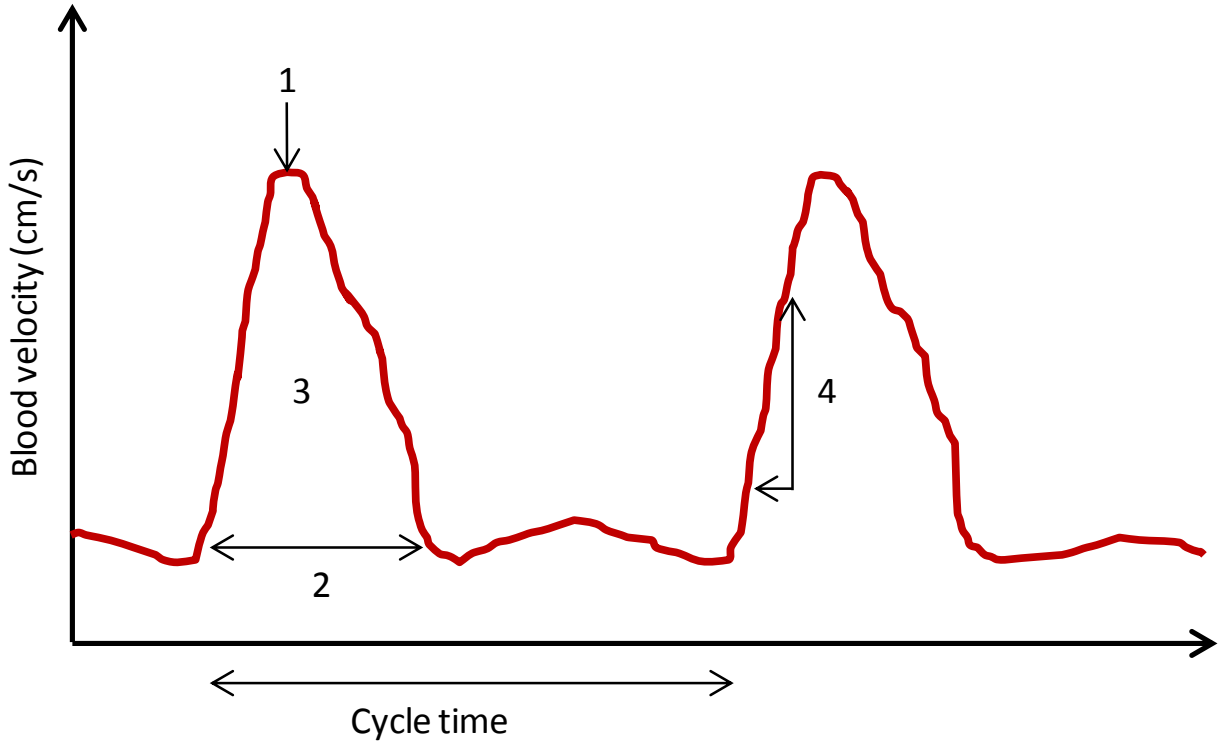
Syllabus	PC_IK_11
Topic	Oesophageal doppler

You have opted to use an oesophageal doppler in a patient undergoing an emergency laparotomy for small bowel obstruction.

a)

Label the diagram of an oesophageal doppler trace below (4 marks)



1. .....
2. .....
3. Area under the curve: .....
4. Gradient: .....

b)

How do you insert an oesophageal doppler? (4 marks)

.....

.....

.....

c)

Define the following terms (8 marks)

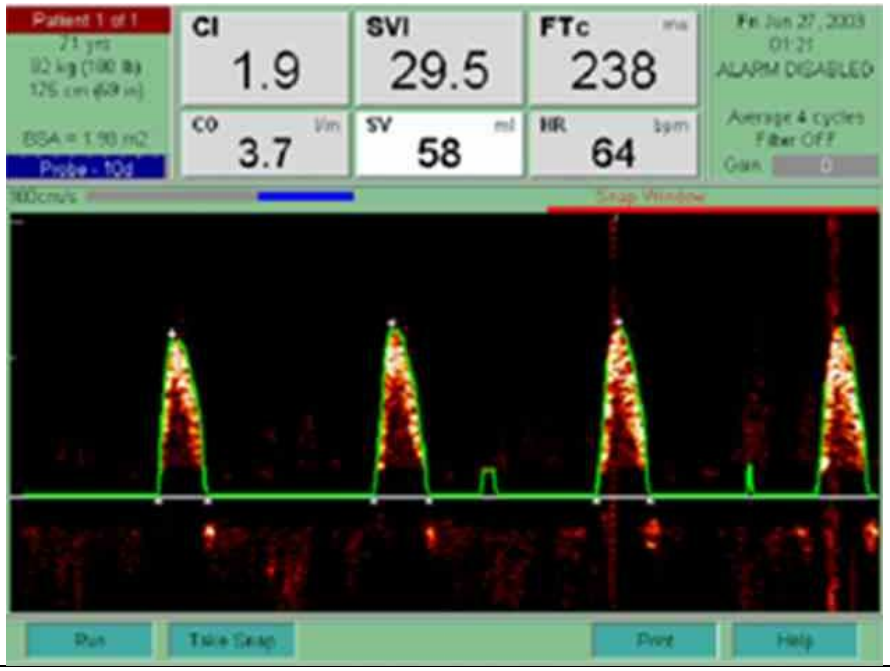
Term	Definition
Peak velocity	....
Cardiac output	....
Stroke volume	....
Flow time corrected (FTc)	....

d)

List 2 circumstances that may cause the doppler probe to give inaccurate readings, even if the probe is positioned appropriately? (2 marks)

1. .....
2. .....

This an intraoperative screenshot for the patient



e)

What is the likely cause for this waveform? (1 mark)

.....

.....

f)

What would your immediate management be? (1 mark)

.....

.....

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Q	Answer	Mark	Guidance
a)	1. Peak Velocity 2. Gradient/Mean acceleration 3. Stroke distance 4. Flow time	4	
b)	• Oral or nasal route • Lubricate with aqueous gel - prevents signal disturbance • Descending aorta ~35-40cm from mouth adjacent to oesophagus • When at appropriate depth rotate bevel so it faces posterior towards aorta • Manipulate probe to achieve best signal	4	• Oral: 35-40 cm • Nasal: 40-45 cm Roughly level of T5 / T6
c)	<u>Peak velocity:</u> • The peak velocity of blood in the aorta gives a good estimate of the contractility of the myocardium <u>Cardiac output:</u> • The cardiac output is calculated from the stroke volume multiplied by the heart rate <u>Stroke volume:</u> • Stroke distance is the area under the velocity-time waveform. When multiplied by the aortic diameter, this gives a good estimate of the stroke volume <u>Flow time corrected (FTc):</u> The flow time is the duration of forward flow of blood in the aorta i.e. it is the width of the base of the velocity-time waveform. The flow time varies with heart rate. To compensate for this, the flow time is corrected to a heart rate of 60 beats per minute (bpm) by dividing the flow time by the square root of the cardiac cycle time (analogous to correcting the QT interval in electrocardiogram [ECG] interpretation)	2 marks for each term (Max. 8 marks)	Stroke Volume - Due to slight beat-to-beat variability in stroke volume, the reading is usually averaged over several beats. The number of beats used for this calculation is the *cycle length*. A cycle length of five beats is usual, but can be increased to improve the accuracy of stroke volume estimation when there is marked beat-to-beat variability, for example, atrial fibrillation or other arrhythmias

d)	• Coarctaton of aorta • Thoracic aortic aneurysm • Presence of intrathecal/epidural anaesthethic	2	• Thoracic aortic aneurysm - especially during cross clamping • Neuraxial – causes lower limb vasodilatation
e)	• Hypovolaemia • Hypothermia	Any 1	• Note the small stroke volume and reduced FTc. • A similar waveform may also be seen in patients with hypothermia or in those on vasopressors. Hypovolaemia is only proved if there is a response to a fluid challenge
f)	• Give fluid bolus • Check/start warming devices	Any 1	

References:

1) Drummond KE, Murphy E. Minimally invasive cardiac output monitors. (2012) CEACCP 12(1)5-10 https://bjaed.org/article/S1743-1816(17)30182-8/pdf

2) E-Learning for Health module: Anaesthesia e-LA > eLibrary > CEACCP/BJA Education 2001 – 2019 > e-LA eLibrary – CEACCP 2012 > CEACCP Feb 12

3) Aston D, Rivers A, Dharmadasa. Equipment in anaesthesia and critical care (2013)