QUIZ 28th November 2018 (answers below)

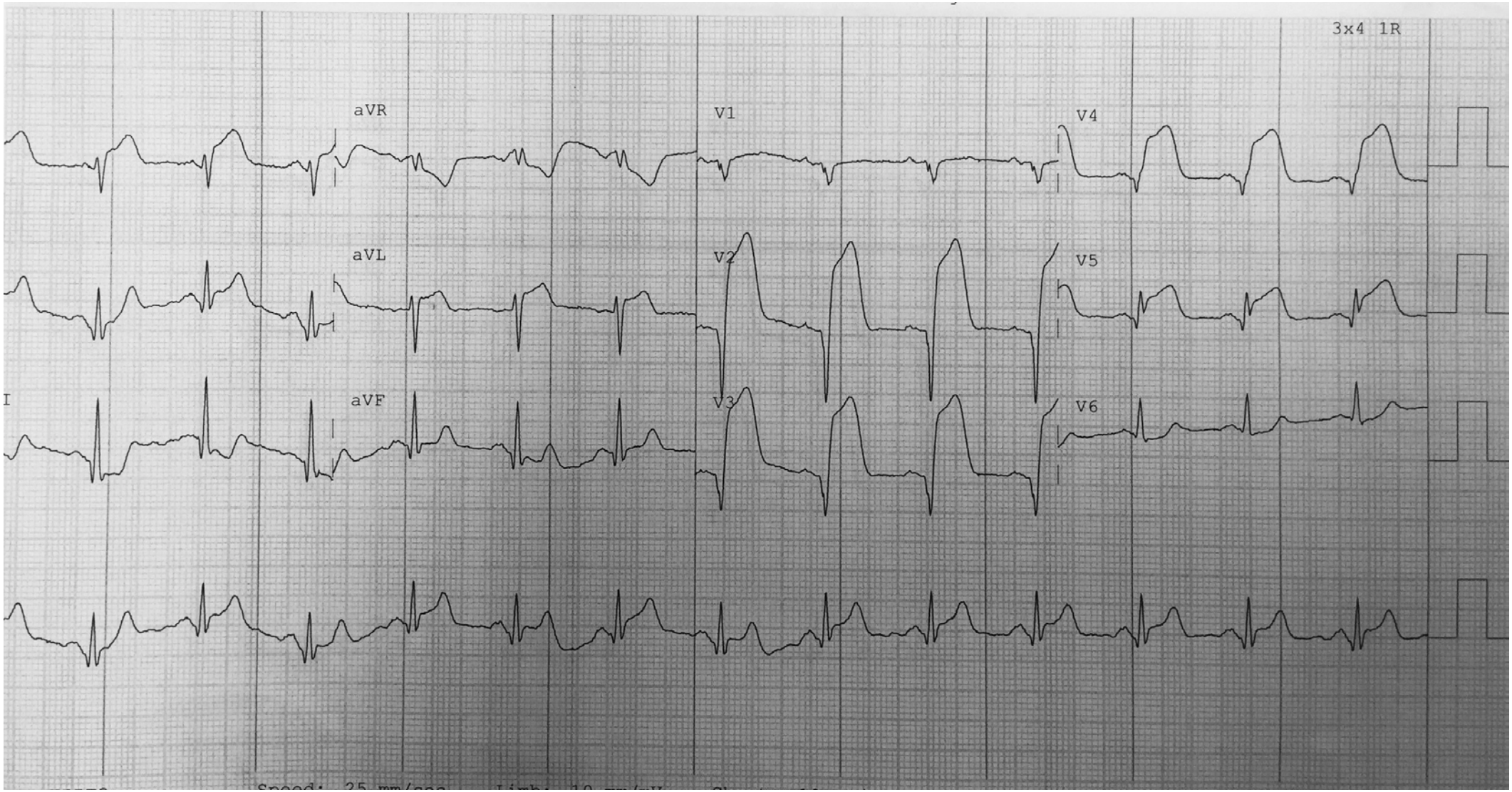
1. **Describe what is SIMV PS mode on the Oxylog 3000.**

2. **What is the significance of the I:E ratio on the Oxylog 3000.**

3. **What actions do you take when the Oxylog alarms with "!!!Paw high"?**

4. **What is the role of the synchronize button on the defibrillator?**

5. **Describe and interpret the following ECG.**


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

QUIZ answers 28th November 2018

1. **Describe what is SIMV PS mode on the Oxylog 3000.**

SIMV PS (Synchronised Intermittent Mandatory Ventilation with Pressure Support) is the preferred mode of ventilation in SVH ED and should be the default mode.

SIMV PS is a volume controlled mode of ventilation. It differs from CMV (Controlled Mandatory Ventilation) in that it coordinates with the patient's own breathing efforts; i.e. it is synchronised. The mandated minute volume (Vt x freq) is selected, but there is a small window around the timing of these breaths, where it can be delivered in time with the patient's effort.

In all modes there is a selected maximal airway pressure that can't be exceeded. In volume control modes, the full volume is not delivered if the pressure reaches the maximum pressure selected. This results in lower tidal volume delivered than what has been selected.

In all modes there is the option of selecting an amount of PEEP (positive end expiratory pressure).

In SIMV PS there is also the opportunity for the patient to take spontaneous breaths in addition to the synchronised mandated volume controlled breaths. These spontaneous breaths are supported with a selected pressure, i.e. pressure support. Pressure support is only applied to spontaneous breaths. These spontaneous breaths are in addition to the volume selected mandated breaths.

2. **What is the significance of the I:E ratio on the Oxylog 3000.**

The I:E ratio is determined by the selected respiratory rate and the selected inspiratory time. Normal spontaneous breathing at rest has an I:E ratio of about 1:2. During exertion the ratio decreases to around 1:1.

The Oxylog 3000 has a default inspiratory time of 2 seconds. As the respiratory rate is adjusted, the calculated I:E ratio is seen on the screen. If the respiratory rate is adjusted to extremes such that the I:E ratio reaches extremes, the ventilator will alarm, and the inspiratory time will need to be adjusted to accommodate the extremes of respiratory rate. This is not an issue for usual physiological respiratory rates.

If selected settings make the I:E ratio grossly different to normal, such as 3:1 or 1:6 , it is uncomfortable and the patient will need to be deeply sedated to tolerate it.

It is not the ratio itself that has an effect; the ratio is simply the combined result of selecting a respiratory rate and inspiratory time. These parameters should be selected by answering the following questions:

1. *What does the pCO_2 level need to be?*
    - *If an appropriate Vt has been chosen, the only way to adjust the pCO_2 is by changing the respiratory rate*

2. *How much time does the patient need to breath in?*
    - *The default setting is 2 seconds*
    - *To deliver a selected volume, the time required can be seen on the ventilator by looking at the flow screen – when the flow reaches zero at the end of inspiration, the volume has been delivered. If the flow has not reached zero at the end of this time, the time is insufficient or the chosen Vt is too large.*
    - *In ARDS or other lung pathology, more time may be required to take the full Vt. A longer inspiratory time time can also have the benefit of a decrease in peak airway pressures.*

3. *How much time does the patient need to breath out?*
    - *This is really only relevant in obstructive lung disease (asthma, COPD) where a very long time may be required to exhale.*
    - *In order to accommodate a long expiratory time, the respiratory rate will need to be reduced, resulting in hypercapnia (aka permissive hypercapnia)*
    - *Looking on the flow screen shows when exhalation has finished as the flow reaches zero at the end of expiration. If flow doesn't reach zero before the next inspiration, breath stacking is can occur.*

3. What actions do you take when the Oxylog alarms with "!!!Paw high"?

Whenever the ventilator alarms, we need to look at the patient. If there is any compromise to the patient, such as desaturation or not ventilating, then they should be disconnected from the ventilator and bagged by hand until the problem is sorted out.

"!!!Paw high" means that the selected maximum airway pressure (Pmax) has been reached. The ventilator will not be able to go above this level and so the selected Vt may not be delivered in full. High airway pressure can be the result of a problem with the patient, the tubing and/or the ventilator.

Patient issues
- *Coughing or awake and breathing against the ventilator*
- *Progression of lung pathology – bronchoconstriction, ARDS*
- *External compression such as pneumothorax*
- *Increased secretions*
- *Position – supine with large abdomen pressing up against diaphragm*

Tubing issues
- *Malpositioned tube*
- *Kinked tube*

Ventilator issues

- *Settings may be too ambitious (eg. large Vt to be delivered too fast or frequently)*
- *P Max may be set too low for the clinical situation (eg. lung pathology)*

4. What is the role of the synchronize button on the defibrillator?

The synchronise button should be on for every cardioversion, that is, for any patient who has a pulse. This is to avoid converting the rhythm to ventricular fibrillation, which unfortunately doesn't produce a pulse.

When the synchronise button is pressed, it lights up and pointers appear on the monitor screen above each of the complexes. The defibrillator is sensing the patient's QRS so that it doesn't deliver the shock on the repolarisation phase. During repolarisation, some of the myocardium is refractory and some is not. A shock at this point can reset some myocytes and not others, resulting in a chaotic rhythm otherwise known as ventricular fibrillation.

SVH defibrillators do not remain synchronised once the shock is delivered. If a further shock is needed, the synchronise button needs to be pressed once more.

5. Describe and interpret the following ECG.

Rhythm	*Regular 90/min*
P waves	*Upright in II so likely sinus in origin*
	Wide (0.12sec) in lead II
PR interval	*Normal (0.16sec)*
QRS	*Narrow (0.10sec)*
	Right axis 120 degrees
	Pathological q waves V1-4 and inferiorly II, III, aVF
ST segment	*Elevation*
	15mm ST elevation V2-3
	7mm ST elevation V4
	4mm ST elevation V5
	3mm ST elevation I and aVL
	Depression
	1mm ST depression aVR
	2mmST depression III
T waves	*Large V2-5*
QTc	*441 msec (normal)*

➔ *Large anteroseptal and high lateral AMI*

This ECG belongs to a 43 year old man at 3am. Cardiac catheterisation revealed complete mid vessel occlusion of a "wrap around" LAD. Revascularisation and stenting were successful.