatation of aortic arch
Obliteration of aortic notch
Double density of the aorta /Double Calcium sign >5mm
Localised prominence along aortic contour

Other

Displacement of NG or ETT to the right

Distortion of left main bronchus

Left apical cap

Pleural effusion

Cardiomegaly

4. List 4 immediate management priorities for this condition. (4 marks)

Analgesia – appropriate drug, dose & route

Urgent referral for Cardiothoracic surgical management of dissection

Control of shear forces

- HR control with titrated IV b-blockers
- BP Control with titrated IV b-blockers, GTN infusion, SNP, Labetolol

Invasive monitoring with arterial line & central line

SAQ 13

Question 1. This is a copy of her 12 lead ECG. Please list two abnormal findings from this image. 2 marks

Sinus tachycardia

RBBB

S1Q3T3 – being poorly specific for PE was not accepted

Question 2. Your provisional diagnosis is pulmonary embolus. Please list two pros and two cons for each of the following tests. 8 marks

Test	Pros	Cons
D dimer	-Readily available -No radiation -possibly good negative predictive value in context of gestalt low pre-test probability- Negative result rule in PE preventing further invasive tests-controversial	-Use with Wells score not validated in pregnancy -“normal range” in late pregnancy unknown -poor positive predictive value and often positive in late pregnancy
Lower limb Doppler US	-No radiation -Good positive predictive value-Positive result rule in PE preventing further invasive tests	-Poor negative predictive value in pregnancy-proximal/pelvic DVTs
VQ scan	-Good negative and positive predictive value- PE rule in and rule out	-Radiation dose-higher dose than new generation CTPA
		-Bladder accumulation of contrast with high foetal radiation dose -poor accuracy in context of background lung disease -indeterminant result forces further testing
CT pulmonary angiogram	-Good negative and positive predictive value- PE rule in and rule out-probably better than VQ scan-could be considered “gold standard”	-Radiation dose- new generation machine lower dose than VQ scan

	-rule in alternative diagnosis ie. other pathology -good accuracy in context of background lung disease	-High active maternal breast tissue radiation dose - Theoretical risk foetal thyroid tissue from iodinated contrast -risk iodine related allergic response
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Question 3. These are copies of two axial slices from her CTPA. Please list one abnormal finding from each of these images. 2 marks

Saddle embolus

Right atrial dilatation

Bilateral consolidation/collapse being non-specific for PE therefore not accepted

