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| FINAL SOE | |
| Category | Clinical Long |

Information given to candidate

You are asked to assess a 70-yr-old man on the ICU who underwent elective liver resection two days ago. Anaesthesia and surgery straightforward. Grade 2a laryngoscopy. Extubated yesterday (Day 1). Epidural infusion running (low dose levobupivacaine and fentanyl). Remained on ICU because required CPAP to maintain SpO₂. Today, he has become hypotensive, and dyspnoeic and complains of chest tightness.

Past Medical History

Pre-operatively, he had shortness of breath on exertion 2ndry to COPD. He also suffers from well- controlled angina, hypertension, intermittent claudication, TIA's *2. He has had a TURP in the past. **Medication** - atorvastatin 40mg, diltiazem, furosemide, aspirin, diclofenac, omeprazole, quinine and a GTN spray (rarely needed). PRN inhaled B agonists converted to nebulizers on ICU

Pre-operative Examination

Ht 1.77M (5ft 10in) **Wt** 70kg **Pulse** 72 bpm regular **BP** 152/90 mmHg. Some basal crepitations bilaterally. Admission investigations (FBC, U&E, clotting) were normal.

On Examination Today

A distressed man who is tachypnoeic (36/min) using CPAP with an FIO₂ of 60%. He has a postoperative PCEA epidural infusion in progress and denies abdominal pain. Block to T4 bilaterally (temp). Pulse 48 bpm, irregular, BP 88/40. On auscultation, he has crepitations throughout his lung fields with some reduced air entry over the right base.

Provided for the candidate are:

1. **Biochemistry** results show marked hypokalaemia and deteriorating renal function
2. **Blood gas** results show increased ΔA-a, hypercarbia and metabolic acidosis with resp compensation
4. **Current ECG** shows atrial fibrillation, slow ventricular response and LBBB
5. **Chest X-Ray** shows collapse and consolidation R base and pulmonary oedema

A) Assessment and Resuscitation

Can you summarize the condition of the patient?

Respiratory failure, probably LVF? 2ndry to an MI and probable chest infection 2ndry to atelectasis, Associated AKI. Hypokalaemia inconsistent with AKI (combination of fluids, furosemide and B-agonists may drive K down).

Check ECG interpretation. New onset LBBB always pathological **What might cause the atrial fibrillation?** (electrolytes, acid/base, fluid shift, MI, infection). **Causes of hypokalaemia?**

Abnormal losses, excessive saline or potassium free solutions, diuretics, insulin, B agonists.

What is the cause of the raised lactate and base deficit? Probably cardiogenic exacerbated by hypoxia

Management? This is an emergency. Help, ABC, Oxygen, respiratory support-consider NIPPV and IPPV. Steer to NIPPV first. May require IPPV but risk profound hypotension/arrest on induction. Should prioritise i.e. AF, cardiac failure, respiratory failure

- Stop/slow epidural temporarily

Correct hypokalaemia: must be via central line iv infusion (rate?)

- Cardiac failure – increase heart rate? May need pacing. Diuretics, GTN, inotropes which?

Cardiology referral

- Severity of hypoxia; how to assess when on oxygen (predicted PaO₂ = 5xFIO₂ in mmHg)

or $0.66 \times \text{FIO}_2$ in kPa [Alveolar air equation]). Indications for intubation and IPPV if no improvement. Consider bronchoscopy, physiotherapy, review antibiotics (which chosen)

- Deteriorating renal function – pre-renal (low CO)

Further investigation? Troponin, cardiac enzymes, Echo

B) Further Management

Patient remains hypotensive and Troponins are raised. Cardiology suggest PCI and pacing in angiography suite.

How common are adverse events during intra-hospital transfers of ICU patients? ~20-50%.

Why are transfers dangerous? Physical, physiological, procedural, monitoring, equipment, power, drugs-maintenance, oxygen, personnel (numbers/training), communication, destination preparedness, special hazards (radiation, equipment, light, remote). [Expect most of these]

How will you prepare for transfer? Address above issues. Should discuss need for ETT intubation (yes)

What particular problems are there in THIS patient re INTUBATION and IPPV? DL previously ok, Expect CVS collapse with iv induction agents (choice ketamine? Dose?) Very low dose, use of opiates/midazolam? Good candidate may suggest awake or sedation only. Must prepare vasopressors.

IPPV may further impair BP (mechanisms?), also metabolic issues- need for increased alveolar ventilation (acidosis)

Patient returns from angio following 3 stents and temporary dual chamber pacing. How might these have helped? Increased CO ($\text{CO} = \text{SV} \times \text{HR}$). Improved coronary flow if BP improves?

Titrate heart rate to CO/O₂ delivery, AV synchrony may increase SV by 20%,

Drug chart shows patient has received regular nebulized salbutamol every 3 hours for 24hrs.

Is this relevant? Possibly caused hypokalaemia/arrhythmia/MI. **What should you do about this?** Discuss with senior- requires careful recording. DATIX. Duty of candour (DoC). What is DoC, when does it apply (significant harm).

This patient likely to require ETT and PPV for 2 days or more. What complications are there

and how can they be reduced? Intubation already discussed- focus on ventilator care bundle; tube size (some newer ETTs available with modified cuffs SSD etc.), cuff management, posture, subglottic secretion drainage and closed suctioning, humidification, reduce circuit/tube changes, sedation holds, avoid barotrauma and volutrauma (protective lung ventilation)

Filler: Why is VAP important (costs, prolonged stay, morbidity, mortality) **How is it diagnosed?**

Multiple criteria, notoriously difficult-combination of clinical, radiological and microbiological. Radiological infiltrates plus two from three of fever, leucocytosis, and purulent secretions, to have a sensitivity of 69% and specificity of 75% for diagnosing VAP.

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Guidance for Examiners

To pass, candidate must recognize severity and likely cardiac failure, describe common problems of transfers, identify CVS risk of iv induction, report adverse event, *familiar with ventilator bundles*

Provided for the candidate are:

1. **Biochemistry**
2. **Blood gas**
4. **Current ECG**
5. **Chest X-Ray**

CURRICULUM MAPPING

TF-IK-multiple. PR_IK_06. CT_IK_06. RC_IK_01 PC_IK_06. PC_IK_17

Biochemistry: Renal & Glucose

| | | | Units | Normal Range |
|------------|-----|--|--------------|---------------------|
| Sodium | 142 | | mmol/l | 136 - 145 |
| Potassium | 2.9 | | mmol/l | 3.6 - 5.4 |
| Chloride | 99 | | mmol/L | 98-106 |
| Urea | 8.4 | | mmol/l | 2.5 - 7.5 |
| Creatinine | 242 | | μmol/l | 58 - 110 |
| Glucose | 5.3 | | mmol/l | 3.0 - 7.7 |

Biochemistry: Arterial Blood Gases

| | | | | |
|---------|-------|--|--------------|---------------------|
| FiO2 | 0.6 | | Temp | 37.8 |
| | | | | |
| | | | Units | Normal Range |
| pH | 7.30 | | | 7.38-7.42 |
| pCO2 | 4.01 | | kPa | 4.7-5.8 |
| pO2 | 14.9 | | kPa | n/a |
| St. Bic | 16 | | mmol | 22-26 |
| BE | -8.00 | | mmol | -2.0-2.0 |
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